



Department for Employment and Learning

Forecasting Future Skill Needs in Northern Ireland

Final Report

April 2009

Oxford Economics in association with FGS Consulting

Oxford Economics
Lagan House
Sackville Street
Lisburn
BT27 4AB
UK

☎: 44 2892 660669

📠: 44 2892 670895

Contents

EXECUTIVE SUMMARY	1
PART 1: KEY FINDINGS	1
PART 2: CONCLUSIONS AND POLICY REMARKS	XVII
1 INTRODUCTION	1
1.1 BACKGROUND AND RATIONALE	1
1.2 ECONOMIC VISION AND POLICY CONTEXT	2
1.3 APPROACH	3
1.4 REPORT STRUCTURE	4
2 ECONOMIC BACKDROP	5
2.1 CHAPTER OVERVIEW	5
2.2 ECONOMIC UNCERTAINTIES	5
2.3 GLOBAL CONTEXT	6
2.4 UK AND ROI CONTEXT	8
2.5 NI CONTEXT ... END OF 'GOLDEN ERA'	13
3 SKILLS IN CONTEXT	16
3.1 CHAPTER OVERVIEW	16
3.2 RECENT TRENDS IN NI WORKFORCE SKILLS	16
3.3 WHERE IS NI TODAY - COMPARISON WITH GB REGIONS AND ROI	18
3.4 WHERE COULD NI BE?	27
4 TOMORROW'S ECONOMY	29
4.1 CHAPTER OVERVIEW	29
4.2 BASELINE OUTLOOK	29
4.3 ESTABLISHING AN ASPIRATIONAL SCENARIO	33
4.4 ASPIRATIONAL OUTLOOK	34
5 SKILLS FOR TOMORROW'S ECONOMY	37
5.1 CHAPTER OVERVIEWS	37
5.2 GROSS AND NET REPLACEMENT DEMAND	39
5.3 WHAT DOES THE BASELINE SUGGEST FOR LEAVERS FROM EDUCATION AND MIGRANT INFLOWS?	44
5.4 FUTURE SKILL NEEDS (BASELINE)	45
5.5 THE DEGREE SUBJECT DIMENSION (BASELINE)	48
5.6 ASPIRATIONAL OUTLOOK	52
6 CONCLUSIONS AND POLICY REMARKS	56
ANNEX A: PRIORITY SECTOR FUTURE SKILL NEEDS	60
FINANCIAL / PROFESSIONAL EXPORTING SERVICES	61
ICT	66
HI-TECH MANUFACTURING & LIFE SCIENCES	71
ANNEX B: NI SKILLS IN CONTEXT – ADDITIONAL ANALYSIS	76
ANNEX C: SKILLS FORECASTING METHODOLOGY AND ASSUMPTIONS	91
SECTORAL AND OCCUPATION EMPLOYMENT FORECASTS – DEMAND-BASED MODELLING	91
REPLACEMENT DEMAND	93
SKILL REQUIREMENTS	97
DEGREE SUBJECT DEMAND	99
CAVEATS	113
ANNEX D: NATIONAL QUALIFICATION FRAMEWORK (NQF), JACS HIGHER EDUCATION DEGREE SUBJECT CLASSIFICATION AND STEM DEFINITION	115

ANNEX E: BASELINE SCENARIO FORECASTS	128
ANNEX F: ASPIRATIONAL SCENARIO FORECASTS	141
ANNEX G: FLOWS FROM NI EDUCATION INTO EMPLOYMENT	158
ANNEX H: EVIDENCE FROM CONSULTATIONS AND SECTOR SKILL COUNCILS	160

Acknowledgements

Oxford Economics would like to acknowledge the contributions provided by a number of individuals and organisations throughout the research process. We are particularly thankful to statisticians from DEL and DETI (Martin Monaghan and Joanne Henderson); Laurence Downey (SSDA Manager); Sector Skill Councils and Invest NI sector representatives who responded to a series of future skill need survey questions designed by Oxford Economics; and finally attendees from the Stakeholder Conference.

We also wish to thank the project steering group, which comprised members of DEL, DETI and DFP, for their guidance, advice and comments throughout the research and drafting of this report.

Classification, definitions and caveats

NQF classification and terminology: In this report future skill needs are classified in terms of formal NQF highest qualifications. Forecasts by NVQ level are also available but are not presented in the report to avoid clutter and confusion. Rather than present future skill needs at each of the 8 NQF levels, a specific aggregation and terminology was agreed with DEL and is used throughout the report. Details of the aggregation, terminology and classification of individual LFS qualification categories into the NQF framework are provided in the main report and in Annex D.

STEM definition: See Annex D

Skills forecasting methodology caveats: See Annex C

Executive summary

The executive summary is split into two parts:

- Part 1 – Key findings: A comprehensive overview of the main findings from the research
- Part 2 – Conclusions and policy remarks: A brief outline of conclusions and policy remarks to inform the review of DEL's 'Success Through Skills' strategy

Part 1: Key findings

Importance of skills

"Our aim is to ensure our people have the right skills to deliver economic prosperity now and in the future" Programme for Government

- There is widespread consensus on the value of higher skills both to the individual and to the economy as a whole. Across the UK, regions such as London, with a higher share of private sector graduates in total employment, tend to have higher productivity. In NI, as in other regions and economies, wages are positively correlated with a person's highest level of qualification and better skilled working age persons are more likely to be employed and less likely to be unemployed or economically inactive. **Productivity, wage levels and employment are all part of the NI Government's published economic goals; therefore skills should be an intrinsic part of achieving these goals.**

Box E.1: Importance of skills

- Higher skills are associated with higher productivity, higher wage levels and higher employment rates
- As each of these are part of the NI Government's published economic goals, skills should be an intrinsic part of achieving these goals

Skills classification and terminology

Note in this report future skill needs are expressed in terms of formal NQF highest qualifications – some of the levels are combined and categorised as follows (this is only a high level summary). The classification below is used consistently throughout the report.

Table E.1: Skills classification and terminology

NQF	Description	Terminology
8	Doctorate	Postgraduate
7	Masters, postgraduate certificate and diploma	
6	Honours degree	First degree and sub-degree
5	Sub-degree including foundation degrees	
4	Certificates of higher education	
3	NVQ Level 3 A-Levels	Intermediate a
2	NVQ Level 2 GCSE grades A*-C	Intermediate b
1	NVQ Level 1 GCSE grades D-G	Low
Entry	Entry level certificate in adult literacy	
	Other qualifications No qualifications	

Skills in context

NI skill strengths

- Given that skills are intrinsic to Government's economic goals, it has been a positive development that **skills levels in the NI workforce have been improving steadily over the last decade** with the per cent of the workforce with sub-degree, degree and postgraduate qualifications (NQF 4-8) increasing from just over 20 per cent to almost 30 per cent. This is explained by a combination of:
 - the *sectoral shift* in the economy away from more traditional lower skilled (in formal qualification terms) activities such as agriculture and textile manufacturing towards more skills hungry activities in the service sector and higher value added elements of manufacturing;
 - a *generational effect* of older less qualified workers leaving the labour force, coupled with inflows of more qualified young people. It is worth remembering that NI has one of the best school systems in the UK in terms of leaver qualifications although large numbers still choose to leave to GB higher education institutions and remain working there following graduation;
 - up-skilling* of the workforce with persons completing part time or evening courses; and
 - these are important factors to consider when thinking of the change in future stock of workforce skills.
- The steady improvement in workforce skills has helped to **place the Northern Ireland economy 'within the pack' of UK regions** in terms of graduate concentrations. With approximately 30 per cent of persons employed qualified to sub-degree, degree and postgraduate level, this is on par with the Eastern region and above the Welsh and industrial Midland regions, but below ROI, London and leading international economies such as the US and Finland.

- Across the economy **most of the private service sectors have a broadly comparable concentration of graduates in NI compared to the UK average**, even in the key export potential sectors of financial and business services. **Of course the potential for graduates to work in a sector, for example a call centre, and not require the level of qualification possessed is a possibility.** There is part evidence of this from NI's observed private service productivity gaps (though new Regional Accounts GVA has changed the size of these gaps) and evidence from the 'NI Skills At Work' report (2006) of 'over-qualification'. According to the latter, while 'over-qualification' is less of an issue in Northern Ireland than in other parts of the UK, even in NI a third of workers are in possession of a qualification which is higher than the qualification required for the job they currently occupy. At the same time according to the NI Skills Monitoring Survey, in 2005 roughly 1 in 10 employers considered there to be a skill gap in their workforce (which refers to existing employees), with skill gaps most prevalent in financial services, health & social care and other services. In other words across and within sectors there is evidence of skill mis-matches with instances of both over and under-qualification.

Box E.2: NI skill strengths

- Workforce skill levels have been improving steadily over the last decade
- NI is 'within the pack' of UK regions for higher level workforce qualifications
- Most of the private service sectors have a broadly comparable concentration of graduates in NI compared to the UK average (though there is some potential for over-qualification)

NI skill weaknesses

- As much as this report reveals notable skill strengths of the NI economy, a number of other weaknesses are identified.
- Outside private services, **graduate concentrations in agriculture, manufacturing, construction, retail and hotels & restaurants lag between 10 and 60 per cent behind the UK average.**
- NI also has a relative **under-representation of managerial and professional occupations.** This is likely a reflection of the limited 'upper-end' activities located in the region (reflected in the small number of NI PLCs and the 'small nature' structure of the economy). Many of NI's industrial and indeed professional services activities are not at the high end headquarter or design and strategy end of the spectrum and thus demand for managerial and professional occupations is lower. For the key export / potential high export sectors of manufacturing and business services, the managerial and professional gap is very evident, even compared to NI's 'near neighbours' in prosperity terms - Wales and the North East.

- In terms of workforce degree subjects, there appears to be **limited subject specialisation within NI**, with a higher concentration of general subjects (business & administration and combined degrees) and much less specialism across elements of STEM, creative arts & design and arts subjects¹. This pattern holds when measuring the number of degree holders by subject per 10,000 working age in addition to the share of overall degree holders in employment. It is of note that London, the most productive region of the UK, has the highest concentration of creative arts & design and arts graduates in employment, whereas NI has the least (this is likely to be in subjects such as graphic & multimedia design, film production and writing etc). Similarly the South East and Eastern, the next two most productive regions, have the highest concentration of elements of STEM graduates in work (physical sciences, mathematical sciences, engineering & technology etc) – again NI trails in last place for this narrow definition of STEM graduates (NI's workforce STEM degree ranking is better when medical degrees are included for which NI appears to have an above average concentration of degree qualified persons). Drilling down to key export sectors, both manufacturing and business services in NI appear to be lacking in these same key subject areas with the more generalist business and administration subject mix more prevalent.

Box E.3: NI skill weaknesses

- Graduate concentrations in agriculture, manufacturing, construction, retail and hotels & restaurants lag well behind the UK average (more likely a demand rather than supply issue)
- Under-representation of managerial and professional occupations
- Limited higher education subject specialisation / greater prevalence of general degrees

Where could NI be?

- Against this backdrop, the report explored **what the NI economy would look like if it had equivalent UK skill, occupation and degree subject concentrations within sectors (but assuming the existing sectoral composition)**. Note **this should not be interpreted directly as what NI could achieve or what should be targeted in an aspirational scenario**. This is because it would be incredibly challenging for NI to 'mimic' the skills, occupation and subject structure of leading regions and attract or create locally this number of jobs which would genuinely require the estimated extra graduates, managers & professionals and STEM degree holders. Many of these types of jobs in the UK requiring high-level managers, STEM subjects etc, will typically locate in the Greater South East. In any case PSA targets do not require NI to converge further with the UK. Rather the headline figures below are largely illustrative to identify the scale of NI's difference with UK averages².

Box E.4: Where could NI be if it had equivalent UK concentrations within sectors?

- 12,000 more persons in employment with sub-degree, degree and postgraduate qualifications
- 30,000 more managers and 20,000 more professionals
- 4,000 more STEM degree holders in work (based on a narrow STEM definition – physical sciences, mathematical & computer sciences and engineering & technology)
- 7,000 more creative and arts degree holders in the workforce

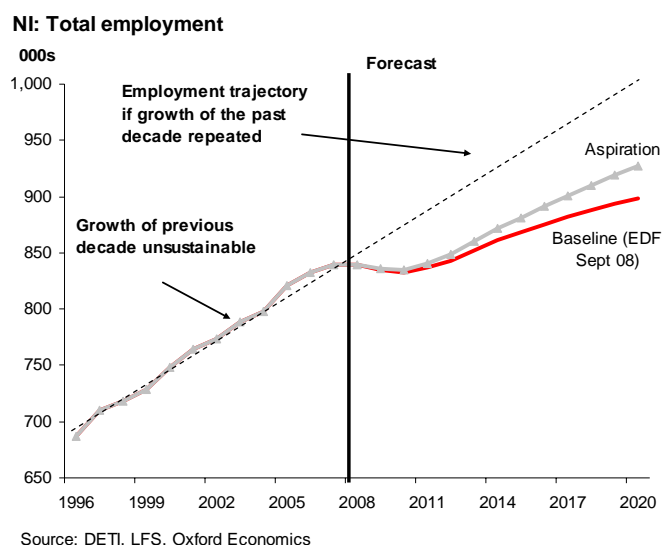
¹ Arts subjects include Linguistics, Languages, Literature, History and Philosophy

² Note it would be worthwhile developing this analysis further to consider where NI could be assuming equivalent UK excluding Greater South East concentrations – this was beyond the scope of this research

What does tomorrow's economy hold in store?

- Up until the recent spike in oil prices, correction in house prices and full unravelling of the credit crunch, **the global, national and NI economies enjoyed an unprecedented 'golden era' over the last decade** in terms of rising output and employment, falling unemployment and increasing wealth and consumer spending. Upon more critical reflection, it is clear now that an element **of this growth was debt-led, and unsustainable in the long-term**, as saving ratios fell to historically low levels and house prices are now clearly recognised as having been over-valued.

Fig E.1: NI total employment forecast (job-based)



- Between 1996 and 2008 the NI economy created 13,000 net new jobs per annum³ (Fig E.1), making it the fastest growing region in the UK in employment terms, albeit starting from a lower employment rate base. It is worth noting however that **structural economic weaknesses have persisted and in some cases worsened**. NI's employment rate is still a long way from converging to the UK rate (the unemployment rate is similar but inactivity much higher), relative GVA per head has barely shifted from being 20 per cent less than the UK average and relative productivity compared to the UK has fallen by almost 10 per cent⁴.
- The replacement demand⁵ analysis in this report has showed that up until approximately 2004, job vacancies arising from high levels of expansion demand in the economy (the growing stock of total employment) and vacancies due to persons exiting employment (retirement, out migration etc), have been largely met by (1) joiners from unemployment (the stock of unemployed was almost 100,000 in the mid 1990s⁶ so there was sufficient 'slack' in the labour market) and (2) leavers from the education system⁷.

³ Job-based measure

⁴ This is based on Regional Accounts GVA at the time of Oxford Economics' submission to EDF in September 2008 and not the latest figures published in December 2008, which indicate a recent improvement in NI's relative productivity compared to the UK excluding the Greater South East

⁵ Gross replacement demand is the demand to fill vacancies created by people leaving employment for a variety of reasons. Net replacement demand adjusts for joiners to employment from unemployment, inactivity excluding full-time students and other occupations

⁶ Claimant count

- However as (a) the stock of unemployment could not fall indefinitely (NI up until the downturn was not a long way from full employment); (b) the incentives to join employment from inactivity remained low (with rising living costs, especially housing, the financial trade off between work and benefits was marginal); and (c) the rate of expansion demand picked up (+20,000 net new jobs in 2005), the only way the NI economy could meet its labour demand was via a sharp increase in migration inflows. Fortunately this coincided with Eastern European accession to the EU⁸.
- **One of the strengths therefore of the replacement demand and skills forecasting model developed for this research is that it predicted the demand for migrant in-flows and broadly in the same magnitude as recorded by official NISRA statistics.**
- **The current economic environment is of course very different to the previous ‘golden era’ decade and could hardly be more challenging.** There are considerable unknowns with respect to how this current economic crisis will play out, which matters for the future demand outlook, not least the:
 - uncertainties attached to the range of policy measures implemented, most importantly the fiscal and monetary actions by the Treasury and Bank of England, including the cut in interest rates;
 - when bank lending will return to normal levels;
 - whether the economy will face a long period of deflation and what the impact of this might be; and
 - to what extent consumers will retract and re-build saving ratios.
- The short-term economic problems and uncertainties will undoubtedly change markedly the level of demand for skills in the next 2-3 years from what the economy has been used to (and possibly the mix of skill demand as well). In addition the flow / supply of skills may change markedly, for example greater replacement of older expensive workers with younger cheaper resources, migrants competing with the indigenous non-employed, older workers staying in employment for longer etc.
- All of these questions exist as a challenging ‘backdrop’ against which the research findings of this report need to be considered. Though the longer-term outlook remains positive, a return to the previous decade of growth is not projected for NI (or indeed most other developed economies). **The central baseline forecast for the NI economy between 2008 and 2020 is of approximately 5,000 net new jobs pa.** This may not be the outcome NI aspires to but the reality is the decade ahead will be more challenging than ever and as the analysis in the main report shows, the possibility of an over-supply of labour and rising unemployment in the first half of the next decade cannot be discounted, especially as economic growth forecasts continue to be revised downwards.

⁷ Annex G in the main report shows that with a current school leaver age cohort of roughly 25,000, roughly 17,000-20,000 pa enter employment in NI. The remainder leave NI for higher and further education elsewhere and a smaller number go straight to unemployment / inactivity (NEETs – Not In Education, Employment of Training).

⁸ An interesting question around this is the extent to which employment growth at the time of accession was a demand or supply issue. It could well be that the availability of low cost migrant workers helped to prop up or grow faster sectors of the economy that otherwise in the past might have shed jobs for reasons of cost competitiveness or lack of available local labour

- In saying this, the research actually shows that **net employment growth of 5,000 pa is a more sustainable level for the NI economy** given projected numbers of leavers and joiners and assuming similar annual entrants from the education system as in the past (which could actually fall as the school leaver age cohort decreases, which is a legacy of falling birth rates, though rising wealth and migration have recently been helping to reverse this trend). Any higher employment growth than 5,000 net pa and the NI economy could struggle to attract the migrant inflows required, especially as the weak value of Sterling erodes the Euro value of expatriated migrant earnings (making Sterling economies a less attractive migrant destination) and UK migration policy tightens with the introduction of a points-based system.
- Therefore under this 5,000 pa net jobs central baseline forecast, the NI economy should in the long-term fully absorb leavers from education and still have a requirement for moderate migration inflows (4,000 pa in-migration requirement in the baseline and 7,000 pa in the aspirational scenario – to put this in context international working age in-migration in 2007 was approximately 18,000, before even counting domestic migration inflows). Note again from above that other changes in supply patterns could influence resident migrant demand and demand for school leavers such as workers retiring later or a greater inflow from the inactive.
- As is shown later under future skill needs, **the weaker economic outlook relative to the past does not however necessarily ‘read across’ to mean a drop in demand for higher level skills**. Indeed quite the opposite. The economy is still predicted to undergo a transformation towards more skills hungry sectors and occupations. Additionally in order to produce internationally competitive products and services, a higher skills base will be required than in the past when the debt-led boom and economic catch-up in NI generated rapid job growth, particularly in retail and construction. In future therefore the NI economy will have to rely more on exports as a source of demand rather than consumers and government.

Box E.5: Tomorrow's economy (EDF September 2008)

- The previous decade was a 'golden era' for the NI economy with 13,000 net new jobs created on average pa.
 - The short-term economic environment today however could hardly be more challenging.
 - The central baseline employment forecast for the NI economy between 2008 and 2020 is lower at 5,000 net new jobs pa with net jobs losses predicted in the short-run (note a number of uncertainties still surround the base outlook and latest forecasts predict slower growth).
 - However net employment growth of 5,000 pa, according to Oxford Economics' model, is a more sustainable level of employment growth for the NI economy given projected numbers of leavers from and joiners to employment and assuming similar annual entrants from the education system as in the past.
 - With this growth, the NI economy should, in the long-term, fully absorb leavers from education and still have a requirement for moderate and more sustainable in-migration flows, despite overall slower employment growth (one of the key reasons is that the number of joiners from unemployment will be lower than the past decade).
 - In addition the weaker short-term outlook does not necessarily 'read across' to mean a drop in demand for higher level skills. The economy is still predicted to undergo a transformation towards more skills hungry exporting sectors and occupations. A higher skills base will be required compared to the past (1) when the debt-led boom and economic catch-up in NI generated rapid job growth in lower skill sectors, particularly in retail and construction, and (2) to ensure NI remains internationally competitive as other economies strive to improve their skills offering.
-
- This research also considered the skill needs of a **more aspirational outcome for the NI economy**. Described in more detail in the main report, the aspiration is the employment and occupation trajectory the NI economy would need to follow to meet the PSA 1 private sector productivity target by 2015, given (1) **the unique characteristics and competitiveness strengths of the NI economy**; (2) **the ethos and direction of policy (MATRIX, Invest NI etc), including focus on key priority sectors, namely financial and business services, ICT, life sciences and hi-tech manufacturing, which ensures growth is export led but with local multiplier impacts on secondary sectors**; and (3) **assuming productivity in the rest of the UK improves as envisaged by the Leitch Review**. Note while this type of scenario was broadly endorsed at the Skills Stakeholder Conference in November 2008, it should be seen as just one potential option and a first step to arrive at a defined path for how the NI economy might achieve its published goals.

- Under the aspirational scenario, net annual job creation is forecast to be 7,300 pa compared to 5,000 in the baseline and GVA / wages & profits higher by £2.7bn in 2020 (2003 prices), equivalent to an 8 per cent larger economy compared to the baseline (note Tables E.2 and E.3 present growth / change values rather than levels). The **aspirational scenario is therefore less about job creation and more about significant productivity enhancements**, as a result of higher levels of skills inherent in employment (from both new entrants and a higher rate of upskilling of the existing workforce). It incorporates faster employment growth but only as one element of the achievement of PSA 1⁹. GVA per head (relative to the UK average) would rise from its long term level around or just above 80 per cent to above 85 per cent, though the more striking development would be the improvement in the PSA 1 target which as said above, would be achieved by 2015 and overall parity (no gap) with the UK outside the Greater South East by 2020 (note the data suggests this was close to being the case in the mid-1990s). **As such the aspirational trajectory can be said to be one of catch-up and convergence and would represent exceptional performance if achieved.**

Table E.2: NI sectoral employment forecast change (aspirational and baseline scenarios)

	2008-2020 (000s) - aspirational scenario	2008-2020 (000s) - baseline scenario	Difference
Agriculture, forestry & fishing	0.6	0.2	0.4
Mining & quarrying	-0.4	-0.4	0.0
Manufacturing	-8.3	-10.3	2.1
Utilities	0.2	0.2	0.0
Construction	0.1	-1.2	1.3
Retail & distribution	10.6	6.1	4.5
Hotels & restaurants	8.2	5.8	2.3
Transport & communications	4.0	2.2	1.8
Financial services	5.9	4.0	1.8
Business services	32.9	24.2	8.7
Public administration & defence	-1.2	-1.2	0.0
Education	3.2	3.1	0.1
Health & social work	15.8	15.7	0.1
Other personal services	4.4	3.2	1.2
Total employee jobs	75.9	51.6	24.2
Land forces	-0.1	-0.1	0.0
Self-employment	12.1	7.6	4.5
Total employment (job-based)	87.9	59.1	28.7
Total employment (job-based) - pa	7.3	4.9	2.4

Source: Oxford Economics

Table E.3: NI GVA forecast change (aspirational and baseline scenarios)

	2008-2020 (£m 2003 prices) - aspirational scenario	2008-2020 (£m 2003 prices) - baseline scenario	Difference
Agriculture, forestry & fishing	153	117	36
Mining & quarrying	-18	-18	0
Manufacturing	2,054	1,449	605
Utilities	162	162	0
Construction	337	269	68
Retail & distribution	1,889	1,713	176
Hotels & restaurants	453	362	91
Transport & communications	820	615	205
Financial services	2,114	1,613	501
Business services	3,130	2,090	1,039
Public administration & defence	116	114	2
Education	203	201	2
Health & social work	769	766	3
Other personal services	217	145	72
Total economy	12,123	9,457	2,666
Economy size (£m 2003 prices, 2020)	37,759	35,094	8%

Source: Oxford Economics

Fig E.2: NI convergence with UK (aspirational scenario)

NI: GVA per capita and productivity

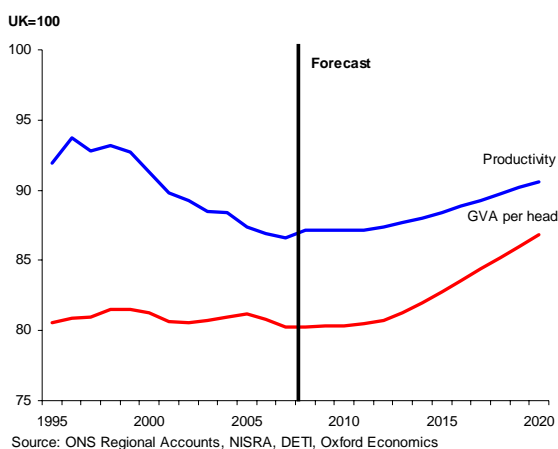
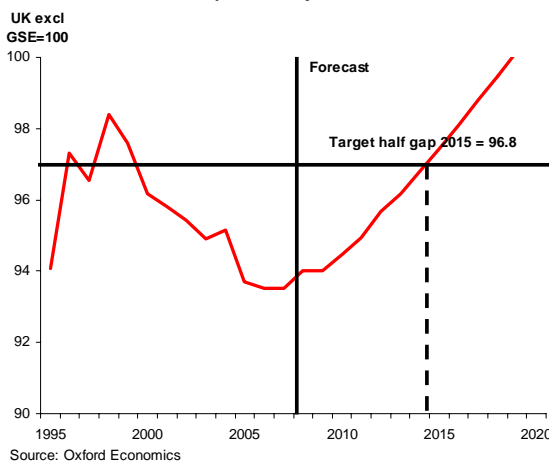


Fig E.3: PSA 1 – closing the private sector productivity gap (aspirational scenario)

NI PSA 1: Private sector productivity



⁹ Given current economic conditions and the uncertain outlook, a more employment-orientated strategy would be less realistic.

Box E.6: What would an aspirational scenario look like and deliver if PSA 1 is achieved?

- Net annual job creation of 7,300 pa – a productivity scenario with employment growth only one element.
- More jobs in exporting priority sectors.
- GVA higher by £2.7bn in 2020 (2003 prices) – an 8 per cent larger economy.
- Relative GVA per head up from 80 per cent to 85 per cent.
- PSA 1 parity by 2020 (i.e. not only halving the gap, closing it).
- In summary catch up and convergence – exceptional performance, a genuine ‘stretch’ target!
-

Future skill needs

- While all of the above analyses are essential building blocks, **the crux and main interest of this report is their implication for the direction of future skill needs and how this differs from the past.** Typically the **focus for skills supply provision is on the net requirement flow from education, training and migration** – this is because joiners from non-employment and other occupations are assumed to be qualified already to take up a similar job as in the past. For the non-employed these tend to be low grade occupations. Ideally migration would be netted off but very little is known about migrant qualifications (and how overseas qualifications are rated by employers in the NI labour market) and with a relatively stable annual education output into employment, net migrant flows should act more as a residual.

Note: The skills forecasts presented in this report are demand-led (from an employers’ perspective). Any reference to upskilling in this report refers to upskilling of the existing employed workforce. This does not include upskilling of the non-employed, which does occur, and from a supply-side perspective could boost NI’s overall employment rate.

- Table E.4 below compares the skill requirements for education leavers and in-migration combined under the baseline and aspirational scenario. It also presents the upskilling requirement of the existing workforce¹⁰. **Note forecasts are presented for the period 2010-2020 excluding the near term slowdown period to avoid this distorting the longer-term picture of skill needs.** (Forecasts for the near-term are however presented in the main report) For comparison of recent trends, the average skill requirement pattern for the past five years is also presented.

¹⁰ Upskilling forecasts are based on estimated observed past trends from the LFS, calculated as the change in stock of skills minus joiner skills plus leaver skills (i.e. an accounting identity). For the aspirational scenario, an extra uplift in the rate of upskilling is needed to achieve the PSA 1 productivity target.

Table E.4: Net requirement from education and migration and upskilling requirement of existing workforce (2010-2020 annual average)

	Baseline		Aspiration		Historical	
	Net requirement from education and migrants	Upskilling	Net requirement from education and migrants	Upskilling	Net requirement from education and migrants (2003-2007)	Upskilling (1997-2007)
Postgraduate (NQF 7-8)	1.8	2.6	2.0	3.7	2.0	1.6
First degree and sub-degree (NQF 4-6)	7.8	6.0	8.7	8.5	7.2	3.8
Intermediate a (NQF 3)	4.8	0.3	5.5	0.3	6.4	-0.6
Intermediate b (NQF 2)	2.8	0.0	3.9	-0.9	4.7	-0.9
Low (NQF 1 and below)	3.6	-8.9	3.8	-11.7	6.4	-3.9
Total	20.8	0.0	23.7	0.0	26.6	0.0
Postgraduate (NQF 7-8)	9%	-	8%	-	7%	-
First degree and sub-degree (NQF 4-6)	38%	-	36%	-	27%	-
Intermediate a (NQF 3)	23%	-	23%	-	24%	-
Intermediate b (NQF 2)	13%	-	16%	-	18%	-
Low (NQF 1 and below)	17%	-	16%	-	24%	-

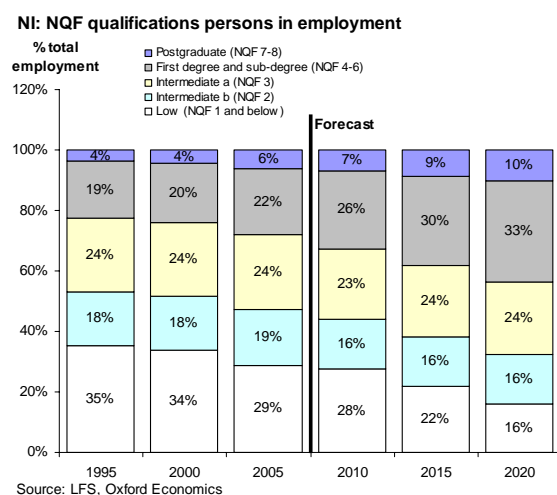
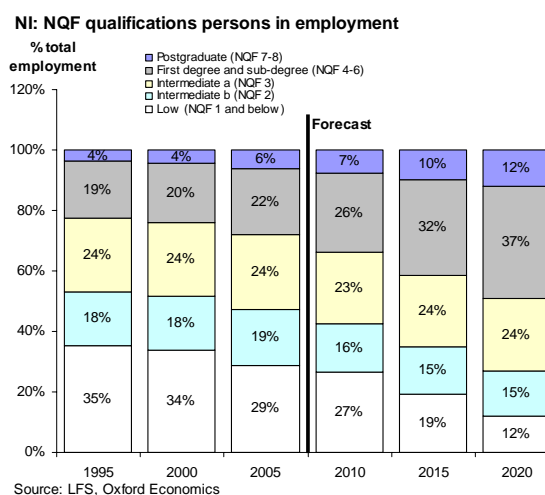
Source: Oxford Economics

- The annual average long-term demand for **sub-degree, degree and postgraduate** qualified persons (NQF 4-8) from education and in-migration is 9,600 in the baseline and just under 11,000 in the aspirational scenario (sum of rows 2 and 3 in Table E.4). This represents **almost half of the total requirement in both scenarios** (20,800 and 23,700) **compared to a third in recent years. The share of higher qualification requirements in the total net requirement of Government's priority sectors is potentially even higher at 70 per cent for financial / exporting professional services and ICT and just over 50 per cent for hi-tech manufacturing and life sciences¹¹.**
- **Only one in six jobs for people leaving the education system / migrants will be for people with low qualifications under both scenarios** (NQF 1 and below). This compares to one in five in the past five years
- **CAVEAT:** As the skills forecasting methodology developed for this research is based on past trend data, which may or may not reflect 'actual' skill demand, care should be taken in interpreting the results. It may be the case that in recent years inflows into the labour market from education have not had as high a level of formal qualification as employers might have wished, from which the economy would otherwise have benefited from better educational standards¹².

¹¹ Note the financial services share may be an over-estimate as call centre employment is likely to be under-estimated in official employee data – a classification issue. The hi-tech manufacturing share may reflect the legacy of the existing workforce and possibly could be higher. Further work is needed to improve the robustness of these estimates

¹² The opposite may also be true where employers recruit persons with higher qualifications than actually necessary, e.g. call centres, though employers can still benefit from the higher skills available

- As evident from Table E.4, the **up-skilling of the existing workforce is also an extremely important element of the changing workforce skill structure**, as it is too in the **UK Commission for Employment and Skills analysis of developing a world-class skills base in NI¹³**. The estimates suggest a further 8,600 persons qualified to NQF level 4-8 per annum required in the baseline and 12,200 in the aspirational scenario through upskilling¹⁴. The negative numbers lower in the skills spectrum, NQF 2 and below, reflect 'stepping up' the skills ladder, i.e. existing working persons moving from highest qualification NQF 2 and below to NQF 3 and higher. Note upskilling figures are effectively net flows. Many workers are required to move up the skills ladder from a low qualification level to intermediate level and many workers with intermediate qualifications are also required to move up to higher qualification levels. Therefore although the net flow upskilling figures for intermediate qualifications are low, this masks an underlying dynamic of persons moving out of this skills category and people moving into this category, previously with low qualifications¹⁵.
- Overall then the skill demand picture, taking into consideration sectoral and occupational trends and leaver and joiner flows, is one of an increasingly 'graduate hungry' economy.**
- What the inflow of new skills, outflow of skills and up-skilling of the existing workforce means for the overall stock of workforce skills is presented in Figs E.4 and E.5 below. **The higher skilled NQF 4-8 proportion of the workforce is forecast to rise to 43 per cent in 2020 under the baseline scenario (49 per cent in the aspiration) from an estimated 28 per cent in 2005. Conversely the proportion of the workforce with low qualifications falls from 2005 level of 29 per cent to 16 per cent in 2020 (12 per cent in the aspiration).** This compares closely to the trends in the Leitch Review (see Table E.5). Again this serves to **emphasise the rising gradient of future skill needs in the NI economy**. A key factor here is that in future a decreasing share of vacancies will be filled by the non-employed and a rising share by better qualified leavers from the education system.

Fig E.4: Trend in workforce skills (baseline)

Fig E.5: Trend in workforce skills (aspiration)


¹³ Source: Presentation by Mike Campbell, UKCES, NI Annual Economic Conference 2008

¹⁴ While this figure appears high it is plausible given the number of part-time HE enrolments

¹⁵ In practice more of the higher level skills could come from entrants from education if for example the share of school leavers going on to higher education was to rise, which would reduce the upskilling requirement.

Table E.5: Trend in forecast stock of workforce skills – NI comparison with UK Leitch (2020)

	Baseline		Aspiration	
	NI - Oxford Economics	UK - Leitch	NI - Oxford Economics	UK - Leitch 'catch up'
Postgraduate (NQF 7-8)	10%	11%	12%	13%
First degree and sub-degree (NQF 4-6)	33%	31%	37%	33%
Intermediate a (NQF 3)	24%	26%	24%	27%
Intermediate b (NQF 2)	16%	19%	15%	17%
Low (NQF 1 and below)	16%	13%	12%	11%
Total	100%	100%	100%	100%

Source: Oxford Economics, Leitch Review

Box E.7: Future skill needs

- Just under one half of the total net requirement from education and in-migration between now and 2020 is estimated to be for sub-degree, degree and postgraduate qualified persons (average of 9,600 pa in the baseline, just under 11,000 in the aspiration), compared to an average of one-third over the past five years. For Government's priority sectors, the proportion of higher level skill requirements of total requirements is greater at around 70 per cent for financial / professional exporting services and ICT, and just over 50 per cent for hi-tech manufacturing and life sciences (though additional sector research is required to firm up these projections).
- Only one in six jobs for people leaving the education system / migrants will be for people with low qualifications under both scenarios (NQF 1 and below), compared to one in five in the past five years.
- Up-skilling of the existing workforce is an extremely important element of the changing workforce skill structure – 8,600 upskilled graduates per annum are required from lower qualification levels in the baseline on top of new entrants from full-time education (12,200 in the aspirational scenario).
- The higher skilled NQF 4-8 proportion of the workforce is forecast to rise to 43 per cent in 2020 under the baseline scenario (49 per cent in the aspiration) from an estimated 28 per cent in 2005. Conversely the proportion of the workforce with low qualifications falls from 2005 level of 29 per cent to 16 per cent in 2020 (12 per cent in the aspiration). This compares closely to the trends in the Leitch Review for both the baseline and better performance scenarios.
- Overall then the skill demand picture, taking into consideration sectoral and occupational trends and leaver and joiner flows, is one of an increasingly 'graduate hungry' economy, particularly so if NI aims to close the productivity gap and achieve PSA 1.

Future degree subject needs

- It has also been possible in this research to **take skills forecasting one step forward by making indicative estimates of the degree subject qualifications required** using the net requirement forecast for higher level qualifications and HESA data on degree subject sectoral and occupational employment destinations. Note this is the first time degree subject demand analysis has been attempted in NI.

- **CAVEAT:** Again extreme care must be taken with this form of analysis as it is based on past trend data from HESA. This may represent what the labour market could get, not what it desired. In other words employers may be taking more general business and administration degrees when they would ideally like more advanced STEM subjects (for example taking a business studies graduate when they might have preferred a maths graduate). This analysis should therefore be considered subject demand if past trends are indicative of actual labour market desires and not just labour market practicalities / subjects supplied by universities.
- Table E.6 shows that relative to recent trends (the final column), **the degree subject requirement will become:**
 - **more skewed towards physical sciences, mathematical & computer sciences, engineering & technology, law and creative arts & design (the more commercial orientated creative subject such as graphic design, film production etc);**
 - **less skewed towards subjects allied to medicine and education;**
 - this should help to address some of the current 'specialisation' weaknesses of the NI graduate workforce provided the education system aligns its supply to this requirement;
 - note however that the forecasts build in some subject 'creep' in some of these growing subject areas based on past trends and an assumption that degree subject gaps with the UK average will be closed over time. Therefore not all of the change in subject demand is explained entirely by sectoral employment trends; and
 - the sum of degree subject demand in the final row of Table E.6 is equal to the degree element of the net requirement for NQF 4-8 qualifications in Table E.4. A proportion of NQF 4-8 qualifications (roughly 25 per cent), which include foundation qualifications, are not classified as full degree qualifications and are not recorded in LFS degree subject or HESA data.

Table E.6: Net requirement from education and migration – degree subjects (2010-2020 annual average)

	Baseline	Aspiration	Baseline % total	Aspiration % total	HESA NI domiciled graduates from UK HEIs entering employment in NI % total (2003-2007 annual average)
STEM	3.5	3.9	48.0%	49.0%	43.0%
Medicine & dentistry	0.2	0.2	3.2%	2.9%	3.3%
Subjects allied to medicine	1.1	1.2	15.6%	14.7%	17.3%
Biological sciences	0.4	0.4	5.3%	5.1%	5.2%
Veterinary science	0.0	0.0	0.1%	0.0%	0.1%
Agriculture & related subjects	0.0	0.0	0.1%	0.0%	0.7%
Physical sciences	0.2	0.2	2.4%	2.8%	2.2%
Mathematical sciences	0.0	0.1	0.6%	0.9%	0.5%
Computer science	0.6	0.8	9.0%	9.5%	6.5%
Engineering & technology	0.5	0.6	7.3%	8.1%	4.0%
Architecture, building & planning	0.3	0.4	4.6%	4.9%	3.1%
Law	0.3	0.5	4.8%	5.7%	2.8%
Business and Administration	1.1	1.2	15.5%	14.7%	15.6%
Languages	0.2	0.2	3.0%	2.7%	3.0%
Creative Arts and Design	0.3	0.4	4.3%	5.0%	3.4%
Education	0.9	0.9	11.9%	10.7%	18.0%
Combined degree	0.1	0.1	1.6%	1.7%	0.6%
Other *	0.8	0.8	10.9%	10.5%	13.6%
Total	7.2	8.0	100.0%	100.0%	100.0%

Source: Oxford Economics

Note: NQF 4-8 requirement from education and migration adjusted for LFS subject degree % NQF 4-8

* Social studies; mass communication and documentation; philosophical studies

- Without wishing to focus on the short-term, it is nonetheless worth drawing to attention the **near term implications of the economic slowdown for graduate job prospects**. Figs E.6 and E.7 below present degree subject demand forecasts under the baseline for two subject areas – architecture, building & planning and computer sciences (other subject charts are available in Annexes E and F). The charts clearly illustrate the impact of the slowdown, particularly for architecture, building & planning graduates. A large share of graduates from these subject areas typically enters construction related occupations. It is however worth saying that the graduate net requirement is based on the assumption of no major change in joiner rates from non-employment (the LFS data on which joiner rates are based are not available for a recessionary period). It could well be that all graduates are absorbed first (whether or not their high skills are required or can be appropriately rewarded), severely limiting opportunities for the non-employed in the short-run, including those persons recently made redundant.

Fig E.6: Degree subject demand – Architecture, Building & Planning (baseline)

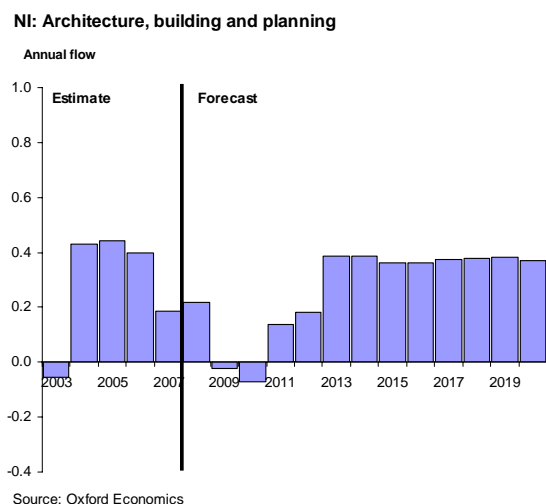
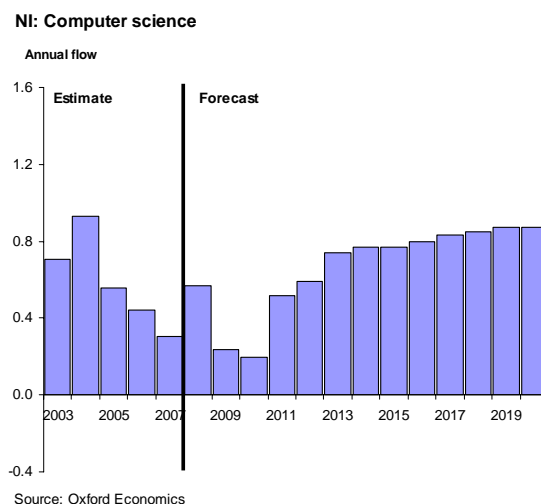


Fig E.7: Degree subject demand – Computer Sciences (baseline)



Box E.8: Future degree subject needs

- Relative to recent trends, the degree subject requirement will become more skewed towards physical sciences, mathematical & computer sciences, engineering & technology, law and creative arts & design; and less skewed towards subjects allied to medicine and education (this is part trend-based and part designed to align more closely with UK average subject patterns). This should help to address some of the current ‘specialisation’ weaknesses of the NI graduate workforce, provided the education system aligns its supply to this requirement
- Though in the short-run job prospects for graduates will weaken (as it will across the entire skills spectrum), particularly for degree subject areas traditionally supplying sectors such as construction which are most exposed to the current downturn (though much depends on who employers recruit first from the choice of potential joiners). Graduate prospects are forecast to recover in 2011 and 2012

Adequacy of supply

- It was beyond the scope of this study to look at the skills supply side in detail in terms of factors such as the changing size of the school leaver age cohort, higher education joiner rates, the 'brain drain', further and higher education subject enrolment trends and DEL's 'C'mon Over Campaign' to attract talent from the UK and further afield.
- However net replacement demand analysis inherently brings in elements of the supply side and it is also useful to bring in other elements to 'sanity check' the model forecasts.
- Indeed it has already been described above how the skills forecasting model developed for this research predicted the recent demand for migrant in-flows and broadly in the same magnitude as recorded by official NISRA statistics. For the future to 2020 the model predicts 4,000 in-migrants pa will be required in the baseline (7,000 pa in the aspiration), on top of the historic relatively stable entry flow from education to fill vacancies.
- The research also compares degree subject demand estimates to HESA graduate NI employment destination figures by subject. This provides a useful check of estimated demand and supply magnitudes by subject, many of which are similar, suggesting some validity in the approach. It does however **indicatively suggest that even under the baseline forecast there would be a shortfall in subject areas such as mathematical & computer sciences, engineering & technology, law and creative art & design graduates, if the last 4 years outturns as recorded by HESA were to be replicated going forwards** (Note: Supply from HESA is based on employment destination numbers and not number of qualifiers). The shortfalls grow larger still under the aspiration scenario. **This is before even considering the up-skilling element which at this stage cannot be split across sectors, occupations and subjects.**

Table E.7: Net requirement from education and migration and comparison with supply – degree subjects (2010-2020 annual average)

	Demand		Supply
	Baseline	Aspiration	HESA NI domiciled graduates from UK HEIs entering employment in NI (2003-2007 annual average grossed up)
STEM	3.5	3.9	3.6
Medicine & dentistry	0.2	0.2	0.3
Subjects allied to medicine	1.1	1.2	1.4
Biological sciences	0.4	0.4	0.4
Veterinary science	0.0	0.0	0.0
Agriculture & related subjects	0.0	0.0	0.1
Physical sciences	0.2	0.2	0.2
Mathematical sciences	0.0	0.1	0.0
Computer science	0.6	0.8	0.5
Engineering & technology	0.5	0.6	0.3
Architecture, building & planning	0.3	0.4	0.3
Law	0.3	0.5	0.2
Business and Administration	1.1	1.2	1.3
Languages	0.2	0.2	0.2
Creative Arts and Design	0.3	0.4	0.3
Education	0.9	0.9	1.5
Combined degree	0.1	0.1	0.1
Other *	0.8	0.8	1.1
Total	7.2	8.0	8.4

Source: Oxford Economics

Note: NQF 4-8 requirement from education and migration adjusted for LFS subject degree % NQF 4-8

* Social studies; mass communication and documentation; philosophical studies

Box E.9: Adequacy of degree supply

- Even under the baseline outlook a shortfall in subject areas such as mathematical & computer sciences, engineering & technology, law and creative art & design graduates is forecast, if the last 4 years outturns as recorded by HESA were to be replicated going forwards
- The shortfalls grow larger still under the aspiration scenario before even considering the up-skilling element which at this stage cannot be split across sectors, occupations and subjects.

Part 2: Conclusions and policy remarks

As explained above, the research identifies a number of interesting conclusions with respect to the Northern Ireland economy and its future skills needs. In some cases this provides confirmation and quantification of known trends. In other cases it identifies new challenges and issues. The main conclusions and associated policy remarks arising from the research are summarised below (and are elaborated in more detail in the main report).

- **NI's skills performance:** NI's concentration of higher qualified persons in the workforce (NQF 4-8) is on a par with many of the UK regions and a notable improvement in the proportion, from just over 20 per cent to almost 30 per cent, has occurred over the last decade. The region however still suffers from a proportionately larger group of the working age population with no formal qualifications, which contributes to NI's overall relatively low employment rate, despite recent improvement. Although the share of low qualifications in the workforce in NI is no higher than the UK average.
- **Importance of skills:** There is clear evidence in published literature and drawn from primary evidence in this research to show the importance of formal skills in driving economic growth and providing improved returns to individuals in terms of likely labour market outcomes and earnings potential. For example over 90 per cent of working age graduates are in employment in NI and a graduate in the workplace has an average salary premium of more than 100 per cent over an individual with no formal skills. As a globally integrated economy becomes more of a reality, the need to be internationally competitive will only increase and thus **even through the downturn and beyond, the need to improve qualification levels will remain.**
- **Recession impact:** The skills landscape will be noticeably different during the recession currently being experienced both in NI and across most of the developed world. There will **undoubtedly be over supply in the short run** and the immediate economic fortunes in 2009 and 2010 for leavers from education, persons recently made redundant and the non-employed seeking work look extremely challenging.
- **Towards recovery:** There is little certainty over the timing and scale of economic recovery in NI. Based on latest forecasts (February 2009), Oxford Economics believe it will be 2010 before growth returns in any form and 2017 before employment levels return to their peak of early 2008 (the 5,000 pa average net job creation only occurs after 2010 and only just offsets the estimated net loss of approximately 25,000 jobs during the recession). In the recovery phase, the shape of growth will be different than the past – led less by the housing and retail sectors and more by export led activities. This will have implications for skills needs. Oxford Economics believe the long-run trend will be labour market expansion of approximately 5,000 - 6,000 net per annum,

compared to over 10,000 on average per annum of the last decade. However given the current uncertainties, this does raise a need to re-visit and reappraise the quantum and nature of skills needs set out in this report.

- **Demand for skills:** Even though the NI economy is forecast to slow considerably in the downturn and **even in the longer-run is unlikely to return to the levels of job growth of the recent past, there will still be a significant demand for additional labour** (to both support expansion of certain sectors and to replace retirees and other leavers from the labour market). On average our analysis suggests approximately 15,000 jobs are available in the NI economy in a given year even without any net increase in the total number of jobs (this is the net replacement demand figure). A labour market expanding at 5,000 net jobs per annum is consistent with the current education system outturns – assuming net migration is roughly in balance (down from recent trends) and employment rates roughly unchanged (again a change from the recent trend of rising employment rates).
- **Aspirational growth will require a ‘step-up’:** Though there is no detailed sectoral ‘roadmap’ for the ‘NI economy of tomorrow’ aspired to in the Economic Vision and associated policy documents and plans (including the Programme for Government), there is acceptance that improved economic performance is central (and PSA targets and Executive statements support this). To achieve improved growth would require uplift in skill levels across the workforce. This is both a demand issue (creating more high productivity jobs) and a supply issue (having the skills to fill these jobs and upskill existing workers). Setting out an indicative alternate economic growth trajectory which meets the published productivity policy goals suggests a need for higher qualification (NQF 4-8) concentrations in the workforce to rise from approximately 30 per cent to 50 per cent (i.e. an uplift across the skills ladder would be required).
- **Need for balanced supply:** Though driving faster growth would require a more skilled workforce **the labour market will still require workers across the skills spectrum and not just at the graduate end**. The model suggests annual requirements of roughly 3,500 for workers with low qualifications over the decade ahead (compared to almost 10,000 for persons with higher level qualifications)
- **Up-skilling the workforce matters:** In order to meet aspirational targets (and indeed even to support the projected baseline needs), **a considerable uplift within the existing workforce skills profile would be required**. Some of this occurs ‘organically’ as better skilled young people enter sectors and lesser skilled older workers depart, but nevertheless the research shows a significant requirement for upskilling the existing workforce to support economic growth. For example under the baseline scenario, 9,000 workers with low qualifications are required to upskill to a higher qualification, and consequently workers with intermediate qualifications are required to move up the skills ladder.
- **Graduate under-representation in certain sectors:** The research suggests that relative to UK averages (and regional comparisons) NI has an under-representation of graduates in a number of sectors. **These are primarily, agriculture, manufacturing, construction, retailing and hotels & catering**. Elsewhere in professional services and public services graduate concentrations are at a comparable level to elsewhere. Note that presence of graduates within a sector does not guarantee the full utilisation of skills. In addition much of the explanation of graduate concentrations may lie in the sub-sectoral nature of the particular firms located in NI (in other words a demand not a supply question).

- **Managerial (and professional) weakness:** The research suggests a significant managerial weakness in the occupational structure of the NI economy. **Even accounting for sectoral mix, NI is some 50,000 managers and professionals short of what level would be expected if NI had the same sectoral managerial and professional concentrations as the UK average.** This shortage is likely a function of the type of activities carried out in NI and the limited amount of higher end functions carried out in the region's firms.
- **Graduate subject diversity:** The research suggests that the pool of graduates within the workforce has a rather 'narrow' unspecialised subject focus, which otherwise are essential for developing an innovative, export-led economy. **There is an over abundance of business and mass communications graduates and a notable under-representation of creative arts & design¹⁶ / arts and STEM graduates** (7,000 and 4,000 respectively). This may reflect demand as opposed to current supply (many may migrate out for work) but is nevertheless a notable facet of the NI economy.
- **Flexibility and adaptability:** The current economic circumstances and the limitation of the data (and a forecast based approach) **suggest that skills policy requires an increased level of flexibility and adaptability.** Though this can be difficult in planning courses and educational infrastructure, it is a necessary requirement in a fast moving global world. For example the importance of financial service skills in the decade ahead may be less than in the decade past or envisaged pre-credit crunch, whilst the importance of subjects related to environmental technologies may be greater. Thus revisiting and reappraising skills research such as this (and that carried out by the SSCs) will be important.
- **Changing dynamics of supply:** The forecasts presented in the research rely on assumptions drawn from the recent trends in the data. Consideration of changes in patterns over the future may be required. For example retention of older staff, or even returning retired staff due to weakening personal wealth circumstances (as pension values have been eroded), may change the magnitudes of outflows and inflows from these particular categories. **This would have an implication on the skill demand and needs from the educational system (and equally have an implication on the adult training environment).**
- **Increasing demand for STEM subjects:** As best as can be predicted, the base forecasts suggest that the growing sectors of the economy **will require an increasing number of STEM qualified graduates and skilled labour.**
- **Shortfalls could occur:** The analysis suggests that if a faster growth trajectory can be achieved - the aspirational scenario - there could be skill subject shortfalls emerging within the next decade (for example in some STEM, law and more commercially orientated creative / arts subjects). **This provides an important 'early warning' of future gaps which if unfilled would result in either lost economic growth or an increased dependence on imported labour** (which cannot always be guaranteed, especially if the exchange rate is unfavourable)
- **Retain and return:** The challenge to maintain and improve the skills base suggests **a need to attract back into the labour market well-qualified persons.** This could be from outside the labour market (parents looking after children or the early retired) or from outside NI (perhaps school leavers who previously left the region to study and remained working outside NI). Such a flow of skilled labour could help to address managerial and diversity of graduate subject

¹⁶ There is a recognised need for creative design disciplines to increasingly work with other sectors, such as engineering, to produce innovative solutions that lead to wealth creation

weaknesses already identified. It is also important not to overlook the greater returns to individuals from skills gained at a personal level, even if they do not reside in the region - up-skilling is rarely wasted on the individual.

The conclusions above raise a number of policy questions and provide support for many of the existing skills programmes already in place. It is important to reflect on the level of job growth in the region over the last decade, and though the 'outturns' in productivity may not have been what might have been hoped for, NI's impressive employment record nevertheless provides some commendation of the skills outputs to date.

The worries at the lower skills end remain with the high proportion of the adult population, workforce, and most worryingly leavers from education having no formal qualifications and limited basic skills.

Looking forward the recession will require short term 'emergency supply-side measures', primarily to help leavers from the education system and those made redundant, especially as businesses are already adjusting quickly (some are operating a reduced number of days per week etc). However a strategic long-term plan must remain in order to capitalise on opportunities when the world emerges from the current economic malaise and to ensure that NI's skills offering remains internationally competitive.

The model developed in this project provides one useful evidence tool capable of re-visiting future skill needs when the economic picture becomes clearer and recovery begins to take shape (or does not). It can augment the qualitative and 'sector by sector' expertise within SSCs, DEL and elsewhere, and can help understand the quantum of skills required given the likely demand within the economy.

Perhaps the emergence of 'green jobs', the reshaping of the financial and professional services sector and a more developed tourist industry will alter the shape of the skills mix and a different aspirational path may emerge. The skills forecasting model will be a useful tool to address the alternate skills needs and we recommend its continued use in exploring alternate scenarios and looking ahead, alongside further consideration of the roadmap to deliver the 'better NI' to which policy aspires.

1 Introduction

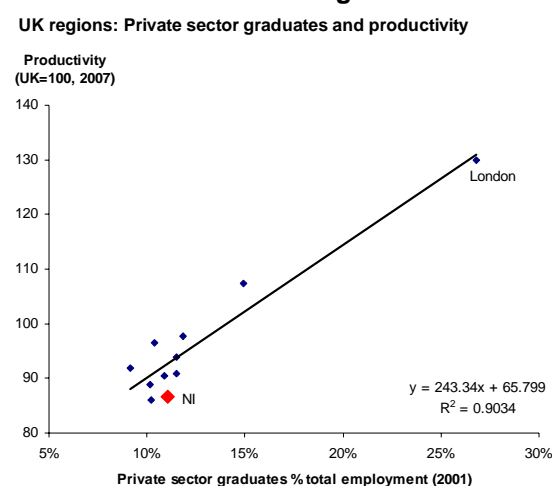
1.1 Background and rationale

“Our aim is to ensure our people have the right skills to deliver economic prosperity now and in the future” Programme for Government

There has been considerable research carried out into the role of skills in supporting and driving economic growth in developed economies. Although discussion continues over matters of precision in terms of the relative contribution of skills to overall economic growth, there is widespread consensus on the value of high skill levels both to the individual and to the economy as a whole. For example Fig 1.1 and Tables 1.1-1.2 below show that (1) across the UK, regions such as London, with a higher share of private sector graduates in total employment tend to have higher productivity (interestingly the relationship does not hold for public sector graduates); (2) in NI wages are positively correlated with a person's highest level of qualification; and (3) also in NI better skilled working age persons are more likely to be employed and less likely to be unemployed or economically inactive. These observations hold for other regions and economies as well.

Productivity, wage levels and employment are all part of the NI Government's published economic goals. For example closing the private sector productivity gap with the rest of UK excluding the Greater South East is PSA 1 in the Programme for Government, while increasing employment levels is PSA 3. Therefore skills should be seen to be an intrinsic part of achieving these goals.

Fig 1.1: Relationship between private sector graduates in employment and productivity across UK regions



Source: Census, Regional Accounts, DETI, ONS, Oxford Economics

Note: Productivity is not based on new / revised Regional Accounts

Table 1.1: Skill levels and wages in NI

	Average weekly wage (2007)
Postgraduate	£565
NVQ Level 4 + (excluding postgrad)	£455
NVQ Level 3	£329
NVQ Level 2	£275
NVQ Below Level 2	£242
None	£204

Source: LFS

Table 1.2: Skill levels and economic activity in NI

	Employed	Unemployed	Inactive excluding students and early retirees
NVQ 5	93%	1%	5%
NVQ 4	91%	1%	8%
NVQ 3	84%	3%	14%
NVQ 2	81%	4%	15%
NVQ 1	68%	7%	25%
NVQ 0	54%	5%	41%

Source: LFS (3-year average 2005-2007)

For economic policy it is important to think prospectively about future skill needs and skills matching to avoid the potentially damaging consequences of skills shortages or skills gaps. Looking ahead towards skills needs is however a difficult and complex process and requires a range of empirical techniques. Engaging with businesses and qualitative studies of specific sectors and occupations can be very helpful in determining precise and specific individual needs across sectors. However this method has the limitation of being sometimes short-term orientated and focussed on existing firms' needs with perhaps not considering the new sectors and industries which may emerge over the future (and therefore less useful for analysis of more aspirational economic scenarios). As such it is useful to consider the skills needs of the firms that may play a bigger role in the future than they do today in the NI economy.

With this in mind this skills forecasting study attempts to look at an empirical assessment of future skills needs for the Northern Ireland economy. At the time of concluding this research (February 2009) the NI economy is in a precarious position with unemployment climbing and sentiment amongst consumers and business at record lows. In this environment the outlook for employment in 2009 and 2010 is more challenging and the employment prospects for educational leavers from schools, FE colleges and universities, as well as the existing stock of unemployed and inactive who would like to work, looks very challenging. While it is important that the study is cognisant of the prevailing economic winds, it is also important that it looks longer-term at both the likely economic outcome for the Northern Ireland economy (when the economy is forecast to pick-up and continue growing) and also the desired or 'aspirational' outcome which policy strives to achieve. The latest 'Working Futures 2007-2017' report also takes a long-term focus. The analysis in this report looks at the skills needs of a baseline and a more aspirational outlook for the Northern Ireland economy where the PSA 1 productivity target is achieved.

Empirical analysis is of course dependent upon the quantity and quality of data available and this report is based largely upon the data available from the LFS survey. It is important to bear some caveats in mind when reviewing the content and analytical findings of this report and we refer the reader to methodology caveats in Annex C.

This report represents an empirical 'first step' in looking at the skills data, setting up a consistent methodology for evaluating skills needs and future demand. Alternative economic futures will become clear as economic policy is reviewed and global conditions change and further analysis of the supply-side is required to fully complete a working flows model of the NI economy. Micro studies of sectors undertaken on a SSC basis and more detailed skills levels (e.g. within ICT, programming languages) are important as is discussion of the findings and assumptions underpinning this report.

1.2 Economic vision and policy context

The Programme for Government has put the economy at centre stage of policy in NI with 'growing a dynamic and innovative economy' a main tenet of the programme. This, and several of the PSA targets, has direct and indirect implications for skills. On the direct side, there are a number of skill targets such as ensuring "80 per cent of the working age population are qualified to at least GCSE level or equivalent". Indirectly PSA 1 (productivity) and PSA 3 (employment levels), as implied earlier, will be influenced by skill levels, reflecting the policy desire to get more people working and earning more, ultimately improving productivity.

The Skills Strategy for NI, known as 'Success through Skills' has the following strategic vision:

“by 2015, the Northern Ireland economy is highly competitive in global terms; it is based on high value jobs, with progressive leadership from a strong cadre of local managers; it has increased export levels and it attracts substantial amounts of inward investment; its people are entrepreneurial and innovative; small businesses are encouraged to grow and strong, coherent services and support for businesses of all sizes are provided. Employment has increased, leading to an expansion of the workforce and migrant workers are playing a valuable role in the economy; the workforce, increasingly, is literate and numerate and has sufficient ICT skills. Individuals can solve problems, work in teams, are innovative and enterprising and expect to learn new skills throughout their working lives. A broader adoption of technology and e-learning will have reduced transport and location barriers” Success through Skills

The strategy's implementation plan is grouped under four themes:

- Understanding the demand for skills
- Improve skill levels of the workforce
- Improve quality and relevance of education and training
- Tackling skills barriers to employment

It could therefore be said that this research addresses directly the first of the four themes though many of the policy issues and recommendations arising refer to all four.

1.3 Approach

The elements below outline briefly the approach taken to deliver this research:

Consultative and desk-based research phase

- Face-to-face and telephone interviews
- Presentation session to SSCs and Invest NI sector representatives
- Review of Sector Skill Agreements
- Survey of SSCs and InvestNI sector representatives
- Stakeholder Conference
- Note the consultative and research process and findings are fully documented in Annex H and where relevant are woven into the report

Extensive LFS analysis phase (jointly undertaken with FGS)

- All UK regions
- By industry and occupation
- NVQ and NQF qualification categories
- 10-year time series
- As a result this entailed regional skill, occupation and degree subject comparisons

Enhanced the original Regional Forecasts' replacement demand methodology

- Now based on a full flows matrix of leavers and joiners
- Added workforce skill stock forecasts – skills of leavers & joiners and upskilling
- Added degree subject analysis

Developed an aspirational scenario

- First considered the Leitch restructuring and catch up scenarios – the Stakeholder Conference endorsed a mixture of both plus some tailoring to NI

- Next we developed an aspirational scenario that achieves PSA 1, reflects the unique characteristics and competitiveness strengths of the NI economy and captures the ethos and direction of policy (Success through Skills, MATRIX, Invest NI etc), including focus on Government's priority sectors

(Note EDF September 2008 forecasts are used as the central baseline forecast to ensure consistency with this existing source – this will have an impact in the short-run as latest forecasts point to a deeper and more prolonged recession but longer-term forecasts are less sensitive to this more marked short-term slowdown)

1.4 Report structure

The remainder of the main report is structured as follows:

- **Chapter 2 – Economic backdrop:** Global, UK, ROI and NI economic context, emphasising the current economic challenges, for all economies and not just NI, and how the next decade for the NI economy will be very different to the previous 'golden era' decade
- **Chapter 3 – Skills in context:** Recent trends in NI workforce skills, how NI's workforce skills rate against comparator UK regions and international economies and where NI could be if its occupational and sectoral skills and degree subject structures more closely matched the UK average
- **Chapter 4 – Tomorrow's economy:** Presentation of the baseline outlook for the NI economy, consistent with Oxford Economics' EDF September 2008 outlook. Also a brief discussion of how the aspirational scenario for the NI economy is developed and differences from the baseline outlook.
- **Chapter 5 – Skills for tomorrow's economy:** Replacement demand, workforce skill flow and stock, upskilling and degree subject demand analysis for both the baseline and aspirational scenarios. This chapter addresses a number of key questions such as the labour market and skill requirement for new entrants from education and migration
- **Chapter 6 – Conclusions and policy remarks:** Drawing on several of the key findings, this concluding chapter presents policy remarks to inform the review of DEL's 'Success through Skills' strategy. This is deliberately kept brief and strategic / high-level and does not aim to set out actionable follow ups

This report is also accompanied by a comprehensive, detailed annex section. This includes the following:

- Annex A: Priority sector future skill needs
- Annex B: NI skills in context – additional analysis
- Annex C: Skills forecasting methodology and assumptions
- Annex D: National Qualification Framework (NQF), JACS higher education degree subject classification and STEM definition
- Annex E: Baseline scenario forecasts
- Annex F: Aspirational scenario forecasts
- Annex G: Flows from NI education into employment
- Annex H: Evidence from consultations and Sector Skill Councils

2 Economic backdrop

2.1 Chapter overview

Box 2.1: Economic backdrop – overview of key issues

- The previous decade was a 'golden era' for the NI economy with 13,000 net new jobs created on average pa
- The 'golden era' is however over and the short-term economic environment could hardly be more challenging. Though it must be said that this holds for most economies, including the UK and even more so ROI, and is not unique to NI
- The central baseline forecast for the NI economy between 2008 and 2020 is 5,000 net new jobs pa with net jobs losses predicted in the short-run. This may not be the long-term outcome NI aspires to but the reality is the decade ahead will be more challenging than ever and the possibility of an over-supply of labour and rising unemployment in the first half of the next decade cannot be discounted.
- There are also considerable unknowns with respect to how this current economic crisis will play out, which matters for the future demand outlook, not least:
 - The uncertainties attached to the range of policy measures implemented, most importantly the fiscal and monetary actions by the Treasury and Bank of England, including the cut in interest rates
 - When bank lending will return to normal levels
 - Whether the economy will face a long period of deflation and what the impact of this might be, and
 - To what extent consumers will retract and re-build saving ratios.

Given these uncertainties, there is a strong risk that NI's employment performance could be weaker than predicted (and indeed latest forecasts have been revised downwards)

2.2 Economic uncertainties

- At the time of concluding this report (February 2009), the NI economy, and almost all other economies, could at best be described as being in a precarious position. The economic environment, at a global, national and regional level, could hardly be more challenging. The onset / inevitability of recession has led to radical policy actions in Washington, Westminster and throughout the world and there is more feverish debate and column inches in the press than perhaps across the previous decade of remarkable growth combined.
- In fact one of the reasons to include the global, UK and ROI context in the report is to show that a weakening outlook is not unique to NI.
- There are also considerable unknowns with respect to how this current economic crisis will play out, which matters for the future demand outlook, not least:

- The uncertainties attached to the range of policy measures implemented, most importantly the fiscal and monetary actions by the Treasury and Bank of England, including the cut in interest rates
 - When bank lending will return to normal levels
 - Whether the economy will face a long period of deflation and what the impact of this might be, and
 - To what extent consumers will retract and re-build saving ratios.
- The short-term problems will undoubtedly change the level of demand for skills markedly from what the economy has been used to, while the flow of skills may change markedly (for example greater replacement of older expensive workers with younger cheaper resources, older workers staying in employment for longer etc).
 - The slow-down is also raising questions over longer-term economic prospects. Is the financial and business service growth model still valid? Could industrial production return to the UK as a source of job creation rather than job loss? Will Sterling remain weak and what impact will this have on exporting sectors? Will migration flows be altered permanently? Will previous rates of growth ever be emulated? All these questions exist as a challenging 'backdrop' against which this analysis needs to be considered. **Though the longer-term outlooks remain positive, a return to the previous decade of growth is not projected. This may not be the outcome NI aspires to but the reality is the decade ahead will be more challenging than ever and the possibility of an over-supply of labour and rising unemployment in the first half of the next decade cannot be discounted (and looks more probable given latest, weaker economic forecasts).**
 - However the worsening economic outlook should not necessarily be 'read across' to mean a drop in demand for higher level skills. Indeed quite the opposite may result. In order to produce internationally competitive products and services, a higher skills base may be required than in the past when the debt-led boom and economic catch-up in NI generated rapid job growth, particularly in retail and construction which are less 'skills hungry'. It is also important to remember the personal returns to individuals with better skills (even if they have to emigrate) and also to bear in mind over-supply of high skills is a better problem to have than under-supply. However the analysis below does draw attention to the fact that the base outlook is a more modest one than the previous decade and this will have implications for the future number of skills required.
 - To conclude here, perhaps the most important economic context point to raise is that the analysis is being carried out in a time of great uncertainty - revisiting the work during calmer times may be required – or at the very least exploring other possible outturns for longer-term economic growth.

2.3 Global context

- The global economy has weakened considerably over the second half of 2008 as the excess of debt began to unwind and expectations of a deeper and potentially worldwide recession begin to spread across governments, consumers and businesses worldwide. This has led recently to frantic policy responses (in contrast to the more sluggish responses as the crisis took its more tentative early steps back in summer 2007). The response has not yet been uniform across countries and the contrasting fiscal responses of the UK and ROI governments is one interesting contrast showing uncertainty over what matters most during this difficult time – fiscal deficits or demand, tax cuts or public investment?

- World GDP growth has fallen markedly from its recent level of close to 4 per cent and is expected to plunge into recession in 2009 (Fig 2.1). The longer-term recovery is strong and returns world growth to close to 4 per cent by 2012 (Fig 2.1). This recovery is predicated on a level of business and consumer confidence returning, ultimately leading to an increase in demand. There are however risks to be considered with this outlook. The first risk is the extent to which the economic 'fundamentals' of bank lending and borrowing have been damaged. There is unlikely to be significant appetite for a return to the same type of lending as was rife prior to this slowdown (though notably lending in the past has faced significant crisis – not least the Latin America debt crisis of the 1980s – and recovered). Secondly the longer-term implications of huge trade surpluses from China and corresponding deficits in developed countries, most notably the US, are difficult to accurately predict. A sharp recession with significant job loss may lead to much stronger public and political pressure not to revert to the patterns experienced in the lead up to the crash.
- The emerging markets are not yet quite expected to fall into recession as a result of the global slow down, but a marked cool off from the recent past is projected (Fig 2.2) as demand for their exports falls as a result of reduced consumer spending and business investment in the developed world. The rate of deceleration in export demand has been rapid (i.e. recent data showed a shock decline in Chinese exports) and stimulus packages to boost domestic demand are unlikely to bear fruit given the uncertain conditions and weakening confidence of local businesses and consumers. The knock-on effect of this is to reduce commodity prices as demand for inputs to the production process moderates and this in turn is weakening prospects from raw material and energy producers such as Russia, in Latin America and Australia. At the time of writing the economy is in something of tailspin – the drastic measures may pull it out of the tailspin – but there are no guarantees and global recession cannot be entirely discounted.

Fig 2.1: World GDP growth (Feb 2009)

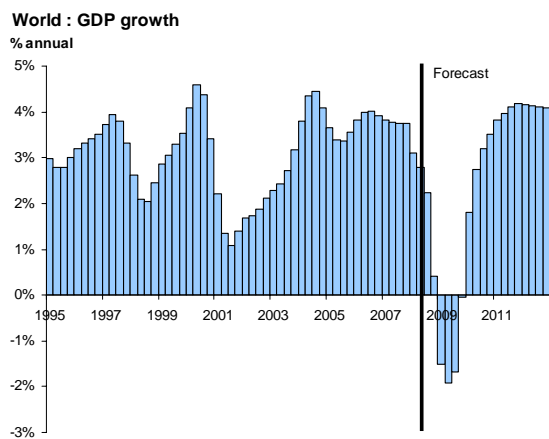
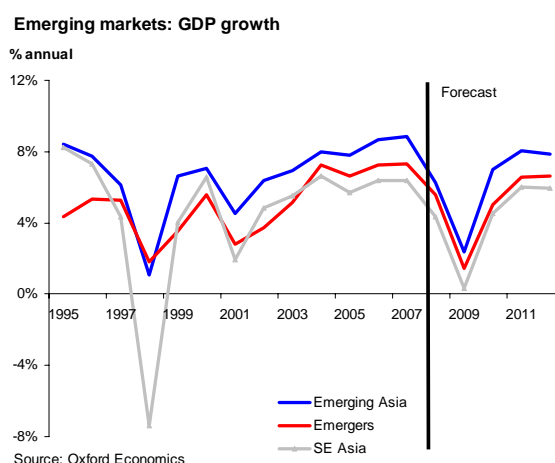


Fig 2.2: Emerging market GDP growth (Feb 2009)



- The fall back in consumer spending has been sharp in the developed world and there is probably worse to come in 2009. This reflects a range of factors, but primarily a loss in real incomes. This has been largely due to falling house prices and equity values, but increasingly now through lost earnings (either in bonuses or reduced hours or even redundancies). The aggressive policy action in terms of interest rates and fiscal stimulus should help repair spending levels in the recovery phase (if borrowing is facilitated) but it is important to recall the last (or arguable last) decade in Japan where even negative interest rates (in real terms) would not encourage borrowing and more spending by consumers.

- Some of the conditions leading to the curtailing of consumer spending are however beginning to improve heading into late 2008. Most notably inflation has begun to fall and is expected to continue to do so sharply as cooling demand reduces prices across most world economies (though deflation poses an altogether different risk). The fall back in oil (from over US\$150 to under US\$40 / barrel) is a major factor but so too are food prices and discounted goods being offered at sale prices across the struggling retail sector. This should help consumers previously so adversely impacted by high food and energy prices. However the fact that oil prices are cooling in response to a slowing global economy is important to bear in mind. A return to previous levels of world economic growth will drive prices back upwards and thus the falls should not be factored into longer-term thinking on the prices of inputs.

Table 2.1: Change in world GDP growth forecasts

	EDF September 2008	February 2009
2008	3.1%	2.1%
2009	2.6%	-1.3%
2010	3.6%	2.8%
2011	3.8%	4.0%
2012	3.7%	4.1%

Source: Oxford Economics

Note: Annual average growth

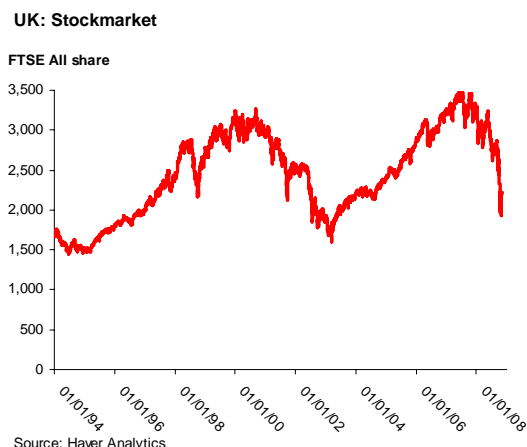
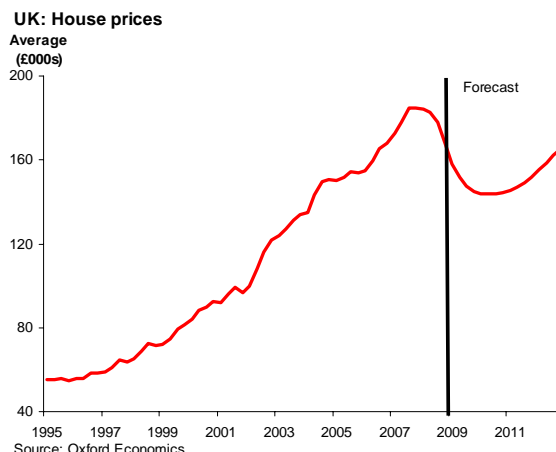
- As Table 2.1 reveals, the world outlook underpinning the analysis in this report (EDF September 2008) is more optimistic in the medium-term than the latest February 2009 outlooks, reflecting the speed of the deterioration in economic conditions. This is important to consider when reviewing the shorter term results. However, the longer term outlooks and skill forecasts, which are the focus of this report, are less sensitive to the current downturn, at least at a global level.

2.4 UK and ROI context

UK context

- The UK economy contracted by 0.6 per cent in 2008 Q3 (revised from a 0.5 per cent fall) and 1.5 per cent in 2008 Q4 - the required two quarters of contraction to trigger a 'technical recession'. For many consumers and businesses the economy will have felt recessionary well before the official figures confirmed recession. The data do however refute the claims that it was purely a 'psychological' or a 'media doctrine' recession and instead rather suggest a genuine and severe economic contraction which will see a non-trivial number of job losses. The deterioration has been relatively fast during the later half of 2008 and though warning signs abounded in the early part of the year, formal recession was not the formality people might say with hindsight. In particular the total breakdown of the lending markets and subsequent near bankruptcy of some of the world (and the UK's) major financial institutions could not have been easily foreseen.

- The UK recession is one of an unwinding of debt but it is taking place rather more suddenly than might have been expected with a sharp collapse in both equity values (Fig 2.3) and house prices (Fig 2.4) significantly impacting peoples' assets base (and ultimately perceived or actual wealth). This is further contracting the levels of consumer spending, as is the limited injection of new monies into the economy through lending to the private sector (primarily to individuals through mortgages but also to businesses).

Fig 2.3: UK stockmarket (up to Feb 2009)

Fig 2.4: UK house prices (Feb 2009)


- This collapse in wealth, inability to borrow to spend and increasing fears over unemployment (which is rising sharply – Fig 2.5) have, unsurprisingly, plunged confidence levels to record lows (Fig 2.6). It is worth noting the long-standing negative balance of confidence even during very positive times for the UK economy.

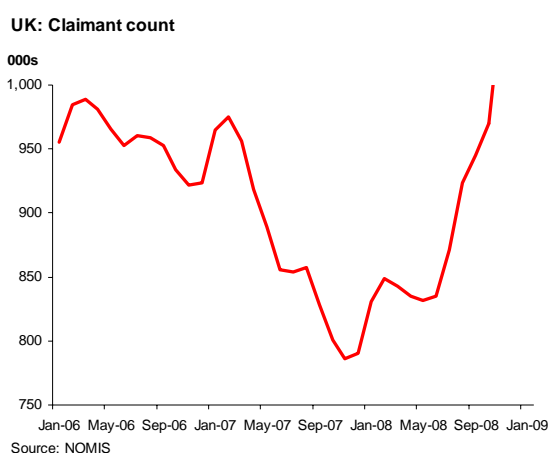
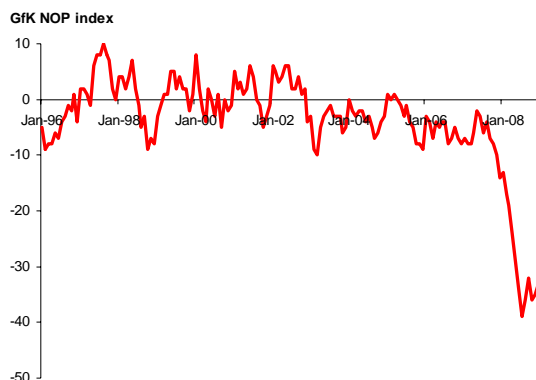
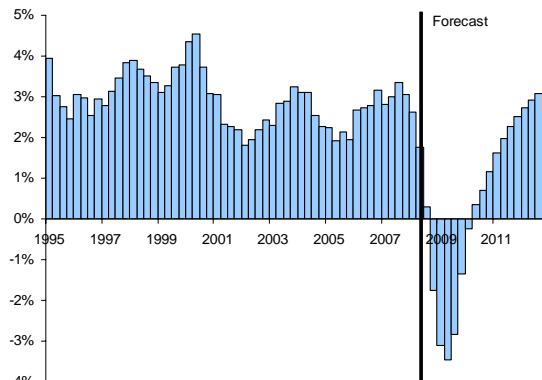
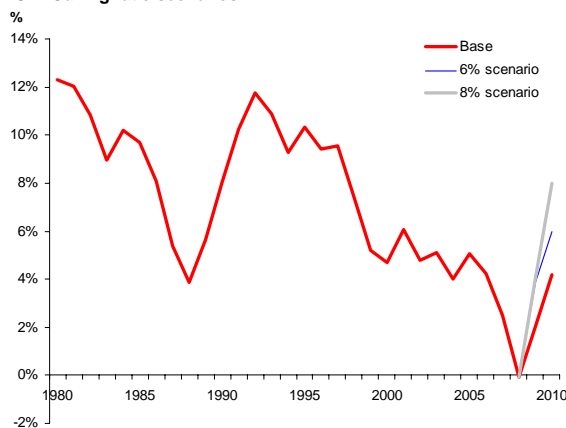
Fig 2.5: UK claimant count (up to Jan 2009)


Fig 2.6: UK confidence (up to Dec 2008)
UK: Consumer confidence

Fig 2.7: UK GDP growth (Feb 2009)
UK : GDP growth
% annual


- Looking forward the critical consideration to determining the rate of UK economic growth (and growth in other economies including NI) is the extent to which consumers 'retract' and re-build savings. Saving ratios have fallen to perilously low levels (indeed into negative territory), not previously recorded even in the last 2 recessions. This is clearly unsustainable and as Fig 2.8 and Table 2.2 show, a return to a 9 per cent savings ratio (hardly at the extremes of possibility) would lead the UK economy into a much more severe downturn - a +4 per cent contraction would push unemployment (ILO definition) very high indeed (certainly in excess of 3 million).

Fig 2.8: UK saving scenarios (Jan 2009)
UK: Saving ratio scenarios

Table 2.2: UK saving scenarios – GDP growth (Feb 2009)

		5 per cent saving ratio (Feb 09 baseline)	7 per cent saving ratio	9 per cent saving ratio
GDP	2009	-2.9%	-3.5%	-4.4%
	2010	0.6%	-0.2%	-0.5%
CPI inflation	2009	1.0%	0.7%	0.2%
	2010	1.5%	1.0%	0.4%
Bank rate	2009	1.3%	0.7%	0.0%
	2010	0.8%	0.2%	0.1%

Source: Oxford Economics

- Current UK forecasts suggest a mild recovery in 2010, gathering pace in 2011 – but how likely is it? Even in the short-run the aggressive interest rate cuts by the Bank of England (with more likely to follow) and fiscal stimulus (bail out of banks and reduction in VAT) could have a greater impact on consumers than currently envisaged, helping to shorten the slowdown. However it is more likely that it will take improving lending conditions and an end in the current swath of redundancies before spending levels pick up again (and not to recent levels of excess). The recovery depends upon a return to a more 'normal' level of lending and borrowing in the private sector (and most notably in the housing market) and the UK retaining its position as a global provider of advanced professional and financial services (the depreciated level of Sterling should help in this regard). A short-term boost of government investment needs to be quickly replaced by an improved export performance and revived levels of consumer spending in order for the forecast recovery to move from projection to reality.

Table 2.3: Change in UK GDP growth forecasts

	EDF September 2008	February 2009
2008	1.2%	0.8%
2009	0.5%	-2.9%
2010	2.2%	0.6%
2011	3.2%	2.3%
2012	3.2%	3.3%

Source: Oxford Economics

Note: Annual average growth

ROI context

- The ROI economy was the first Eurozone economy to enter recession (during the first half of 2008), as the construction boom unwound at a rapid pace and export markets suffered the impacts of the global slowdown. In stark contrast to UK fiscal policy to run deficits to stimulate demand, the ROI government (who cannot cut interest rates in any case as they are set by the European Central Bank) reacted quickly with a tough budget (two month's early) recognising the scale of the problems and tightening fiscal plans accordingly. The ROI economy looks particularly exposed to the current slowdown and immediate prospects are far from favourable, indeed worse so than for both UK and NI.

The bullet points below set out a summary of a number of the key factors impacting upon the ROI's level of exposure to the current economic challenges.

- The housing market boom in ROI, fuelled by a growing economy (both in jobs and population terms), low interest rates and a generous lending market, triggered sharp rises in prices. This encouraged house-building and helped to support a significantly larger construction sector than in parts of the UK. House prices have since contracted sharply, with the expected knock-on effects on the over-sized construction sector and indirectly on retailing and professional services sectors (e.g. real estate, legal services dealing in property transactions etc).
- One of the major growth components of ROI's success has been a rapidly expanding, and highly profitable, international financial centre. This sector has been adversely impacted by the credit crunch and subsequent recession and thus ROI is now more exposed than would otherwise be the case.

- It is well-known that the US economy has been acutely impacted by the credit crunch. Though ROI will remain an attractive location for FDI as the low rate of corporation has withstood pressure to increase it (indeed the slowdown will help ease some cost pressures longer term), outbound FDI flows from the US are unlikely to be significant during the slowdown.
- With a sustained period of higher inflation and VAT at 21 per cent, the cost of living is high in ROI relative to NI. Though wages are also relatively high, many people will have lost their job, or at least fear doing so, resulting in a severe dent to confidence (and as previously noted confidence is a hugely important factor in investment and spending decisions). Given the higher cost of living and the rapid weakening of Sterling, flows of retail spending north into NI are likely to remain high for the foreseeable future. In real terms, adjusting for inflation differentials, sterling has depreciated by over 50 per cent against the Euro since 2001, a massive change which will take some time to reverse if at all.
- Though the situation may change, the ECB is not likely to make as aggressive cuts to its interest rate as the Bank of England, or indeed which the Central Bank of Ireland would make to boost demand and housing sales if it had the power to do so. For a long time ECB interest rates were too low for the ROI economy fuelling excess demand. Now the opposite is true.
- Coupled with this, the priority put on balancing the budget by ROI with a tight fiscal stance is contrary to what the UK, US and others are doing with fiscal stimulus budgets (as they have less pressure to balance the books than ROI which has to meet the Eurozone Stability Pact fiscal criteria). One would expect this to dampen demand in the short-run in ROI. Although a tight fiscal stance proved helpful to Margaret Thatcher in the 1980s recession, it is a largely Keynesian 'demand' boost approach being advocated elsewhere.

Looking further ahead ROI remains well positioned to enjoy longer term growth. The favourable corporation tax rate and a well skilled and experienced work force remain hugely competitive factors. With the slowdown a global phenomenon, the out migration of the most qualified labour is likely to be more limited than if it were a uniquely Irish problem. The future strength of the US economy remains important as does a return to growth in exportable tradable services. Much of this activity, centred around Dublin, is crucial to tax returns and economic growth. At a time when the UK and other governments are likely to be tightening the fiscal purse strings (and possibly forced to increase tax rates), the expectation is that the ROI Government will relax fiscal policy as required and tax levies on high earners, as if retained longer-term these could detrimental to economic potential.

Table 2.4: Change in ROI GDP growth forecasts

	EDF September 2008	February 2009
2008	-0.4%	-1.0%
2009	1.1%	-4.2%
2010	2.9%	0.6%
2011	3.7%	2.7%
2012	3.4%	3.1%

Source: Oxford Economics

Note: Annual average growth

2.5 NI context ... end of 'golden era'

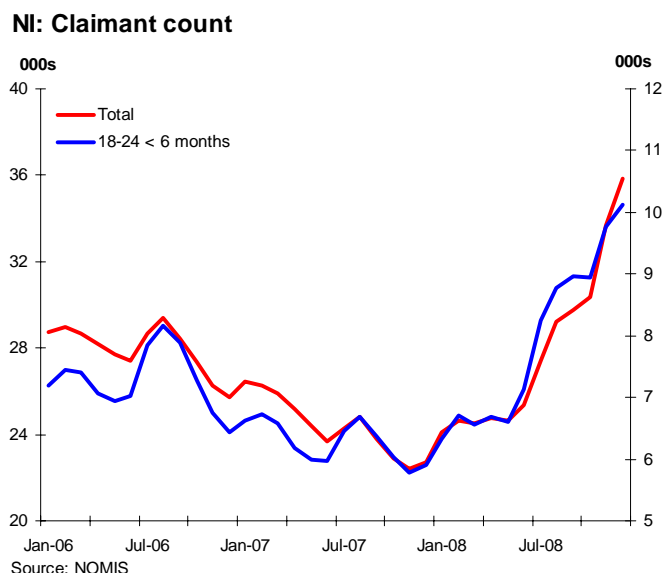
- The Northern Ireland economy, much in the same way as the UK, ROI and several other leading economies, will not escape the current recession. This is even despite its large public sector providing a very helpful buffer. The extreme overheating in the property market has led to a marked fall back for the economy and this has impacted through construction into retailing and elements of business services (real estate, legal services etc), the latter of which all depend upon house moves for business. Quarterly employee jobs data from DETI, though sometimes volatile, clearly confirms the downturn with net jobs losses across construction, retail and professional services (Table 2.5). As a result unemployment is rising although there is no evidence yet that recent youth unemployment is rising any faster than overall claimant count unemployment, which otherwise might have indicated education leavers experiencing more difficulty entering employment (Fig 2.9).

Table 2.5: NI quarterly change in employee jobs

	2007 Q3	2007 Q4	2008 Q1	2008 Q2	2008 Q3
Manufacturing	380	260	-240	-10	-1,040
Construction	620	50	-750	-880	-1,690
Retail & distribution	0	6,790	-4,250	1,100	-770
Financial services	40	30	140	-120	-360
Business services	3,740	570	-210	-430	-1,640
Other personal services	120	-150	20	520	-90
Total	1,470	10,260	-4,490	-530	-9,800

Source: DETI

Fig 2.9: NI claimant count



- The extent of the slowdown in the region is however something of an area for debate. The over-exposure to retail and construction-led growth has led a number of commentators to predict a more severe impact than for the UK as a whole. Oxford Economics point to (1) the fall in mortgage lending, which is broadly similar in levels to the drop-off in the UK as a whole and (2) the offsetting upside impact of the large public sector, and the retail boost from cross-border trade, as reasons to expect the slowdown to be of a similar, but not worse, extent than the UK average.

- **What is clear is that the economic conditions, performance and the outlook in early 2009 look entirely different to those in the decade prior.** As said above, already quarterly employee data shows declines in business services to compound the already established and well-known contraction in the construction sector. The fall in Sterling will have helped exporters (in addition to the fall in oil prices) though slowing world demand and rising costs of imports will reduce these benefits - manufacturing job losses in Q3 2008 were particularly high (Table 2.5). The VAT cut (though modest) and the fall in mortgage rates will have boosted the real incomes of many residents (especially those in or linked to the public sector where job fears are less acute). The impact of cross border trade is also a further factor to push against the downward pressures on retail from reduced confidence.
- Nevertheless it is a near certainty that job creation and growth will moderate from its recent levels (153,000 job 1996-2008 compared to EDF 2008 baseline outlook 59,000 2008-2020), and indeed the latest data suggests the picture is even weaker in the short-term than the data underpinning the rest of this report (based on the September 2008 EDF forecasts). Fig 2.10 sets out total employment forecasts from Oxford Economics from the EDF September 2008 submission and the very latest forecasts. The February 2009 forecasts are provisional and reflect a reduction in longer-term international migration flows and a much more severe and prolonged short-term slowdown.

Fig 2.10: NI total employment forecast (job-based)

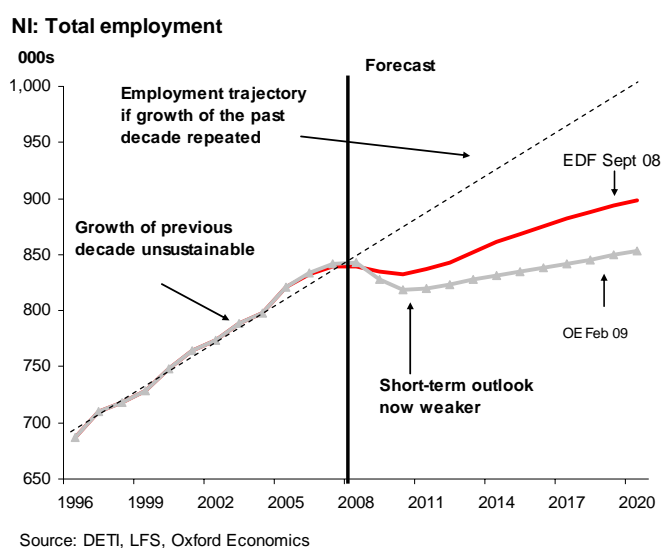


Table 2.6: Change in NI GVA growth forecasts

	EDF September 2008	February 2009
2008	1.3%	1.2%
2009	0.5%	-2.3%
2010	2.1%	0.4%
2011	3.2%	2.2%
2012	3.1%	2.7%

Source: Oxford Economics

Note: Annual average growth

Box 2.2: EDF September 2008 versus Oxford Economics February 2009 forecasts

The period since mid-2008 has been perhaps the most uncertain in post war history in the UK, and indeed in the global economy. The problems which originated in the finance and lending markets (the so called 'credit crunch') has spiralled into a global recession as demand falls in response to reduced credit availability, collapsing property values and confidence levels, which have reached all time lows. This has made it a challenging time for forecasters and throughout the last 6 months outlooks have continued to be downgraded by all the major forecasting houses. No organisation or model correctly predicted the extent of the problems and most models suggested the rapid and significant policy response already in place would have made a greater impact than it has to date.

This causes difficulties for the research carried out for this project which is based upon the September 2008 EDF forecasts. Although these forecasts predicted a fall in employment, it was relatively shallow and confined to the construction and consumer sectors. The latest forecasts (February 2009) show a much more severe recession reaching into the manufacturing and professional services sectors and a more modest recovery as squeezed public finances dampen demand.

A comparison of the latest forecasts with the September 2008 projections upon which this report is based are set out below in Fig 2.10 and at the start of chapter 4. This reveals a significantly lower employment forecast level by 2020 (though longer term growth rates are broadly similar). This would have a noticeable impact upon the results, particularly during the shorter term (2009, 2010 and to a lesser degree 2011). Though long term average growth rates remain broadly comparable to those utilised within the report (and the direction of travel of skill needs will not change markedly), the considerably weaker near term would lead to a greater excess of labour supply in the short-run, thus bringing the conclusions relating to the recession impact into sharper focus. The potential for a 'lost cohort' or two is considerable and thus the short-term 'warm storage' options for leavers from education in 2009 and 2010 will almost certainly be necessary to avoid 'locking out' a considerable tranche of young people.

Furthermore the recovery is not predicted to be strong enough to 'hoover up' the excess supply meaning there will be an ongoing oversupply unless faster growth can be achieved (or migrant outflows increase). This means the figures and analysis surrounding the aspirational growth trajectory carry greater importance, though achieving faster growth looks even more challenging in the current environment. The results contained within the report remain useful, as the longer term labour market expansion of approximately 5,000 jobs per annum remains consistent with educational outputs (see later for an explanation) but the problems caused by the recession with respect to skills demand and its impact on supply and on labour market outcomes are much more acute than predicted six months ago.

3 Skills in context

3.1 Chapter overview

Box 3.1: Skills in context – overview of key issues

NI skill strengths

- Workforce skill levels have been improving steadily over the last decade
- NI is 'within the pack' of UK regions for higher level workforce qualifications
- Most of NI's private service sectors have a broadly comparable concentration of graduates relative to the UK average

NI skill weaknesses

- Graduate concentrations in agriculture, manufacturing, construction, retail and hotels & restaurants lag well behind the UK average
- There is an under-representation of managerial and professional occupations and limited higher education subject specialisation

Where could NI be if it had equivalent UK concentrations within sectors?

- 12,000 more persons in employment with sub-degree, degree and postgraduate qualifications
- 30,000 more managers and 20,000 more professionals
- 4,000 more STEM degree holders in work (based on narrow STEM definition – physical sciences, mathematical & computer sciences and engineering & technology)
- 7,000 more creative and arts degree holders in the workforce

Note the analysis in this chapter is based on LFS analysis conducted specifically for this report. None of the data or figures for NI and GB regions are taken from other publications or official data sources.

3.2 Recent trends in NI workforce skills

- Skills levels in the workforce have been improving steadily over the last decade with the per cent of the workforce with sub-degree, degree and postgraduate qualifications increasing from just over one fifth to almost 30 per cent (Table 3.1). (See Annex D for a full description of the NQF skills classification framework used throughout the report)
- Part of this increase is **due to the sectoral shift in the economy** away from more traditional lower skilled (in formal qualification terms) activities such as agriculture and textile manufacturing towards more skills hungry activities in the service sector and high value added elements of manufacturing.
- Older less qualified workers leaving the labour force coupled with inflows of more qualified young people also provides a **generational effect** in the skills 'ladder'.

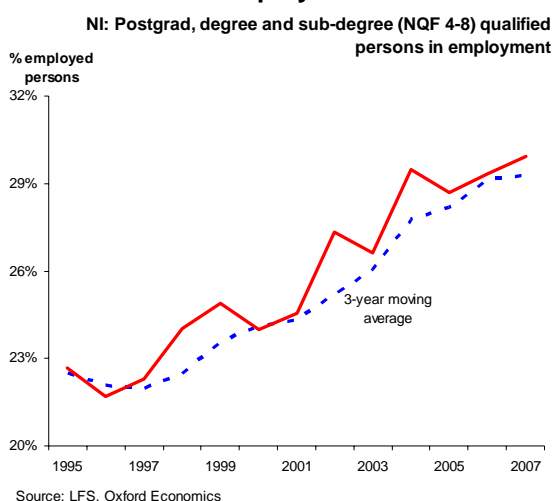
- It also appears that, according to our analysis, **up skilling of persons in employment**, for example part time or evening courses is having an impact, the size of which could be potentially large given the large number of part-time FE and HE enrolments

Table 3.1: NQF highest qualifications of persons in employment

	1997 % total (3-year moving average)	2007 % total (3-year moving average)	Change (percentage point)
Postgraduate (NQF 7-8)	3.4%	5.9%	2.4
First degree and sub-degree (NQF 4-6)	18.7%	23.5%	4.8
Intermediate a (NQF 3)	24.3%	23.7%	-0.6
Intermediate b (NQF 2)	18.3%	16.6%	-1.8
Low (NQF 1 and below)	35.3%	30.4%	-4.9
Total	100.0%	100.0%	0.0

Source: LFS, Oxford Economics

- Looked at over time the workforce skills pattern shows a rise in the share of higher level qualifications (NQF 4 and above). It will be interesting to see the impact of the recession on these trends – whether it will be lower or higher skilled individuals feeling the brunt of the job loss.
- The fall in the proportions of person in employment with low qualifications appears to have ended in 2004 and indeed begun to rise modestly (Fig 3.2). This may reflect the influx of lower skilled migrants into the economy and it may also reflect a need for a minimum level of ‘unskilled’ labour. 2005 would appear to be a quirk of the data but a rising proportion of persons employed with low qualifications, or at minimum an end in decline, still appears evident.

Fig 3.1: Trend in NQF 4-8 qualified persons in employment

Fig 3.2: Trend in persons in employment with low qualifications


3.3 Where is NI today - comparison with GB regions and ROI

Higher level skills in employment

- In relative terms the Northern Ireland economy is 'within the pack' of UK regions. With 29 per cent of persons qualified to sub-degree, degree and postgraduate level employed, NI is on par with the Eastern region and above the Welsh and industrial Midland regions. The impact of London (and Scotland) on the UK average is significant and largely explains the observed UK relativity differential. Excluding the Greater South East, there is only a slight differential (Table 3.2).
- According to CSO data from the QNHS (equivalent to the LFS), ROI has a higher share of graduates in employment (Table 3.2). This is as expected given the 'Celtic tiger' boom and the rapid GVA growth often quoted and aspired to (indeed the educational outputs are often cited as key in delivering this growth).
- In global terms many countries perform stronger with Canada and Finland notably high (these figures relate to proportions of the working age population and thus it most likely understates the higher level skill concentrations in the workforce).

Table 3.2: Workforce higher level skill relativities – total economy

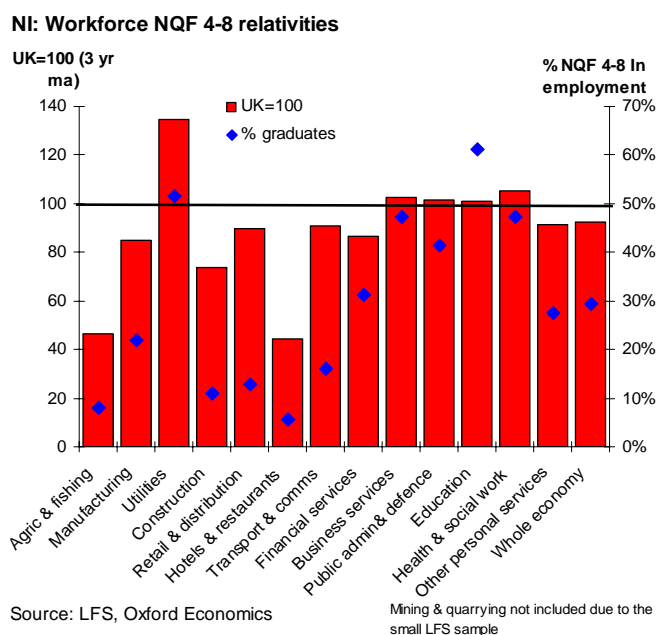
	Sub-degree, degree and postgrad % employed persons (2007, 3-year moving average)	UK=100
Canada (adult graduate pop 2005) *	46%	145
London	44%	137
US (adult grad pop 2005) *	39%	123
Scotland	36%	113
Finland (adult graduate pop 2005) *	35%	109
ROI (graduate) *	34%	106
South East	33%	104
UK	32%	100
South West	30%	96
North West	30%	94
UK excluding Greater South East	30%	93
NI	29%	92
Eastern	29%	91
Wales	28%	90
East Midlands	28%	88
West Midlands	28%	88
North East	28%	87
Yorkshire & Humber	26%	83
France (adult graduate pop 2005) *	25%	78
Germany (adult graduate pop 2005) *	25%	77

Source: LFS, OECD, CSO QNHS (ROI), Oxford Economics

Note: UK regional figures refer to the share of NQF 4-8 persons in employment. International figures refer to the share of 25-64 working age persons with graduate qualifications (ISCED 5+6, which is not directly comparable to NQF 4-8), i.e. not persons in employment. The graduate employed share in international comparators is likely to be higher still (and for a more recent year since 2005). ROI figure refers to persons in employment with 3rd level degrees (equivalent to ISCED 5+6, which is not directly comparable to NQF 4-8)

- It is also useful to consider whether the sectoral make-up of the Northern Ireland economy explains the differential in high level skill concentration. Fig 3.3 reveals that there are notable divergences in NQF 4-8 relativities across sectors.
 - Hotels & restaurants and agriculture record the biggest differential with less than half the share of NQF 4-8 employed persons in the UK as a whole. This may reflect more part-time, less qualified work in both sectors in NI or a more fundamental weakness with respect to the structure of the sectors.
 - Manufacturing, construction and retailing also exhibit a differential of between 10 and 25 per cent. This may reflect a limited number of management positions in the retail sector and within the construction sector which is dominated by smaller firms in Northern Ireland. In manufacturing it may partly reflect the specific nature of the sector in NI (i.e. sub-sectoral mix) but may also be indicative of a limited number of high end activities taking place within the region's industrial base (though remember that outsourced management or head office functions are classified under the business services sector).
 - Outside retailing and hotel & restaurants most of the private service sector has a broadly comparable concentration of graduates to the UK average, even in the key export potential sectors of financial and business services (of course the potential for graduates to work in a sector, for example a call centre, and not require the level of qualification is a possibility).
 - Utilities is the only sector to record a markedly above UK average concentration of graduates, perhaps reflecting the structure of the industry in Northern Ireland (much of which remains in public hands) or it could be a classification issue if head office functions are not correctly recorded in business services within NI.

Fig 3.3: Workforce NQF 4/5/ relativities by sector



- It is useful to consider how much of NI's higher level skill gap with the UK average is explained by sector structure and how much by lower individual sector graduate concentrations. As reported in Annex B, approximately 0.8 per cent or one-third of the 2.6 per cent differential [Table 3.2 - 32 per cent (UK) minus 29 per cent (NI)] is explained by sector structure and the other 1.6 per cent by the relative graduate concentrations within sectors (figures may not add due to rounding). That is the

sectoral structure of the NI economy is only part of the explanation for NI's workforce high skill level gap.

Occupations

- Occupational structure is heavily dependent upon sectoral composition. For example a large construction sector will be reflected in high numbers of skilled construction trade occupations. Fig 3.4 and Table 3.3 sets out relative concentrations of the 25 occupations in NI.
- NI has a relative under-representation of managerial and professional occupations; protective service occupations; culture, media & sports occupations and customer service occupations. The managerial and professional under-representation is likely a reflection of the limited 'upper-end' activities located in the region (reflected in the small number of NI PLCs and the 'small nature' structure of the economy). Many of the industrial and indeed professional services activities are not at the headquarter or design and strategy end of the spectrum and thus demand for managerial and professional occupations is lower
- Sales occupations and skilled trades are over-represented in Northern Ireland, partly a reflection of sectoral mix but also again reflection of many firms' position within the 'value chain'. Many call centre workers will describe themselves in sales (though customer service occupations would be their correct classification).

Fig 3.4: Occupation relativities

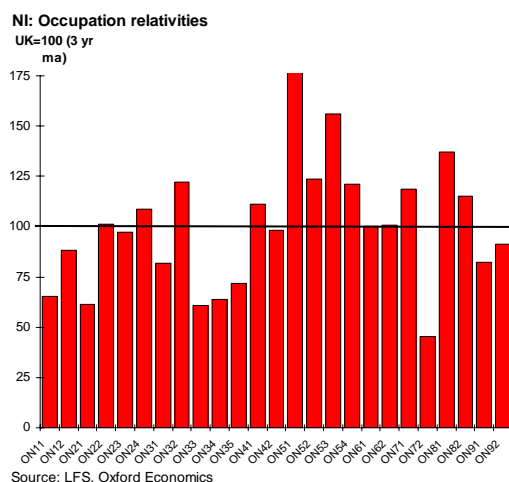


Table 3.3: Occupation relativities

		NI (UK=100)	NI weekly wage (2008)
ON11	Corporate Managers	66	£570
ON12	Managers & Proprietors in Agriculture & Services	88	£460
ON21	Science & Technology Professionals	61	£573
ON22	Health Professionals	101	£788
ON23	Teaching & Research Professionals	97	£690
ON24	Business & Public Service Professionals	109	£621
ON31	Science & Technology Associate Professionals	82	£381
ON32	Health & Social Welfare Associate Professionals	122	£519
ON33	Protective Service Occupations	61	£771
ON34	Culture, Media & Sports Occupations	64	£480
ON35	Business & Public Service Associate Professionals	72	£499
ON41	Administrative Occupations	111	£323
ON42	Secretarial & Related Occupations	98	£316
ON51	Skilled Agricultural Trades	309	£276
ON52	Skilled Metal & Electrical Trades	124	£466
ON53	Skilled Construction & Building Trades	156	£389
ON54	Textiles, Printing & Other Skilled Trades	121	£318
ON61	Caring Personal Service Occupations	100	£295
ON62	Leisure & Other Personal Service Occupations	101	£310
ON71	Sales Occupations	119	£253
ON72	Customer Service Occupations	45	£262
ON81	Process, Plant & Machine Operatives	137	£345
ON82	Transport & Mobile Machine Drivers & Operatives	115	£377
ON91	Elementary Trades, Plant & Storage Related Occupations	82	£317
ON92	Elementary Administration & Service Occupations	91	£282
	Total	-	£418

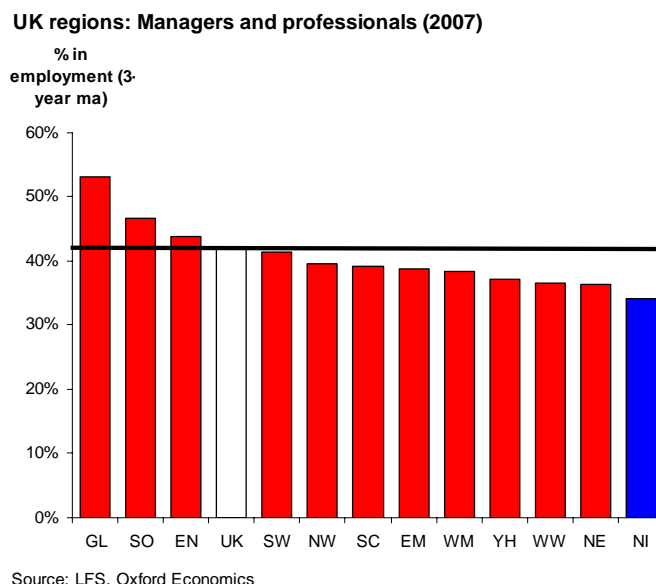
Source: LFS, DETI ASHE, Oxford Economics

Note: Cells shaded purple indicate NI's occupation share is 10 per cent less than the UK average. Cells shaded blue indicate NI's occupation share is 10 per cent greater than the UK average. Weekly earnings are median gross earnings full-time

- Looking further at managerial and professional occupations (Fig 3.5) this is clearly one economic strength indicator where NI remains firmly at the bottom of the regional spectrum, with the North East and Wales the nearest neighbours (as they are interestingly in GVA per head and productivity estimates). Again London and the South East lead the way, and strongly influence the level of the UK average but this is a clearly identified 'weakness' in the NI economy (and was also identified during the consultation phase of the research). It is of note too that the Success through Skills'

vision also includes an objective to have “progressive leadership from a strong cadre of local managers”.

Fig 3.5: Managerial and professional occupation concentrations



- Drilling further into the occupational mix within sectors for the key export sectors of manufacturing and business services¹⁷ (Tables 3.4 and 3.5), the managerial and professional gap remains evident compared to the ‘near neighbours’ in prosperity terms - Wales and the North East
- In manufacturing just over one in ten workers in NI are managers, compared to close to two in ten in the UK. The level is below that in both the North East and Wales. NI has a higher concentration of process operatives and skilled trades than average.

Table 3.4: Occupation concentrations – manufacturing

	NI	North East	Wales	UK
Managers & senior officials	11%	16%	13%	18%
Professional occupations	7%	8%	5%	9%
Associate professional & technical occupations	9%	8%	8%	11%
Administrative and secretarial occupations	7%	7%	6%	8%
Skilled trades occupations	24%	21%	22%	20%
Personal service occupations	0%	0%	0%	0%
Sales and customer service occupations	2%	1%	1%	2%
Process, plant and machine operatives	32%	28%	33%	22%
Elementary occupations	7%	11%	11%	9%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

¹⁷ Though only offering limited exports at present, business services have the potential to be a much larger contributor to overall export figures

- In business services again the managerial gap is evident. Strikingly NI, according to the LFS, actually has a much higher concentration of professional occupations than Wales or the North East, or even the UK average. This, backed up by the evidence of around average concentrations of graduates across much of the private services sector (including business services), suggests that the structure of this sector is more comparable to the UK average and **it is in production sectors (agriculture and manufacturing) and supporting secondary sectors (retail and construction) in which the 'high end' gaps in management / professionals and consequently graduate concentrations are.**
- **Again it must be recalled that neither concentrations of graduate nor occupations necessarily tell the full story of the relative performance of a given sector. Under-utilisation of skills and a lack of comparability of a management position across different sectors remain factors to bear in mind.**

Table 3.5: Occupation concentrations – business services

	NI	North East	Wales	UK
Managers & senior officials	12%	15%	16%	20%
Professional occupations	27%	18%	20%	24%
Associate professional & technical occupations	15%	20%	19%	18%
Administrative and secretarial occupations	18%	16%	21%	17%
Skilled trades occupations	6%	7%	3%	3%
Personal service occupations	1%	1%	2%	1%
Sales and customer service occupations	2%	5%	2%	3%
Process, plant and machine operatives	4%	3%	2%	2%
Elementary occupations	15%	16%	14%	12%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Annex B provides additional analysis on occupation concentrations for all industry sectors for NI, North East, Wales and UK.

Degree subjects of workforce

- The LFS also holds data on the main subject of study in degree qualifications, which covers roughly 75 per cent of NQF 4-8 (See Annex D for a detailed overview of the JACS subject classification framework and examples of sub-degrees which fall under broad degree subject categories). NI has a much higher concentration of medicine & dentistry and subjects allied to medicine graduates working than the UK average, almost twice as high (Table 3.6). This is partly a reflection the sectoral mix (NI has almost 20 per cent more health jobs per capita compared to the UK average) but also reflects the region's recognised specialism in medical care.
- The above average concentration of veterinary and agricultural degrees also reflects the sectoral mix of the region and is to be expected.
- Business & administration degrees are also highly concentrated in NI, as are education degrees. Business and administration degrees, according to the HESA JACS classification, include a range of subjects such as business studies, management, accountancy and hospitality. The large public sector in the region is clearly a factor behind the above average education pattern. Many of the qualifiers in other subjects may not have had employment opportunities within the region and consequently moved elsewhere.

- Languages, mass communications (includes media studies), science and art / design have much lower concentrations in the region, again partly a reflection of the sectoral mix but equally an important factor in understanding the skills base within the region.
- Though not at the lowest relativities, the concentrations of mathematics, computing and engineering are also well below UK averages, around one fifth less.
- **By way of summary there appears to be limited subject specialisation within the NI region, with more general subjects (business & administration and combined degrees in evidence) and much less specialism across engineering, creative and classic subjects.**
- It is however important to also consider relative levels (as, for example, the higher proportion of business & administration degrees automatically lowers the share of other degrees). Standardisation per 10,000 working age population, as presented in the final column of Table 3.6, shows that the same pattern holds sway although some of the relative differences are less marked.

Table 3.6: Degree subject relativities

	NI % total degree qualified employed persons (UK=100)	NI % total degree qualified employed persons	NI subject degree employed persons per 10,000 working age population (UK=100)
Medicine and Dentistry	197	5%	171
Subjects Allied to Medicine	126	14%	109
Biological Sciences	73	4%	63
Vetinary Science, Agriculture and Related Subjects	124	1%	107
Physical Sciences	65	3%	56
Mathematical and Computer Sciences	82	5%	71
Engineering	80	5%	69
Technologies	88	1%	77
Architecture, Building and Planning	92	2%	79
Social Studies	98	6%	85
Law	69	2%	60
Business and Administration	138	15%	119
Mass Communication and Documentation	48	1%	42
Linguistics, Classics and Related	31	1%	27
European Language, Literature and Related Subjects	62	1%	54
East Asiatic, African, American and Australian Languages and Literature	0	0%	0
History and Philosophical Studies	76	3%	66
Creative Arts and Design	66	3%	57
Education	107	7%	93
Combined degree	111	21%	96

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK

- Looking at regional concentrations in a select number of subjects, NI's relative concentrations can be set in context. At over one in seven of all graduates in employment Northern Ireland has by far the highest regional concentration in business & administration degrees within the workforce. London is next in the regional distribution with more industrial regions towards the lower end of the distribution (Fig 3.6).

- In STEM subjects Northern Ireland trails behind (Fig 3.7) though its rank is boosted by its above average concentration of medicine & dentistry and subjects allied to medicine graduates. While not presented here, analysis using a more narrow definition of STEM (physical sciences, mathematical and computing sciences and engineering & technology) reveals NI trailing far behind the UK average. Based on this narrow definition, the share of degree qualified persons in employment in NI holding a STEM qualification is a full 2 per cent lower than any other UK region and 7 per cent below the top regions of the South East and Eastern where advanced manufacturing and specialist service activities attract STEM graduates.

Fig 3.6: Business and Administration degree concentrations

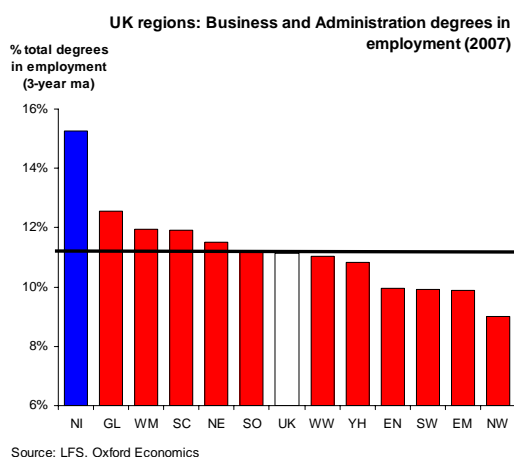
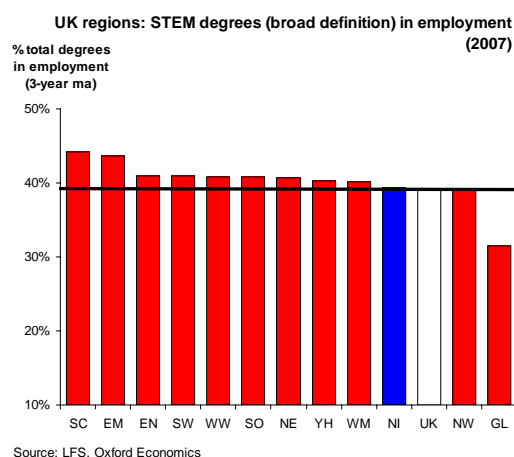


Fig 3.7: STEM (broad definition) degree concentrations



- Northern Ireland also trails in last in the regional graduate concentration for creative arts and design subjects and other art subjects. Interestingly London is far and away the region with the highest concentration of both creative and arts degrees (Figs 3.8 and 3.9) – London will have a higher proportion of graduates with backgrounds in graphic design, film making etc – i.e. more commercially orientated creative sectors linked directly to the economy as opposed to less commercially orientated subjects such as fine arts. The industrial midlands regions, Scotland and the North East have well below UK averages, but above the low levels (by around 3 per cent in both cases) in Northern Ireland

Fig 3.8: Creative Arts and Design degree concentrations

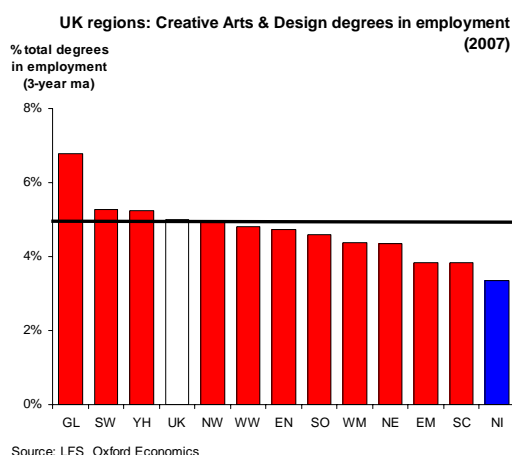
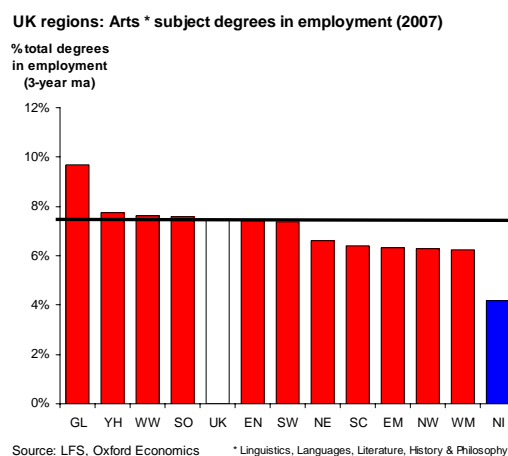


Fig 3.9: Arts Subjects degree concentrations



- Again drilling down into the key export sectors provides interesting additional information. In manufacturing, medical, combined degrees and business & administration degrees are the most over-represented in the NI economy relative to the UK (Table 3.7). The proportion of medical subjects in manufacturing is very small and therefore relatively unimportant but close to half of graduates in NI industry have a combined or business & administration degree compared to just over a third in the UK as a whole.
- Creative art and design are particularly under-represented in NI's manufacturing graduate workforce compared to the UK, though the STEM figures (the more narrow definition as above) are also revealing at 10 per cent below the UK average. Nevertheless at one third of the manufacturing graduate workforce, core STEM subjects remain the dominant degree subject area.

Table 3.7: Degree subject relativities – manufacturing

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	44%	46%	95
Medicine & Dentistry and Subjects Allied to Medicine	4%	3%	153
Biological & Veterinary Science and Agriculture	6%	6%	106
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	33%	36%	90
Architecture, Building and Planning	0%	1%	0
Law	1%	2%	78
Business and Administration	25%	15%	171
Art Subjects *	1%	7%	13
Creative Arts and Design	1%	6%	23
Education	0%	1%	0
Combined Degree	23%	19%	126
Other	4%	6%	69
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

- In business services (Table 3.8) NI has a notably lower share of degree holders in STEM subjects at over 20 per cent lower than the UK average concentration. This may be partly due to a high proportion of temporary workers through recruitment agencies in mainland UK working in industry as contractors (and recorded under business services), but this is unlikely to fully explain the gap. HQ functions, which are limited in NI, may also partly explain this concentration of 2 in 5 of the UK's business services graduate workforce being qualified in a STEM subject. Furthermore many advanced professional services (such as architecture, design, technical testing and consultancy) may value scientific and mathematical qualifications above more general business degrees, if they could be obtained.
- Again the more generalist business & administration subject mix is much more prevalent in the NI graduate workforce within business services. Almost one quarter of graduate workers in the sector are qualified in this subject, compared to only one in six in the UK as a whole.

Table 3.8: Degree subject relativities – business services

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	30%	38%	78
Medicine & Dentistry and Subjects Allied to Medicine	3%	2%	127
Biological & Veterinary Science and Agriculture	2%	4%	44
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	18%	25%	72
Architecture, Building and Planning	7%	7%	109
Law	10%	9%	102
Business and Administration	23%	15%	149
Art Subjects *	2%	6%	33
Creative Arts and Design	4%	5%	81
Education	1%	1%	160
Combined Degree	24%	18%	132
Other	7%	7%	91
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Annex A sets out further analysis of other subject concentrations across all industry sectors, in which the pattern of over concentration of business & administration degrees remains a feature.

It is also useful to consider briefly the sectoral degree subjects of new entrants to employment. (Recall the above analysis is for the entire degree qualified workforce stock). Table 3.9, based on sectoral employment destinations by subject area from the HESA First Destination Survey, reiterates several of the same observations from above for new entrants to employment. That is, a relatively low inflow of some STEM subjects into the economy (e.g. mathematics graduates into financial services) and low inflows of language and creative arts & design graduates, particularly for the latter into manufacturing and business services. Other interesting observations include the relatively high share of computer science graduate entrants across the economy (which differs from the workforce stock observations) and a high share of agriculture graduates to manufacturing (most likely to the food & drinks sub-sector).

Table 3.9: Degree subject relativities of first destination entrants from HE – selected sectors (UK sectoral subject share=100, 2006/07)

	Manufacturing	Wholesale & retail	Financial services	Business services	Whole economy
Medicine and Dentistry	185	0	0	111	133
Subjects Allied to Medicine	86	223	148	93	142
Agriculture & Related Subjects	209	75	0	56	81
Physical Sciences	85	104	128	29	72
Mathematical Sciences	106	97	53	88	60
Computer Science	144	95	126	184	122
Engineering & Technology	121	54	140	76	89
Architecture, Building and Planning	215	181	260	129	130
Law	67	92	164	115	98
Business and Administration	115	99	100	162	110
Languages	62	99	81	52	69
Creative Arts and Design	56	47	70	44	49

Source: HESA, Oxford Economics

Note: Cells shaded purple indicate NI's sectoral degree subject entrant share is 20 per cent less than the UK sectoral average. Cells shaded blue indicate NI's sectoral degree subject entrant share is 20 per cent higher than the UK sectoral average

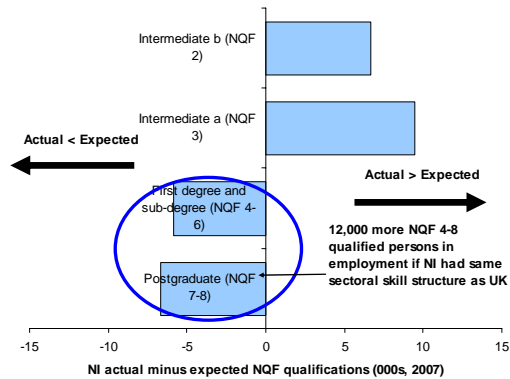
3.4 Where could NI be?

- It is a difficult question to assess where NI could be in terms of skills, occupational structure and subject concentrations. It may be the case that there are only a limited number of jobs requiring a given skills mix and it is unrealistic to consider these spread across the country – the London / South East concentration is the most effective spatial distribution to realised agglomeration, networking and economies of scale benefits. Nevertheless it is useful to explore, given the sectoral composition of NI, what the skills, occupational and subject concentrations would look like if equivalent to UK concentrations within sectors.
- Figure 3.10 shows that NI has a much larger concentration of people employed with intermediate qualifications than would be expected given its sectoral structure. Similarly around 12,000 more NQF 4-8 qualified persons in employment might be expected given NI's sectoral composition. Results for low qualifications are not presented as the high UK figure for other qualifications, which may not be low level at all, distorts the overall relative low skill comparison.
- Figure 3.11 suggests (as discussed previously) that higher level skill concentrations (NQF 4-8) are lower in production and secondary sectors (manufacturing, construction, hotels and retailing), with public services and other elements of private services much closer to the high level skill concentrations which might be expected.
- Figure 3.12 depicts the occupational structure compared to what might be expected given the sectoral mix within the region. This shows a legacy of an industrial past with skilled trades and plant & process operatives higher than the sectoral mix would suggest. In contrast the economy is an estimated 30,000 managers and 20,000 professionals below the levels sectoral structure might suggest would be expected (this will be a big part of the explanation for lower productivity and wages compared to UK averages).
- In degree subject terms having accounted for sectoral structure, the over representation of business & administration subjects is clearly evident with approximately 8,000 more in employment than UK averages would predict. In contrast STEM (narrow definition) is around 4,000 graduates below UK average levels and creative / arts subjects approximately 7,000 below (Fig 3.13).

Further analysis of the managerial 'gap' (decomposing the gap into a sectoral and specific occupation effect) is set out in Annex B.

Fig 3.10: NI actual minus expected qualifications of persons in employment (2007)

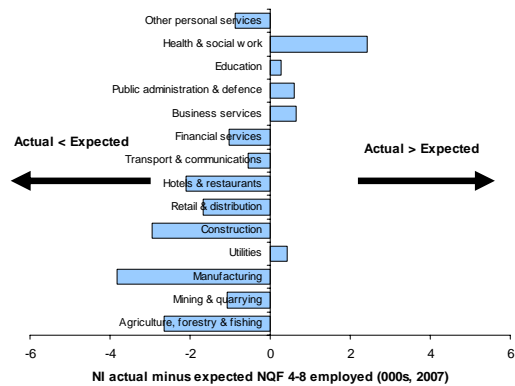
NI: Actual minus expected qualifications (2007)



Source: LFS, Oxford Economics

Fig 3.11: NI actual minus expected NQF 4-8 qualified persons in employment by sector (2007)

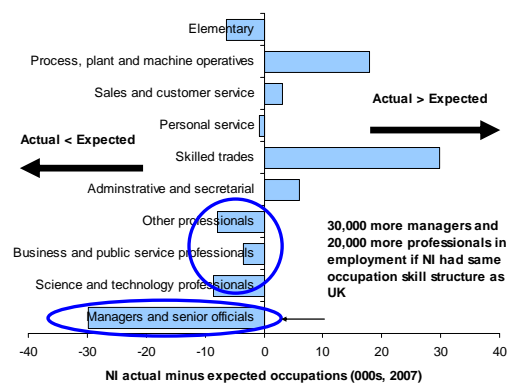
NI: Actual minus expected NQF 4-8 employed persons (2007)



Source: LFS, Oxford Economics

Fig 3.12: NI actual minus expected occupations of persons in employment (2007)

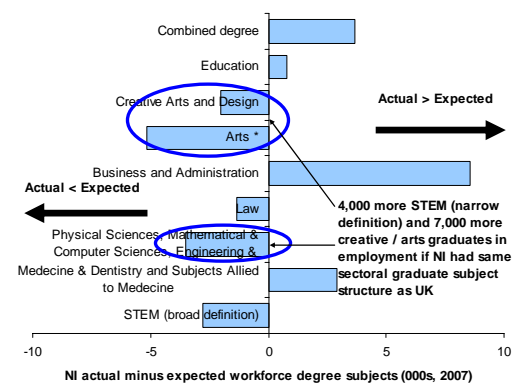
NI: Actual minus expected occupations (2007)



Source: LFS, Oxford Economics

Fig 3.13: NI actual minus expected subjects of graduates in employment by sector (2007)

NI: Actual minus expected workforce degree subjects (2007)



Source: LFS, Oxford Economics * Linguistics, Languages, Literature, History & Philosophy

4 Tomorrow's economy

4.1 Chapter overview

Box 4.1: Tomorrow's economy – overview of key issues

- As described in chapter 2, the previous decade was a 'golden era' for the NI economy with 13,000 net new jobs created on average pa
- The 'golden era' is now over and the central baseline forecast between 2008 and 2020 is 5,000 net new jobs pa with net jobs losses predicted in the short-run, and little economic convergence with the UK though the private sector productivity gap excluding the Greater South East is forecast to close partly but not completely
- The baseline may not be the long-term outcome NI aspires to but the reality is the decade ahead will be more challenging than ever
- Partly for this reason a more aspirational scenario was developed to give a picture of skill needs for the type of economy aspired to. In short the scenario is consistent with the ethos and direction of current policy and is more productivity than employment focused. Achievement of the aspirational scenario would deliver:
 - Net annual job creation of 7,300 pa
 - More jobs in exporting priority sectors
 - GVA higher by £2.7bn in 2020 (2003 prices) – an 8 per cent larger economy
 - Relative GVA per head up from 80 per cent to 85 per cent of UK average
 - PSA 1 parity by 2020 (i.e. not only halving the gap, closing it)
 - In summary catch up and convergence which would represent exceptional performance

4.2 Baseline outlook

- As discussed in the economic context chapter 2, it is perhaps the most challenging time since the Second World War for economists and forecasters to make projections. The extent of policy intervention is unprecedented and the economy is in uncharted waters. **The bursting of the debt bubble may have been inevitable but at the 'eye of the storm' is a dangerous place to predict the challenges on the way out.** As such the analysis is based around forecasts from the EDF September 2008 submission but this report does provide indicative estimates of the latest, more pessimistic short-term outlooks provisionally available from Oxford Economics in February 2009 (a full regional update is due in March 2009).
- The weakening of economic prospects in the sectoral employment outlooks set out in Table 4.1 suggest many sectors will struggle to be any larger in 12 years time than they are today. Significant contraction in construction (before later recovery) is a given and widely accepted, and has already been observed. Private services will also suffer. The longer-term employment declines for agriculture and manufacturing have moderated as the weakening of Sterling helps to bolster exports and improve UK competitiveness.

Table 4.1: NI sectoral employment trends and forecasts (EDF Sept 2008 and Feb 2009)

	EDF baseline Sept 08		OE baseline Feb 09	
	2008-2010 (000s)	2010-2010 (000s)	2008-2010 (000s)	2010-2010 (000s)
Agriculture, forestry & fishing	1	0	1	0
Mining & quarrying	0	0	0	0
Manufacturing	-2	-9	-5	-10
Utilities	0	0	0	0
Construction	-4	3	-5	1
Retail & distribution	-3	10	-4	9
Hotels & restaurants	0	6	-1	3
Transport & communications	-1	3	-1	1
Financial services	0	4	-1	1
Business services	-2	26	-3	23
Public administration & defence	0	-1	-1	-3
Education	1	2	1	3
Health & social work	4	12	3	11
Other personal services	1	2	-2	1
Total employee jobs	-5	57	-20	40
Land forces	0	0	0	0
Self-employment	-2	10	-5	6
Total employment (job-based)	-7	66	-25	46
Total employment (people-based)	-7	56	-24	38

Source: DETI, LFS, Oxford Economics

Note from Table 4.1 the gradual weakening of the overall long-term employment outlook between September 2008 and February 2009, which is most noticeable in the near term as the recession is assumed to be deeper and more prolonged (15,000 less employee jobs) but also in the longer-term.

- **From henceforth in this analysis we focus on the EDF September 2008 outlooks.** It is important to bear in mind a markedly revised set of GVA data has been published from Regional Accounts which provides updates (and in some sectors markedly revised) value added and productivity estimates. This revision is less important for this study in terms of skills and job requirements; though the implications for scenarios aimed at PfG productivity targets (PSA 1) is more critical.
- Figs 4.1-4.4 below present key economic forecasts for NI under the EDF September 2008 outlook. Following a long period of rising employment and falling unemployment rates, both rates are forecast to stabilise over the next decade reflecting the slower rate of employment growth.

Fig 4.1: NI and UK employment rates (EDF Sept 08)

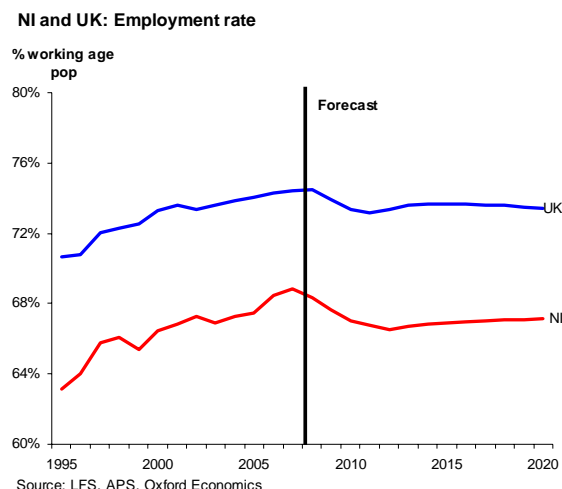
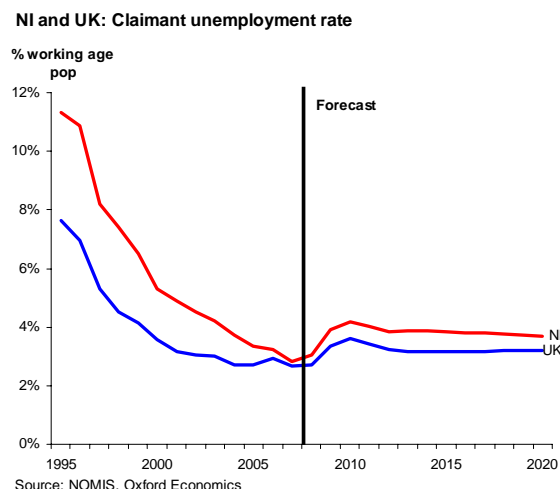


Fig 4.2: NI and UK claimant unemployment rates (EDF Sept 08)



- As shown by Fig 4.3, GVA per head and productivity (as defined as GVA per job) has fallen in Northern Ireland since the mid-1990s (note again this is not based on the revised Regional Accounts data). Much of this is due to a hard-to-explain fall in health relative productivity, the arrival of call centres (lower productivity business service jobs) and the growth in high value added output in financial and professional services in the UK (the benchmark against which NI's relativity is compared). The baseline forecast is for little improvement in convergence but no further deterioration. This forecast is based upon sectoral analysis where the productivity in a number of industries is reaching what Oxford Economics consider something of a 'minimum' level and thus further falling behind is unlikely to continue.
- With a continued sectoral restructuring of the economy this will facilitate some convergence toward the PSA productivity goal of halving the private sector productivity gap with the UK minus the Greater South East in the private sector (Fig 4.4). As referred to earlier, the publication of new Regional Accounts data in late December 2008 came too late for inclusion in this report in the baseline scenario (EDF September 2008). However as Fig 4.4 shows, the new data do substantially alter the data position with respect to PSA 1. Principally the productivity gap with the UK excluding the Greater South East is now much smaller in the data, around 4 percentage points compared to 6 percentage points previously. The revised recent trend has been towards convergence rather than further divergence as previous data suggested. Interestingly this sets the Oxford Economics original EDF forecast in a more plausible light as the base case convergence the model was predicting looks entirely in keeping with the latest data, where it previously appeared to suggest a break in trend. The spike in the latest forecasts for NI in 2008/09 in the new February 2009 forecast (Fig 4.4) reflects the significant fall in productivity expected in the Midlands regions of the UK resulting from manufacturing difficulties and in the Scottish / North West and Yorkshire regions as a result of the professional services losses in the major cities. The longer-term trends remain something of a modest convergence and indeed the policy aim of halving the gap is achieved in the base case forecasts towards 2020¹⁸. There has not yet been a re-appraisal

¹⁸ Note the productivity definition used by Oxford Economics relates to real GVA (£2003 prices) and the denominator is number of total jobs (employee plus self employed). Slightly different and more precise definitions exist (using nominal GVA data for example or an hours worked adjusted employment denominator), though these tend to have little affect on the overall relative position

of the PSA targets but the sentiment and trajectory of the aspirational scenario used in the main report remains both appropriate and useful as a potential 'faster growth' path for the NI economy.

Fig 4.3: NI convergence with UK (EDF Sept 08)

NI: GVA per capita and productivity

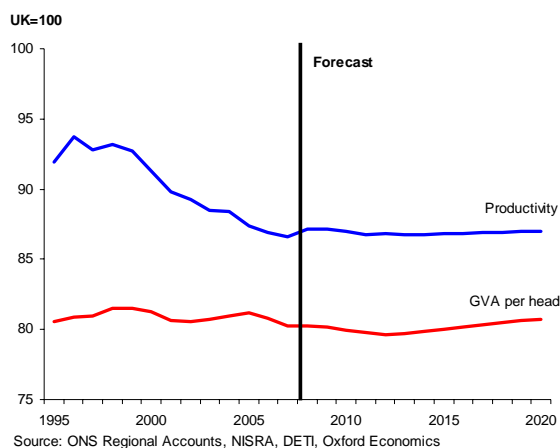
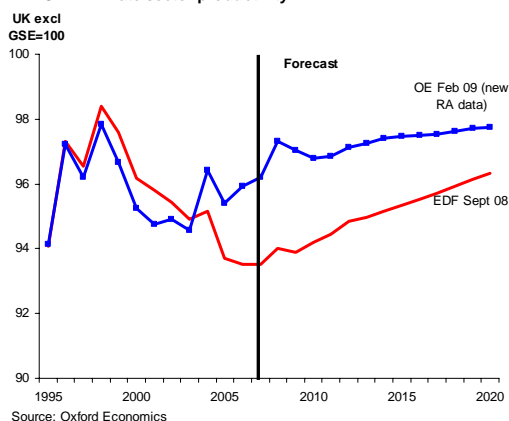


Fig 4.4: PSA 1 – closing the private sector productivity gap (EDF Sept 08 and Feb 2009)

NI PSA 1: Private sector productivity



4.3 Establishing an aspirational scenario

- Development of an aspirational scenario is a **complex process**. Though there are published goals for the economy such as closing the productivity gap (see Annex F) and a degree of consensus over ‘moving up the value chain’, ‘focusing on exports’ etc, there is **no defined path or all encompassing accepted vision on ‘how to get there’**. For example what combination of industry sectors will deliver this ‘better economy’? Or what balance between (a) faster productivity through better returns per worker (perhaps through improvements in processes or in technological advances) and (b) faster job growth and increased concentrations of growing and emerging sectors? **It is easier to say where we want to get to (more jobs, more productive, richer) than how.**
- To establish an aspirational scenario, a number of options were considered. A consultation process was embarked upon (see Annex H for a write-up) though this quickly revealed (1) the extent of work already being carried out by SSCs in engagement with businesses and exploring potential future outcomes, as well as (2) the lack of articulated views by consultees on the path NI needs to follow – **in any case gathering a consensus is probably unachievable given different priorities by key stakeholders etc.** In addition some of the SSC reports we were guided towards (which include forecasts) are dated and others are yet to publish. In any case the wealth of information in Sector Skill Agreement reports, much of it qualitative, provides more precise skills information than it was worthwhile and possible to replicate in this study, especially as this research is not obliged to report on a SSC basis. The focus of this study is more ‘high / macro level’.
- The next efforts to develop an aspirational scenario concentrated on mimicking the influential Leitch analysis for Northern Ireland (see Annex F for more details). The results of this for the Leitch ‘restructuring’ and ‘catch up’ scenarios were presented at the Stakeholder Conference¹⁹. The lively debate at the conference broadly concluded that it was difficult to be certain as to whether ‘catch-up’ or ‘re-structuring’ was the best approach – indeed a hybrid taking something from both was endorsed as the best way forward.
- As a result the hybrid approach was developed which supersedes the results presented at the conference (Leitch scenario forecasts based on improved replacement demand and skill assumptions are available upon request).

¹⁹ The main characteristic of the ‘restructuring’ scenario is that the sectors that have performed less well recently are regarded as being most vulnerable to the impact of globalisation and technological change in the future - hence the restructuring scenario embodies greater investment in skills in the same sectors that performed well in the last decade.

The main characteristic of the ‘catch-up’ scenario is that sectors that have performed less well are regarded as offering the greatest scope for improvement - the catch-up scenario embodies greater investment in skills and a stronger relative improvement in those sectors which are less skill-intensive and which have under-performed in the last decade.

Box 4.2: Describing the aspirational scenario

- The aspiration is best described as the employment and occupation trajectory the NI economy would need to follow to meet the PSA 1 private sector productivity target by 2015, given (1) the unique characteristics and competitiveness strengths of the NI economy (which ensures some plausibility); (2) the ethos and direction of policy (Success through Skills, MATRIX, Invest NI etc), including focus on Government's priority sectors, namely financial and business services, ICT, life sciences and hi-tech manufacturing, which ensures growth is export led but with local multiplier impacts on secondary sectors; and (3) assuming productivity in the rest of the UK improves as envisaged by Leitch.
- More technical details on the aspirational scenario are provided in Annex F.
- While broadly endorsed at the Skills Stakeholder Conference, the aspirational scenario is only one potential option for future growth and should be seen as a first step to arrive at a defined path for how the NI economy might achieve its published goals. Though it results in relatively strong employment growth, it does not return job growth to the high levels of the last decade. It would however be possible to revisit the model with any upper scenario (or indeed lower) if exact assumptions about sectoral employment and productivity growth can be specified.
- In addition the modeling framework does not allow drilling down to the level of precision possible in, for example, the MATRIX report or specific sector studies as these require alignment with official sectoral classification and empirical precision is lost at finer grain levels of sectoral analysis. (Although priority sector future skill needs analysis is presented in Annex A for financial services, ICT and hi-tech manufacturing & life sciences)

4.4 Aspirational outlook

- The key results of the aspirational scenario are set out below for sectoral employment, GVA and occupations (Tables 4.2 to 4.4). This shows employment higher by 29,000 jobs in 2020 compared to the baseline outlook. Note that although this equates to a growth in employment of approximately 7,300 per annum (compared to 5,000 in the baseline), this remains well below the trends of the last 12 years when this average was over 13,000 per annum.
- Employment in the aspirational scenario is faster in each of the key export sectors compared to the baseline, with supporting activities such as retailing and construction modestly higher as a result of multiplier impacts. Population impacts through migration were not applied as the per annum increase in jobs was not deemed sufficiently different from the baseline to necessarily draw in a steady flow of additional migrants.

Table 4.2: NI sectoral employment trends and forecasts (aspirational scenario)

	1996-2008 (000s)	2008-2020 (000s) - aspirational scenario	2008-2020 (000s) - baseline EDF Sept 08	2008-2020 (000s) - aspiration difference from baseline
Agriculture, forestry & fishing	-5	1	0	0
Mining & quarrying	0	0	0	0
Manufacturing	-16	-8	-10	2
Utilities	-2	0	0	0
Construction	21	0	-1	1
Retail & distribution	38	11	6	4
Hotels & restaurants	14	8	6	2
Transport & communications	8	4	2	2
Financial services	5	6	4	2
Business services	43	33	24	9
Public administration & defence	-1	-1	-1	0
Education	8	3	3	0
Health & social work	24	16	16	0
Other personal services	7	4	3	1
Total employee jobs	143	76	52	24
Land forces	-7	0	0	0
Self-employment	16	12	8	5
Total-employment (job-based)	153	88	59	29
Total-employment (people-based)	134	74	48	26
Total-employment (job-based, annual)	12.7	7.3	4.9	2.4

Source: DETI, LFS, Oxford Economics

- The extra GVA is set out in Table 4.3 below. This clearly mirrors the patterns set out in the employment series but also reflects the extent to which improved productivity, as a result of the higher levels of skills inherent in the scenario (from both new entrants and a higher rate of upskilling of the existing workforce), contribute to the achievement of policy goals. **In other words the aspirational scenarios is less about job creation and more about productivity enhancement which incorporates faster employment growth as only one element of the achievement of the goal.**

Table 4.3: NI occupation employment forecast (aspirational scenario)

	2008-2020 (000s) - aspirational scenario	2008-2020 (000s) - baseline scenario	Difference
Corporate Managers	37	31	5
Managers & Proprietors in Agriculture & Services	4	2	1
Science & Technology Professionals	11	10	2
Health Professionals	2	2	0
Teaching & Research Professionals	2	2	0
Business & Public Service Professionals	13	11	2
Science & Technology Associate Professionals	1	0	0
Health & Social Welfare Associate Professionals	4	4	0
Protective Service Occupations	-1	-1	0
Culture, Media & Sports Occupations	5	4	1
Business & Public Service Associate Professionals	11	9	2
Administrative Occupations	-4	-7	2
Secretarial & Related Occupations	-8	-9	0
Skilled Agricultural Trades	1	0	1
Skilled Metal & Electrical Trades	-8	-9	1
Skilled Construction & Building Trades	1	0	1
Textiles, Printing & Other Skilled Trades	-3	-3	0
Caring Personal Service Occupations	15	15	0
Leisure & Other Personal Service Occupations	0	-1	0
Sales Occupations	8	6	2
Customer Service Occupations	2	2	0
Process, Plant & Machine Operatives	-11	-11	0
Transport & Mobile Machine Drivers & Operatives	2	1	1
Elementary Trades, Plant & Storage Related Occupations	-5	-6	1
Elementary Administration & Service Occupations	9	6	3
Total-employment (job-based)	88	59	29

Source: Oxford Economics

Table 4.4: NI GVA forecast (aspirational scenario)

	2008-2020 (€m 2003 prices) - aspirational scenario	2008-2020 (€m 2003 prices) - baseline scenario	Difference
Agriculture, forestry & fishing	153	117	36
Mining & quarrying	-18	-18	0
Manufacturing	2,054	1,449	605
Utilities	162	162	0
Construction	337	269	68
Retail & distribution	1,889	1,713	176
Hotels & restaurants	453	362	91
Transport & communications	820	615	205
Financial services	2,114	1,613	501
Business services	3,130	2,090	1,039
Public administration & defence	116	114	2
Education	203	201	2
Health & social work	763	766	-3
Other personal services	217	145	72
Total economy	12,123	9,457	2,666
Economy size (€m 2003 prices, 2020)	37,759	35,094	2,666

Source: Oxford Economics

- The outcome of the scenario is evident in the key economic forecasts which would see NI's employment rate beginning to climb (though notably not achieving UK convergence even by 2020) and unemployment falling just below the UK average in the longer term (Figs 4.5 and 4.6).

Fig 4.5: NI and UK employment rates (aspirational scenario)

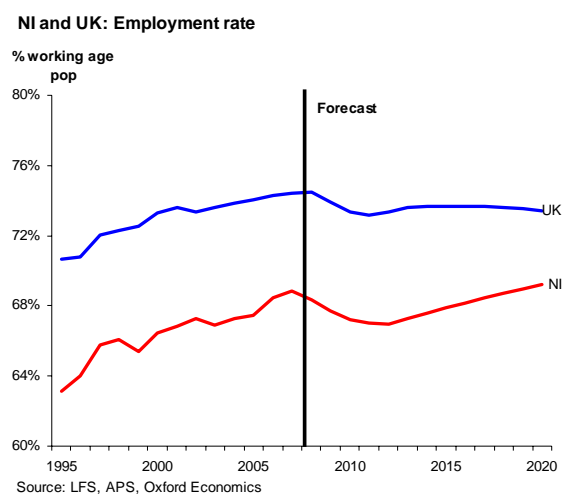
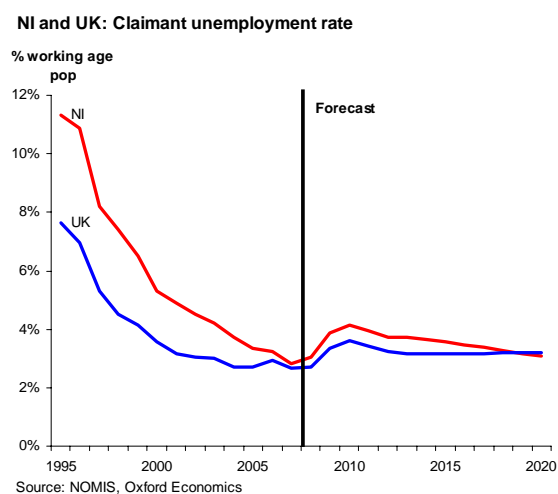


Fig 4.6: NI and UK claimant unemployment rates (aspirational scenario)



- Productivity and GVA per head relative to the UK average would reverse recent trends and climb upwards steadily (Fig 4.7), though notably not back to mid-1990s levels in productivity. GVA per head would however rise from its long-term level around or just above 80 per cent to above 85 per cent (Fig 4.7). More striking would be the improvements in the PSA 1 target which would be achieved by 2015 and parity with the UK outside the Greater South East by 2020 (note the data suggests this was close to being the case in the mid-1990s). Note the upward trajectory of performance would clearly reach a ceiling at some point in the future beyond the timeframe considered here.

Fig 4.7: NI convergence with UK (aspirational scenario)

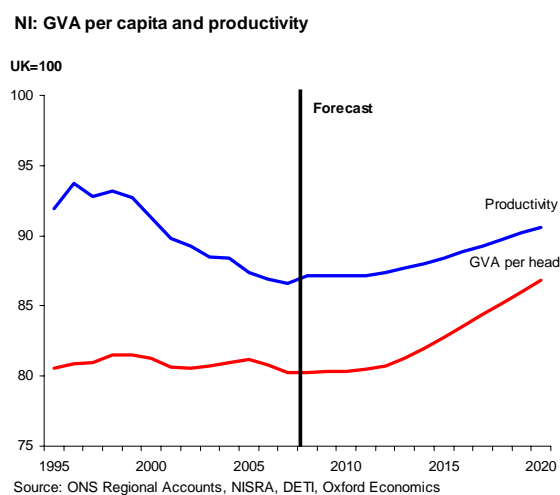
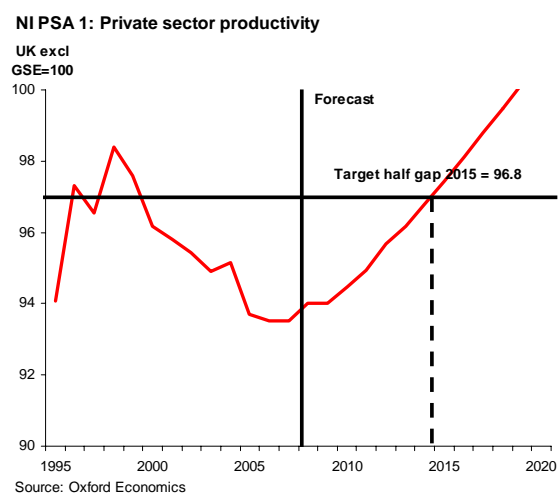


Fig 4.8: PSA 1 – closing the private sector productivity gap (aspirational scenario)



5 Skills for tomorrow's economy

5.1 Chapter overviews

Box 5.1: Skills for tomorrow's economy – replacement demand analysis and net requirement from education and migration

- Although baseline net employment growth is forecast to slow to 5,000 pa, our skills model shows that this is a more sustainable level of employment growth for the NI economy given projected numbers of leavers and joiners and assuming similar annual entrants from the education system as in the past
- With this growth, the **NI economy should in the long-term fully absorb leavers from education and still have a requirement for moderate in-migration inflows, despite the overall slower employment growth** - this is because the number of joiners from unemployment will be lower than the past decade as the stock is no longer as high and cannot decline at the same rate (note this will not necessarily hold in the short-run recession period)

Box 5.2: Skills for tomorrow's economy – an increasingly 'graduate hungry' economy

- **Just under one half of the total net requirement from education and in-migration between now and 2020 is estimated to be for sub-degree, degree and postgraduate qualified persons** (average of 9,600 pa in the baseline, just under 11,000 in the aspiration), compared to an average of one-third over the past five years
- **Only one in six jobs for people leaving the education system / migrants will be for people with low qualifications** under both scenarios (NQF 1 and below), compared to one in five in the past five years
- **Up-skilling of the existing workforce is an extremely important element of the changing workforce skill structure** – 8,600 upskilled persons qualified to NQF 4-8 level per annum are required from lower qualification levels in the baseline on top of new entrants from full-time education (12,200 in the aspirational scenario)
- The higher skilled NQF 4-8 proportion of the workforce is forecast to rise to 43 per cent in 2020 under the baseline scenario (49 per cent in the aspiration) from an estimated 28 per cent in 2005. Conversely the proportion of the workforce with low qualifications falls from 2005 level of 29 per cent to 16 per cent in 2020 (12 per cent in the aspiration). This compares closely to the trends in the Leitch Review for both the baseline and 'catch up' scenarios.
- Overall then the skill demand picture, taking into consideration sectoral and occupational trends and leaver and joiner flows, is one of an **increasingly 'graduate hungry' economy, particularly as NI aims to close the productivity gap and achieve PSA 1**

Box 5.3: Skills for tomorrow's economy – degree subject demand and adequacy of supply

- Relative to recent trends, the **degree subject requirement will become more skewed towards physical sciences, mathematical & computer sciences, engineering & technology, law and creative arts & design; and less skewed towards subjects allied to medicine and education**
- However in the short-run job prospects for graduates will weaken (as it will across the entire skills spectrum), particularly for degree subject areas traditionally supplying sectors such as construction which are most exposed to the current downturn. Graduate prospects are forecast to recover in 2011 and 2012
- Even under the baseline outlook a **shortfall in subject areas such as mathematical & computer sciences, engineering & technology, law and creative art & design graduates is forecast**, if the last 4 years outturns as recorded by HESA were to be replicated going forwards
- The shortfalls grow larger still under the aspiration scenario before even considering the up-skilling element which at this stage cannot be split across sectors, occupations and subjects.

5.2 Gross and net replacement demand

Box 5.4: Methodological note 1 – replacement demand

- Forecasting skills requirements is a challenging process. It is not simply the change in employment stock (which is known as expansion demand) but also the so called 'replacement demand' to fill vacancies created by people leaving employment for a variety of reasons (to retire, migrate, have children, illness etc.). This 'replacement' category is much larger than expansion demand and explains why even declining sectors still require new staff / advertise vacancies. The replacement demand concept is explained in more detail in Annex C which also sets out the flow assumptions into and out of the labour market which make-up the replacement demand analysis
 - Looking at the supply of labour filling the demand is also complex. The LFS provides data on historic trends of flows in from the various potential economic activities (coming back from having children, from unemployment / inactivity, from education etc). In the replacement demand analysis carried out by other organisations it is common to assume net zero migration, ignore occupational mobility and also to net off flows into and out of unemployment and inactivity, leaving largely the deceased and retired as the labour to 'replace'. **We have not netted migration to zero, nor ignored the flows in and out of forms of inactivity and occupational mobility and have rather provided a full flows matrix with the 'residual' net requirement set out as those people required to come from the education system and in-migration.** In addition we largely use NI flows data where it is sufficiently robust.
 - By way of summary the following leaver and joiner flows are included in our forecasting model:
 - Leavers to death and retirement
 - Leavers to inactivity excluding retirement
 - Leavers to unemployment and training schemes
 - Leavers to other occupations / sectors
 - Leavers to out migration
 - Joiners from inactivity excluding FT education
 - Joiners from unemployment and training schemes
 - Joiners from other occupations / sectors
-
- Highlighted at the start of the report, **this form of analysis is complex and is highly dependent upon the quality of the data used to determine the flows.** This caveat on the flows must be borne in mind and consideration of the validity of the flows recorded (averaged over three years) is important. Also previously discussed but worth repeating, it is also the case that the flows data may change during the current recession. No LFS data is available to gauge the extent of this (as only the last 10 years LFS have the necessary variables). Leavers to unemployment may rise markedly and movement within the labour market (from one job to another) may fall also but with a lack of empirical evidence it is very difficult to know how to adjust leaver and joining rates.
 - The baseline analysis suggests a negative expansion requirement in the very short-term during the recessionary period (around 2,000 per annum) with a positive expansion figure of approximately 5,600 per annum in the longer term (Tables 5.1 and 5.2).

- Adding in replacement demand however increases the gross requirement considerably (expansion demand plus leavers from replacement demand) – to 53,000 per annum during the recessionary years and to almost 61,000 per annum in the longer-term. **This is a significant figure – suggesting around 1 in 13 people in the labour market need to be ‘replaced’ each year – this compares to the UK where the figure, according to the LFS and our analysis, is higher at 1 in 9, perhaps reflecting lower turnover rates in Northern Ireland (which are very low in the large public administration sector) or less dynamism in the labour market depending on how one looks at it.** Note though that many of these leavers move to another job (so called occupational mobility) and many of the leavers to unemployment can be termed as frictional unemployment as they move quickly back into employment (at least during periods when the economy is growing). Indeed joiner rates in the UK are higher by roughly the same magnitude as the difference in leaver rates.
- Total returnees (from other jobs, unemployment and inactivity excluding students) are estimated (again according to LFS flows data) to be in the order of 39,000 per annum in the recessionary years and to 40,000 in the longer term (Tables 5.1 and 5.2). Many of these are the people leaving one job (in the replacement demand estimates) and taking up a new position. It is common practice to ‘net off’ these returners on the basis that they are already able to take up a job and thus do not have a formal skills requirement²⁰. **Doing this would leave the net annual requirement at roughly 21,000 per annum over the period 2010-2020 (Table 5.2) – and this might be characterised as the net requirement from migrants and people exiting the education system.**

Table 5.1: Net requirement from education and migration (2007-2010)

	Expansion demand	Gross expansion and replacement demand	Total returnees	Net requirement from education and migrants
Managers & senior officials	4.5	17.7	4.8	12.9
Professional occupations	3.2	15.8	8.6	7.2
Associate professional & technical occupations	2.2	14.2	11.8	2.4
Administrative and secretarial occupations	-5.2	15.0	13.3	1.7
Skilled trades occupations	-7.9	17.2	16.6	0.6
Personal service occupations	2.8	20.1	11.6	8.5
Sales and customer service occupations	0.2	16.8	17.6	-0.9
Process, plant and machine operatives	-3.8	17.6	11.5	6.1
Elementary occupations	-2.1	25.2	19.9	5.3
Whole economy		159.7	115.8	43.9
Whole economy (annual)	-2.1	53.2	38.6	14.6

Source: Oxford Economics

²⁰ This may not be precisely true as re-training etc. may be required and the recorded flows historically do not identify the extent to which returnees have engaged in formal training during their time away from the labour market (or whilst in their previous job)

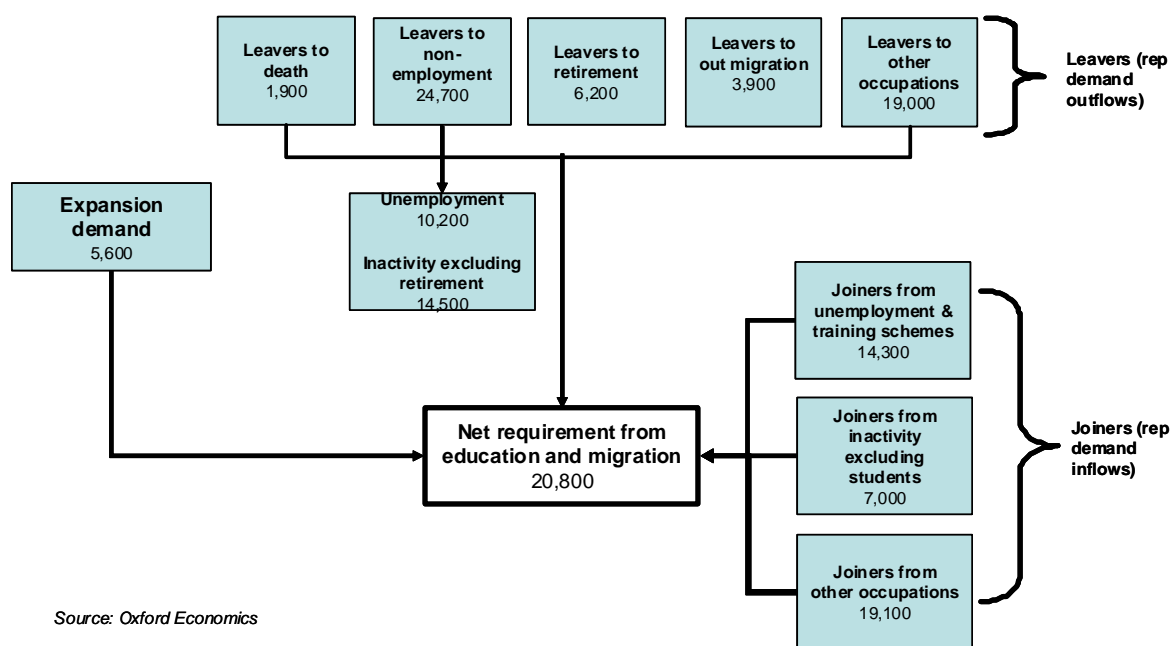
Table 5.2: Net requirement from education and migration (2010-2020)

	Expansion demand	Gross expansion and replacement demand	Total returnees	Net requirement from education and migrants
Managers & senior officials	26.6	78.6	18.4	60.2
Professional occupations	18.7	65.6	32.3	33.3
Associate professional & technical occupations	13.5	56.8	42.4	14.4
Administrative and secretarial occupations	-10.0	52.5	43.5	9.0
Skilled trades occupations	-4.3	73.5	55.4	18.1
Personal service occupations	9.5	73.0	41.7	31.3
Sales and customer service occupations	7.7	66.0	62.7	3.3
Process, plant and machine operatives	-7.3	55.3	37.7	17.7
Elementary occupations	1.3	90.6	69.5	21.1
Whole economy	55.7	612.0	403.7	208.3
Whole economy (annual)	5.6	61.2	40.4	20.8

Source: Oxford Economics

- To summarise this complex set of flows the diagram below sets out the annual estimates in the longer run periods (post 2010) to establish the picture of flows:

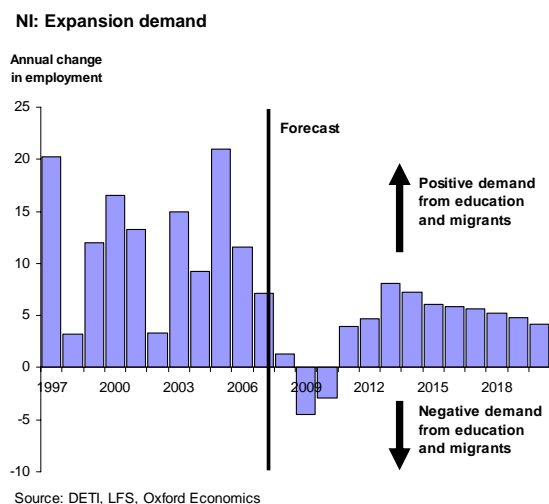
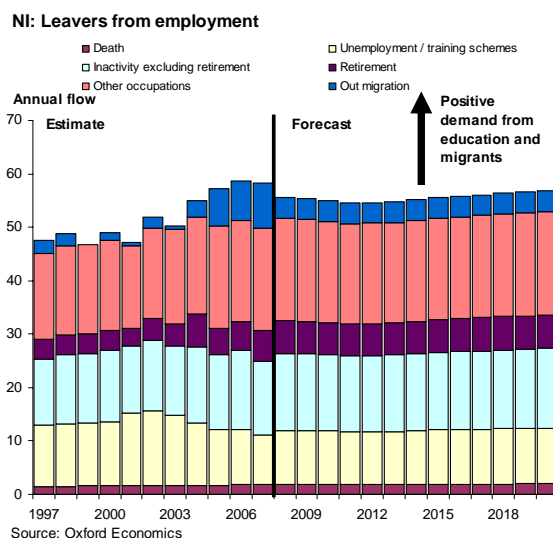
Fig 5.1: Net requirement from education and migration (2010-2020 annual average flows)



Source: Oxford Economics

- Figs 5.2 to 5.5 provide additional analysis of the labour market flows to clarify the results of the analysis.
- Fig 5.2 shows the net change in stock of employment (people-based) – expansion demand. This reveals the rapid labour market expansion at times during the last decade and the fall into negative territory in the short-run as the labour market contracts in overall terms. The pick-up during the recovery phase is evident as is the longer term picture of net job growth of around 5,000-6,000 per annum – much lower than the average over the previous decade which was well over 10,000.

- Fig 5.3 shows the categories people leave employment to, with leaving to other jobs, to inactivity and to unemployment the most significant categories. Out migration is also estimated to have risen in recent times as temporary migrants flow back out after a period in the NI labour market. Note that retirement appears very modest in this chart – it might be expected that a higher proportion of people retire in a given year. It would appear many people leave to a form of inactivity or unemployment before moving into retirement, if the LFS data is to be believed. Over the forecast proportions remain relatively stable as shown in Fig 5.3.

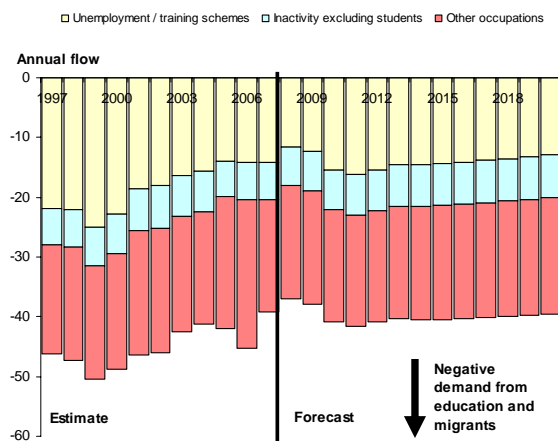
Fig 5.2: Expansion demand

Fig 5.3: Leavers from employment


- Figure 5.4 shows the estimated in-flows from unemployment, other jobs and inactivity (from migration and education are left off as the 'residual' in this analysis – see Fig 5.5). **Flows in from unemployment were much higher in the mid / late 1990s – partly as this category was much larger during that period.** Though many moved across into inactivity (incapacity benefit), the rising employment rate trends over this period are consistent with this greater flow in from other elements of the labour market. The level of joiners from unemployment is more modest over the medium term as the stock cannot go on falling indefinitely²¹.
- Fig 5.5 reflects the 'residual' or what is left to be 'filled' by migrants and outputs of the education system (not counting people in full-time employment and studying / training – the 'up-skillers'). This shows the high requirements in recent years (over 30,000 in 2005) to match the growth of the labour market – and this has been reflected in the steady in-flow of migrants into work during this period. The level of job creation in recent years of over 10,000 pa has 'required' a flow of migrant (equally migrant flows have helped generate demand). The forecast is for moderation to a net requirement from education and migrants to around 21,000 per annum.

²¹ As a cross-check we have closely matched the flows in and out of unemployment from replacement demand analysis with the overall NI stock unemployment forecasts from the NI Policy Simulation model

Fig 5.4: Joiners to employment

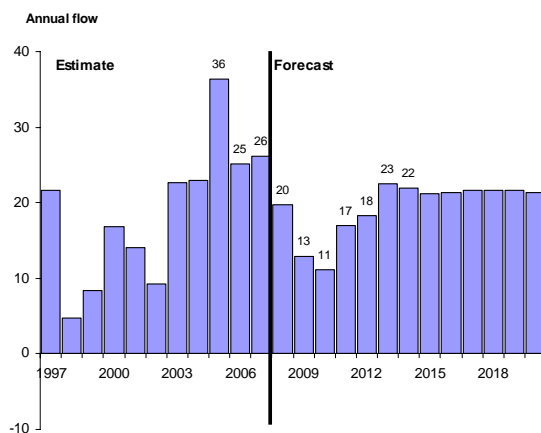
NI: Joiners to employment



Source: Oxford Economics

Fig 5.5: Net requirement from education and migration

NI: Net requirement from education system and in-migration



- Figs 5.6-5.9 show expansion demand, leavers, joiners and the net requirement for individual sectors. This highlights (1) the scale of leaver and joiner flows in relation to expansion demand and; (2) how high leaving rates in declining sectors such as manufacturing, also with a large number of low grade occupations, can result in a positive net requirement from education and migration which is much higher than faster growing sectors in expansion demand terms.
- Note the forecasts in this report are available on both an occupation and sector basis although some scaling is required to match exactly (net requirement estimates are however very similar). Occupation flow assumptions are preferred (which are presented in this report bar for Figs 5.8 and 5.9) given their extra detail and better capture of promotion movements through occupational mobility.

Fig 5.6: Expansion demand by sector

NI sectors: Expansion demand (2010-2020)

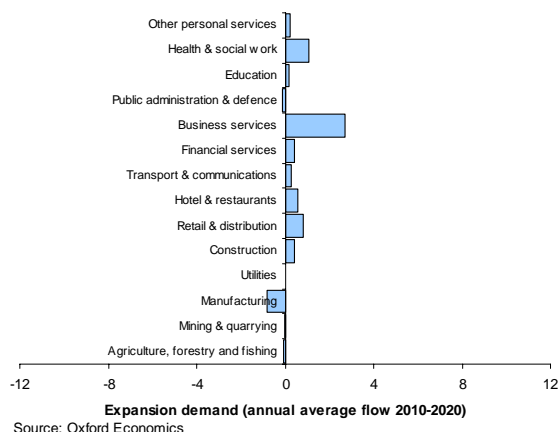


Fig 5.7: Leavers from employment by sector

NI sectors: Total leavers (2010-2020)

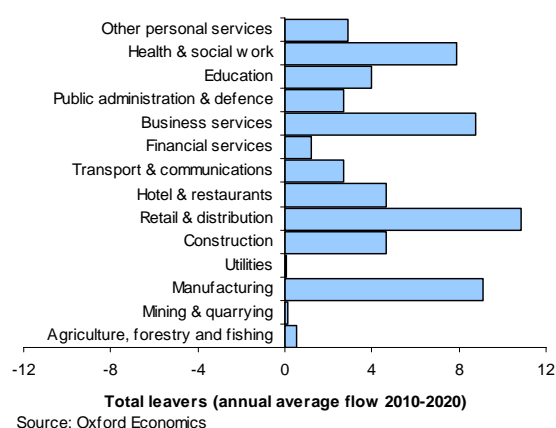
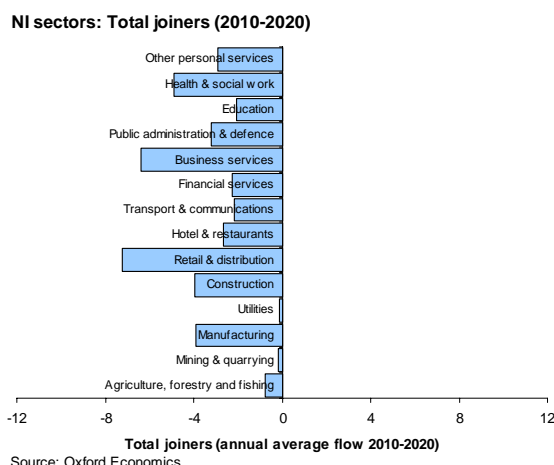
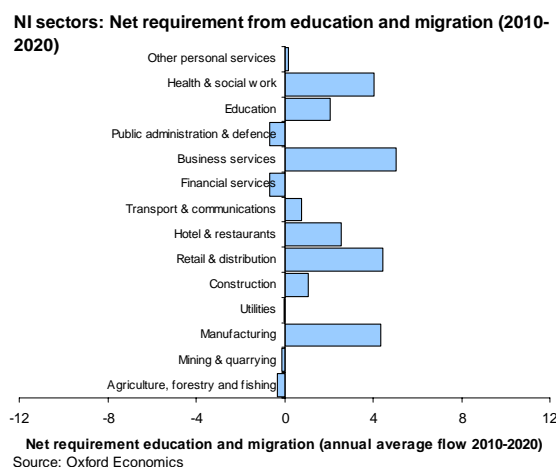


Fig 5.8: Joiners to employment by sector

Fig 5.9: Net requirement from education and migration by sector


5.3 What does the baseline suggest for leavers from education and migrant inflows?

- With a net requirement of around 21,000 in the longer run does this suggest a significant level of youth unemployment, graduates not finding jobs in NI or a drop off in migration? This is complex to answer as the flows data may change in the future – for example employers may switch from a historical pattern of taking labour from inactivity or unemployment (perhaps that is all they could get) to switching to, possibly more or less expensive, recruits straight from the education system. It is possible that well qualified leavers from the education system will always be the first recruited regardless of economic conditions. A counter argument might suggest that the excess supply of ‘work ready’ experienced staff who will be available post recession will crowd out inexperienced young people with no employment history, even if they have high level qualifications.
- **It is not possible to draw conclusion with any certainty but with the stable estimates built into the baseline forecasts, it suggests a net requirement of around 20,000 in the long run is broadly consistent with current education outputs entering employment, plus a possible moderate level of working age migrant inflows (though much lower than the recent past).** See Annex G for details on Oxford Economics’ attempt to trace education leaver flows into employment in NI.
- In the recent past migrant in-flows are estimated at 11,000-18,000 into the labour market (Table 5.3), prior to the recent influx this estimate was much lower. It is difficult to be certain about the immigration outlook in the longer term but it is true that an inflow of recent magnitudes (if they all found work) would clearly leave many more indigenous people out of work under the baseline demand forecasts (including leavers from education). Providing some evidence on this – unemployment amongst young persons aged 16-24 (on claimant count in the last six months) has risen though by no greater extent than the overall unemployment picture (refer back to Fig 2.9).

Fig 5.10: NI working age net international migration trend and forecast (EDF Sept 08)

NI: Working age net international migration

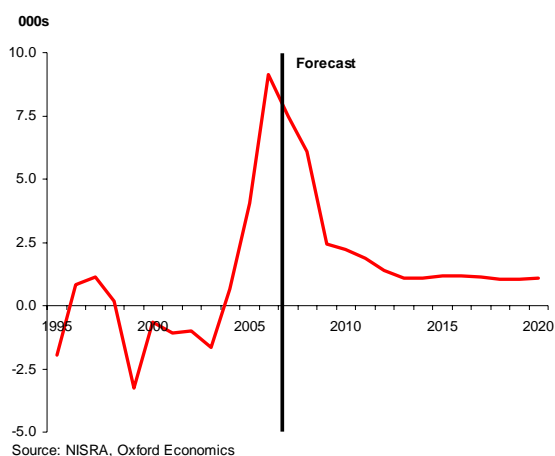


Table 5.3: Recent NI migration trends

	2005	2006	2007
Net domestic migration (000s)	2.0	0.9	1.8
Inflow s	13.3	12.4	12.9
Outflow s	11.3	11.5	11.1
Net international migration (000s)	4.7	9.0	8.0
Inflow s	13.6	18.1	19.4
o/w working age (est)	11.7	15.6	18.0
Outflow s	8.9	9.1	11.3

Source: NISRA, Oxford Economics

5.4 Future skill needs (baseline)

- While all of the above analyses in this and preceding chapters are essential building blocks, **the crux and main interest of this report is the implication for the direction of future skill needs and how this differs from the past** – this is the focus of this section.
- For the actual skills requirements of entrants from education and migration, we again turn to the LFS as the key source of data (although there is little reliable evidence on skills of students and migrants combined).

Box 5.5: Methodological note 2 – skill requirements of entrants from education and migration

- Estimation of highest qualifications of the net requirement from education and migration is based on a combination of:
 - LFS qualifications of FT student entrants to employment by occupation
 - LFS qualifications of entrants to employment from existing employment by occupation
 - NI School Leaver Survey and HESA graduate destination data
 - A combination of sources was used as the graduate proportion of new entrants from FT students from the LFS did not tally with school leaver survey and HESA data which suggests a much higher proportion of joiners from education are graduates
 - Historical skills creep trends are also built in to the modelling assumptions
- As Table 5.4 shows the annual average demand is for just under 10,000 higher qualified people from education / migrants in the longer run, approximately 50 per cent of all demand. The forecasts suggest around only one in six jobs for people leaving the education system / migrants will be for people with low qualifications (3,600 of the 20,800 total in Table 5.4).

- Note that the gross demand for skills is greater than shown here – entrants from other activities (namely other jobs, inactivity etc.) provide a further inflow of skills which outputs from the education system could compete against in the future (Table 5.5).
- As outlined in Annex C, extreme care must be taken with this form of analysis as it is based on past trend data. It may be the case that in recent years inflows into the labour market from education have not always had a high level formal qualification but that is not to say employers would not have liked or benefited from better educational standards. Equally though the labour market may perhaps not have been able to pay the wages of more skilled staff. The opposite may also be true where employers recruit persons with higher qualifications than actually necessary, e.g. call centres, though employers can still benefit from the higher skills available. In either of these two more extreme cases, using past data would not be a true reflection of actual employer demand.

Table 5.4: Net requirement from education and migration – NQF qualifications

	2007-2010 (annual)	2010-2020 (annual)	Difference	2010-2020 (annual % total)
Postgraduate (NQF 7-8)	1.2	1.8	0.6	9%
First degree and sub-degree (NQF 4-6)	5.0	7.8	2.9	38%
Intermediate a (NQF 3)	2.7	4.8	2.2	23%
Intermediate b (NQF 2)	2.8	2.8	0.0	13%
Low (NQF 1 and below)	2.9	3.6	0.6	17%
Total	14.6	20.8	6.2	100%

Source: Oxford Economics

Table 5.5: Gross demand for skills – NQF qualifications (2010-2020 annual average)

	Joiners from unemployment and training schemes	Joiners from inactivity excluding students	Joiners from other occupations	Net requirement from education and migration
Postgraduate (NQF 7-8)	1.2	0.6	1.0	1.8
First degree and sub-degree (NQF 4-6)	0.4	0.2	4.5	7.8
Intermediate a (NQF 3)	0.6	0.3	4.7	4.8
Intermediate b (NQF 2)	0.6	0.3	3.2	2.8
Low (NQF 1 and below)	11.5	5.7	5.7	3.6
Total	14.3	7.0	19.1	20.8

Source: Oxford Economics

Box 5.6: Methodological note 3 – upskilling requirement

- The up-skilling of the existing workforce is also an important element of the changing workforce skill structure.
- This is estimated using LFS data on the changing stock of workforce skills over time after adjusting for leavers and joiners and their respective skills profile, to determine what the upskilling pattern must have been to explain the current workforce skill structure relative to a decade ago.

- The upskilling estimates suggest a further 8,600 NQF 4-8 qualified persons per annum are required (Table 5.6). The negative numbers lower in the skills spectrum reflect 'stepping up' the skills ladder. While this figure (8,600) appears high it is plausible given the number of part-time HE enrolments (Table 5.7). It may also suggest that many of the people working part time whilst studying are not being counted in the new entrants from education analysis. As a result this suggests it may be useful to combine the figures (as set out above) until the data can be further interrogated and 'match-up' with supply side information.

Table 5.6: Upskilling of existing workforce requirement

	2007-2020 (annual upskilling)
Postgraduate (NQF 7-8)	2.6
First degree and sub-degree (NQF 4-6)	6.0
Intermediate a (NQF 3)	0.3
Intermediate b (NQF 2)	0.0
Low (NQF 1 and below)	-8.9
Total	0.0

Source: LFS, Oxford Economics

Table 5.7: Full-time and part-time first year HE enrolments of NI domiciled students (2006/07)

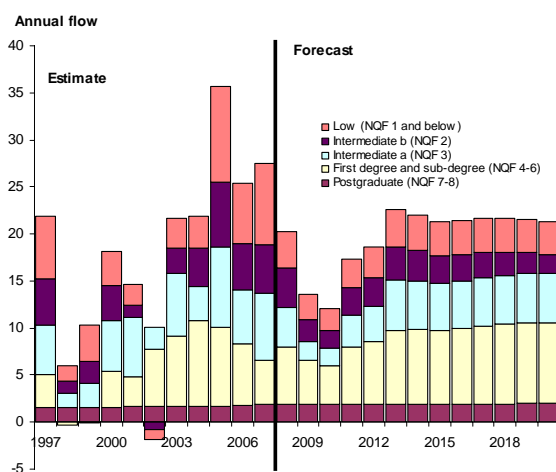
	Full-time		Part-time	
	NI	Rest UK and ROI	NI	Rest UK and ROI
First degree	8,795	4,100	1,330	875
Other undergraduate	3,000	190	10,045	1,725
Postgraduate	1,585	980	1,950	690
Total	13,380	5,270	13,325	3,290

Source: DEL Student Enrolments on HE Courses Statistical Bulletin

- Figs 5.11 and 5.12 graphically set out the potential skills requirements at each education level on annual basis, showing separately up-skilling needs of the existing workforce and the overall skills net requirement from new entrants from education / migration.

Fig 5.11: Net requirement from education and migration – NQF qualifications

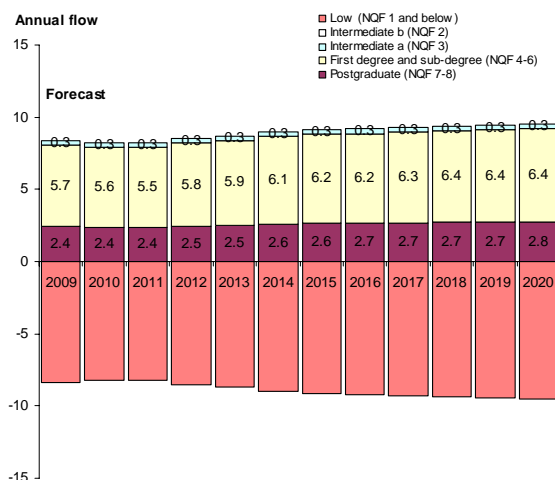
NI: Net requirement from education system and in-migration



Source: Oxford Economics

Fig 5.12: Upskilling of existing workforce requirement

NI: Upskilling



Source: Oxford Economics

Box 5.7: Methodological note 4 – skill stock forecasts

- Workforce skill stock forecasts are arrived at by adding the inflow of skills from joiners, upskilling of the existing workforce and subtracting the outflow of skills from leavers. i.e. the model is a full 'stock and flow' system.
- As set out in Fig 5.14 below, the NQF 4-8 proportion of the workforce is forecast to rise to 43 per cent in 2020 from an estimated 28 per cent in 2005. Conversely the proportion of the workforce with low qualifications is forecast to fall from its current share of 29 per cent through to 16 per cent by 2020. The change in stock forecasts broadly matches the change in the UK baseline projections from Leitch (see end of chapter).
- Recall one of the main drivers of the changing stock picture is the ongoing structural transformation of the economy which is evident from the occupation stock projections in Fig 5.13 (e.g. the rising share of managerial and professional occupations in overall employment).
- Overall then the skill demand picture, in terms of stock and flows, is one of an increasingly 'graduate hungry' economy.**

Fig 5.13: Trend in occupations

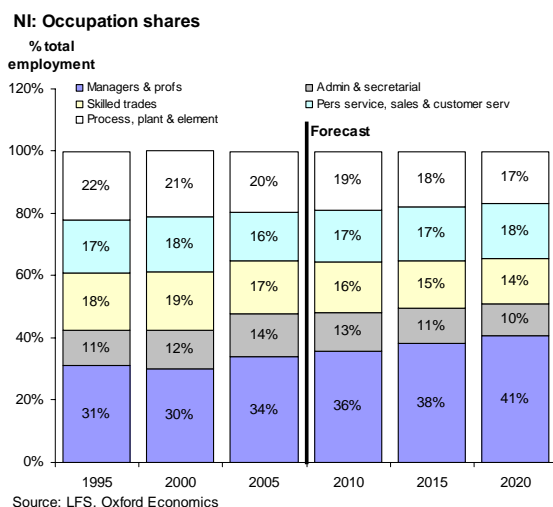
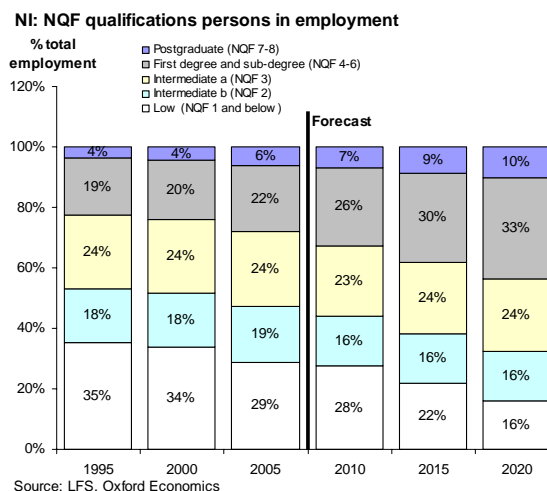


Fig 5.14: Trend in NQF qualifications of persons in employment



5.5 The degree subject dimension (baseline)

- It is possible to make indicative estimates of the degree subject qualifications required using the analysis above and HESA data for graduates entering employment in NI. Again this is heavily caveated by the concern raised above that the up skilling requirement may include some of the new degree entrant requirements and would need to be added to the total degree requirement. However it is not possible at this stage to allocate upskilling across occupations and sectors and therefore across subject areas.

Box 5.8: Methodological note 5 – degree subject demand

- Degree subject demand is estimated using HESA data from the First Destination Leavers Survey on sectoral and occupational employment destinations by subject area. i.e. X per cent of new manufacturing graduate entrants come from a STEM background. The assumptions are based on average proportions over the period 2003-2007 for NI domiciled graduates entering employment in NI, with trend 'subject creep' assumed in lagging subject areas.
 - HESA patterns on occupation destinations by subject are less appropriate than by sector as occupations are broad-based. i.e. there is likely to be a difference between subject demand for a manager in construction compared to in business services, which occupational forecasts may not pick up but sector forecasts would. In other words sectors are a better 'screen' for likely subject demand than occupations. Note the contrast with replacement demand forecasts which are based on occupational leaver and joiner rates.
-
- It is important to caveat that subject demand based on historical HESA trends may represent what the labour market could get not what it desired. In other words employers may be taking more general business & administration degrees when they would ideally like more advanced STEM subjects (say taking a business studies graduate when they could have preferred a maths graduate). **This analysis should therefore be considered subject demand if past trends are indicative of actual labour market desires and not just labour market practicalities / subjects supplied by universities.**
 - It should also be noted that some sectors have more specific subject requirements than others. Findings from the consultations, reported in Annex H, indicated that degree specialism matters for sub-sectors within the SEMTA SSC (science, engineering and manufacturing technologies), much more so than in a sector such as financial services where high calibre personal attributes of degree holders matters more than actual subject studied. The response of Skillsmart Retail on the importance of degree subject was that "subject is only considered important if the advertised role is more specific - i.e. marketing, finance etc – retailers generally look less at subject specific degrees and more at personal attributes and enthusiasm and the ability to communicate and be enthusiastic".
 - The forecasts for degree subject demand are compared to HESA employment destination data for the last 4 years on entrants to jobs in NI by subject, partly as a sanity check and partly to indicate any potential mismatches (which may indicate data concerns rather than real labour market issues). HESA data records around 8,400 entrants into work (grossed up) – this excludes GB, other EU and non-EU domiciled graduates entering NI jobs - these flows are likely to be relatively small but could rise if NI out-performed other regions in creating more highly paid graduate jobs.

- Helpfully the analysis of demand versus supply suggests read across some sectors (Table 5.10) suggesting some validity in the approach. It does however indicatively suggest that even under the baseline forecast there would be a shortfall in subject areas such as elements of STEM, law²² and specific creative art & design graduates if the last 4 years outturns as recorded by HESA were to be replicated going forwards (based on employment destination numbers and not number of qualifiers). Creative art & design shortages would most likely be in more commercially orientated subject areas such as graphic design.
- This analysis is broadly consistent with other published subject work such as recent research by the Warwick Institute for Employment Research, commissioned by the Engineering & Technology Board and others, which predicts that projected demand for STEM graduates and postgraduates is likely to increase faster than for other disciplines.
- Off course some of the predicted NI subject shortages from the forecasts may be met by GB, EU and non-EU domiciled graduates from UK higher education institutions and inflows of migrants gaining degree qualifications outside GB. While anecdotal examples of graduate migrant recruitment may not be well known, there are some important examples in local businesses such as Almac (STEM) and BT (ICT).

Table 5.8: Net requirement from education and migration – degree subjects

	2007-2010 (annual average)	2010-2020 (annual average)	Difference	2010-2020 (annual % total)	HESA NI domiciled graduates from UK HEIs entering employment in NI (2003-2007 annual average grossed up)
STEM	2.2	3.5	1.2	48%	3.6
Medicine & dentistry	0.2	0.2	0.0	3%	0.3
Subjects allied to medicine	1.0	1.1	0.1	16%	1.4
Biological sciences	0.3	0.4	0.1	5%	0.4
Veterinary science	0.0	0.0	0.0	0%	0.0
Agriculture & related subjects	0.1	0.0	0.0	0%	0.1
Physical sciences	0.1	0.2	0.1	2%	0.2
Mathematical sciences	0.0	0.0	0.0	1%	0.0
Computer science	0.3	0.6	0.3	9%	0.5
Engineering & technology	0.3	0.5	0.3	7%	0.3
Architecture, building & planning	0.0	0.3	0.3	5%	0.3
Law	0.1	0.3	0.2	5%	0.2
Business and Administration	0.7	1.1	0.5	16%	1.3
Languages	0.1	0.2	0.1	3%	0.2
Creative Arts and Design	0.2	0.3	0.1	4%	0.3
Education	0.7	0.9	0.2	12%	1.5
Combined degree	0.0	0.1	0.1	2%	0.1
Other *	0.6	0.8	0.2	11%	1.1
Total	4.6	7.2	2.6	148%	8.4

Source: Oxford Economics, HESA

Note: NQF 4-8 requirement from education and migration adjusted for LFS subject degree % NQF 4-8

* Social studies; mass communication and documentation; and historical and philosophical studies

²² The potential shortfall in law subjects is interesting and perhaps not previously a priority of policy direction. There has however been a rising trend in the share of law graduates entering sectors in NI recently, including in financial and business services. It is assumed that this trend will continue (though at a moderate rate) and, combined with (1) rising employment in financial and business services, and (2) sectors requiring a rising share of graduates within new entrants, together these factors explain the growth in demand for law degrees. Thinking more specifically where future demand might come from, there are two possible drives. (1) The legal sector is a potential export sector though it is probably under-developed right now in NI focusing on the domestic market – think of London and Edinburgh as exporting legal centres which NI could aspire to. (2) Legal expertise may become more important in some sectors facing increased regulation – financial services are a perfect example – but other sectors may face increased regulation

- Without wishing to focus on the short-term, it is nonetheless worth drawing to attention the **near term implications of the economic slowdown for graduate job prospects**. Figs 5.15 and 5.16 below present annual degree subject demand forecasts under the baseline for two subject areas – architecture, building & planning and computer sciences (other subject charts are available in Annex E). The charts clearly illustrate the impact of the slowdown, particularly for architecture, building & planning graduates, a large share of who typically enter construction related occupations.
- It is however worth recapping that the graduate net requirement is based on the assumption of no major change in joiner rates from non-employment (the LFS data on which joiner rates are based are not available for a recessionary period). It could well be that all graduates are absorbed first (whether or not their high skills are required or can be appropriately rewarded), severely limiting opportunities for the non-employed in the short-run.

Fig 5.15: Degree subject demand – Architecture, Building & Planning (baseline)

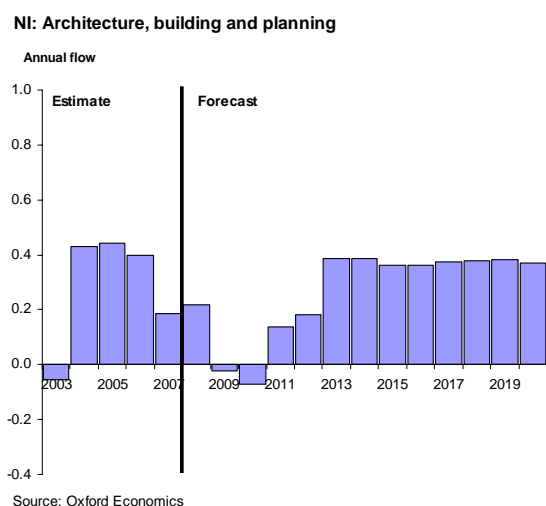
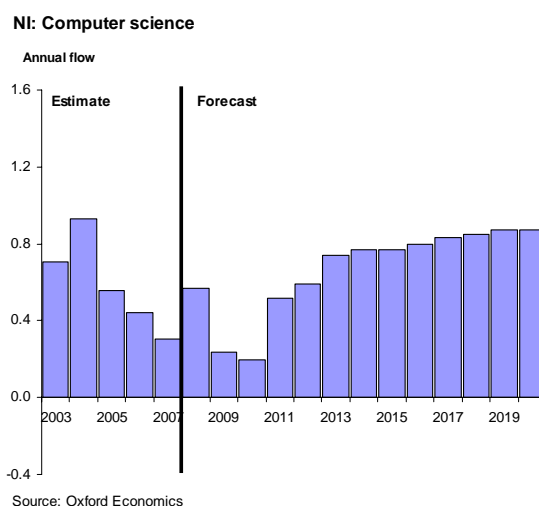


Fig 5.16: Degree subject demand – Computer Sciences (baseline)



5.6 Aspirational outlook

- This section utilises the aspirational employment forecasts presented in the previous chapter and covers the same future skill needs analysis as for the baseline. Note additional forecasts results are presented in Annex F.
- The key skill need and subject demand forecasts for the aspirational scenario are presented below with comparisons against the baseline. In short the main messages / differences are:
 - A higher annual net requirement from education and migration by approximately 3,000 pa – this is due to higher expansion demand from faster employment growth in key exporting and secondary sectors (Table 5.9)
 - Annual average demand for sub-degree, degree and postgraduate qualified persons from education / migrants of just under 11,000 pa (9,600 in the baseline). Again this represents almost half of the total requirement (Table 5.9)
 - As for the baseline only one in six jobs for people leaving the education system / migrants will be for people with low qualifications under both scenarios (NQF 1 and below) – though the absolute ‘need’ number is higher by 200 pa (Table 5.9)
 - An annual higher level (NQF 4-8) upskilling requirement of 12,200 (8,600 in the baseline) (Table 5.9) Note upskilling figures are effectively net flows. Many workers are required to move up the skills ladder from a low qualification level to intermediate level and many workers with intermediate qualifications are also required to move up to higher qualification levels. Therefore although the net flow upskilling figures for intermediate qualifications are low, this masks an underlying dynamic of persons moving out of this skills category and being ‘back-filled’ by newly upskilled workers, previously with low qualifications.
 - The implication of the forecast is a steeper ‘skills gradient’ in the overall stock of workforce skills with the higher skilled NQF 4-8 proportion of the workforce forecast to rise to 49 per cent in 2020 and the proportion of the workforce with low qualifications falling to 12 per cent (Fig 5.18). This is consistent with the Leitch UK catch-up scenario (though it was not in any way deliberately intended to replicate Leitch results) (Table 5.10)
 - Degree subject demand is forecast to become further skewed towards physical sciences, mathematical & computer sciences, engineering & technology and creative arts & design; and less skewed towards subjects allied to medicine and education, resulting in larger potential supply shortages in key degree subject areas (Tables 5.11 and 5.12)

Table 5.9: Net requirement from education and migration and upskilling requirement of existing workforce (2010-2020 annual average)

	Baseline		Aspiration		Historical	
	Net requirement from education and migrants	Upskilling	Net requirement from education and migrants	Upskilling	Net requirement from education and migrants (2003-2007)	Upskilling (1997-2007)
Postgraduate (NQF 7-8)	1.8	2.6	2.0	3.7	2.0	1.6
First degree and sub-degree (NQF 4-6)	7.8	6.0	8.7	8.5	7.2	3.8
Intermediate a (NQF 3)	4.8	0.3	5.5	0.3	6.4	-0.6
Intermediate b (NQF 2)	2.8	0.0	3.9	-0.9	4.7	-0.9
Low (NQF 1 and below)	3.6	-8.9	3.8	-11.7	6.4	-3.9
Total	20.8	0.0	23.7	0.0	26.6	0.0
Postgraduate (NQF 7-8)	9%	-	8%	-	7%	-
First degree and sub-degree (NQF 4-6)	38%	-	36%	-	27%	-
Intermediate a (NQF 3)	23%	-	23%	-	24%	-
Intermediate b (NQF 2)	13%	-	16%	-	18%	-
Low (NQF 1 and below)	17%	-	16%	-	24%	-

Source: Oxford Economics

Fig 5.17: Trend in occupations

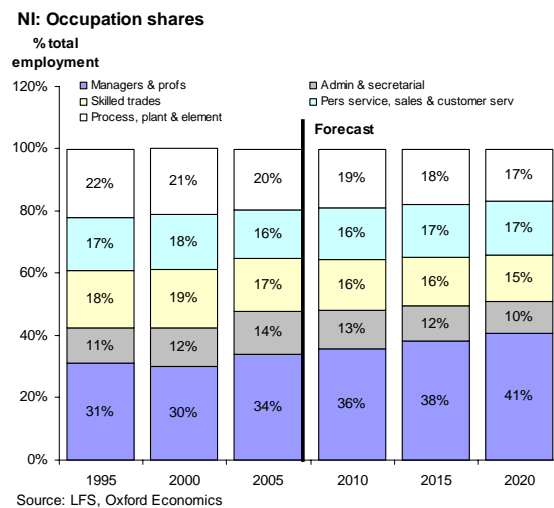


Fig 5.18: Trend in NQF qualifications of persons in employment

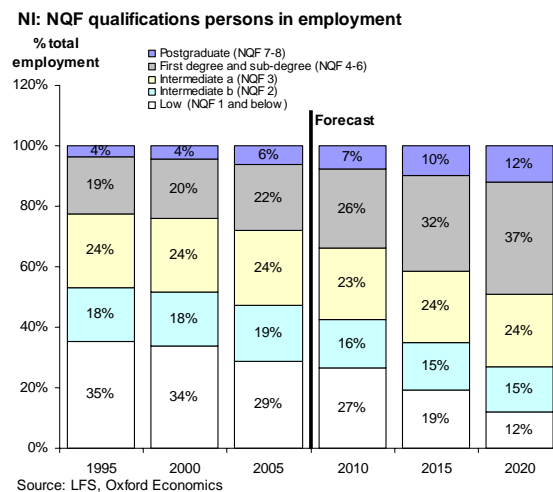


Table 5.10: Trend in forecast stock of workforce skills – NI comparison with UK Leitch (2020)

	Baseline		Aspiration	
	NI - Oxford Economics	UK - Leitch	NI - Oxford Economics	UK - Leitch 'catch up'
Postgraduate (NQF 7-8)	10%	11%	12%	13%
First degree and sub-degree (NQF 4-6)	33%	31%	37%	33%
Intermediate a (NQF 3)	24%	26%	24%	27%
Intermediate b (NQF 2)	16%	19%	15%	17%
Low (NQF 1 and below)	16%	13%	12%	11%
Total	100%	100%	100%	100%

Source: Oxford Economics

Table 5.11: Net requirement from education and migration – degree subjects (2010-2020 annual average) – aspirational and baseline scenarios - flows

	Demand		Supply
	Baseline	Aspiration	HESA NI domiciled graduates from UK HEIs entering employment in NI (2003-2007 annual average grossed up)
STEM	3.5	3.9	3.6
Medicine & dentistry	0.2	0.2	0.3
Subjects allied to medicine	1.1	1.2	1.4
Biological sciences	0.4	0.4	0.4
Veterinary science	0.0	0.0	0.0
Agriculture & related subjects	0.0	0.0	0.1
Physical sciences	0.2	0.2	0.2
Mathematical sciences	0.0	0.1	0.0
Computer science	0.6	0.8	0.5
Engineering & technology	0.5	0.6	0.3
Architecture, building & planning	0.3	0.4	0.3
Law	0.3	0.5	0.2
Business and Administration	1.1	1.2	1.3
Languages	0.2	0.2	0.2
Creative Arts and Design	0.3	0.4	0.3
Education	0.9	0.9	1.5
Combined degree	0.1	0.1	0.1
Other *	0.8	0.8	1.1
Total	7.2	8.0	8.4

Source: Oxford Economics

Note: NQF 4-8 requirement from education and migration adjusted for LFS subject degree % NQF 4-8

* Social studies; mass communication and documentation; philosophical studies

Table 5.12: Net requirement from education and migration – degree subjects (2010-2020 annual average) – aspirational and baseline scenarios - proportions

	Baseline % total	Aspiration % total	HESA NI domiciled graduates from UK HEIs entering employment in NI % total (2003-2007 annual average)
STEM	48.0%	49.0%	43.0%
Medicine & dentistry	3.2%	2.9%	3.3%
Subjects allied to medicine	15.6%	14.7%	17.3%
Biological sciences	5.3%	5.1%	5.2%
Veterinary science	0.1%	0.0%	0.1%
Agriculture & related subjects	0.1%	0.0%	0.7%
Physical sciences	2.4%	2.8%	2.2%
Mathematical sciences	0.6%	0.9%	0.5%
Computer science	9.0%	9.5%	6.5%
Engineering & technology	7.3%	8.1%	4.0%
Architecture, building & planning	4.6%	4.9%	3.1%
Law	4.8%	5.7%	2.8%
Business and Administration	15.5%	14.7%	15.6%
Languages	3.0%	2.7%	3.0%
Creative Arts and Design	4.3%	5.0%	3.4%
Education	11.9%	10.7%	18.0%
Combined degree	1.6%	1.7%	0.6%
Other *	10.9%	10.5%	13.6%
Total	100.0%	100.0%	100.0%

Source: Oxford Economics

Note: NQF 4-8 requirement from education and migration adjusted for LFS subject degree % NQF 4-8

* Social studies; mass communication and documentation; philosophical studies

- To summarise the aspirational scenario predicts a similar pattern of future skill demand as the baseline but with:

- A higher absolute net requirement
- A larger absolute demand for higher qualifications and to a much lesser extent though still additional, extra demand for low level qualifications beyond baseline demand
- A greater annual upskilling requirement
- A more pronounced skills gradient of future workforce skills, and
- Greater potential for degree subject supply shortages

6 Conclusions and policy remarks

This research has identified a number of interesting conclusions with respect to the Northern Ireland economy and its future skills needs. In some cases this provides confirmation and quantification of known trends. In other cases it identifies new challenges and issues. The main conclusions and associated policy remarks arising from the research are summarised below.

- **NI's skills performance:** NI's concentration of higher qualified persons in the workforce (NQF 4-8) is on a par with many of the UK regions and a notable improvement in the proportion, from just over 20 per cent to almost 30 per cent, has occurred over the last decade. The region however still suffers from a proportionately larger group of the working age population with no formal qualifications, which contributes to NI's overall relatively low employment rate, despite recent improvement. Although the share of low qualifications in the workforce in NI is no higher than the UK average.
- **Importance of skills:** There is clear evidence in published literature and drawn from primary evidence in this research to show the importance of formal skills in driving economic growth and providing improved returns to individuals in terms of likely labour market outcomes and earnings potential. For example over 90 per cent of working age graduates are in employment in NI and a graduate in the workplace has an average salary premium of more than 100 per cent over an individual with no formal skills. As a globally integrated economy becomes more of a reality, the need to be internationally competitive will only increase and thus **even through the downturn and beyond, the need to improve qualification levels will remain.**
- **Recession impact:** The skills landscape will be noticeably different during the recession currently being experienced both in NI and across most of the developed world. There will **undoubtedly be over supply in the short run** and the immediate economic fortunes in 2009 and 2010 for leavers from education, persons recently made redundant and the non-employed seeking work look extremely challenging.
- **Towards recovery:** There is little certainty over the timing and scale of economic recovery in NI. Based on latest forecasts (February 2009), Oxford Economics believe it will be 2010 before growth returns in any form and 2017 before employment levels return to their peak of early 2008 (the 5,000 pa average net job creation only occurs after 2010 and only just offsets the estimated net loss of approximately 25,000 jobs during the recession). In the recovery phase, the shape of growth will be different than the past – led less by the housing and retail sectors and more by export led activities. This will have implications for skills needs. Oxford Economics believe the long-run trend will be labour market expansion of approximately 5,000 - 6,000 net per annum, compared to over 10,000 on average per annum of the last decade. However given the current uncertainties, this does raise a need to re-visit and reappraise the quantum and nature of skills needs set out in this report.
- **Demand for skills:** Even though the NI economy is forecast to slow considerably in the downturn and **even in the longer-run is unlikely to return to the levels of job growth of the recent past, there will still be a significant demand for additional labour** (to both support expansion of certain sectors and to replace retirees and other leavers from the labour market). On average our analysis suggests approximately 15,000 jobs are available in the NI economy in a given year even without any net increase in the total number of jobs (this is the net replacement demand figure). A

labour market expanding at 5,000 net jobs per annum is consistent with the current education system outturns – assuming net migration is roughly in balance (down from recent trends) and employment rates roughly unchanged (again a change from the recent trend of rising employment rates).

- **Aspirational growth will require a ‘step-up’:** Though there is no detailed sectoral ‘roadmap’ for the ‘NI economy of tomorrow’ aspired to in the Economic Vision and associated policy documents and plans (including the Programme for Government), there is acceptance that improved economic performance is central (and PSA targets and Executive statements support this). To achieve improved growth would require uplift in skill levels across the workforce. This is both a demand issue (creating more high productivity jobs) and a supply issue (having the skills to fill these jobs and upskill existing workers). Setting out an indicative alternate economic growth trajectory which meets the published productivity policy goals suggests a need for higher qualification (NQF 4-8) concentrations in the workforce to rise from approximately 30 per cent to 50 per cent (i.e. an uplift across the skills ladder would be required).
- **Need for balanced supply:** Though driving faster growth would require a more skilled workforce **the labour market will still require workers across the skills spectrum and not just at the graduate end.** The model suggests annual requirements of roughly 3,500 for workers with low qualifications over the decade ahead (compared to almost 10,000 for persons with higher level qualifications)
- **Up-skilling the workforce matters:** In order to meet aspirational targets (and indeed even to support the projected baseline needs), **a considerable uplift within the existing workforce skills profile would be required.** Some of this occurs ‘organically’ as better skilled young people enter sectors and lesser skilled older workers depart, but nevertheless the research shows a significant requirement for upskilling the existing workforce to support economic growth. For example under the baseline scenario, 9,000 workers with low qualifications are required to upskill to a higher qualification, and consequently workers with intermediate qualifications are required to move up the skills ladder.
- **Graduate under-representation in certain sectors:** The research suggests that relative to UK averages (and regional comparisons) NI has an under-representation of graduates in a number of sectors. **These are primarily, agriculture, manufacturing, construction, retailing and hotels & catering.** Elsewhere in professional services and public services graduate concentrations are at a comparable level to elsewhere. Note that presence of graduates within a sector does not guarantee the full utilisation of skills. In addition much of the explanation of graduate concentrations may lie in the sub-sectoral nature of the particular firms located in NI (in other words a demand not a supply question).
- **Managerial (and professional) weakness:** The research suggests a significant managerial weakness in the occupational structure of the NI economy. **Even accounting for sectoral mix, NI is some 50,000 managers and professionals short of what level would be expected if NI had the same sectoral managerial and professional concentrations as the UK average.** This shortage is likely a function of the type of activities carried out in NI and the limited amount of higher end functions carried out in the region’s firms.
- **Graduate subject diversity:** The research suggests that the pool of graduates within the workforce has a rather ‘narrow’ unspecialised subject focus, which otherwise are essential for developing an innovative, export-led economy. **There is an over abundance of business and**

mass communications graduates and a notable under-representation of creative arts & design²³ / arts and STEM graduates (7,000 and 4,000 respectively). This may reflect demand as opposed to current supply (many may migrate out for work) but is nevertheless a notable facet of the NI economy.

- **Flexibility and adaptability:** The current economic circumstances and the limitation of the data (and a forecast based approach) **suggest that skills policy requires an increased level of flexibility and adaptability.** Though this can be difficult in planning courses and educational infrastructure, it is a necessary requirement in a fast moving global world. For example the importance of financial service skills in the decade ahead may be less than in the decade past or envisaged pre-credit crunch, whilst the importance of subjects related to environmental technologies may be greater. Thus revisiting and reappraising skills research such as this (and that carried out by the SSCs) will be important.
- **Changing dynamics of supply:** The forecasts presented in the research rely on assumptions drawn from the recent trends in the data. Consideration of changes in patterns over the future may be required. For example retention of older staff, or even returning retired staff due to weakening personal wealth circumstances (as pension values have been eroded), may change the magnitudes of outflows and inflows from these particular categories. **This would have an implication on the skill demand and needs from the educational system (and equally have an implication on the adult training environment).**
- **Increasing demand for STEM subjects:** As best as can be predicted, the base forecasts suggest that the growing sectors of the economy **will require an increasing number of STEM qualified graduates and skilled labour.**
- **Shortfalls could occur:** The analysis suggests that if a faster growth trajectory can be achieved - the aspirational scenario - there could be skill subject shortfalls emerging within the next decade (for example in some STEM, law and more commercially orientated creative / arts subjects). **This provides an important ‘early warning’ of future gaps which if unfilled would result in either lost economic growth or an increased dependence on imported labour** (which cannot always be guaranteed, especially if the exchange rate is unfavourable)
- **Retain and return:** The challenge to maintain and improve the skills base suggests **a need to attract back into the labour market well-qualified persons.** This could be from outside the labour market (parents looking after children or the early retired) or from outside NI (perhaps school leavers who previously left the region to study and remained working outside NI). Such a flow of skilled labour could help to address managerial and diversity of graduate subject weaknesses already identified. It is also important not to overlook the greater returns to individuals from skills gained at a personal level, even if they do not reside in the region - up-skilling is rarely wasted on the individual.

The conclusions above raise a number of policy questions and provide support for many of the existing skills programmes already in place. It is important to reflect on the level of job growth in the region over the last decade, and though the ‘outturns’ in productivity may not have been what might have been hoped for, NI’s impressive employment record nevertheless provides some commendation of the skills outputs to date.

²³ There is a recognised need for creative design disciplines to increasingly work with other sectors, such as engineering, to produce innovative solutions that lead to wealth creation

The worries at the lower skills end remain with the high proportion of the adult population, workforce, and most worryingly leavers from education having no formal qualifications and limited basic skills.

Looking forward the recession will require short term 'emergency supply-side measures', primarily to help leavers from the education system and those made redundant, especially as businesses are already adjusting quickly (some are operating a reduced number of days per week etc). However a strategic long-term plan must remain in order to capitalise on opportunities when the world emerges from the current economic malaise and to ensure that NI's skills offering remains internationally competitive.

The model developed in this project provides one useful evidence tool capable of re-visiting future skill needs when the economic picture becomes clearer and recovery begins to take shape (or does not). It can augment the qualitative and 'sector by sector' expertise within SSCs, DEL and elsewhere, and can help understand the quantum of skills required given the likely demand within the economy.

Perhaps the emergence of 'green jobs', the reshaping of the financial and professional services sector and a more developed tourist industry will alter the shape of the skills mix and a different aspirational path may emerge. The skills forecasting model will be a useful tool to address the alternate skills needs and we recommend its continued use in exploring alternate scenarios and looking ahead, alongside further consideration of the roadmap to deliver the 'better NI' to which policy aspires.

Annex A: Priority sector future skill needs

This annex chapter presents future skill needs analysis for the following DETI priority sectors – financial / exporting professional services, ICT and hi-tech manufacturing (including life sciences). The analysis is not presented in full in the main report for three main reasons:

1. To ensure that the main report focuses on the quantum of wider economy ‘macro’ skill needs, thereby avoiding the conclusions being skewed towards the specific requirements of individual sectors
2. Data limitations, notably LFS sample size issues and 4-digit employee data which cannot be disclosed, means that analysis at sector level is less robust and more difficult to draw precise conclusions from. (Also Oxford Economics’ NIPS model, which covers 59 employment sectors, does not forecast all individual sub-sectors – this required forecasts for relevant sub-sector elements of the wider 59 sectors)
3. Lastly it is our view that sector skill needs analysis is best handled by more comprehensive individual sector studies, such as the SSC Sector Skill Agreements and two studies which DEL have recently commenced on future skill needs of ICT and Financial Services. These types of studies allow specific sector skill issues to be explored in the greater depth they merit than is possible in this study

Note priority sector definitions were agreed between Oxford Economics and DETI and reflect international sectoral definitions (e.g. OECD) and our own joint views of what should be included. There is some cross-over of sub-sectors between ICT and hi-tech manufacturing & life sciences.

For each priority sector, the following detail is presented:

- SIC industry definition
- Current sub-sectoral, occupation and skill sector structure
- Employment forecast (baseline and aspirational)
- Sub-sectoral employment forecast (baseline and aspirational)
- The replacement demand components which make up the net requirement from education and in-migration in the sector (baseline and aspirational)
- A breakdown of the net requirement by NQF level from education and in-migration

Note it is not possible at this stage to undertake degree subject analysis as this would require a time-consuming special output from the HESA First Destination Leavers’ Survey, based on the bespoke priority sector definition.

Also note that the commentary in this annex chapter is kept deliberately brief as the charts and tables are identical to the format of those in the main report and are largely self-explanatory.

Financial / professional exporting services

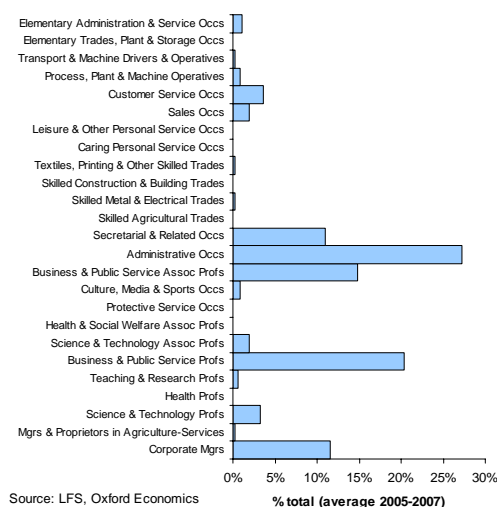
Note given the SIC industry definition below, it is perhaps more accurate to term this priority sector as 'professional services' with export potential.

SIC industry definition

- 65.121: Banks
- 65.122: Building societies
- 65.21: Financial leasing
- 65.22: Other credit granting
- 65.231-6: Unit / investment trusts
- 65.233: Securities dealing for self
- 66.01: Life insurance
- 66.02: Pension funding
- 66.03: Non-life insurance
- 67.11: Financial market administration
- 67.12: Securities / fund management
- 67.13: Other financial intermediary activities
- 67.20: Other insurance activities
- 73.10: Research - natural sciences and engineering
- 73.20: Research - social sciences and humanities
- 73.89: Call centre
- 74.11: Legal activities
- 74.12: Accounting, auditing, tax consultancy
- 74.13: Market opinion research
- 74.14: Business, management consultancy
- 74.15: Management activities, holding companies
- 74.20: Architecture, engineering etc consultancy
- 74.30: Technical testing and analysis
- 74.40: Advertising

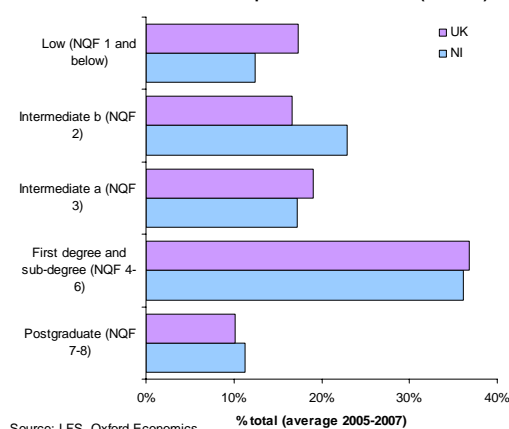
Occupation structure

NI: Professional services occupation structure (2005-07)



Qualification structure

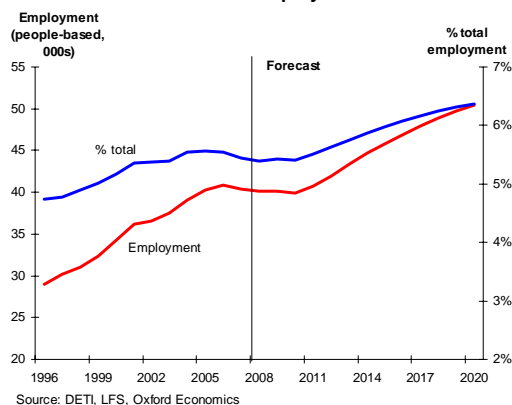
NI & UK: Professional services qualification structure (2005-07)



Baseline scenario

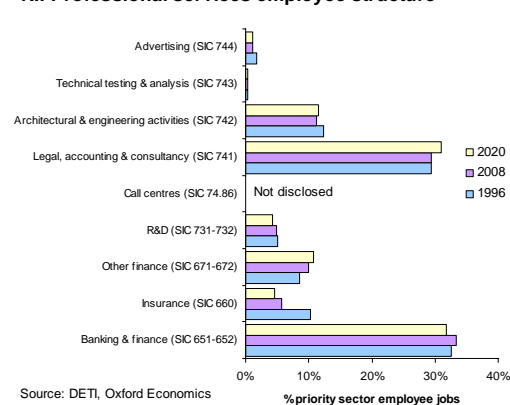
Employment

NI: Professional services employment



Sub-sectoral employment

NI: Professional services employee structure



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
Banking & finance (SIC 651-652)	8.7	12.8	12.7	12.7	12.7	12.8	13.0	15.2
Insurance (SIC 660)	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.2
Other finance (SIC 671-672)	2.3	3.6	3.7	3.7	3.8	3.9	4.0	5.2
R&D (SIC 731-732)	1.3	1.7	1.8	1.8	1.8	1.8	1.8	2.0
Legal, accounting & consultancy (SIC 741)	7.9	11.4	11.3	11.2	11.2	11.0	11.3	14.8
Architectural & engineering activities (SIC 742)	3.3	4.6	4.4	4.3	4.2	4.1	4.2	5.5
Technical testing & analysis (SIC 743)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Advertising (SIC 744)	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5
Call centres (SIC 74.86)	0.0	1.2	1.5	1.5	1.5	1.5	1.6	2.3
Self-employment	4.9	6.7	6.4	6.0	6.0	6.0	6.1	7.6
Total employment (job-based)	31.6	44.8	44.4	43.9	44.0	43.7	44.7	55.4
Total employment (people-based)	29.0	40.9	40.4	40.1	40.1	39.9	40.8	50.5

Source: DETI, Oxford Economics

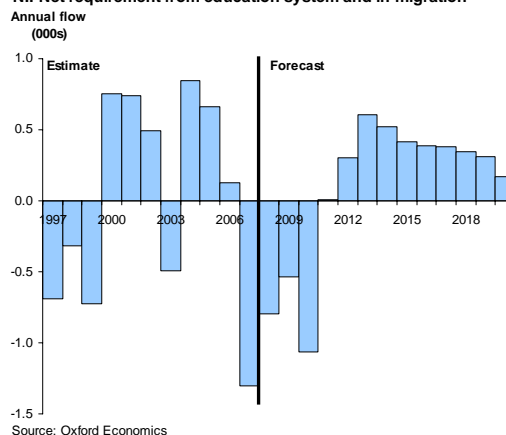
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	-0.6	10.6
Gross expansion and replacement demand	10.5	52.0
Total returnees	12.9	48.5
Net requirement from education and migration	-2.4	3.4
Net requirement from education and migration (annual)	-0.8	0.3

Source: Oxford Economics

NI: Net requirement from education system and in-migration



Net requirement from education and migration – highest qualification requirement

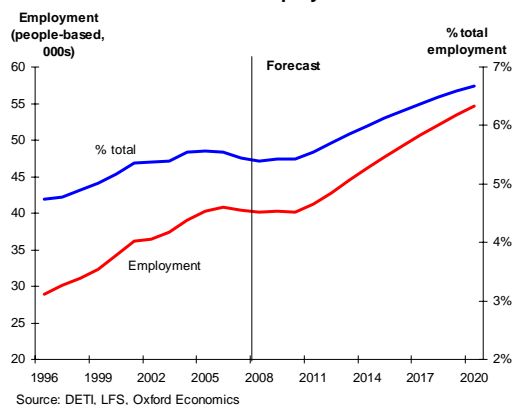
	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	-0.1	0.0
First degree and sub-degree (NQF 4-6)	-0.4	0.2
Intermediate a (NQF 3)	-0.1	0.1
Intermediate b (NQF 2)	-0.2	0.0
Low (NQF 1 and below)	0.0	0.0
Total	-0.8	0.3
Postgraduate (NQF 7-8)	12%	14%
First degree and sub-degree (NQF 4-6)	49%	54%
Intermediate a (NQF 3)	15%	16%
Intermediate b (NQF 2)	19%	14%
Low (NQF 1 and below)	4%	2%

Source: Oxford Economics

Aspirational scenario

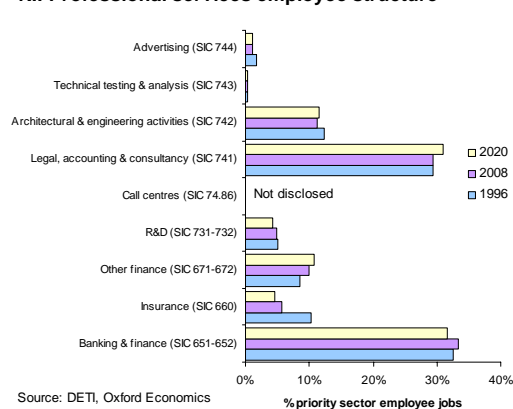
Employment

NI: Professional services employment



Sub-sectoral employment

NI: Professional services employee structure



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
Banking & finance (SIC 651-652)	8.7	12.8	12.7	12.7	12.8	12.9	13.1	16.4
Insurance (SIC 660)	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.4
Other finance (SIC 671-672)	2.3	3.6	3.7	3.7	3.9	3.9	4.1	5.6
R&D (SIC 731-732)	1.3	1.7	1.8	1.8	1.8	1.8	1.8	2.2
Legal, accounting & consultancy (SIC 741)	7.9	11.4	11.3	11.2	11.2	11.1	11.5	16.1
Architectural & engineering activities (SIC 742)	3.3	4.6	4.4	4.3	4.2	4.2	4.3	6.0
Technical testing & analysis (SIC 743)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Advertising (SIC 744)	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.6
Call centres (SIC 74.86)	0.0	1.2	1.5	1.5	1.5	1.5	1.6	2.5
Self-employment	4.9	6.7	6.4	6.0	6.1	6.0	6.2	8.2
Total employment (job-based)	31.6	44.8	44.4	43.9	44.1	44.0	45.3	60.0
Total employment (people-based)	29.0	40.9	40.4	40.1	40.2	40.1	41.3	54.6

Source: DETI, Oxford Economics

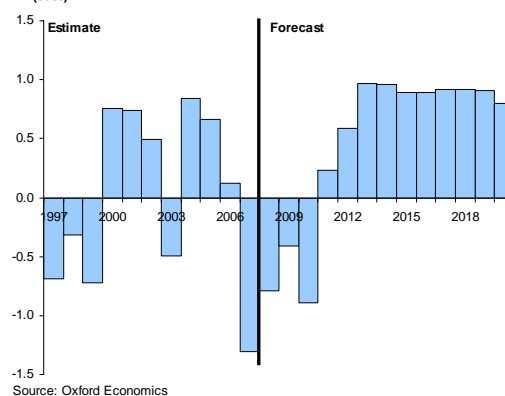
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	-0.3	14.5
Gross expansion and replacement demand	10.8	57.5
Total returnees	12.9	49.4
Net requirement from education and migration	-2.1	8.1
Net requirement from education and migration (annual)	-0.7	0.8

Source: Oxford Economics

NI: Net requirement from education system and in-migration
Annual flow (000s)



Net requirement from education and migration – highest qualification requirement

	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	-0.1	0.1
First degree and sub-degree (NQF 4-6)	-0.3	0.4
Intermediate a (NQF 3)	-0.1	0.1
Intermediate b (NQF 2)	-0.1	0.2
Low (NQF 1 and below)	0.0	0.0
Total	-0.7	0.8
Postgraduate (NQF 7-8)	12%	13%
First degree and sub-degree (NQF 4-6)	50%	51%
Intermediate a (NQF 3)	15%	16%
Intermediate b (NQF 2)	19%	19%
Low (NQF 1 and below)	3%	1%

Source: Oxford Economics

Box A.1: Financial / professional exporting services

- **Main occupations** – administrative; business and business associate professionals; corporate managers and secretarial occupations
- **Skill structure** – just under half of the workforce is qualified to NQF 4-8 level (the same as the UK sectoral concentration); 1 in 8 of the workforce have low qualifications
- **Sub-sectoral structure** – one-third employed in banking & finance; 30 per cent in legal, accounting and consultancy
- **Employment trend and forecast** – 11,000 net new jobs created in the last 12 years (although stagnating recently); 10,000 net new jobs forecast in next 12 years under the baseline (remember this refers to EDF September 2008 outlooks – this sector has been significantly revised down in latest outlooks) and 15,000 net new jobs in the aspirational scenario. Employment growth is forecast across the majority of sub-sectors. Note employment is relatively stagnant up to 2011 before the economic recovery phase
- **Net requirement from education and in-migration post economy recovery** – annual average 300 pa (baseline); 800 pa (aspiration)
- **Skill needs from education and in-migration post economy recovery** – the sector can be considered ‘skills hungry’ with almost 7 in 10 jobs requiring higher qualifications and only 1 in 5 jobs requiring NQF 2 and below in the aspiration

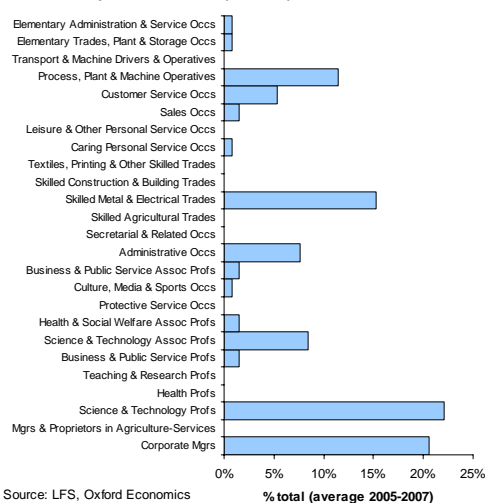
ICT

SIC industry definition

- 30.01: Office machinery manufacture
- 30.02: Computers and IT equipment manufacture
- 31.30: Insulated cable manufacture
- 32.10: Electronic components etc manufacture
- 32.201: Telegraph and telephone equipment manufacture
- 32.202: Radio and electronic goods manufacture
- 32.30: TV, radio, HiFi etc equipment manufacture
- 33.10: Medical equipment and appliances manufacture
- 64.20: Telecommunications
- 71.33: Office machinery equipment rental
- 72.10: Computer hardware consultancy
- 72.20: Computer software consultancy
- 72.30: Data processing
- 72.40: Database activities
- 72.50: Repair of office computer equipment
- 72.60: Other computer activities

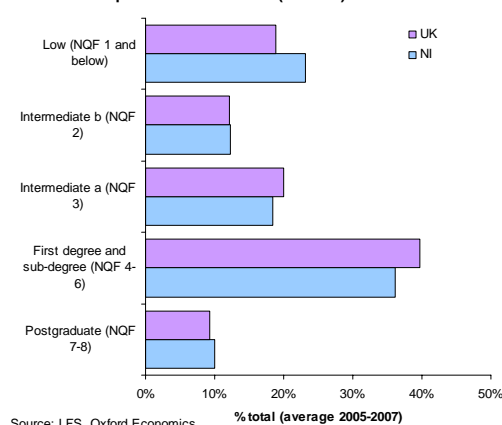
Occupation structure

NI: ICT occupation structure (2005-07)



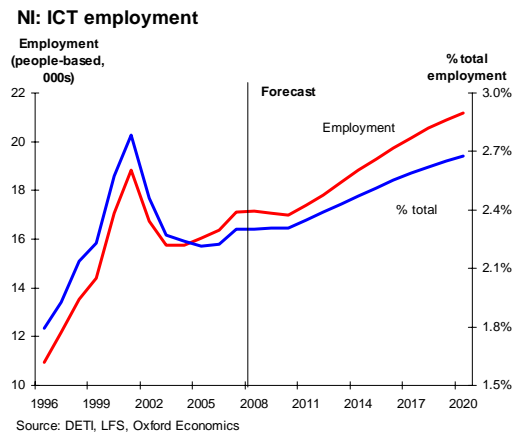
Qualification structure

NI & UK: ICT qualification structure (2005-07)

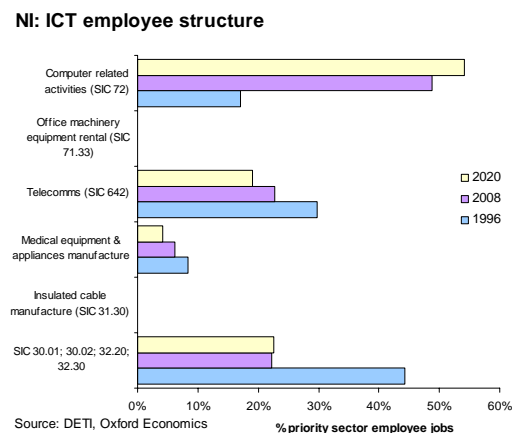


Baseline scenario

Employment



Sub-sectoral employment



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
SIC 30.01; 30.02; 32.20; 32.30	4.5	3.6	3.7	3.5	3.6	3.7	3.8	4.5
Insulated cable manufacture (SIC 31.30)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical equipment & appliances manufacture	0.8	1.0	1.0	1.0	0.9	0.9	0.9	0.8
Telecomms (SIC 642)	3.0	3.5	3.6	3.6	3.5	3.5	3.6	3.8
Office machinery equipment rental (SIC 71.33)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Computer related activities (SIC 72)	1.7	6.7	7.4	7.8	7.8	7.7	8.0	10.8
Self-employment	1.9	3.1	3.0	2.8	2.8	2.8	2.8	3.4
Total employment (job-based)	12.0	18.0	18.8	18.8	18.7	18.6	19.1	23.3
Total employment (people-based)	11.0	16.4	17.1	17.1	17.1	17.0	17.4	21.2

Source: DETI, Oxford Economics

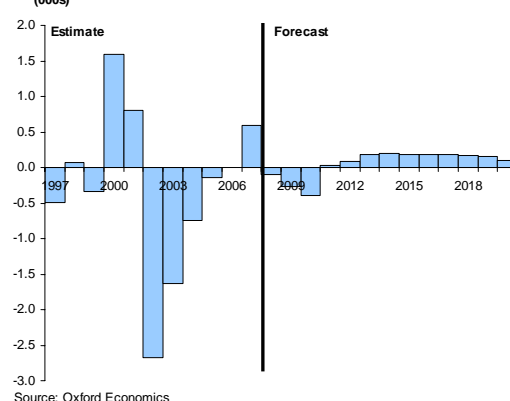
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	-0.1	4.2
Gross expansion and replacement demand	4.5	21.4
Total returnees	5.3	20.0
Net requirement from education and migration	-0.8	1.4
Net requirement from education and migration (annual)	-0.3	0.1

Source: Oxford Economics

Ni: Net requirement from education system and in-migration



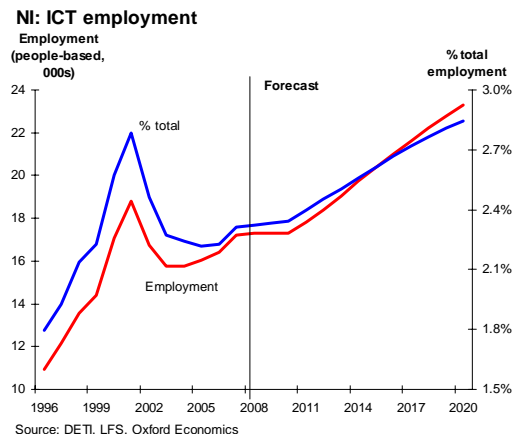
Net requirement from education and migration – highest qualification requirement

	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	0.0	0.0
First degree and sub-degree (NQF 4-6)	-0.1	0.1
Intermediate a (NQF 3)	0.0	0.0
Intermediate b (NQF 2)	0.0	0.0
Low (NQF 1 and below)	0.0	0.0
Total	-0.3	0.1
Postgraduate (NQF 7-8)	18%	22%
First degree and sub-degree (NQF 4-6)	44%	47%
Intermediate a (NQF 3)	19%	20%
Intermediate b (NQF 2)	19%	11%
Low (NQF 1 and below)	0%	0%

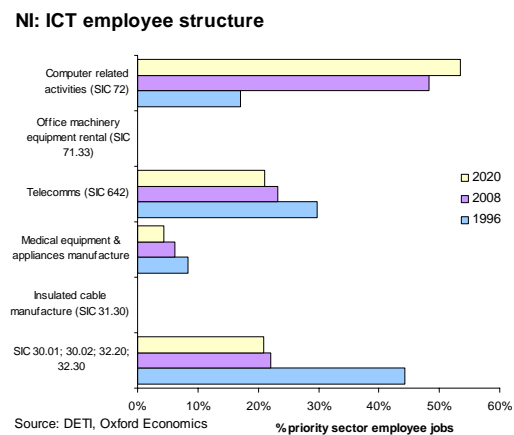
Source: Oxford Economics

Aspirational scenario

Employment



Sub-sectoral employment



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
SIC 30.01; 30.02; 32.20; 32.30	4.5	3.6	3.7	3.5	3.6	3.7	3.8	4.6
Insulated cable manufacture (SIC 31.30)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical equipment & appliances manufacture	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Telecomms (SIC 642)	3.0	3.5	3.7	3.7	3.7	3.7	3.8	4.6
Office machinery equipment rental (SIC 71.33)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Computer related activities (SIC 72)	1.7	6.7	7.4	7.8	7.9	7.8	8.1	11.7
Self-employment	1.9	3.1	3.0	2.9	2.8	2.8	2.9	3.7
Total employment (job-based)	12.0	18.0	18.9	18.9	19.0	19.0	19.6	25.6
Total employment (people-based)	11.0	16.4	17.2	17.3	17.3	17.3	17.8	23.3

Source: DETI, Oxford Economics

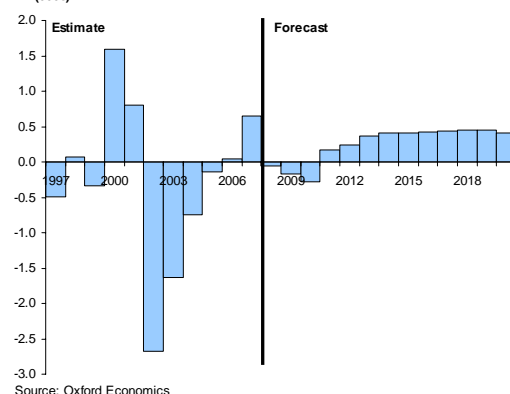
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	0.1	6.0
Gross expansion and replacement demand	4.8	24.1
Total returnees	5.3	20.4
Net requirement from education and migration	-0.5	3.7
Net requirement from education and migration (annual)	-0.2	0.4

Source: Oxford Economics

NI: Net requirement from education system and in-migration
Annual flow (000s)



Net requirement from education and migration – highest qualification requirement

	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	0.0	0.1
First degree and sub-degree (NQF 4-6)	-0.1	0.2
Intermediate a (NQF 3)	0.0	0.1
Intermediate b (NQF 2)	0.0	0.0
Low (NQF 1 and below)	0.0	0.0
Total	-0.2	0.4
Postgraduate (NQF 7-8)	18%	23%
First degree and sub-degree (NQF 4-6)	45%	50%
Intermediate a (NQF 3)	19%	21%
Intermediate b (NQF 2)	18%	6%
Low (NQF 1 and below)	0%	0%

Source: Oxford Economics

Box A.2: ICT

- **Main occupations** – technology and associate technology professionals; corporate managers; skilled electrical trades; machine operatives; administrative occupations
- **Skill structure** – just under half of the workforce is qualified to NQF 4-8 level (slightly lower than the UK sectoral concentration); almost 1 in 4 of the workforce have low qualifications
- **Sub-sectoral structure** – one-half employed in computer-related activities; one-quarter in telecommunications and just over one-fifth in electronics (which was previously a much larger sub-sector)
- **Employment trend and forecast** – 6,000 net new jobs created in the last 12 years (though the sector has still not returned to its peak employment pre-dot com crash); 4,000 net new jobs forecast in next 12 years under the baseline and 6,000 in the aspirational scenario. Employment growth is mainly forecast in computer related activities which includes software and hardware consultancy
- **Net requirement from education and in-migration post economy recovery** – annual average 100 pa (baseline); 400 pa (aspiration). Note the historical negative net requirement post-2001 is explained entirely by the engineering-led downturn
- **Skill needs from education and in-migration post economy recovery** – the sector can be considered ‘skills hungry’ with almost three-quarters of jobs requiring higher qualifications and less than 1 in 10 jobs requiring NQF 2 and below in the aspiration

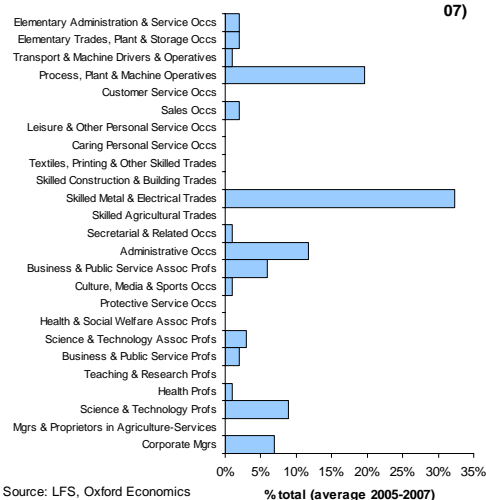
Hi-tech manufacturing & life sciences

SIC industry definition

- 24.41: Basic pharmaceutical manufacture
- 24.42: Pharmaceutical preparations manufacture
- 32.201: Telegraph and telephone equipment manufacture
- 32.202: Radio and electronic goods manufacture
- 32.30: TV, radio, HiFi etc equipment manufacture
- 33.20: Testing, navigating etc equipment manufacture
- 33.30: Industrial proc control equipment manufacture
- 33.401: Spectacles and lens manufacture
- 33.402: Optical precision equipment manufacture
- 33.403: Photographic and cinema equipment manufacture
- 35.30: Aircraft and spacecraft manufacture

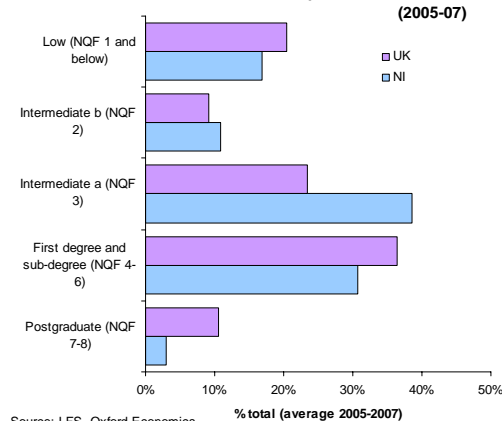
Occupation structure

NI: Hi-tech manuf & life sciences occupation structure (2005-07)



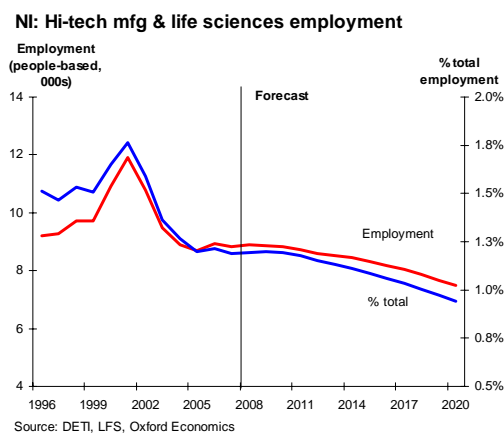
Qualification structure

NI & UK: Hi-tech manuf & life sciences qualification structure (2005-07)



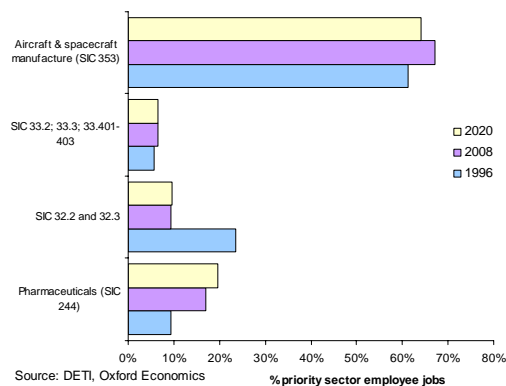
Baseline scenario

Employment



Sub-sectoral employment

NI: Hi-tech manuf & life sciences employee structure



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
Pharmaceuticals (SIC 244)	0.9	1.6	1.6	1.6	1.6	1.6	1.6	1.5
SIC 32.2 and 32.3	2.2	0.9	0.9	0.8	0.8	0.8	0.8	0.7
SIC 33.2; 33.3; 33.401-403	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5
Aircraft & spacecraft manufacture (SIC 353)	5.8	6.0	6.0	6.1	6.1	6.0	5.9	4.9
Self-employment								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total employment (job-based)	9.4	9.2	9.1	9.1	9.1	9.0	8.9	7.7
Total employment (people-based)	9.2	8.9	8.8	8.9	8.9	8.8	8.7	7.5

Source: DETI, Oxford Economics

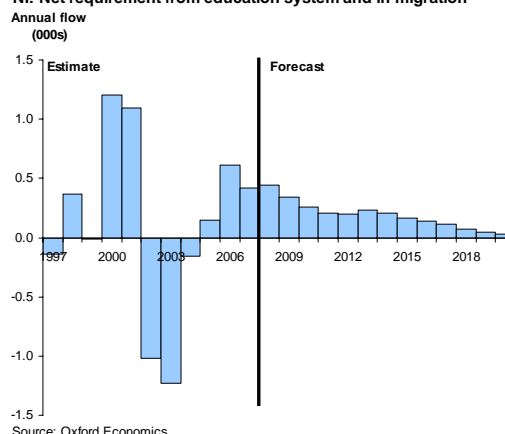
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	0.0	-1.3
Gross expansion and replacement demand	2.3	6.1
Total returnees	1.3	4.7
Net requirement from education and migration	1.1	1.4
Net requirement from education and migration (annual)	0.4	0.1

Source: Oxford Economics

NI: Net requirement from education system and in-migration



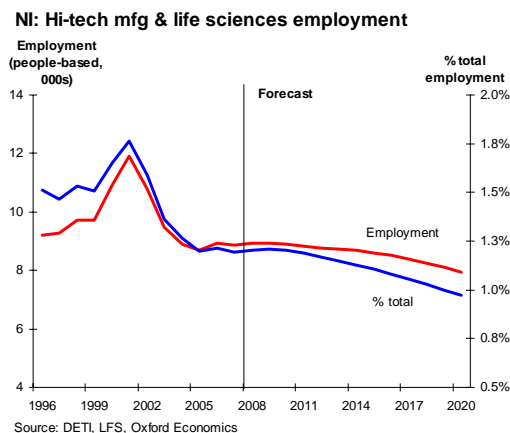
Net requirement from education and migration – highest qualification requirement

	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	0.0	0.0
First degree and sub-degree (NQF 4-6)	0.2	0.1
Intermediate a (NQF 3)	0.1	0.1
Intermediate b (NQF 2)	0.1	0.0
Low (NQF 1 and below)	0.0	0.0
Total	0.4	0.1
Postgraduate (NQF 7-8)	3%	3%
First degree and sub-degree (NQF 4-6)	43%	49%
Intermediate a (NQF 3)	35%	37%
Intermediate b (NQF 2)	19%	11%
Low (NQF 1 and below)	0%	0%

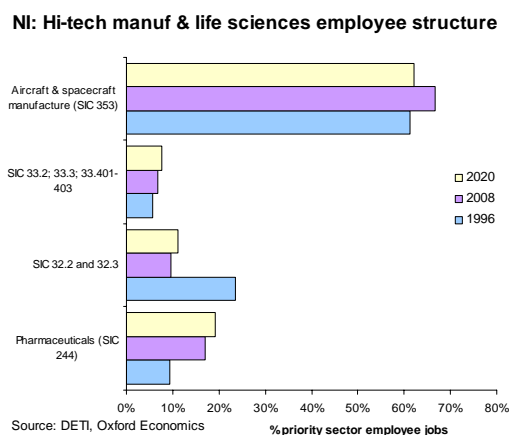
Source: Oxford Economics

Aspirational scenario

Employment



Sub-sectoral employment



Sub-sectoral employment

	1996	2006	2007	2008	2009	2010	2011	2020
Employee jobs								
Pharmaceuticals (SIC 244)	0.9	1.6	1.6	1.6	1.6	1.6	1.6	1.6
SIC 32.2 and 32.3	2.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9
SIC 33.2; 33.3; 33.401-403	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Aircraft & spacecraft manufacture (SIC 353)	5.8	6.0	6.0	6.1	6.1	6.0	5.9	5.0
Self-employment								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total employment (job-based)	9.4	9.2	9.1	9.2	9.2	9.1	9.1	8.1
Total employment (people-based)	9.2	8.9	8.9	8.9	8.9	8.9	8.8	7.9

Source: DETI, Oxford Economics

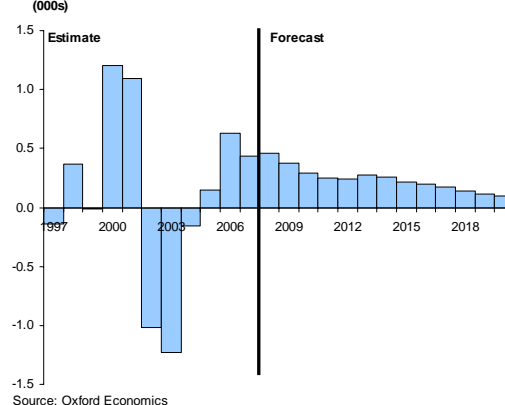
Net requirement from education and migration

Replacement demand analysis

	2007-2010	2010-2020
Expansion demand	0.0	-1.0
Gross expansion and replacement demand	2.4	6.7
Total returnees	1.3	4.7
Net requirement from education and migration	1.1	2.0
Net requirement from education and migration (annual)	0.4	0.2

Source: Oxford Economics

NI: Net requirement from education system and in-migration



Net requirement from education and migration – highest qualification requirement

	2007-2010 (annual)	2010-2020 (annual)
Postgraduate (NQF 7-8)	0.0	0.0
First degree and sub-degree (NQF 4-6)	0.2	0.1
Intermediate a (NQF 3)	0.1	0.1
Intermediate b (NQF 2)	0.1	0.0
Low (NQF 1 and below)	0.0	0.0
Total	0.4	0.2
Postgraduate (NQF 7-8)	3%	4%
First degree and sub-degree (NQF 4-6)	44%	51%
Intermediate a (NQF 3)	35%	37%
Intermediate b (NQF 2)	18%	8%
Low (NQF 1 and below)	0%	0%

Source: Oxford Economics

Box A.3: Hi-tech manufacturing and life sciences

- **Main occupations** – skilled metal & electrical trades; machine operatives; administrative occupations; science & technology professionals (note the UK occupation structure is much more heavily skewed towards managers and science & technology professionals)
- **Skill structure** – one-third of the workforce is qualified to NQF 4-8 level (compared to almost one-half for the UK average); almost 1 in 5 of the workforce have low qualifications (which is similar to the UK)
- **Sub-sectoral structure** – two-thirds employed in aerospace and just under one-fifth in pharmaceuticals
- **Employment trend and forecast** – net job loss of 300 in the last 12 years (the sector had been growing overall pre-2001); 1,400 net job loss forecast in next 12 years under the baseline and 1,000 net job loss in the aspirational scenario. Within the sector there have been areas of growth over the last 12 years - +700 net new jobs in pharmaceuticals and +300 net new jobs in aerospace. The overall past decline is explained entirely by electronics (which is also part of the ICT definition), more than offsetting growth in other areas. The future forecast decline is entirely in aerospace with other sectors remaining relatively stable
- **Net requirement from education and in-migration post economy recovery** – annual average 100 pa (baseline); 200 pa (aspiration)
- **Skill needs from education and in-migration post economy recovery** – the sector can be considered 'skills hungry' with just over half of jobs requiring higher qualifications. Importantly over one-third of jobs are forecast to require NQF 3 level intermediate qualifications

Annex B: NI skills in context – additional analysis

This annex chapter sets out additional detailed skills analysis relevant to chapter 3. It includes:

- NI and UK sectoral comparisons of high level skill concentrations
- Decomposition of the NI-UK high level skill gap
- NI and UK comparisons of occupation concentrations
- NI, North East and Wales sectoral comparisons of occupation concentrations
- NI and UK comparisons of degree subject concentrations by sector
- Decomposition of the NI-UK managerial gap

High level skills

NQF 4-8 relativities by sector

	NI NQF 4-8 % employed persons (2007, 3- year moving average)	UK NQF 4-8 % employed persons (2007, 3- year moving average)	NI (UK=100)
Agriculture, forestry & fishing	8%	17%	47
Mining & quarrying	0%	36%	0
Manufacturing	22%	26%	85
Utilities	52%	38%	135
Construction	11%	15%	74
Retail & distribution	13%	14%	90
Hotels & restaurants	6%	13%	44
Transport & communications	17%	18%	95
Financial services	32%	36%	88
Business services	47%	46%	103
Public administration & defence	42%	41%	102
Education	61%	61%	101
Health & social work	47%	45%	105
Other personal services	27%	30%	91
Whole economy	29%	32%	92

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's sectoral NQF 4-8 share is 10 per cent less than the UK average. Cells shaded blue indicate NI's sectoral NQF 4-8 share is 10 per cent greater than the UK average

Decomposition of NI-UK NQF 4-8 gap

	NQF 4-8 share (2007, 3-year moving average)	UK=100
NI actual NQF 4-8 share in employment	29.3%	92.3
UK actual NQF 4-8 share in employment	31.8%	100.0
Expected NI NQF 4-8 share if sector NQF 4-8 shares equal to UK shares	30.9%	97.4
NQF 4-8 gap due to lower sector NQF 4-8 shares	1.6%	5.0
NQF 4-8 gap due to structure of economy	0.8%	2.6

Source: Oxford Economics

Occupations

Occupation relativities

	NI % employed persons (2007, 3-year moving average)	UK % employed persons (2007, 3-year moving average)	NI (UK=100)
Corporate Managers	8%	12%	66
Managers & Proprietors in Agriculture & Services	3%	3%	88
Science & Technology Professionals	2%	4%	61
Health Professionals	1%	1%	101
Teaching & Research Professionals	5%	5%	97
Business & Public Service Professionals	4%	3%	109
Science & Technology Associate Professionals	1%	2%	82
Health & Social Welfare Associate Professionals	5%	4%	122
Protective Service Occupations	1%	1%	61
Culture, Media & Sports Occupations	1%	2%	64
Business & Public Service Associate Professionals	4%	5%	72
Administrative Occupations	10%	9%	111
Secretarial & Related Occupations	3%	3%	98
Skilled Agricultural Trades	3%	1%	309
Skilled Metal & Electrical Trades	5%	4%	124
Skilled Construction & Building Trades	6%	4%	156
Textiles, Printing & Other Skilled Trades	2%	2%	121
Caring Personal Service Occupations	6%	6%	100
Leisure & Other Personal Service Occupations	2%	2%	101
Sales Occupations	8%	6%	119
Customer Service Occupations	1%	1%	45
Process, Plant & Machine Operatives	5%	4%	137
Transport & Mobile Machine Drivers & Operatives	4%	4%	115
Elementary Trades, Plant & Storage Related Occupations	3%	3%	82
Elementary Administration & Service Occupations	7%	8%	91
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's occupation share is 10 per cent less than the UK average. Cells shaded blue indicate NI's occupation share is 10 per cent greater than the UK average

Occupation concentrations – agriculture, forestry & fishing

	NI	North East	Wales	UK
Corporate Managers	0%	4%	0%	3%
Managers & Proprietors in Agriculture & Services	3%	9%	12%	9%
Science & Technology Professionals	0%	0%	1%	1%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	0%	4%	1%	1%
Science & Technology Associate Professionals	0%	0%	0%	0%
Health & Social Welfare Associate Professionals	0%	2%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	1%	0%	1%	1%
Administrative Occupations	2%	0%	2%	3%
Secretarial & Related Occupations	0%	2%	1%	2%
Skilled Agricultural Trades	77%	44%	57%	48%
Skilled Metal & Electrical Trades	0%	0%	1%	0%
Skilled Construction & Building Trades	0%	3%	0%	1%
Textiles, Printing & Other Skilled Trades	0%	0%	0%	0%
Caring Personal Service Occupations	1%	5%	4%	4%
Leisure & Other Personal Service Occupations	0%	2%	0%	0%
Sales Occupations	0%	0%	1%	1%
Customer Service Occupations	0%	0%	0%	0%
Process, Plant & Machine Operatives	0%	0%	0%	1%
Transport & Mobile Machine Drivers & Operatives	3%	5%	3%	3%
Elementary Trades, Plant & Storage Related Occupations	12%	21%	17%	19%
Elementary Administration & Service Occupations	0%	0%	0%	1%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – mining & quarrying

	NI	North East	Wales	UK
Corporate Managers	18%	7%	4%	15%
Managers & Proprietors in Agriculture & Services	0%	0%	0%	0%
Science & Technology Professionals	0%	13%	8%	11%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	1%
Business & Public Service Professionals	0%	0%	0%	3%
Science & Technology Associate Professionals	0%	6%	0%	5%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	1%
Business & Public Service Associate Professionals	0%	10%	0%	9%
Administrative Occupations	4%	4%	0%	8%
Secretarial & Related Occupations	0%	2%	0%	3%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	11%	17%	18%	9%
Skilled Construction & Building Trades	7%	3%	10%	2%
Textiles, Printing & Other Skilled Trades	0%	0%	0%	1%
Caring Personal Service Occupations	0%	3%	0%	1%
Leisure & Other Personal Service Occupations	0%	0%	0%	1%
Sales Occupations	0%	0%	0%	1%
Customer Service Occupations	0%	0%	0%	1%
Process, Plant & Machine Operatives	18%	27%	41%	19%
Transport & Mobile Machine Drivers & Operatives	31%	6%	14%	6%
Elementary Trades, Plant & Storage Related Occupations	11%	2%	4%	2%
Elementary Administration & Service Occupations	0%	0%	0%	1%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – manufacturing

	NI	North East	Wales	UK
Corporate Managers	11%	15%	13%	17%
Managers & Proprietors in Agriculture & Services	0%	0%	0%	1%
Science & Technology Professionals	5%	7%	5%	7%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	2%	1%	0%	1%
Science & Technology Associate Professionals	3%	3%	4%	3%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	2%	1%	1%	3%
Business & Public Service Associate Professionals	4%	4%	3%	5%
Administrative Occupations	6%	5%	5%	6%
Secretarial & Related Occupations	1%	1%	1%	2%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	14%	16%	16%	13%
Skilled Construction & Building Trades	4%	2%	2%	2%
Textiles, Printing & Other Skilled Trades	6%	4%	4%	5%
Caring Personal Service Occupations	0%	0%	0%	0%
Leisure & Other Personal Service Occupations	0%	0%	0%	0%
Sales Occupations	2%	1%	1%	1%
Customer Service Occupations	0%	0%	1%	1%
Process, Plant & Machine Operatives	28%	24%	29%	19%
Transport & Mobile Machine Drivers & Operatives	4%	4%	4%	3%
Elementary Trades, Plant & Storage Related Occupations	5%	9%	9%	7%
Elementary Administration & Service Occupations	1%	1%	2%	2%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – utilities

	NI	North East	Wales	UK
Corporate Managers	6%	13%	16%	16%
Managers & Proprietors in Agriculture & Services	0%	1%	2%	2%
Science & Technology Professionals	11%	6%	10%	15%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	13%	0%	0%	2%
Science & Technology Associate Professionals	8%	7%	2%	5%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	0%	7%	0%	6%
Administrative Occupations	0%	6%	13%	9%
Secretarial & Related Occupations	0%	0%	2%	1%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	40%	9%	22%	10%
Skilled Construction & Building Trades	4%	5%	5%	5%
Textiles, Printing & Other Skilled Trades	0%	0%	0%	0%
Caring Personal Service Occupations	0%	0%	0%	0%
Leisure & Other Personal Service Occupations	0%	0%	0%	0%
Sales Occupations	0%	1%	2%	4%
Customer Service Occupations	0%	35%	16%	11%
Process, Plant & Machine Operatives	7%	3%	6%	7%
Transport & Mobile Machine Drivers & Operatives	0%	1%	1%	1%
Elementary Trades, Plant & Storage Related Occupations	0%	2%	2%	3%
Elementary Administration & Service Occupations	10%	1%	0%	1%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – construction

	NI	North East	Wales	UK
Corporate Managers	7%	11%	9%	12%
Managers & Proprietors in Agriculture & Services	0%	0%	1%	1%
Science & Technology Professionals	3%	2%	3%	4%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	1%	2%	1%	2%
Science & Technology Associate Professionals	1%	2%	3%	2%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	1%	2%	2%	2%
Administrative Occupations	4%	2%	4%	5%
Secretarial & Related Occupations	1%	1%	1%	2%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	9%	12%	7%	10%
Skilled Construction & Building Trades	54%	42%	42%	42%
Textiles, Printing & Other Skilled Trades	0%	1%	0%	0%
Caring Personal Service Occupations	0%	0%	0%	0%
Leisure & Other Personal Service Occupations	0%	1%	0%	0%
Sales Occupations	1%	0%	1%	0%
Customer Service Occupations	0%	0%	0%	0%
Process, Plant & Machine Operatives	6%	6%	9%	6%
Transport & Mobile Machine Drivers & Operatives	4%	5%	5%	3%
Elementary Trades, Plant & Storage Related Occupations	7%	11%	9%	8%
Elementary Administration & Service Occupations	0%	0%	1%	1%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – retail & distribution

	NI	North East	Wales	UK
Corporate Managers	13%	15%	12%	15%
Managers & Proprietors in Agriculture & Services	7%	5%	5%	5%
Science & Technology Professionals	0%	1%	0%	1%
Health Professionals	1%	1%	1%	1%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	0%	0%	0%	1%
Science & Technology Associate Professionals	0%	0%	0%	0%
Health & Social Welfare Associate Professionals	0%	1%	1%	1%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	2%	3%	3%	4%
Administrative Occupations	6%	6%	6%	7%
Secretarial & Related Occupations	2%	1%	1%	1%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	8%	5%	7%	6%
Skilled Construction & Building Trades	0%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	2%	3%	2%	2%
Caring Personal Service Occupations	0%	0%	0%	0%
Leisure & Other Personal Service Occupations	0%	0%	0%	0%
Sales Occupations	42%	42%	40%	36%
Customer Service Occupations	1%	2%	2%	2%
Process, Plant & Machine Operatives	2%	1%	2%	2%
Transport & Mobile Machine Drivers & Operatives	4%	4%	4%	4%
Elementary Trades, Plant & Storage Related Occupations	3%	4%	5%	4%
Elementary Administration & Service Occupations	5%	6%	7%	7%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – hotel & restaurants

	NI	North East	Wales	UK
Corporate Managers	2%	2%	3%	3%
Managers & Proprietors in Agriculture & Services	16%	14%	20%	16%
Science & Technology Professionals	0%	1%	0%	0%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	0%	0%	0%	0%
Science & Technology Associate Professionals	0%	0%	0%	0%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	0%	2%	0%	1%
Administrative Occupations	2%	1%	2%	2%
Secretarial & Related Occupations	1%	2%	2%	2%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	0%	0%	0%	0%
Skilled Construction & Building Trades	0%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	19%	11%	11%	13%
Caring Personal Service Occupations	1%	0%	0%	0%
Leisure & Other Personal Service Occupations	3%	2%	2%	2%
Sales Occupations	5%	5%	4%	4%
Customer Service Occupations	0%	0%	0%	1%
Process, Plant & Machine Operatives	1%	0%	0%	1%
Transport & Mobile Machine Drivers & Operatives	1%	2%	0%	1%
Elementary Trades, Plant & Storage Related Occupations	0%	0%	1%	1%
Elementary Administration & Service Occupations	46%	57%	55%	50%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – transport & communications

	NI	North East	Wales	UK
Corporate Managers	13%	9%	12%	12%
Managers & Proprietors in Agriculture & Services	1%	2%	1%	1%
Science & Technology Professionals	0%	4%	3%	3%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	1%	0%	1%	1%
Science & Technology Associate Professionals	1%	2%	1%	1%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	3%	5%	3%	5%
Administrative Occupations	10%	8%	6%	9%
Secretarial & Related Occupations	1%	0%	1%	1%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	6%	3%	6%	4%
Skilled Construction & Building Trades	0%	1%	0%	0%
Textiles, Printing & Other Skilled Trades	0%	0%	0%	0%
Caring Personal Service Occupations	0%	0%	1%	0%
Leisure & Other Personal Service Occupations	7%	4%	3%	6%
Sales Occupations	2%	2%	1%	1%
Customer Service Occupations	3%	12%	6%	4%
Process, Plant & Machine Operatives	0%	1%	2%	1%
Transport & Mobile Machine Drivers & Operatives	39%	31%	35%	30%
Elementary Trades, Plant & Storage Related Occupations	2%	5%	5%	7%
Elementary Administration & Service Occupations	11%	10%	12%	11%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – financial services

	NI	North East	Wales	UK
Corporate Managers	16%	20%	27%	26%
Managers & Proprietors in Agriculture & Services	0%	0%	0%	0%
Science & Technology Professionals	1%	2%	1%	4%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	0%	0%	0%
Business & Public Service Professionals	1%	1%	2%	4%
Science & Technology Associate Professionals	0%	0%	2%	2%
Health & Social Welfare Associate Professionals	0%	0%	0%	0%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	0%	0%
Business & Public Service Associate Professionals	19%	13%	19%	22%
Administrative Occupations	47%	36%	30%	27%
Secretarial & Related Occupations	3%	1%	1%	3%
Skilled Agricultural Trades	0%	1%	0%	0%
Skilled Metal & Electrical Trades	0%	0%	0%	0%
Skilled Construction & Building Trades	0%	1%	0%	0%
Textiles, Printing & Other Skilled Trades	0%	0%	0%	0%
Caring Personal Service Occupations	0%	0%	0%	0%
Leisure & Other Personal Service Occupations	0%	0%	0%	0%
Sales Occupations	4%	8%	5%	3%
Customer Service Occupations	8%	17%	9%	7%
Process, Plant & Machine Operatives	0%	0%	0%	0%
Transport & Mobile Machine Drivers & Operatives	0%	0%	1%	0%
Elementary Trades, Plant & Storage Related Occupations	0%	1%	0%	0%
Elementary Administration & Service Occupations	0%	0%	1%	1%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – business services

	NI	North East	Wales	UK
Corporate Managers	10%	12%	13%	16%
Managers & Proprietors in Agriculture & Services	2%	3%	3%	4%
Science & Technology Professionals	9%	7%	8%	10%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	1%	0%	1%	1%
Business & Public Service Professionals	18%	10%	12%	13%
Science & Technology Associate Professionals	4%	6%	3%	3%
Health & Social Welfare Associate Professionals	1%	2%	1%	1%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	4%	3%	3%	4%
Business & Public Service Associate Professionals	7%	9%	12%	10%
Administrative Occupations	10%	12%	14%	11%
Secretarial & Related Occupations	9%	4%	7%	6%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	3%	4%	1%	2%
Skilled Construction & Building Trades	1%	2%	2%	1%
Textiles, Printing & Other Skilled Trades	1%	1%	0%	0%
Caring Personal Service Occupations	0%	1%	1%	1%
Leisure & Other Personal Service Occupations	1%	0%	1%	1%
Sales Occupations	2%	2%	2%	2%
Customer Service Occupations	1%	2%	1%	1%
Process, Plant & Machine Operatives	1%	1%	1%	1%
Transport & Mobile Machine Drivers & Operatives	3%	1%	1%	1%
Elementary Trades, Plant & Storage Related Occupations	1%	1%	2%	1%
Elementary Administration & Service Occupations	14%	15%	12%	10%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – public administration & defence

	NI	North East	Wales	UK
Corporate Managers	6%	8%	10%	11%
Managers & Proprietors in Agriculture & Services	1%	0%	2%	1%
Science & Technology Professionals	3%	2%	2%	2%
Health Professionals	1%	0%	0%	1%
Teaching & Research Professionals	2%	3%	2%	3%
Business & Public Service Professionals	9%	4%	5%	6%
Science & Technology Associate Professionals	3%	2%	2%	3%
Health & Social Welfare Associate Professionals	3%	3%	4%	4%
Protective Service Occupations	6%	14%	12%	15%
Culture, Media & Sports Occupations	0%	1%	1%	1%
Business & Public Service Associate Professionals	12%	10%	13%	10%
Administrative Occupations	34%	39%	32%	28%
Secretarial & Related Occupations	3%	3%	2%	3%
Skilled Agricultural Trades	1%	1%	0%	0%
Skilled Metal & Electrical Trades	1%	1%	1%	1%
Skilled Construction & Building Trades	0%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	0%	0%	1%	0%
Caring Personal Service Occupations	1%	2%	2%	3%
Leisure & Other Personal Service Occupations	1%	0%	0%	1%
Sales Occupations	0%	1%	1%	0%
Customer Service Occupations	0%	2%	1%	1%
Process, Plant & Machine Operatives	2%	0%	0%	0%
Transport & Mobile Machine Drivers & Operatives	2%	1%	1%	1%
Elementary Trades, Plant & Storage Related Occupations	2%	0%	0%	1%
Elementary Administration & Service Occupations	6%	4%	4%	4%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – education

	NI	North East	Wales	UK
Corporate Managers	1%	3%	2%	2%
Managers & Proprietors in Agriculture & Services	0%	1%	1%	1%
Science & Technology Professionals	0%	1%	1%	1%
Health Professionals	0%	0%	1%	0%
Teaching & Research Professionals	54%	45%	50%	48%
Business & Public Service Professionals	1%	1%	1%	1%
Science & Technology Associate Professionals	2%	2%	1%	2%
Health & Social Welfare Associate Professionals	1%	2%	1%	2%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	1%	0%	1%
Business & Public Service Associate Professionals	1%	2%	3%	2%
Administrative Occupations	3%	5%	3%	4%
Secretarial & Related Occupations	3%	4%	4%	3%
Skilled Agricultural Trades	0%	0%	1%	0%
Skilled Metal & Electrical Trades	0%	0%	0%	0%
Skilled Construction & Building Trades	0%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	1%	1%	3%	1%
Caring Personal Service Occupations	16%	16%	17%	18%
Leisure & Other Personal Service Occupations	3%	2%	1%	2%
Sales Occupations	1%	0%	0%	0%
Customer Service Occupations	0%	0%	0%	0%
Process, Plant & Machine Operatives	0%	0%	0%	0%
Transport & Mobile Machine Drivers & Operatives	2%	1%	1%	1%
Elementary Trades, Plant & Storage Related Occupations	0%	0%	0%	0%
Elementary Administration & Service Occupations	10%	12%	9%	9%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – health & social work

	NI	North East	Wales	UK
Corporate Managers	6%	7%	9%	8%
Managers & Proprietors in Agriculture & Services	0%	1%	1%	1%
Science & Technology Professionals	1%	1%	1%	1%
Health Professionals	6%	6%	5%	7%
Teaching & Research Professionals	0%	1%	0%	1%
Business & Public Service Professionals	3%	3%	4%	3%
Science & Technology Associate Professionals	0%	1%	0%	1%
Health & Social Welfare Associate Professionals	27%	25%	22%	24%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	0%	0%	1%	0%
Business & Public Service Associate Professionals	1%	2%	2%	2%
Administrative Occupations	6%	6%	6%	7%
Secretarial & Related Occupations	5%	5%	5%	5%
Skilled Agricultural Trades	0%	0%	0%	0%
Skilled Metal & Electrical Trades	1%	0%	0%	0%
Skilled Construction & Building Trades	0%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	1%	1%	1%	1%
Caring Personal Service Occupations	31%	32%	35%	31%
Leisure & Other Personal Service Occupations	0%	1%	1%	1%
Sales Occupations	0%	0%	0%	0%
Customer Service Occupations	0%	0%	0%	0%
Process, Plant & Machine Operatives	0%	0%	0%	0%
Transport & Mobile Machine Drivers & Operatives	1%	1%	1%	1%
Elementary Trades, Plant & Storage Related Occupations	0%	1%	0%	0%
Elementary Administration & Service Occupations	8%	7%	5%	5%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Occupation concentrations – other personal services

	NI	North East	Wales	UK
Corporate Managers	2%	5%	5%	6%
Managers & Proprietors in Agriculture & Services	8%	7%	6%	7%
Science & Technology Professionals	0%	0%	1%	1%
Health Professionals	0%	0%	0%	0%
Teaching & Research Professionals	0%	2%	1%	2%
Business & Public Service Professionals	8%	4%	5%	4%
Science & Technology Associate Professionals	0%	0%	0%	1%
Health & Social Welfare Associate Professionals	2%	1%	2%	1%
Protective Service Occupations	0%	0%	0%	0%
Culture, Media & Sports Occupations	17%	11%	17%	17%
Business & Public Service Associate Professionals	2%	4%	2%	3%
Administrative Occupations	10%	7%	8%	8%
Secretarial & Related Occupations	5%	3%	1%	3%
Skilled Agricultural Trades	3%	2%	2%	5%
Skilled Metal & Electrical Trades	3%	1%	2%	1%
Skilled Construction & Building Trades	1%	0%	0%	0%
Textiles, Printing & Other Skilled Trades	1%	0%	0%	1%
Caring Personal Service Occupations	3%	1%	2%	3%
Leisure & Other Personal Service Occupations	23%	17%	18%	16%
Sales Occupations	1%	4%	2%	2%
Customer Service Occupations	0%	0%	0%	1%
Process, Plant & Machine Operatives	0%	1%	1%	1%
Transport & Mobile Machine Drivers & Operatives	1%	4%	4%	2%
Elementary Trades, Plant & Storage Related Occupations	0%	1%	3%	2%
Elementary Administration & Service Occupations	8%	22%	18%	14%
Total	100%	100%	100%	100%

Source: LFS, Oxford Economics

Note: Figures refer to per cent of employed persons (2007, 3 year moving average)

Degree subjects

Degree subject relativities

	NI % degree employed persons (2007, 3-year moving average)	UK % degree employed persons (2007, 3-year moving average)	NI (UK=100)
Medicine and Dentistry	5%	2%	197
Subjects Allied to Medicine	14%	11%	126
Biological Sciences	4%	5%	73
Vetinary Science, Agriculture and Related Subjects	1%	1%	124
Physical Sciences	3%	5%	65
Mathematical and Computer Sciences	5%	5%	82
Engineering	5%	6%	80
Technologies	1%	1%	88
Architecture, Building and Planning	2%	2%	92
Social Studies	6%	7%	98
Law	2%	3%	69
Business and Administration	15%	11%	138
Mass Communication and Documentation	1%	1%	48
Linguistics, Classics and Related	1%	3%	31
European Language, Literature and Related Subjects	1%	1%	62
East Asiatic, African, American and Australian Languages and Literature	0%	0%	0
History and Philosophical Studies	3%	4%	76
Creative Arts and Design	3%	5%	66
Education	7%	7%	107
Combined degree	21%	19%	111
Total	100%	100%	100

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's degree employed subject share is 10 per cent less than the UK average.

Cells shaded blue indicate NI's degree employed subject share is 10 per cent greater than the UK average

Degree subject relativities – agriculture, forestry & fishing

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	63%	54%	116
Medicine & Dentistry and Subjects Allied to Medicine	0%	10%	0
Biological & Vetinary Science and Agriculture	23%	31%	74
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	40%	11%	351
Architecture, Building and Planning	0%	2%	0
Law	0%	2%	0
Business and Administration	0%	3%	0
Art Subjects *	0%	8%	0
Creative Arts and Design	0%	4%	0
Education	0%	3%	0
Combined Degree	13%	18%	72
Other	24%	7%	333
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK

average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – utilities

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	58%	48%	122
Medicine & Dentistry and Subjects Allied to Medicine	0%	1%	0
Biological & Veterinary Science and Agriculture	0%	2%	0
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	58%	43%	133
Architecture, Building and Planning	0%	0%	0
Law	0%	1%	0
Business and Administration	23%	19%	117
Art Subjects *	0%	4%	0
Creative Arts and Design	0%	4%	0
Education	0%	0%	0
Combined Degree	9%	18%	53
Other	10%	6%	175
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – construction

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	41%	57%	73
Medicine & Dentistry and Subjects Allied to Medicine	0%	1%	0
Biological & Veterinary Science and Agriculture	0%	2%	0
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	23%	35%	68
Architecture, Building and Planning	18%	19%	94
Law	0%	2%	0
Business and Administration	23%	12%	188
Art Subjects *	0%	4%	0
Creative Arts and Design	0%	5%	0
Education	2%	1%	175
Combined Degree	31%	16%	195
Other	3%	4%	71
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – retail & distribution

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	31%	35%	89
Medicine & Dentistry and Subjects Allied to Medicine	14%	13%	113
Biological & Veterinary Science and Agriculture	6%	6%	96
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	11%	15%	71
Architecture, Building and Planning	0%	1%	0
Law	0%	2%	0
Business and Administration	26%	18%	146
Art Subjects *	7%	6%	111
Creative Arts and Design	8%	10%	84
Education	1%	2%	64
Combined Degree	17%	18%	92
Other	9%	9%	107
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – hotel & restaurants

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	42%	30%	142
Medicine & Dentistry and Subjects Allied to Medicine	12%	5%	228
Biological & Veterinary Science and Agriculture	16%	8%	197
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	14%	15%	92
Architecture, Building and Planning	0%	1%	0
Law	0%	3%	0
Business and Administration	36%	21%	172
Art Subjects *	0%	6%	0
Creative Arts and Design	13%	11%	118
Education	0%	2%	0
Combined Degree	0%	19%	0
Other	9%	9%	96
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – transport & communications

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	13%	35%	36
Medicine & Dentistry and Subjects Allied to Medicine	4%	4%	99
Biological & Veterinary Science and Agriculture	0%	5%	0
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	9%	25%	35
Architecture, Building and Planning	0%	1%	0
Law	6%	2%	404
Business and Administration	52%	19%	273
Art Subjects *	7%	7%	88
Creative Arts and Design	0%	4%	0
Education	3%	1%	300
Combined Degree	17%	24%	72
Other	3%	8%	37
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – financial services

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	15%	26%	60
Medicine & Dentistry and Subjects Allied to Medicine	5%	2%	348
Biological & Veterinary Science and Agriculture	2%	3%	71
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	7%	20%	37
Architecture, Building and Planning	0%	1%	0
Law	6%	4%	159
Business and Administration	37%	26%	144
Art Subjects *	8%	7%	115
Creative Arts and Design	3%	2%	158
Education	2%	1%	266
Combined Degree	21%	24%	89
Other	9%	12%	70
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – public administration & defence

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	29%	31%	94
Medicine & Dentistry and Subjects Allied to Medicine	4%	8%	53
Biological & Veterinary Science and Agriculture	5%	7%	73
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	16%	13%	117
Architecture, Building and Planning	4%	3%	157
Law	3%	7%	42
Business and Administration	22%	13%	169
Art Subjects *	7%	9%	76
Creative Arts and Design	1%	2%	35
Education	5%	5%	103
Combined Degree	21%	21%	101
Other	12%	12%	101
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – education

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	20%	23%	88
Medicine & Dentistry and Subjects Allied to Medicine	3%	4%	77
Biological & Veterinary Science and Agriculture	8%	7%	113
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	9%	12%	78
Architecture, Building and Planning	0%	0%	81
Law	1%	1%	83
Business and Administration	4%	5%	83
Art Subjects *	8%	12%	63
Creative Arts and Design	5%	6%	78
Education	31%	28%	112
Combined Degree	27%	20%	138
Other	5%	6%	78
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – health & social work

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	71%	64%	111
Medicine & Dentistry and Subjects Allied to Medicine	62%	54%	115
Biological & Veterinary Science and Agriculture	5%	7%	73
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	3%	3%	118
Architecture, Building and Planning	0%	0%	178
Law	0%	1%	33
Business and Administration	2%	4%	56
Art Subjects *	1%	3%	29
Creative Arts and Design	1%	1%	102
Education	2%	2%	76
Combined Degree	16%	17%	94
Other	7%	8%	86
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Degree subject relativities – other personal services

	NI % degree qualified employed persons (2007, 3-year moving average)	UK % degree qualified employed persons (2007, 3-year moving average)	NI (UK=100)
STEM	22%	23%	94
Medicine & Dentistry and Subjects Allied to Medicine	3%	4%	84
Biological & Veterinary Science and Agriculture	2%	8%	29
Physical Sciences, Mathematical & Computer Sciences, Engineering & Technology	17%	11%	151
Architecture, Building and Planning	0%	1%	0
Law	2%	2%	88
Business and Administration	15%	7%	209
Art Subjects *	10%	17%	58
Creative Arts and Design	17%	16%	111
Education	3%	4%	68
Combined Degree	22%	19%	117
Other	9%	12%	73
Total	100%	100%	-

Source: LFS, Oxford Economics

Note: Cells shaded purple indicate NI's employed degree subject share is 10 per cent less than the UK average. Cells shaded blue indicate NI's employed degree subject share is 10 per cent greater than the UK average

Where NI could be

Decomposition of NI-UK managerial gap

	Managerial share (2007, 3-year moving average)	UK=100
NI actual managerial share in employment	10.5%	70.0
UK actual managerial share in employment	15.0%	100.0
Expected NI managerial share if sector managerial shares equal to UK shares	14.4%	95.9
Managerial gap due to low er sector managerial shares	3.9%	25.8
Managerial gap due to structure of economy	0.6%	4.1

Annex C: Skills forecasting methodology and assumptions

This annex chapter sets out in more detail the sophisticated skills forecasting methodology developed by Oxford Economics. It includes:

- An explanation of the demand-based modelling approach to forecasting sectoral employment and occupations
- Leaver and joiner rate assumptions by occupation for replacement demand analysis
- Skill assumptions for leavers from and joiners to employment and for the net requirement from education and migration, all of which are required, alongside upskilling assumptions, to forecast the stock of workforce skills
- Sectoral degree subject demand patterns
- **Caveats**

Sectoral and occupation employment forecasts – demand-based modelling

Demand-based modelling is the most common form of forecasting used to predict economic / employment growth at a regional (and sub-regional) level. This type of modelling relies on understanding of the macroeconomic context, exploring past trends and applying key economic relationships. It ensures that baseline forecasts are plausible in a regional, national and international context. Frequently this form of modelling leads to the question – what are the underlying assumptions? This can be difficult to answer satisfactorily as the assumptions are traditionally macroeconomic ones (such as oil prices, exchange rates, inflation) which indirectly impact regions. At a regional level the assumptions are essentially:

- That economic relationships are not broken over the forecast period (i.e. links between consumer spending and retail employment, house prices and migration etc)
- That supply side factors (namely skills, land, infrastructure and environment / legislation) remain unchanged in *relative* terms

Demand-based framework

As implied above, a demand based forecast model depends essentially upon three factors:

- The national outlook (itself based on a set of econometric equations)
- Historical trends in an area (which implicitly factor in supply side factors impinging on demand)
- Fundamental economic relationships.

Each of these factors is discussed in more detail below.

National outlooks²⁴

The respected Oxford Economics NI Policy Simulation Model is linked to the wide suite of Oxford world models and thus is consistent with global trends in demand / commodity prices / exchange rates etc.

²⁴ Additional detail on the Oxford Economics' suite of models – international, national and regional - are available upon request

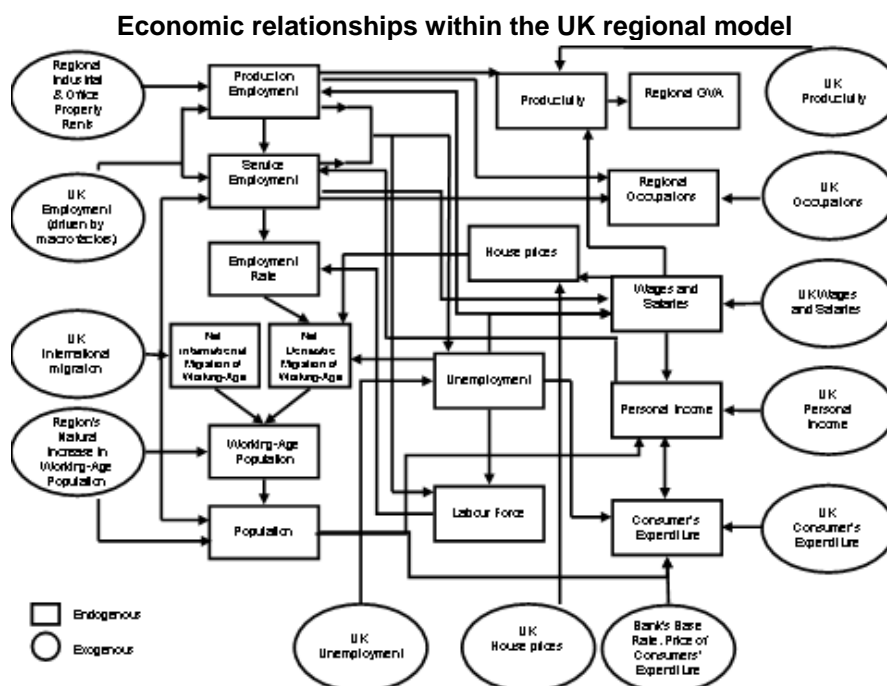
This hierarchical structure ensures that global factors have a significant impact, indirectly on the forecasts, for NI within the UK. This empirical framework (or set of 'controls') must be borne in mind when considering the historical trend element of the approach.

Historical trends

The historical trend in a region is used as an important driver of future trends, within the confines of the economic fundamentals (discussed below) and the macro environment (discussed above). The use of historical trends as a basis for projection is often, unfairly, criticised for being too basic and not capturing the regional dimension. However, sometimes a more complex forecasting approach such as that used within national models are not suitable for regional use. Basic 'relationships' are adhered to 'control' the forecasts and make the trend-based approach an appropriate technique.

Economic relationships

The NI regional model (much as the macro and sectoral models 'above' it in the hierarchy structure) adheres to a set of well established economic relationships which interlink the various elements of the outlook. This is best explained via a flow diagram setting out the basic elements of the model



This framework sets out how each of the elements of the model interact and 'bind' together. A couple of points are worth making:

- Indirect multipliers:** The regional model does not employ a detailed input–output framework. This is partly due to the difficulty in attaining reliable data for regional input–output relationships. In a global world purchasing patterns may change from year to year, especially across regional boundaries, and a fixed input output framework may not be sufficiently reliable. As the NI regional model links retail and distribution employment into spending outlooks, public services to population and business-to-business activities and construction into total employment, there are implicit multipliers within the model. The overall indirect / induced employment are cross checked to ensure they are broadly in line with the secondary jobs that an input output framework would produce.

- **Population and labour market linked:** The population forecasts are linked into employment and vice-versa through a number of mechanisms. Migration forecasts, which are key to the population outlooks, depend upon relative unemployment and house price outlooks (which themselves link to the labour market) and a range of sectors, most notably the public services, have employment linked back into population outlooks. Similarly population forecasts produce income which in turn drives employment in retail and hotel & restaurants.

Occupation forecasts are based on the existing occupation shares within employment in each sector (from the Census and LFS) and are extrapolated using parent sectoral employment forecasts and occupation shares. Therefore the overall economy occupational structure is heavily dependent upon sectoral composition and future trends can be largely explained by sectoral trends.

Replacement demand

- Forecasting skills requirements is not simply the change in employment stock (which is known as expansion demand) but also the so called 'replacement demand' to fill vacancies created by people leaving the labour market for a variety of reasons (to retire, migrate, have children, illness etc). This 'replacement' category is much larger than expansion demand and explains why even declining sectors such as manufacturing still require new staff / advertise vacancies.
- In the replacement demand analysis carried out by other organisations it is common to assume net zero migration and also to net off flows into and out of unemployment, leaving largely migrants and the deceased and retired as the labour to 'replace' and to add on to expansion demand. For this report, we have not netted migration to zero, nor ignored the flows in and out of forms of inactivity. Rather we have provided a full flows matrix with the 'residual' net requirement set out as those people required to come from the education system and in-migration. Leaver and joiner rates by 2-digit occupation, based on historic LFS data for NI and adjusted UK LFS data where NI data is not available, are presented overleaf. The same rates are applied in both scenarios.
- This report then estimates the number of people in each occupation and sector (and by skill level) needed from the education system and migration. We believe the additional sophistication from a full flows matrix is important as more basic approaches fail to capture particular nuances in the labour market. For example at economy-wide level movers to and leavers from other occupations will cancel out but such balancing is however unlikely to occur for individual occupations (usually leavers are at lower occupational levels and joiners are at higher levels as people move for promotion opportunities).

Leaving rate assumptions

	Leaving rate to death (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Managers & Proprietors in Agriculture & Services	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Science & Technology Professionals	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Health Professionals	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Teaching & Research Professionals	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Business & Public Service Professionals	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Science & Technology Associate Professionals	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Health & Social Welfare Associate Professionals	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Protective Service Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Culture, Media & Sports Occupations	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Business & Public Service Associate Professionals	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Administrative Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Secretarial & Related Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Skilled Agricultural Trades	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Skilled Metal & Electrical Trades	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Skilled Construction & Building Trades	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Textiles, Printing & Other Skilled Trades	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Caring Personal Service Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Leisure & Other Personal Service Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Sales Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Customer Service Occupations	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Process, Plant & Machine Operatives	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Transport & Mobile Machine Drivers & Operatives	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Elementary Trades, Plant & Storage Related Occupations	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Elementary Administration & Service Occupations	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%

Source: LFS, Oxford Economics

	Leaving rate to unemployment and training schemes (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	2.1%	1.1%	0.5%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Managers & Proprietors in Agriculture & Services	0.5%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Science & Technology Professionals	2.4%	1.9%	0.8%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Health Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Teaching & Research Professionals	1.6%	1.2%	0.5%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Business & Public Service Professionals	1.3%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Science & Technology Associate Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health & Social Welfare Associate Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Protective Service Occupations	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Culture, Media & Sports Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Associate Professionals	1.1%	0.7%	0.3%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Administrative Occupations	1.8%	1.6%	1.8%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Secretarial & Related Occupations	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Skilled Agricultural Trades	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skilled Metal & Electrical Trades	1.7%	1.4%	1.1%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Skilled Construction & Building Trades	4.2%	3.5%	3.2%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Textiles, Printing & Other Skilled Trades	3.4%	0.7%	0.3%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Caring Personal Service Occupations	2.1%	1.2%	0.7%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Leisure & Other Personal Service Occupations	0.6%	3.4%	4.9%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Sales Occupations	2.9%	1.5%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Customer Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Process, Plant & Machine Operatives	1.8%	1.4%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Transport & Mobile Machine Drivers & Operatives	1.4%	0.6%	0.3%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Elementary Trades, Plant & Storage Related Occupations	4.1%	3.4%	3.6%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Elementary Administration & Service Occupations	1.9%	1.7%	2.4%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%

Source: LFS, Oxford Economics

	Leaving rate to retirement (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Managers & Proprietors in Agriculture & Services	0.9%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Science & Technology Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health Professionals	1.0%	1.1%	0.5%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Teaching & Research Professionals	0.5%	0.7%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Business & Public Service Professionals	0.0%	0.5%	0.9%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Science & Technology Associate Professionals	0.9%	1.0%	0.4%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Health & Social Welfare Associate Professionals	0.3%	0.3%	0.1%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Protective Service Occupations	0.0%	0.9%	1.5%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Culture, Media & Sports Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Associate Professionals	1.4%	1.3%	1.4%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Administrative Occupations	0.7%	0.8%	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Secretarial & Related Occupations	0.4%	1.2%	1.4%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Skilled Agricultural Trades	1.3%	1.0%	0.7%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Skilled Metal & Electrical Trades	1.0%	0.7%	0.5%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Skilled Construction & Building Trades	1.3%	0.8%	0.3%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Textiles, Printing & Other Skilled Trades	1.6%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Caring Personal Service Occupations	0.5%	0.8%	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Leisure & Other Personal Service Occupations	1.2%	1.2%	0.5%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Sales Occupations	0.9%	0.9%	0.6%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Customer Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Process, Plant & Machine Operatives	0.3%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Transport & Mobile Machine Drivers & Operatives	0.6%	0.6%	0.3%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Elementary Trades, Plant & Storage Related Occupations	1.2%	2.1%	2.5%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Elementary Administration & Service Occupations	0.7%	0.7%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%

Source: LFS, Oxford Economics

	Leaving rate to other occupations (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	1.9%	2.0%	1.9%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Managers & Proprietors in Agriculture & Services	3.2%	2.8%	3.5%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Science & Technology Professionals	1.7%	0.7%	1.2%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Health Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Teaching & Research Professionals	1.8%	1.2%	1.0%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Business & Public Service Professionals	1.0%	0.8%	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Science & Technology Associate Professionals	3.7%	1.0%	0.4%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Health & Social Welfare Associate Professionals	1.2%	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Protective Service Occupations	2.3%	2.4%	1.0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Culture, Media & Sports Occupations	3.8%	1.1%	0.4%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Business & Public Service Associate Professionals	4.4%	3.0%	2.8%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Administrative Occupations	1.7%	2.4%	2.6%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Secretarial & Related Occupations	1.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Skilled Agricultural Trades	0.4%	0.5%	0.2%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Skilled Metal & Electrical Trades	1.3%	3.6%	5.2%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Skilled Construction & Building Trades	1.6%	1.0%	0.6%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Textiles, Printing & Other Skilled Trades	3.2%	3.8%	4.5%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Caring Personal Service Occupations	2.1%	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Leisure & Other Personal Service Occupations	2.0%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Sales Occupations	5.1%	5.0%	5.5%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%
Customer Service Occupations	0.0%	2.7%	4.4%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Process, Plant & Machine Operatives	5.4%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%
Transport & Mobile Machine Drivers & Operatives	1.7%	2.0%	1.7%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Elementary Trades, Plant & Storage Related Occupations	4.0%	4.5%	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Elementary Administration & Service Occupations	3.0%	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%

Source: LFS, Oxford Economics

	Leaving rate to out migration (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	0.3%	0.2%	0.0%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Managers & Proprietors in Agriculture & Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Science & Technology Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health Professionals	0.0%	0.9%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Teaching & Research Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Professionals	0.3%	0.2%	0.0%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Science & Technology Associate Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health & Social Welfare Associate Professionals	0.4%	1.1%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Protective Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Culture, Media & Sports Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Associate Professionals	0.0%	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Administrative Occupations	0.4%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Secretarial & Related Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skilled Agricultural Trades	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skilled Metal & Electrical Trades	0.1%	1.3%	1.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Skilled Construction & Building Trades	0.0%	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Textiles, Printing & Other Skilled Trades	1.4%	1.1%	1.6%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Caring Personal Service Occupations	0.0%	1.3%	2.2%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Leisure & Other Personal Service Occupations	0.0%	1.8%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sales Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Customer Service Occupations	0.0%	3.9%	6.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Process, Plant & Machine Operatives	1.0%	3.6%	4.6%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Transport & Mobile Machine Drivers & Operatives	0.0%	0.8%	1.4%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Elementary Trades, Plant & Storage Related Occupations	0.2%	1.8%	2.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Elementary Administration & Service Occupations	0.3%	2.0%	2.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%

Source: LFS, Oxford Economics

	Leaving rate to inactivity excluding retirement (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	0.5%	0.5%	0.7%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Managers & Proprietors in Agriculture & Services	0.5%	0.7%	1.1%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Science & Technology Professionals	2.3%	1.7%	0.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Health Professionals	3.0%	1.1%	0.5%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Teaching & Research Professionals	1.6%	2.1%	2.4%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Business & Public Service Professionals	0.8%	0.9%	0.4%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Science & Technology Associate Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health & Social Welfare Associate Professionals	1.5%	1.3%	0.5%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Protective Service Occupations	2.3%	4.3%	4.2%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Culture, Media & Sports Occupations	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Associate Professionals	0.3%	0.3%	0.1%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Administrative Occupations	1.2%	2.3%	2.7%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Secretarial & Related Occupations	0.9%	0.4%	0.6%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Skilled Agricultural Trades	1.1%	1.1%	1.4%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Skilled Metal & Electrical Trades	1.5%	1.0%	0.4%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Skilled Construction & Building Trades	1.5%	2.5%	2.6%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Textiles, Printing & Other Skilled Trades	1.9%	0.5%	0.2%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Caring Personal Service Occupations	3.3%	3.5%	2.9%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Leisure & Other Personal Service Occupations	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Sales Occupations	3.5%	1.6%	1.4%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Customer Service Occupations	1.9%	3.4%	3.1%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Process, Plant & Machine Operatives	2.6%	2.3%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Transport & Mobile Machine Drivers & Operatives	1.7%	2.1%	2.6%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
Elementary Trades, Plant & Storage Related Occupations	3.4%	3.3%	4.4%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Elementary Administration & Service Occupations	4.5%	5.2%	4.7%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%

Source: LFS, Oxford Economics

Joining rate assumptions

	Joining rate from unemployment and training schemes (applied to previous year's unemp stock)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	1.4%	0.8%	0.7%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%
Managers & Proprietors in Agriculture & Services	0.4%	0.7%	0.8%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%
Science & Technology Professionals	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Health Professionals	0.0%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Teaching & Research Professionals	0.8%	0.9%	1.2%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%
Business & Public Service Professionals	0.0%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Science & Technology Associate Professionals	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Health & Social Welfare Associate Professionals	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Protective Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Culture, Media & Sports Occupations	0.4%	0.9%	1.2%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%
Business & Public Service Associate Professionals	0.6%	0.7%	1.2%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%
Administrative Occupations	3.0%	4.3%	5.2%	4.3%	4.2%	4.1%	4.0%	4.0%	3.7%
Secretarial & Related Occupations	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skilled Agricultural Trades	0.6%	0.2%	0.0%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Skilled Metal & Electrical Trades	1.6%	1.6%	2.0%	1.6%	1.5%	1.5%	1.5%	1.4%	1.3%
Skilled Construction & Building Trades	2.4%	2.9%	3.5%	2.9%	2.9%	2.8%	2.8%	2.7%	2.6%
Textiles, Printing & Other Skilled Trades	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%
Caring Personal Service Occupations	3.4%	3.7%	2.8%	3.7%	3.6%	3.5%	3.4%	3.4%	3.2%
Leisure & Other Personal Service Occupations	0.6%	1.1%	1.2%	1.1%	1.0%	1.0%	1.0%	1.0%	0.9%
Sales Occupations	4.4%	4.7%	4.7%	4.7%	4.6%	4.5%	4.4%	4.3%	4.0%
Customer Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Process, Plant & Machine Operatives	2.0%	2.2%	2.3%	2.2%	2.2%	2.1%	2.1%	2.0%	1.9%
Transport & Mobile Machine Drivers & Operatives	1.6%	1.7%	2.0%	1.7%	1.7%	1.6%	1.6%	1.6%	1.5%
Elementary Trades, Plant & Storage Related Occupations	3.2%	2.7%	2.3%	2.7%	2.6%	2.6%	2.5%	2.5%	2.3%
Elementary Administration & Service Occupations	5.0%	5.7%	5.7%	5.7%	5.6%	5.5%	5.4%	5.3%	5.0%

Source: LFS, Oxford Economics

	Joining rate from inactivity excluding students (applied to previous year's economically i stock)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Managers & Proprietors in Agriculture & Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Science & Technology Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Teaching & Research Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Science & Technology Associate Professionals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Health & Social Welfare Associate Professionals	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Protective Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Culture, Media & Sports Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Business & Public Service Associate Professionals	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Administrative Occupations	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Secretarial & Related Occupations	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Skilled Agricultural Trades	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skilled Metal & Electrical Trades	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Skilled Construction & Building Trades	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Textiles, Printing & Other Skilled Trades	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Caring Personal Service Occupations	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Leisure & Other Personal Service Occupations	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Sales Occupations	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Customer Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Process, Plant & Machine Operatives	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Transport & Mobile Machine Drivers & Operatives	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Elementary Trades, Plant & Storage Related Occupations	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Elementary Administration & Service Occupations	0.5%	0.4%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%

Source: LFS, Oxford Economics

	Joining rate from other occupations (applied to previous year's employment)								
	Avg 2001-2004	Avg 2003-2007	Avg 2005-2007	2008	2009	2010	2011	2012	2015
Corporate Managers	1.9%	1.3%	1.6%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Managers & Proprietors in Agriculture & Services	1.7%	0.9%	0.4%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Science & Technology Professionals	3.4%	3.6%	3.0%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Health Professionals	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Teaching & Research Professionals	1.4%	1.5%	1.1%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Business & Public Service Professionals	3.3%	2.9%	3.5%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Science & Technology Associate Professionals	0.9%	4.5%	6.3%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Health & Social Welfare Associate Professionals	4.2%	3.9%	5.0%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Protective Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Culture, Media & Sports Occupations	5.1%	1.1%	0.4%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Business & Public Service Associate Professionals	4.2%	2.4%	2.8%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Administrative Occupations	2.4%	1.5%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Secretarial & Related Occupations	4.3%	4.9%	4.3%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%
Skilled Agricultural Trades	0.7%	0.4%	0.1%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Skilled Metal & Electrical Trades	2.8%	2.8%	3.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Skilled Construction & Building Trades	2.6%	1.9%	1.2%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Textiles, Printing & Other Skilled Trades	5.1%	4.4%	3.0%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Caring Personal Service Occupations	2.6%	1.8%	1.2%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Leisure & Other Personal Service Occupations	2.1%	4.0%	5.8%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Sales Occupations	3.8%	5.3%	5.4%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%
Customer Service Occupations	11.3%	3.3%	1.4%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Process, Plant & Machine Operatives	3.4%	3.6%	3.0%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Transport & Mobile Machine Drivers & Operatives	3.6%	2.1%	2.6%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Elementary Trades, Plant & Storage Related Occupations	3.3%	3.6%	3.5%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
Elementary Administration & Service Occupations	1.8%	2.7%	2.8%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%

Source: LFS, Oxford Economics

Skill requirements

- Estimation of highest qualifications of the net requirement from education and migration, which are presented further below for both the baseline and aspiration, is based on a combination of:
 - LFS qualifications of FT student entrants to employment
 - LFS qualifications of entrants to employment from existing employment
 - NI School Leaver Survey and HESA graduate destination data

A combination of sources was used as the graduate proportion of new entrants from FT students did not tally with school leaver survey and HESA data, which suggests a much higher proportion of joiners from education are graduates. Historical skills creep trends are also built in to the modelling assumptions

Highest qualifications of other leaver and joiner flows are presented below. These matter for forecasting the overall stock of workforce skills though comparisons between leaver and joiner qualifications are nonetheless still of interest.

Skill assumptions – leavers

	NQF qualifications of leavers to unemployment and training schemes (used for leavers to unemployment & training schemes and to migration)							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
First degree and sub-degree (NQF 4-6)	19.4%	19.4%	19.4%	19.4%	19.4%	19.4%	19.4%	19.4%
Intermediate a (NQF 3)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Intermediate b (NQF 2)	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%
Low (NQF 1 and below)	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%	60.4%

Source: LFS, Oxford Economics

	NQF qualifications of leavers to inactivity excluding retirement (used for leavers to inactivity excluding retirement)							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
First degree and sub-degree (NQF 4-6)	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
Intermediate a (NQF 3)	34.9%	34.9%	34.9%	34.9%	34.9%	34.9%	34.9%	34.9%
Intermediate b (NQF 2)	13.1%	13.1%	13.1%	13.1%	13.1%	13.1%	13.1%	13.1%
Low (NQF 1 and below)	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%

Source: LFS, Oxford Economics

	NQF qualifications of leavers to retirement (used for leavers to retirement and to death)							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%
First degree and sub-degree (NQF 4-6)	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%	23.6%
Intermediate a (NQF 3)	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%
Intermediate b (NQF 2)	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%
Low (NQF 1 and below)	49.2%	49.2%	49.2%	49.2%	49.2%	49.2%	49.2%	49.2%

Source: LFS, Oxford Economics

Skill assumptions – joiners

	NQF qualifications of non-employed entering employment (used for joiners from unemployment & training schemes and economically inactive excluding students)							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
First degree and sub-degree (NQF 4-6)	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Intermediate a (NQF 3)	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Intermediate b (NQF 2)	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Low (NQF 1 and below)	78.3%	78.3%	78.3%	78.3%	78.3%	78.3%	78.3%	78.3%

Source: LFS, Oxford Economics

	NQF qualifications of employed entering different employment (used for leavers from and joiners to employment)							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	5.6%	5.6%	5.7%	5.9%	6.0%	6.2%	6.7%	7.6%
First degree and sub-degree (NQF 4-6)	24.4%	24.4%	25.0%	25.6%	26.3%	26.9%	29.0%	32.8%
Intermediate a (NQF 3)	23.3%	23.3%	23.5%	23.8%	24.0%	24.2%	25.0%	26.2%
Intermediate b (NQF 2)	15.6%	15.6%	15.7%	15.8%	15.9%	15.9%	16.2%	16.6%
Low (NQF 1 and below)	31.1%	31.1%	30.0%	28.9%	27.8%	26.7%	23.2%	16.8%

Source: LFS, Oxford Economics

Skill assumptions – net requirement from education and migration

Baseline scenario

	NQF qualifications for net requirement from education and migration							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	7.0%	6.8%	6.9%	6.8%	7.0%	7.1%	7.7%	8.8%
First degree and sub-degree (NQF 4-6)	32.0%	31.4%	31.9%	32.5%	33.3%	34.2%	36.8%	41.6%
Intermediate a (NQF 3)	21.2%	23.6%	23.3%	23.5%	23.8%	24.0%	24.7%	26.0%
Intermediate b (NQF 2)	18.3%	21.0%	19.1%	18.0%	17.3%	16.6%	14.3%	9.4%
Low (NQF 1 and below)	21.5%	17.1%	18.8%	19.2%	18.6%	18.1%	16.5%	14.2%

Source: LFS, Oxford Economics

Aspirational scenario

	NQF qualifications for net requirement from education and migration							
	Avg 2005-2007	2008	2009	2010	2011	2012	2015	2020
Postgraduate (NQF 7-8)	7.0%	6.8%	6.9%	6.8%	7.1%	7.3%	8.0%	9.4%
First degree and sub-degree (NQF 4-6)	32.0%	31.4%	32.0%	32.7%	33.7%	34.8%	38.2%	44.5%
Intermediate a (NQF 3)	21.2%	23.6%	23.3%	23.6%	23.9%	24.2%	25.1%	26.7%
Intermediate b (NQF 2)	18.3%	21.0%	19.3%	18.5%	18.4%	18.3%	18.0%	17.6%
Low (NQF 1 and below)	21.5%	17.1%	18.5%	18.4%	16.9%	15.5%	10.7%	1.8%

Source: LFS, Oxford Economics

Degree subject demand

- Sectoral assumptions for degree subject demand, applied to roughly 75 per cent of the net NQF 4-8 requirement from education and migration, are provided below for both scenarios – the aspiration has a higher rate of ‘subject creep’ in key, lagging subject areas such as STEM.
- HESA patterns on occupation destinations by subject are less appropriate than by sector as occupations are broad-based. i.e. there is likely to be a difference between subject demand for a manager in construction compared to in business services, which occupational forecasts may not pick up but sector forecasts would. In other words sectors are a better ‘screen’ for likely subject demand than occupations.

Baseline scenario

	Agriculture, forestry & fishing							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	50%	67%	67%	67%	67%	67%	68%	68%
Physical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	0%	0%	0%	0%	0%	0%
Engineering & technology	0%	0%	0%	0%	33%	11%	12%	12%
Architecture, building & planning	0%	0%	0%	33%	0%	11%	11%	11%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	50%	33%	33%	0%	0%	11%	10%	9%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	0%	0%	0%	0%	0%	0%	0%	0%

Source: HESA, Oxford Economics

	Mining & quarrying							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	0%	0%	0%	0%	0%	0%
Engineering & technology	100%	100%	100%	0%	100%	67%	69%	71%
Architecture, building & planning	0%	0%	0%	0%	0%	0%	0%	0%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	0%	0%	0%	100%	0%	33%	30%	28%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	0%	0%	0%	0%	0%	0%	1%	1%

Source: HESA, Oxford Economics

	Manufacturing							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	4%	2%	3%	4%	3%	3%	3%	3%
Biological sciences	2%	8%	7%	6%	7%	7%	7%	7%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	4%	5%	3%	3%	3%	3%	2%	1%
Physical sciences	4%	2%	6%	1%	4%	4%	4%	4%
Mathematical sciences	1%	2%	0%	0%	1%	0%	1%	1%
Computer science	17%	14%	11%	11%	7%	10%	10%	10%
Engineering & technology	22%	22%	24%	24%	24%	24%	25%	25%
Architecture, building & planning	1%	2%	0%	1%	1%	1%	1%	1%
Social studies	2%	5%	4%	3%	4%	4%	4%	3%
Law	0%	0%	3%	1%	1%	2%	2%	2%
Business & administrative studies	28%	25%	21%	29%	24%	25%	23%	22%
Mass communications and documentation	2%	6%	3%	4%	3%	3%	3%	3%
Languages	2%	2%	4%	3%	4%	4%	4%	4%
Historical and philosophical studies	1%	2%	3%	1%	3%	2%	2%	2%
Creative arts & design	4%	5%	6%	7%	7%	7%	7%	7%
Education	1%	2%	1%	1%	1%	1%	1%	1%
Combined	4%	2%	0%	0%	1%	0%	1%	2%

Source: HESA, Oxford Economics

	Utilities							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	0%	0%	0%	17%	0%	6%	6%	7%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	25%	0%	17%	14%	14%	15%
Engineering & technology	25%	50%	25%	33%	17%	25%	26%	27%
Architecture, building & planning	0%	0%	0%	0%	33%	11%	11%	11%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	50%	50%	50%	33%	33%	39%	35%	32%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	17%	0%	6%	5%	5%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	25%	0%	0%	0%	0%	0%	2%	4%

Source: HESA, Oxford Economics

	Construction							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	3%	0%	0%	0%	0%	0%	0%
Biological sciences	3%	3%	4%	0%	2%	2%	2%	2%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	3%	0%	4%	4%	2%	3%	3%	4%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	6%	6%	4%	4%	0%	2%	2%	3%
Engineering & technology	23%	24%	39%	29%	30%	32%	34%	34%
Architecture, building & planning	39%	42%	32%	43%	41%	39%	38%	38%
Social studies	0%	3%	4%	4%	2%	3%	3%	3%
Law	0%	0%	0%	0%	2%	1%	1%	1%
Business & administrative studies	23%	12%	14%	14%	14%	14%	13%	12%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	3%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	3%	3%	0%	4%	5%	3%	3%	3%
Education	0%	0%	0%	0%	2%	1%	1%	1%
Combined	0%	0%	0%	0%	0%	0%	0%	0%

Source: HESA, Oxford Economics

	Retail & distribution							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	16%	15%	17%	19%	19%	18%	18%	18%
Biological sciences	5%	6%	7%	9%	10%	9%	9%	9%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	0%	1%	1%	1%	1%	0%	0%
Physical sciences	5%	3%	4%	6%	4%	5%	5%	6%
Mathematical sciences	1%	1%	1%	1%	1%	1%	1%	1%
Computer science	11%	7%	8%	5%	6%	6%	6%	6%
Engineering & technology	4%	5%	3%	2%	3%	2%	2%	3%
Architecture, building & planning	1%	1%	1%	1%	1%	1%	1%	1%
Social studies	8%	8%	10%	9%	9%	9%	8%	8%
Law	1%	2%	3%	2%	3%	3%	3%	3%
Business & administrative studies	26%	27%	19%	21%	18%	19%	17%	16%
Mass communications and documentation	3%	3%	4%	3%	5%	4%	4%	3%
Languages	6%	6%	7%	6%	6%	6%	6%	6%
Historical and philosophical studies	5%	6%	7%	5%	5%	6%	5%	5%
Creative arts & design	7%	8%	8%	9%	8%	8%	9%	9%
Education	0%	1%	2%	3%	2%	2%	2%	2%
Combined	0%	0%	0%	0%	0%	0%	2%	3%

Source: HESA, Oxford Economics

	Hotel & restaurants							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	3%	3%	0%	4%	2%	2%	2%
Biological sciences	7%	6%	9%	8%	11%	9%	10%	10%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	4%	0%	1%	1%	1%
Physical sciences	7%	6%	3%	4%	4%	4%	4%	4%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	10%	6%	3%	4%	7%	5%	5%	5%
Engineering & technology	3%	3%	3%	4%	4%	4%	4%	4%
Architecture, building & planning	0%	3%	3%	0%	0%	1%	1%	1%
Social studies	10%	6%	12%	8%	11%	10%	10%	9%
Law	3%	3%	3%	4%	4%	4%	4%	4%
Business & administrative studies	38%	36%	36%	36%	32%	35%	33%	32%
Mass communications and documentation	3%	6%	3%	4%	4%	4%	3%	3%
Languages	7%	3%	6%	8%	7%	7%	7%	7%
Historical and philosophical studies	3%	6%	6%	4%	7%	6%	5%	5%
Creative arts & design	7%	9%	9%	8%	7%	8%	8%	9%
Education	0%	3%	0%	4%	0%	1%	1%	1%
Combined	0%	0%	0%	0%	0%	0%	2%	3%

Source: HESA, Oxford Economics

	Transport & communications							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	4%	0%	3%	2%	2%	2%
Biological sciences	4%	3%	8%	3%	10%	7%	7%	8%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	4%	3%	4%	6%	3%	5%	5%	5%
Mathematical sciences	0%	0%	0%	0%	3%	1%	1%	1%
Computer science	15%	17%	8%	16%	13%	12%	13%	13%
Engineering & technology	15%	10%	8%	6%	10%	8%	8%	9%
Architecture, building & planning	0%	0%	0%	3%	0%	1%	1%	1%
Social studies	7%	7%	13%	10%	6%	10%	9%	9%
Law	0%	0%	4%	3%	3%	4%	4%	4%
Business & administrative studies	33%	38%	29%	32%	32%	31%	30%	29%
Mass communications and documentation	4%	3%	4%	3%	3%	4%	3%	3%
Languages	7%	7%	4%	6%	3%	5%	4%	4%
Historical and philosophical studies	4%	7%	8%	3%	6%	6%	6%	5%
Creative arts & design	4%	3%	4%	3%	3%	4%	4%	4%
Education	0%	0%	0%	3%	0%	1%	1%	1%
Combined	4%	0%	0%	0%	0%	0%	1%	2%

Source: HESA, Oxford Economics

	Financial services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	2%	2%	1%	2%	2%	2%	2%	2%
Biological sciences	4%	6%	9%	8%	4%	7%	7%	7%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	2%	2%	1%	2%	0%	1%	1%	1%
Physical sciences	2%	6%	6%	5%	4%	5%	5%	6%
Mathematical sciences	2%	4%	4%	2%	4%	3%	4%	4%
Computer science	12%	13%	7%	10%	9%	9%	9%	9%
Engineering & technology	2%	2%	3%	2%	4%	3%	3%	3%
Architecture, building & planning	0%	0%	0%	0%	2%	1%	1%	1%
Social studies	11%	8%	13%	10%	15%	13%	12%	11%
Law	4%	2%	6%	5%	9%	6%	7%	7%
Business & administrative studies	44%	38%	30%	35%	28%	31%	29%	28%
Mass communications and documentation	2%	4%	3%	2%	2%	2%	2%	2%
Languages	9%	6%	7%	6%	4%	6%	6%	6%
Historical and philosophical studies	4%	4%	6%	5%	4%	5%	5%	4%
Creative arts & design	2%	6%	3%	3%	4%	3%	4%	4%
Education	0%	0%	1%	3%	2%	2%	2%	2%
Combined	2%	0%	0%	2%	0%	1%	3%	4%

Source: HESA, Oxford Economics

	Business services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	1%	2%	1%	1%	2%	1%	1%	1%
Biological sciences	3%	2%	4%	2%	3%	3%	3%	3%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	1%	1%	1%	1%	1%	0%	0%
Physical sciences	2%	2%	2%	3%	1%	2%	2%	2%
Mathematical sciences	1%	1%	1%	1%	2%	1%	1%	2%
Computer science	22%	17%	17%	18%	18%	18%	18%	19%
Engineering & technology	5%	8%	7%	6%	5%	6%	7%	7%
Architecture, building & planning	12%	10%	13%	10%	11%	11%	11%	11%
Social studies	6%	6%	6%	4%	6%	5%	5%	5%
Law	6%	10%	12%	12%	11%	12%	12%	12%
Business & administrative studies	29%	31%	26%	27%	29%	27%	25%	23%
Mass communications and documentation	2%	2%	2%	2%	2%	2%	2%	2%
Languages	3%	2%	3%	3%	3%	3%	3%	3%
Historical and philosophical studies	1%	2%	2%	2%	2%	2%	2%	2%
Creative arts & design	2%	4%	3%	4%	3%	4%	4%	4%
Education	1%	1%	1%	2%	2%	2%	2%	2%
Combined	1%	0%	1%	1%	0%	0%	2%	3%

Source: HESA, Oxford Economics

	Public administration & defence							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	14%	7%	3%	3%	4%	3%	3%	3%
Biological sciences	4%	5%	3%	3%	6%	4%	4%	4%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	3%	2%	1%	1%	1%	1%	1%
Physical sciences	3%	4%	3%	4%	8%	5%	5%	5%
Mathematical sciences	0%	2%	0%	1%	1%	1%	1%	1%
Computer science	9%	7%	4%	3%	4%	3%	4%	4%
Engineering & technology	3%	4%	1%	1%	3%	1%	1%	1%
Architecture, building & planning	5%	7%	6%	3%	5%	5%	4%	4%
Social studies	14%	12%	8%	10%	14%	11%	10%	10%
Law	3%	5%	2%	4%	8%	4%	5%	5%
Business & administrative studies	23%	23%	15%	11%	25%	17%	16%	14%
Mass communications and documentation	1%	1%	1%	1%	3%	1%	1%	1%
Languages	3%	3%	2%	2%	5%	3%	3%	3%
Historical and philosophical studies	3%	4%	3%	3%	4%	3%	3%	3%
Creative arts & design	2%	1%	1%	2%	3%	2%	2%	2%
Education	7%	10%	46%	51%	8%	35%	36%	37%
Combined	4%	0%	1%	1%	1%	1%	2%	2%

Source: HESA, Oxford Economics

	Education							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	1%	2%	1%	1%	1%
Subjects allied to medicine	4%	3%	3%	3%	3%	3%	3%	3%
Biological sciences	5%	6%	4%	4%	4%	4%	4%	4%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	1%	1%	0%	0%	0%	0%	0%
Physical sciences	1%	1%	2%	2%	1%	1%	1%	2%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	5%	6%	2%	3%	2%	3%	3%	3%
Engineering & technology	1%	1%	1%	2%	1%	1%	1%	1%
Architecture, building & planning	0%	0%	0%	0%	0%	0%	0%	0%
Social studies	6%	5%	5%	3%	3%	4%	4%	3%
Law	1%	0%	1%	1%	0%	1%	1%	1%
Business & administrative studies	6%	5%	4%	6%	3%	4%	4%	4%
Mass communications and documentation	0%	1%	1%	1%	1%	1%	1%	1%
Languages	3%	3%	3%	2%	2%	2%	2%	2%
Historical and philosophical studies	3%	3%	2%	2%	2%	2%	2%	2%
Creative arts & design	3%	2%	2%	3%	3%	3%	3%	3%
Education	58%	63%	68%	65%	72%	68%	68%	68%
Combined	2%	0%	1%	1%	0%	1%	1%	1%

Source: HESA, Oxford Economics

	Health & social work							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	13%	0%	12%	13%	12%	12%	13%	13%
Subjects allied to medicine	41%	61%	53%	52%	53%	53%	53%	53%
Biological sciences	6%	6%	6%	5%	5%	5%	6%	6%
Veterinary science	0%	1%	0%	1%	0%	0%	0%	0%
Agriculture & related subjects	0%	1%	0%	0%	0%	0%	0%	0%
Physical sciences	1%	1%	1%	1%	1%	1%	1%	1%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	3%	2%	1%	1%	0%	1%	1%	1%
Engineering & technology	1%	0%	1%	0%	0%	0%	0%	0%
Architecture, building & planning	1%	0%	0%	0%	0%	0%	0%	0%
Social studies	17%	16%	14%	14%	16%	15%	14%	13%
Law	1%	1%	1%	1%	1%	1%	1%	1%
Business & administrative studies	8%	5%	4%	5%	3%	4%	3%	3%
Mass communications and documentation	1%	1%	0%	1%	1%	0%	0%	0%
Languages	1%	1%	1%	2%	1%	1%	1%	1%
Historical and philosophical studies	2%	1%	2%	2%	1%	2%	1%	1%
Creative arts & design	1%	1%	1%	1%	1%	1%	1%	1%
Education	1%	3%	3%	2%	3%	3%	3%	3%
Combined	2%	0%	1%	1%	1%	1%	1%	1%

Source: HESA, Oxford Economics

	Other personal services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	4%	2%	4%	5%	2%	4%	4%	4%
Biological sciences	4%	10%	12%	11%	12%	12%	12%	13%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	2%	2%	0%	2%	1%	1%	1%
Physical sciences	2%	4%	2%	2%	2%	2%	2%	2%
Mathematical sciences	0%	0%	0%	2%	0%	1%	1%	1%
Computer science	8%	6%	6%	5%	4%	5%	5%	5%
Engineering & technology	2%	2%	4%	2%	4%	3%	4%	4%
Architecture, building & planning	2%	2%	0%	0%	0%	0%	0%	0%
Social studies	13%	8%	10%	9%	8%	9%	8%	8%
Law	2%	0%	2%	2%	2%	2%	2%	2%
Business & administrative studies	17%	21%	20%	16%	14%	17%	16%	15%
Mass communications and documentation	8%	4%	8%	7%	6%	7%	6%	6%
Languages	6%	4%	4%	2%	8%	5%	5%	5%
Historical and philosophical studies	9%	10%	10%	14%	14%	13%	12%	11%
Creative arts & design	17%	21%	10%	18%	16%	15%	15%	16%
Education	4%	2%	6%	2%	4%	4%	4%	4%
Combined	4%	0%	2%	2%	0%	1%	3%	4%

Source: HESA, Oxford Economics

Aspirational scenario

	Agriculture, forestry & fishing							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	50%	67%	67%	67%	67%	67%	67%	67%
Physical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	0%	0%	0%	0%	0%	0%
Engineering & technology	0%	0%	0%	0%	33%	11%	13%	14%
Architecture, building & planning	0%	0%	0%	33%	0%	11%	11%	11%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	50%	33%	33%	0%	0%	11%	9%	8%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	0%	0%	0%	0%	0%	0%	0%	0%

Source: HESA, Oxford Economics

	Mining & quarrying							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	0%	0%	0%	0%	0%	0%
Engineering & technology	100%	100%	100%	0%	100%	67%	73%	77%
Architecture, building & planning	0%	0%	0%	0%	0%	0%	0%	0%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	0%	0%	0%	100%	0%	33%	27%	23%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	0%	0%	0%	0%	0%	0%	0%	0%

Source: HESA, Oxford Economics

	Manufacturing							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	4%	2%	3%	4%	3%	3%	3%	3%
Biological sciences	2%	8%	7%	6%	7%	7%	7%	7%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	4%	5%	3%	3%	3%	3%	1%	1%
Physical sciences	4%	2%	6%	1%	4%	4%	5%	5%
Mathematical sciences	1%	2%	0%	0%	1%	0%	1%	1%
Computer science	17%	14%	11%	11%	7%	10%	11%	12%
Engineering & technology	22%	22%	24%	24%	24%	24%	26%	27%
Architecture, building & planning	1%	2%	0%	1%	1%	1%	1%	1%
Social studies	2%	5%	4%	3%	4%	4%	3%	3%
Law	0%	0%	3%	1%	1%	2%	2%	2%
Business & administrative studies	28%	25%	21%	29%	24%	25%	21%	19%
Mass communications and documentation	2%	6%	3%	4%	3%	3%	3%	3%
Languages	2%	2%	4%	3%	4%	4%	3%	3%
Historical and philosophical studies	1%	2%	3%	1%	3%	2%	2%	2%
Creative arts & design	4%	5%	6%	7%	7%	7%	7%	8%
Education	1%	2%	1%	1%	1%	1%	1%	1%
Combined	4%	2%	0%	0%	1%	0%	1%	2%

Source: HESA, Oxford Economics

	Utilities							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	0%	0%	0%	0%	0%	0%
Biological sciences	0%	0%	0%	0%	0%	0%	0%	0%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	0%	0%	0%	17%	0%	6%	7%	8%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	0%	0%	25%	0%	17%	14%	16%	16%
Engineering & technology	25%	50%	25%	33%	17%	25%	29%	32%
Architecture, building & planning	0%	0%	0%	0%	33%	11%	11%	11%
Social studies	0%	0%	0%	0%	0%	0%	0%	0%
Law	0%	0%	0%	0%	0%	0%	0%	0%
Business & administrative studies	50%	50%	50%	33%	33%	39%	31%	27%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	0%	0%	17%	0%	6%	5%	4%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	0%	0%	0%	0%	0%	0%	0%	0%
Education	0%	0%	0%	0%	0%	0%	0%	0%
Combined	25%	0%	0%	0%	0%	0%	1%	2%

Source: HESA, Oxford Economics

	Construction							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	3%	0%	0%	0%	0%	0%	0%
Biological sciences	3%	3%	4%	0%	2%	2%	2%	2%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	3%	0%	4%	4%	2%	3%	3%	4%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	6%	6%	4%	4%	0%	2%	3%	3%
Engineering & technology	23%	24%	39%	29%	30%	32%	34%	34%
Architecture, building & planning	39%	42%	32%	43%	41%	39%	38%	38%
Social studies	0%	3%	4%	4%	2%	3%	3%	3%
Law	0%	0%	0%	0%	2%	1%	1%	1%
Business & administrative studies	23%	12%	14%	14%	14%	14%	11%	10%
Mass communications and documentation	0%	0%	0%	0%	0%	0%	0%	0%
Languages	0%	3%	0%	0%	0%	0%	0%	0%
Historical and philosophical studies	0%	0%	0%	0%	0%	0%	0%	0%
Creative arts & design	3%	3%	0%	4%	5%	3%	3%	3%
Education	0%	0%	0%	0%	2%	1%	1%	1%
Combined	0%	0%	0%	0%	0%	0%	1%	2%

Source: HESA, Oxford Economics

	Retail & distribution							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	16%	15%	17%	19%	19%	18%	18%	18%
Biological sciences	5%	6%	7%	9%	10%	9%	9%	9%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	0%	1%	1%	1%	1%	0%	0%
Physical sciences	5%	3%	4%	6%	4%	5%	6%	6%
Mathematical sciences	1%	1%	1%	1%	1%	1%	1%	1%
Computer science	11%	7%	8%	5%	6%	6%	6%	6%
Engineering & technology	4%	5%	3%	2%	3%	2%	3%	3%
Architecture, building & planning	1%	1%	1%	1%	1%	1%	1%	1%
Social studies	8%	8%	10%	9%	9%	9%	8%	7%
Law	1%	2%	3%	2%	3%	3%	3%	4%
Business & administrative studies	26%	27%	19%	21%	18%	19%	16%	13%
Mass communications and documentation	3%	3%	4%	3%	5%	4%	4%	3%
Languages	6%	6%	7%	6%	6%	6%	5%	5%
Historical and philosophical studies	5%	6%	7%	5%	5%	6%	5%	5%
Creative arts & design	7%	8%	8%	9%	8%	8%	10%	11%
Education	0%	1%	2%	3%	2%	2%	2%	2%
Combined	0%	0%	0%	0%	0%	0%	3%	4%

Source: HESA, Oxford Economics

	Hotel & restaurants							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	3%	3%	0%	4%	2%	2%	2%
Biological sciences	7%	6%	9%	8%	11%	9%	9%	9%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	4%	0%	1%	1%	0%
Physical sciences	7%	6%	3%	4%	4%	4%	5%	6%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	10%	6%	3%	4%	7%	5%	5%	6%
Engineering & technology	3%	3%	3%	4%	4%	4%	4%	4%
Architecture, building & planning	0%	3%	3%	0%	0%	1%	1%	1%
Social studies	10%	6%	12%	8%	11%	10%	9%	8%
Law	3%	3%	3%	4%	4%	4%	4%	4%
Business & administrative studies	38%	36%	36%	36%	32%	35%	33%	32%
Mass communications and documentation	3%	6%	3%	4%	4%	4%	3%	3%
Languages	7%	3%	6%	8%	7%	7%	6%	6%
Historical and philosophical studies	3%	6%	6%	4%	7%	6%	5%	5%
Creative arts & design	7%	9%	9%	8%	7%	8%	10%	11%
Education	0%	3%	0%	4%	0%	1%	1%	1%
Combined	0%	0%	0%	0%	0%	0%	0%	0%

Source: HESA, Oxford Economics

	Transport & communications							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	0%	0%	4%	0%	3%	2%	2%	2%
Biological sciences	4%	3%	8%	3%	10%	7%	7%	7%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	0%	0%	0%	0%	0%	0%	0%
Physical sciences	4%	3%	4%	6%	3%	5%	5%	5%
Mathematical sciences	0%	0%	0%	0%	3%	1%	2%	2%
Computer science	15%	17%	8%	16%	13%	12%	12%	12%
Engineering & technology	15%	10%	8%	6%	10%	8%	9%	10%
Architecture, building & planning	0%	0%	0%	3%	0%	1%	1%	1%
Social studies	7%	7%	13%	10%	6%	10%	8%	8%
Law	0%	0%	4%	3%	3%	4%	4%	4%
Business & administrative studies	33%	38%	29%	32%	32%	31%	30%	29%
Mass communications and documentation	4%	3%	4%	3%	3%	4%	3%	3%
Languages	7%	7%	4%	6%	3%	5%	4%	4%
Historical and philosophical studies	4%	7%	8%	3%	6%	6%	6%	5%
Creative arts & design	4%	3%	4%	3%	3%	4%	4%	5%
Education	0%	0%	0%	3%	0%	1%	1%	1%
Combined	4%	0%	0%	0%	0%	0%	1%	1%

Source: HESA, Oxford Economics

	Financial services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	2%	2%	1%	2%	2%	2%	2%	2%
Biological sciences	4%	6%	9%	8%	4%	7%	7%	7%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	2%	2%	1%	2%	0%	1%	0%	0%
Physical sciences	2%	6%	6%	5%	4%	5%	7%	8%
Mathematical sciences	2%	4%	4%	2%	4%	3%	5%	7%
Computer science	12%	13%	7%	10%	9%	9%	10%	11%
Engineering & technology	2%	2%	3%	2%	4%	3%	3%	4%
Architecture, building & planning	0%	0%	0%	0%	2%	1%	1%	1%
Social studies	11%	8%	13%	10%	15%	13%	11%	10%
Law	4%	2%	6%	5%	9%	6%	7%	8%
Business & administrative studies	44%	38%	30%	35%	28%	31%	26%	23%
Mass communications and documentation	2%	4%	3%	2%	2%	2%	2%	2%
Languages	9%	6%	7%	6%	4%	6%	5%	5%
Historical and philosophical studies	4%	4%	6%	5%	4%	5%	5%	4%
Creative arts & design	2%	6%	3%	3%	4%	3%	4%	5%
Education	0%	0%	1%	3%	2%	2%	2%	2%
Combined	2%	0%	0%	2%	0%	1%	2%	2%

Source: HESA, Oxford Economics

	Business services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	1%	2%	1%	1%	2%	1%	1%	1%
Biological sciences	3%	2%	4%	2%	3%	3%	3%	3%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	1%	1%	1%	1%	1%	0%	0%
Physical sciences	2%	2%	2%	3%	1%	2%	3%	3%
Mathematical sciences	1%	1%	1%	1%	2%	1%	2%	3%
Computer science	22%	17%	17%	18%	18%	18%	18%	19%
Engineering & technology	5%	8%	7%	6%	5%	6%	7%	8%
Architecture, building & planning	12%	10%	13%	10%	11%	11%	11%	11%
Social studies	6%	6%	6%	4%	6%	5%	5%	4%
Law	6%	10%	12%	12%	11%	12%	14%	15%
Business & administrative studies	29%	31%	26%	27%	29%	27%	22%	19%
Mass communications and documentation	2%	2%	2%	2%	2%	2%	2%	2%
Languages	3%	2%	3%	3%	3%	3%	3%	2%
Historical and philosophical studies	1%	2%	2%	2%	2%	2%	2%	2%
Creative arts & design	2%	4%	3%	4%	3%	4%	4%	5%
Education	1%	1%	1%	2%	2%	2%	2%	2%
Combined	1%	0%	1%	1%	0%	0%	2%	2%

Source: HESA, Oxford Economics

	Public administration & defence							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	14%	7%	3%	3%	4%	3%	3%	3%
Biological sciences	4%	5%	3%	3%	6%	4%	4%	4%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	1%	3%	2%	1%	1%	1%	1%	0%
Physical sciences	3%	4%	3%	4%	8%	5%	6%	8%
Mathematical sciences	0%	2%	0%	1%	1%	1%	1%	1%
Computer science	9%	7%	4%	3%	4%	3%	4%	4%
Engineering & technology	3%	4%	1%	1%	3%	1%	2%	2%
Architecture, building & planning	5%	7%	6%	3%	5%	5%	4%	4%
Social studies	14%	12%	8%	10%	14%	11%	10%	9%
Law	3%	5%	2%	4%	8%	4%	5%	6%
Business & administrative studies	23%	23%	15%	11%	25%	17%	14%	12%
Mass communications and documentation	1%	1%	1%	1%	3%	1%	1%	1%
Languages	3%	3%	2%	2%	5%	3%	3%	2%
Historical and philosophical studies	3%	4%	3%	3%	4%	3%	3%	3%
Creative arts & design	2%	1%	1%	2%	3%	2%	2%	2%
Education	7%	10%	46%	51%	8%	35%	35%	36%
Combined	4%	0%	1%	1%	1%	1%	3%	3%

Source: HESA, Oxford Economics

	Education							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	1%	2%	1%	1%	1%
Subjects allied to medicine	4%	3%	3%	3%	3%	3%	3%	3%
Biological sciences	5%	6%	4%	4%	4%	4%	4%	4%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	1%	1%	0%	0%	0%	0%	0%
Physical sciences	1%	1%	2%	2%	1%	1%	2%	2%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	5%	6%	2%	3%	2%	3%	3%	3%
Engineering & technology	1%	1%	1%	2%	1%	1%	2%	2%
Architecture, building & planning	0%	0%	0%	0%	0%	0%	0%	0%
Social studies	6%	5%	5%	3%	3%	4%	3%	3%
Law	1%	0%	1%	1%	0%	1%	1%	1%
Business & administrative studies	6%	5%	4%	6%	3%	4%	4%	3%
Mass communications and documentation	0%	1%	1%	1%	1%	1%	1%	1%
Languages	3%	3%	3%	2%	2%	2%	2%	2%
Historical and philosophical studies	3%	3%	2%	2%	2%	2%	2%	2%
Creative arts & design	3%	2%	2%	3%	3%	3%	3%	4%
Education	58%	63%	68%	65%	72%	68%	68%	68%
Combined	2%	0%	1%	1%	0%	1%	1%	1%

Source: HESA, Oxford Economics

	Health & social work							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	13%	0%	12%	13%	12%	12%	12%	13%
Subjects allied to medicine	41%	61%	53%	52%	53%	53%	53%	53%
Biological sciences	6%	6%	6%	5%	5%	5%	5%	5%
Veterinary science	0%	1%	0%	1%	0%	0%	0%	0%
Agriculture & related subjects	0%	1%	0%	0%	0%	0%	0%	0%
Physical sciences	1%	1%	1%	1%	1%	1%	1%	1%
Mathematical sciences	0%	0%	0%	0%	0%	0%	0%	0%
Computer science	3%	2%	1%	1%	0%	1%	1%	1%
Engineering & technology	1%	0%	1%	0%	0%	0%	0%	0%
Architecture, building & planning	1%	0%	0%	0%	0%	0%	0%	0%
Social studies	17%	16%	14%	14%	16%	15%	13%	12%
Law	1%	1%	1%	1%	1%	1%	1%	1%
Business & administrative studies	8%	5%	4%	5%	3%	4%	3%	3%
Mass communications and documentation	1%	1%	0%	1%	1%	0%	0%	0%
Languages	1%	1%	1%	2%	1%	1%	1%	1%
Historical and philosophical studies	2%	1%	2%	2%	1%	2%	1%	1%
Creative arts & design	1%	1%	1%	1%	1%	1%	1%	1%
Education	1%	3%	3%	2%	3%	3%	3%	3%
Combined	2%	0%	1%	1%	1%	1%	2%	3%

Source: HESA, Oxford Economics

	Other personal services							
	2003	2004	2005	2006	2007	2008	2015	2020
Medicine & dentistry	0%	0%	0%	0%	0%	0%	0%	0%
Subjects allied to medicine	4%	2%	4%	5%	2%	4%	4%	4%
Biological sciences	4%	10%	12%	11%	12%	12%	12%	12%
Veterinary science	0%	0%	0%	0%	0%	0%	0%	0%
Agriculture & related subjects	0%	2%	2%	0%	2%	1%	1%	0%
Physical sciences	2%	4%	2%	2%	2%	2%	3%	3%
Mathematical sciences	0%	0%	0%	2%	0%	1%	1%	1%
Computer science	8%	6%	6%	5%	4%	5%	6%	6%
Engineering & technology	2%	2%	4%	2%	4%	3%	4%	4%
Architecture, building & planning	2%	2%	0%	0%	0%	0%	0%	0%
Social studies	13%	8%	10%	9%	8%	9%	8%	7%
Law	2%	0%	2%	2%	2%	2%	2%	3%
Business & administrative studies	17%	21%	20%	16%	14%	17%	15%	14%
Mass communications and documentation	8%	4%	8%	7%	6%	7%	6%	6%
Languages	6%	4%	4%	2%	8%	5%	4%	4%
Historical and philosophical studies	9%	10%	10%	14%	14%	13%	12%	11%
Creative arts & design	17%	21%	10%	18%	16%	15%	18%	20%
Education	4%	2%	6%	2%	4%	4%	4%	4%
Combined	4%	0%	2%	2%	0%	1%	1%	0%

Source: HESA, Oxford Economics

Caveats

The caveats below are critical to bear in mind for understanding the limitation of the empirical skills forecasting model.

- **A challenging process** - forecasting skill requirements is a challenging process. It is not simply the change in employment stock (which is known as expansion demand) but also the so-called 'replacement demand' to fill vacancies created by people leaving the labour market for a variety of reasons (to retire, migrate, have children, illness etc) net of joiners from similar sources. This process therefore involves an analysis of the flows into and out of the labour market.
- **Complex system of flows and dependent on quality of LFS data for which NI has a small sample** - this form of analysis is complex and is highly dependent upon the quality of the data used to determine the flows. For this we have to rely on the LFS as it is the only source of data which records economic activity of individuals one year ago and economic activity this year – and thus allows flows to be determined. Even here the survey will not have data on people in work who have either died or left the county (as obviously neither will be surveyed) and the NI LFS sample is small (in some instances we use UK LFS data adjusted for known NI-UK skill differentials).
- **Sophisticated approach** - Oxford Economics' skills forecasting methodology does not net migration to zero, exclude occupational mobility, or ignore the flows in and out of forms of unemployment / inactivity. Rather the approach employed in this study is a full flows matrix with the 'residual' net requirement set as those people required to come from the education system and in-migration.
- **No LFS data for a recessionary period** - labour flows could well change during the current recession relative to the past 'golden era' decade with significant implications for the assumptions and short-term forecasts presented in this report. No LFS data is available to gauge the extent of this (as only the last 10 years' LFS have the necessary variables). Leavers to unemployment may rise markedly and movement within the labour market (from one job to another) may fall also but with a lack of empirical evidence it is very difficult to know how to adjust leaver and joining rates. This is clearly a limitation for forecasting short-term skill needs given the current economic conditions. Our approach assumes similar patterns in the future to the recent past.
- **Relying on recent trends – does past data reflect employers hiring people with the required skill level?** The skill assumptions applied to the 'residual' net requirement from education and in-migration are based entirely on past data (with some skills creep built into new entrant flows). This approach should therefore be considered skill demand if past actual trends and data are indicative of actual labour market desires and not just education and migrant skill outputs – i.e. it assumes the skill patterns in past data reflect the actual skill demand from employers. It may be the case that in recent years inflows into the labour market from education have not always had a high level formal qualification but that is not to say employers would not have liked or benefited from better educational standards. Equally though the labour market may perhaps not have been able to pay the wages of more skilled staff. The opposite may also be true where employers recruit persons with higher qualifications than actually necessary, e.g. call centres, though employers can still benefit from the higher skills available. In either of these two more extreme cases, using past data would not be a precise reflection of actual employer demand.

- **Relying on past trends – did the market get the degree subject mix it would have liked?**
Similarly extreme care must be taken with the degree subject analysis presented in this report as it is also based on past trend data from the HESA Destination of Leavers survey which only has sample coverage of 70-80 per cent (and to the best of our understanding this is the first time skills forecasting research has been extended to degree subject analysis at a macro level). Again this may represent what the labour market could get not what it desired. Employers in NI may be taking more general business & administration degrees when they would ideally like more advanced STEM subjects (say taking a business studies graduate when they might have preferred a maths graduate). As for above, this analysis should therefore be considered subject demand if past trends and data are indicative of the subjects actually demanded by employers more so than the supply of subjects from graduating students. In addition subject analysis would ideally involve more detailed sectoral analysis as, for example, subject demand will vary across a sector such as businesses services from accounting, computer science, law etc.
- **Formal qualification measures such as NQF levels 1-8 do not cover all aspects of skill needs** – a limitation of this type of empirical skills forecasting exercise is that it only focuses on formal NQF qualifications and not other ‘softer’ key skill requirements such as experience, work-readiness and generic skills. This is because these other skills need types lack comprehensive and robust data and are therefore difficult to quantify in a modelling framework. Analysis of ‘softer’ skill needs is best handled through qualitative research and review of Sector Skill Council reports – this was beyond the scope of this research.
- **New GVA data** – a markedly revised set of GVA data has been published from ONS Regional Accounts which provides updates (and in some sectors markedly revised) value added and productivity estimates. This revision is less important for this study in terms of replacement demand requirements and future skill needs, though the implications for scenarios aimed at Programme for Government (PfG) productivity targets (PSA 1) is more critical. The forecasts and historical official data underlying the analysis in this report are consistent with Oxford Economics’ submission to EDF in September 2008 and therefore do not include the latest GVA data (although a comparison is presented in the main report).

Annex D: National Qualification Framework (NQF), JACS higher education degree subject classification and STEM definition

This annex chapter describes the National Qualification Framework used in this study to categorise highest qualification levels, and sets out in full the JACS higher education degree subject classification to give the reader an idea of what individual subject areas are included in broader subject groupings presented in this report. It also provides a definition of STEM in terms of JACS subject areas.

National Qualification Framework (NQF)

For this project it was specifically requested to provide skill forecasts on both a National Qualification Framework (NQF) basis and NVQ basis. DETI provided the following classification of LFS categories by NQF level to allow adjustment of our models which are typically based on NVQ.

NQF framework

NQF	LFS category
NQF 1 and below (including entry)	No qualifications
	Other qualifications
	Key skills qualifications
	Entry level qualifications
	Basic skills qualifications
	BTEC general certificate
	YT certificate
	Other RSA qualifications
	Other City & Guilds qualifications
	NVQ level 1 or equivalent
	GNVQ GSVQ foundation level
	Less than 5 GCSE passes grades A*-C
	CSE below grade1, GCSE below grade C
	BTEC SCOTVEC first/general certificate
NQF 2	City & Guilds craft
	BTEC firsts
	5+ GCSE passes grades A*-C
	GNVQ/GSVQ intermediate
	NVQ level 2 or equivalent
	One A-Level or equivalent
	AS Level or equivalent
NQF 3	More than 1 A-level
	Advanced VCE and Advanced Subsidiary VCE
	NVQ level 3
	GNVQ/GSVQ advanced
	OND ONC BTEC etc national
	City & Guilds advanced craft/part 1
	Scottish CSYS
	SCE Higher or equivalent
	Trade apprenticeship
NQF 4-6	RSA diploma
	First/ foundation degree
	Other degree
	NVQ level 4
	Diploma in higher education
	HNC HND BTEC etc higher
	Teaching further education
	Teaching secondary education
	Teaching primary education
	Teaching foundation stage
	Teaching level not stated
NQF 7-8	Nursing etc
	RSA higher diploma
	Other higher education below degree
NQF 7-8	Higher degree
	NVQ level 5

Source: DEL, DETI

Rather than present future skill needs at each of the 8 NQF levels, a specific aggregation and terminology was agreed with DEL and is used throughout the report. Details of the aggregation, terminology and classification of individual LFS qualification categories is provided below (this is only a high level summary). This classification is used consistently throughout the report.

Skills classification and terminology

NQF	Description	Terminology
8	Doctorate	Postgraduate
7	Masters, postgraduate certificate and diploma	
6	Honours degree	First degree and sub-degree
5	Sub-degree including foundation degrees	
4	Certificates of higher education	
3	NVQ Level 3 A-Levels	Intermediate a
2	NVQ Level 2 GCSE grades A*-C	Intermediate b
1	NVQ Level 1 GCSE grades D-G	Low
Entry	Entry level certificate in adult literacy Other qualifications No qualifications	

JACS higher education degree subject classification

The table below provides a detailed breakdown of individual degree subjects by the broad subject area classification used in the main report (JACS stands for Joint Academic Coding System). Note the table should be read vertically with individual subjects under broad groupings continuing on to successive pages.

JACS higher education degree subject classification

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
Medicine & dentistry	Pre-clinical medicine	Engineering	General engineering	Linguistics, Classics and related subjects	Linguistics
	Pre-clinical dentistry		Integrated engineering		Applied linguistics
	Clinical medicine		Safety engineering		Historical linguistics
	Clinical dentistry		Fire safety engineering		Phonetics & phonology
	Others in medicine & dentistry		Water quality control		Phonetics
	Medicine & dentistry not elsewhere classified		Public health engineering		Phonology
Subjects allied to medicine	Anatomy, physiology & pathology		Computer-aided engineering		Sociolinguistics
	Anatomy		Automated engineering design		Psycholinguistics
	Physiology		Mechanics		Linguistics not elsewhere classified
	Pathology		Fluid mechanics		Comparative literary studies
	Cellular pathology		Solid mechanics		Literature in translation
	Pathobiology		Structural mechanics		Literature in its original language
	Neuroscience		Engineering design		Comparative literary studies not elsewhere classified
	Physiotherapy		General engineering not elsewhere classified		English studies
	Anatomy, physiology & pathology not elsewhere classified		Civil engineering		English language
	Pharmacology, toxicology & pharmacy		Structural engineering		English literature
	Pharmacology		Environmental engineering		English literature by period
	Toxicology		Energy resources		English literature by author
	Pharmacy		Coastal decay		English literature by topic
	Pharmacology, toxicology & pharmacy not elsewhere classified		Environmental impact assessment		English as a second language
	Complementary medicine		Transport engineering		English literature written as a second language
	Osteopathy		Permanent way engineering		English studies not elsewhere classified
	Chiropractic		Pavement engineering		Ancient language studies
	Chiropody		Surveying science		Ancient Egyptian
	Alternative medicine		General practice surveying		Coptic
	Chinese		Engineering surveying		Classical Arabic
	Herbalism		Geotechnical engineering		Akkadian
	Acupuncture		Civil engineering not elsewhere classified		Sumerian
	Aromatherapy		Mechanical engineering		Sanskrit
	Hypnotherapy		Dynamics		Prakrit
	Reflexology		Thermodynamics		Aramaic
	Complementary medicine not elsewhere classified		Mechanisms & machines		Hebrew
	Nutrition		Turbine technology		Ancient language studies not elsewhere classified
	Dietetics		Automotive engineering		Celtic studies
	Nutrition not elsewhere classified		Road vehicle engineering		Ancient Celtic studies
	Ophthalmics		Rail vehicle engineering		Modern Celtic studies
	Optometry		Ship propulsion engineering		Goidelic group of languages
	Orthoptics		Acoustics & vibration		Brythonic group of languages

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Ophthalmics not elsewhere classified		Acoustics		Scottish Gaelic
	Aural & oral sciences		Vibration		Scottish Gaelic literature
	Audiology		Offshore engineering		Irish Gaelic
	Speech science		Electromechanical engineering		Irish Gaelic literature
	Language pathology		Mechanical engineering not elsewhere classified		Manx
	Aural & oral sciences not elsewhere classified		Aerospace engineering		Manx literature
	Nursing		Aeronautical engineering		Welsh
	Palliative care nursing		Air passenger transport engineering		Welsh literature
	Community nursing		Air freight transport engineering		Cornish
	District nursing		Air combat engineering		Cornish literature
	Health visiting		Astronautical engineering		Breton
	School nursing		Avionics		Breton literature
	Practice nursing		Aerodynamics		Celtic studies not elsewhere classified
	Midwifery		Flight mechanics		Latin studies
	Paediatric nursing		Propulsion systems		Latin language
	Adult nursing		Aviation studies		Church Latin
	Geriatric nursing		Aerospace engineering not elsewhere classified		Medieval Latin
	Dental nursing		Naval architecture		Latin literature
	Mental health nursing		Shipbuilding		Latin literature in translation
	Learning disability nursing		Surface passenger ship building		Latin studies not elsewhere classified
	Medical nursing		Surface freight ship building		Classical Greek studies
	Critical care nursing		Surface combat ship building		Classical Greek language
	Paramedical nursing		Submarine building		Classical Church Greek
	Nursing not elsewhere classified		Ship design		Late Greek
	Medical technology		Surface passenger ship design		Classical Greek literature
	Cardiography		Surface freight ship design		Classical Greek literature in translation
	Radiology		Surface combat ship design		Classical Greek studies not elsewhere classified
	Radiography, diagnostic		Submarine design		Classical studies
	Radiography, therapeutic		Naval architecture not elsewhere classified		Classical studies not elsewhere classified
	Biomechanics, biomaterials & prosthetics (non-clinical)		Electronic & electrical engineering	European Languages, Literature and related subjects	Others in linguistics, classics & related subjects
	Dental technology		Electronic engineering		Translation studies
	Mortuary technology		Microelectronic engineering		Translation theory
	Medical technology not elsewhere classified		Integrated circuit design		Linguistics, classics & related subjects not elsewhere classified
	Others in subjects allied to medicine		Electrical engineering		French studies
	Environmental health		Electrical power		French language
	Occupational health		Electrical power generation		French literature
	Occupational therapy		Electrical power distribution		French society & culture
	Counselling		Communications engineering		French studies not elsewhere classified
	Subjects allied to medicine not elsewhere classified		Telecommunications engineering		German studies
			Broadcast engineering		German language
			Satellite engineering		German literature
			Microwave engineering		German society & culture
			Systems engineering		German studies not elsewhere classified
			Digital circuit engineering		Italian studies
			Analogue circuit engineering		Italian language
			Control systems		Italian literature
			Instrumentation control		Italian society & culture
			Control by light systems		Italian studies not elsewhere classified
Biological sciences	Biology				
	Applied biology				
	Parasitology				
	Behavioural biology				
	Cell biology				
	Applied cell biology				
	Developmental/reproductive biology				
	Developmental biology				
	Reproductive biology				

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Environmental biology		Robotics & cybernetics		Spanish studies
	Marine/freshwater biology		Robotics		Spanish language
	Marine biology		Cybernetics		Spanish languages in other countries
	Freshwater biology		Bioengineering		Spanish literature
	Population biology		Virtual reality engineering		Spanish society & culture
	Ecology		Optoelectronic engineering		Spanish studies not elsewhere classified
	Biodiversity		Electronic & electrical engineering not elsewhere classified		Portuguese studies
	Evolution		Production & manufacturing engineering		Portuguese language
	Biology not elsewhere classified		Manufacturing systems engineering		Portuguese languages in other countries
	Biometry		Manufacturing systems design		Portuguese literature
	Botany		Manufacturing installation systems		Portuguese society & culture
	Applied botany		Production processes		Portuguese studies not elsewhere classified
	Mycology		Manufacturing systems maintenance		Scandinavian studies
	Plant cell science		Quality assurance engineering		Scandinavian languages
	Plant pathology		Mechatronics		Swedish language
	Botany not elsewhere classified		Production & manufacturing engineering not elsewhere classified		Norwegian language
	Zoology		Chemical, process & energy engineering		Finnish language
	Applied zoology		Chemical engineering		Danish language
	Cell zoology		Biochemical engineering		Scandinavian literature
	Developmental zoology		Pharmaceutical engineering		Swedish literature
	Entomology		Atomic engineering		Norwegian literature
	Marine zoology		Nuclear engineering		Finnish literature
	Pest science		Chemical process engineering		Danish literature
	Zoology not elsewhere classified		Bioprocess engineering		Scandinavian society & culture
	Genetics		Gas engineering		Swedish society & culture
	Applied genetics		Petroleum engineering		Norwegian society & culture
	Human genetics		Chemical, process & energy engineering not elsewhere classified		Finnish society & culture
	Medical & veterinary genetics		Others in engineering		Danish society & culture
	Medical genetics		Engineering not elsewhere classified		Scandinavian studies not elsewhere classified
	Veterinary genetics	Technologies	Minerals technology		Russian & East European studies
	Molecular genetics		Mining		Russian & East European languages
	Genomics		Quarrying		Russian language
	Genetic engineering		Rock mechanics		Polish language
	Genetics not elsewhere classified		Minerals processing		Czech language
	Microbiology		Minerals surveying		Russian & east european Literature
	Applied microbiology		Petrochemical technology		Russian literature
	Medical & veterinary microbiology		Minerals technology not elsewhere classified		Polish literature
	Medical microbiology		Metallurgy		Czech literature
	Veterinary microbiology		Applied metallurgy		Russian & east european society & culture
	Bacteriology		Metallic fabrication		Russian society & culture
	Virology		Pattern making		Polish society & culture
	Immunology		Corrosion technology		Czech society & culture
	Serology		Metallurgy not elsewhere classified		Russian & east european studies not elsewhere classified
	Microbiology not elsewhere classified		Ceramics & glass		European studies
	Sports science		Ceramics		Others in European languages, literature & related subjects
	Molecular biology, biophysics & biochemistry		Glass technology		Other European languages

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Applied molecular biology, biophysics & biochemistry		Ceramics & glass not elsewhere classified		Dutch
	Biological chemistry		Polymers & textiles		Flemish
	Metabolic biochemistry		Polymers technology		Other European literature
	Medical & veterinary biochemistry		Plastics		Other European societies & cultures
	Medical biochemistry		Textiles technology		European languages, literature & related subjects not elsewhere classified
	Veterinary biochemistry		Textile chemistry	Eastern, Asiatic, African, American and Australasian Languages, Literature and related subjects	Chinese studies
	Plant biochemistry		Dying & colouring of textiles		Chinese language studies
	Biomolecular science		Leather technology		Chinese literature studies
	Biophysical science		Tanning		Chinese society & culture studies
	Molecular biology, biophysics & biochemistry not elsewhere classified		Clothing production		Chinese studies not elsewhere classified
	Psychology		Machine knitting		Japanese studies
	Applied psychology		Commercial tailoring		Japanese language studies
	Occupational psychology		Pattern cutting		Japanese literature studies
	Educational psychology		Millinery		Japanese society & culture studies
	Sport psychology		Footwear production		Japanese studies not elsewhere classified
	Organisational psychology		Polymers & textiles not elsewhere classified		South Asian studies
	Business psychology		Materials technology not otherwise specified		South Asian language studies
	Forensic psychology		Materials technology		South Asian literature studies
	Developmental psychology		Engineering materials		South Asian society & culture studies
	Child psychology		Paper technology		South Asian studies not elsewhere classified
	The psychology of ageing		Furniture technology		Other Asian studies
	Methodological & conceptual issues in psychology		Printing		Other Asian language studies
	Research methods in psychology		Offset lithography		Other Asian Literature Studies
	Quantitative psychology		Photo-lithography		Other Asian society & culture studies
	Qualitative psychology		Reprographic techniques		Other Asian studies not elsewhere classified
	History of psychology		Screen process printing		African studies
	Philosophy of psychology		Gemmology		African language studies
	Psychology in health & medicine		Materials technology not elsewhere classified		African literature studies
	Health psychology		Maritime technology		African society & culture studies
	Clinical psychology		Marine technology		African studies not elsewhere classified
	Counselling psychology		Marine navigation		Modern Middle Eastern studies
	Psychotherapy		Marine radar		Modern Middle Eastern language studies
	Clinical neuropsychology		Marine radio		Modern Middle Eastern literature studies
	Community psychology		Marine plumbing		Modern Middle Eastern society & culture studies
	Psychoanalytical studies		Maritime technology not elsewhere classified		Modern Middle Eastern studies not elsewhere classified
	Psychology of mental health		Biotechnology		American studies
	Cognitive & affective psychology		Plant biotechnology (crops, trees, shrubs etc.)		American language studies
	Psychological modelling		Animal biotechnology		Latin American language studies
	Psychology of communication		Environmental biotechnology		American literature studies
	Psychology of memory & learning		Industrial biotechnology		Latin American literature studies
	Psychology of perception		Medical biotechnology		American society & culture studies
	Psychology of higher cognitive processes		Biotechnology not elsewhere classified		Latin American society & culture studies
	Experimental psychology		Others in technology		American studies not elsewhere classified
	Affective psychology		Energy technologies		Australasian studies
	Transpersonal psychology		Ergonomics		Australasian language studies
	Psychobiology		Audio technology		Australasian literature studies

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Cognitive neuroscience		Music recording		Australasian society & culture studies
	Affective neuroscience		Machinery maintenance		Australasian studies not elsewhere classified
	Psychopharmacology		Office machinery maintenance		Others in Eastern, Asiatic, African, American & Australasian languages
	Evolutionary psychology		Industrial machinery maintenance		Others in Eastern, Asiatic, African, American & Australasian languages
	Animal psychology		Musical instrument technology		Others in Eastern, Asiatic, African, American & Australasian literature
	Personality & individual differences		Transport logistics		Others in Eastern, Asiatic, African, American & Australasian societies & culture
	Psychometrics		Technologies not elsewhere classified		Eastern, Asiatic, African, American & Australasian languages, literature
	Psychology of gender		Architecture	Historical and philosophical studies	History by period
	Cross-cultural psychology		Architectural design theory		Ancient history
	Social psychology		Interior architecture		Byzantine history
	Social cognition		Architectural technology		Medieval history
	Psychology not elsewhere classified		Architecture not elsewhere classified		Modern history
	Others in biological sciences		Building		Modern history 1500-1599
	Applied biological sciences		Building technology		Modern history 1600-1699
	Biological sciences not elsewhere classified		Construction management		Modern history 1700-1799
	Pre-clinical veterinary medicine	Architecture, building & planning	Building surveying		Modern history 1800-1899
	Pre-clinical veterinary medicine not elsewhere classified		Quantity surveying		Modern history 1900-1919
	Clinical veterinary medicine & dentistry		Conservation of buildings		Modern history 1920-1949
	Clinical veterinary medicine		Building not elsewhere classified		Modern history 1950-1999
	Clinical veterinary dentistry		Landscape design		Modern history 2000-2099
	Clinical veterinary medicine & dentistry not elsewhere classified		Landscape architecture		History by period not elsewhere classified
	Animal science		Landscape studies		History by area
	Veterinary nursing		Landscape design not elsewhere classified		British history
	Animal health		Planning (urban, rural & regional)		Irish history
	Animal anatomy		Regional planning		Scottish history
	Animal physiology		Urban & rural planning		Welsh history
	Animal pathology		Urban planning		English history
	Animal pharmacology		Rural planning		European history
	Animal toxicology		Planning studies		French history
	Animal pharmacy		Urban studies		German history
	Animal nutrition		Housing		Italian history
	Animal welfare		Transport planning		Iberian history
	Veterinary public health		Planning (urban, rural & regional) not elsewhere classified		Russian history
Veterinary science and agriculture & related subjects	Overseas veterinary development		Others in architecture, building & planning		American history
	Animal sciences not elsewhere classified		Architecture, building & planning not elsewhere classified		Canadian history
	Agriculture	Social studies	Economics		USA history
	Arable & fruit farming		Applied economics		South American history
	Agricultural pests & diseases		Financial economics		Central American history
	Crop physiology		Agricultural economics		Asian history
	Crop nutrition		Economic policy		Chinese history
	Crop protection		Microeconomics		Indian history
	Crop production		Macroeconomics		South East Asian history
	Glasshouse culture		Econometrics		African history
	Amenity plant production		Political economics		North African history

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Exotic plants & crops		International economics		Central African history
	Livestock		Economic systems		Southern African history
	Livestock husbandry		Capitalism		East African history
	Equine studies		Monetarism		West African history
	Poultry keeping		Keynesianism		Australasian history
	Gamekeeping		Collectivism		Australian history
	Exotic livestock		Economics not elsewhere classified		New Zealand history
	Fish farming		Politics		World history
	Fish husbandry		Political theories		International history
	Freshwater fish		Liberalism		History by area not elsewhere classified
	Saltwater fish		Conservatism		History by topic
	Ornamental fish		Socialism		Economic history
	Aquaculture		Nationalism		Social history
	Rural estate management		Fascism		Local history
	Farm management		Feminism		Oral history
	Gamekeeping management		Environmentalism		Family history
	Water resource management		Anarchism		History of religions
	Land management for recreation		Political systems		Intellectual history
	Heritage management		Autocracy		History of art
	Wilderness management		Democracy		History of architecture
	Environmental conservation		Plutocracy		History of design
	International agriculture		Oligarchy		History of science
	Organic farming		UK government/parliamentary studies		History of physics
	Organic arable & fruit farming		Public administration		History of chemistry
	Organic livestock		UK constitutional studies		History of mathematics
	Organic fish farming		International politics		History by topic not elsewhere classified
	Agricultural technology		European Union politics		Military history
	Agricultural machinery		Commonwealth politics		Archaeology
	Agricultural irrigation & drainage		Politics of a specific country/region		Egyptology
	Agriculture not elsewhere classified		International constitutional studies		Stone Age
	Forestry		International relations		Bronze Age
	Trees & shrubs		Strategic studies		Iron Age
	Forestry pests & diseases		War & peace studies		Archaeological conservation
	Tree physiology		Comparative politics		Archaeological techniques
	Tree nutrition		Politics not elsewhere classified		Archaeology not elsewhere classified
	Tree protection		Sociology		Philosophy
	Tree production		Applied sociology		Metaphysics
	Timber production		Gender studies		Epistemology
	Community forestry		Women's studies		Moral philosophy
	International forestry		Men's studies		Scholastic philosophy
	Organic forestry		Ethnic studies		Social philosophy
	Forestry technology		Disability in society		Philosophy of science
	Forestry irrigation & drainage		Religion in society		Mental philosophy
	Forestry not elsewhere classified		Socio-economics		Philosophy not elsewhere classified
	Food & beverage studies		Social theory		Theology & religious studies
	Food science		Social hierarchy		Theology
	Meat science		Political sociology		Religious studies
	Cereal science		Sociology not elsewhere classified		Christian studies
	Vegetable science		Sociology of science & technology		Islamic studies

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Fruit science		Social policy		Judaism
	Food hygiene		UK social policy		Hinduism
	Food & beverage production		International social policy		Buddhism
	Food & beverage manufacture		Public policy		Other Asian religious studies
	Food & beverage processing		Health policy		Comparative religious studies
	Food & beverage technology		Welfare policy		Divinity
	Industrial baking		Education policy		Religious writings
	Industrial brewing		Transport policy		The Bible & Christian texts
	Food & beverages for the consumer		Security policy		The Qur'an & Islamic texts
	Food & beverage packaging		Social policy not elsewhere classified		The Torah & Judaic texts
	Food & beverage delivery		Social work		Asian religious texts
	Food & beverage studies not elsewhere classified		Health & welfare		Comparative religious texts
	Agricultural sciences		Child care		Pastoral studies
	Agricultural biology		Youth work		Theology & religious studies not elsewhere classified
	Agricultural microbiology		Community work		Others in historical & philosophical studies
	Agricultural chemistry		Careers guidance		Historical & philosophical studies not elsewhere classified
	Agricultural biochemistry		Probation/after-care	Creative arts & design	Fine art
	Agricultural botany		Social work not elsewhere classified		Drawing
	Agricultural zoology		Anthropology		Painting
	Soil as an agricultural medium		Social & cultural anthropology		Sculpture
	Agricultural sciences not elsewhere classified		Physical & biological anthropology		Printmaking
	Others in veterinary sciences, agriculture & related subjects		Anthropology not elsewhere classified		Calligraphy
	Veterinary sciences, agriculture & related subjects not elsewhere classified		Human & social geography		Fine art conservation
Physical sciences	Chemistry		Human & social geography by area		Fine art not elsewhere classified
	Applied chemistry		Human & social geography of Europe		Design studies
	Industrial chemistry		Human & social geography of Asia		Graphic design
	Colour chemistry		Human & social geography of Africa		Typography
	Inorganic chemistry		Human & social geography of Australasia		Multimedia design
	Structural chemistry		Human & social geography of the Americas		Visual communication
	Crystallography		Human & social geography of the Arctic/Antarctic		Illustration
	Environmental chemistry		Human & social geography by topic		Clothing/fashion design
	Marine chemistry		Economic geography		Textile design
	Medicinal chemistry		Urban geography		Industrial/product design
	Pharmaceutical chemistry		Political geography		Interior design
	Organic chemistry		Transport geography		Furniture design
	Organometallic chemistry		Historical geography		Ceramics design
	Polymer chemistry		Cultural geography		Interactive & electronic design
	Bio-organic chemistry		Agricultural geography		Design studies not elsewhere classified
	Petrochemical chemistry		Human & social geography not elsewhere classified		Music
	Biomolecular chemistry		Others in social studies		Musicianship/performance studies
	Physical chemistry		Social studies not elsewhere classified		History of music
	Analytical chemistry	Law	Law by area		Types of music
	Chemistry not elsewhere classified		UK legal systems		Musicology
	Materials science		English law		Musical instrument history
	Materials science not elsewhere classified		Welsh law		Music not elsewhere classified
	Physics		Northern Irish law		Drama

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Applied physics		Scottish law		Acting
	Engineering physics		European Union law		Directing for theatre
	Chemical physics		Public international law		Producing for theatre
	Solid-state physics		Comparative law		Theatre studies
	Environmental physics		Law by area not elsewhere classified		Stage management
	Atmospheric physics		Law by topic		Theatrical wardrobe design
	Marine physics		Public law		Theatrical make-up
	Mathematical & theoretical physics		Criminal law		Theatre design
	Electromagnetism		Private law		Stage design
	Quantum mechanics		Business & commercial law		Drama not elsewhere classified
	Computational physics		Contract law		Dance
	Medical physics		Property law		Choreography
	Radiation physics		Torts		Body awareness
	Optical physics		Jurisprudence		History of dance
	Laser physics		Legal practice		Types of dance
	Nuclear & particle physics		Medical law		Dance not elsewhere classified
	Acoustics		Law by topic not elsewhere classified		Cinematics & photography
	Physics not elsewhere classified		Others in law		Moving image techniques
	Forensic & archaeological sciences		Law not elsewhere classified		Directing motion pictures
	Forensic science	Business & administrative studies	Business studies		Producing motion pictures
	Archaeological science		European business studies		Film & sound recording
	Forensic & archaeological sciences not elsewhere classified		International business studies		Visual & audio effects
	Astronomy		Business studies not elsewhere classified		Animation techniques
	Astrophysics		Management studies		Cinematography
	Space & planetary sciences		Management techniques		History of cinematics & photography
	Space science		Strategic management		History of cinematics
	Planetary science		Creative management		History of photography
	Astronomy not elsewhere classified		Project management		Photography
	Geology		Change management		Cinematics & photography not elsewhere classified
	Applied geology		Organisational development		Crafts
	Industrial geology		Institutional management		Fabric & leather crafts
	Engineering geology		Domestic management		Needlecraft
	Mining geology		Management & organisation of education		Dressmaking
	Exploration geology		Land & property management		Soft furnishing
	Geotechnology		Land management		Weaving
	Marine geotechnology		Property management		Leatherwork
	Earth science		Property valuation & auctioneering		Metal crafts
	Palaeontology		Retail management		Silversmithing/goldsmithing
	Geoscience		Management studies not elsewhere classified		Blacksmithing
	Quaternary studies		Finance		Clock/watchmaking
	Geological oceanography		Banking		Wood crafts
	Geophysics		Investment & insurance		Carpentry/joinery
	Exploration geophysics		Investment		Cabinet making
	Geochemistry		Insurance		Marquetry & inlaying
	Geology not elsewhere classified		Actuarial science		Veneering
	Science of aquatic & terrestrial environments		Taxation		Surface decoration
	Marine sciences		Financial management		Clay & stone crafts
	Hydrography		Financial risk		Pottery

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Ocean sciences		Finance not elsewhere classified		Tile making
	Environmental sciences		Accounting		Stone crafts
	Applied environmental sciences		Accountancy		Reed crafts
	Hydrology		Cost & management accountancy		Basketry
	Pollution control		Public accountancy		Thatching
	Climatology		Book keeping		Glass crafts
	Meteorology		Accounting theory		Glassblowing
	Soil science		Auditing of accounts		Paper crafts
	Science of aquatic & terrestrial environments not elsewhere classified		Financial reporting		Bookbinding
	Physical geographical sciences		Accounting not elsewhere classified		Origami
	Environmental geography		Marketing		Crafts not elsewhere classified
	Biogeography		Market research		Imaginative writing
	Physical geography		Sales management		Scriptwriting
	Maritime geography		Distribution		Poetry writing
	Geomorphology		International marketing		Prose writing
	Topography		Promotion & advertising		Imaginative writing not elsewhere classified
	Cartography		Advertising		Others in creative arts & design
	Remote sensing		Corporate image		Creative arts & design not elsewhere classified
	Geographical information systems		Sponsorship	Education	Training teachers
	Physical geographical sciences not elsewhere classified		Marketing not elsewhere classified		Training teachers - nursery
	Others in physical sciences		Human resource management		Training teachers - primary
	Physical sciences not elsewhere classified		Industrial relations		Training teachers - infant (key stage 1)
Mathematical and computer sciences	Mathematical and computer sciences		Staff development		Training teachers - junior (key stage 2)
	Mathematical science		Training methods		Training teachers - secondary
	Computer science		Recruitment methods		Training teachers - key stage 3
	Mathematics		Health & safety issues		Training teachers - key stage 4
	Pure mathematics		Human resources management not elsewhere classified		Training teachers - tertiary
	Applied mathematics		Office skills		Training teachers - further education
	Mechanics (mathematical)		Office administration		Training teachers - higher education
	Mathematical methods		Secretarial & typing skills		Training teachers - adult education
	Numerical analysis		Audio typing		Training teachers - coaching
	Mathematical modelling		Shorthand & shorthand transcription		Training teachers - specialist
	Engineering/industrial mathematics		Office skills not elsewhere classified		Training teachers - special needs
	Mathematics not elsewhere classified		Hospitality, leisure, tourism & transport		Teaching English as a Foreign Language (TEFL)
	Operational research		Travel management		Training teachers not elsewhere classified
	Operational research not elsewhere classified		Event management		Research & study skills in education
	Statistics		Tourism		Research skills
	Applied statistics		Tourism studies		Study skills
	Medical statistics		Tourism management		Research & study skills in education not elsewhere classified
	Probability		Transport studies		Academic studies in education
	Stochastic processes		Land travel		Academic studies in nursery education
	Statistical modelling		Sea travel		Academic studies in primary education
	Mathematical statistics		Air travel		Academic studies in secondary education
	Statistics not elsewhere classified		Hospitality		Academic studies in tertiary education
	Computer science		Hospitality studies		Academic studies in further education
	Computer architectures & operating systems		Hospitality management		Academic studies in higher education

Broad subject	Subject	Broad subject	Subject	Broad subject	Subject
	Computer architectures		Recreation, sport & leisure studies		Academic studies in adult education
	Operating systems		Hospitality, leisure, tourism & transport not elsewhere classified		Academic studies in specialist education
	Networks & communications		Others in business & administrative studies		Academic studies in education (across phases)
	Computational science foundations		Business & administrative studies not elsewhere classified		Academic studies in education not elsewhere classified
	Human-computer interaction		Information services		Others in education
	Multimedia computing science		Information management		Education not elsewhere classified
	Computer science not elsewhere classified		Librarianship		
	Information systems		Library studies		
	Information modelling		Curatorial studies		
	Systems design methodologies		Museum studies		
	Systems analysis & design		Archive studies		
	Databases		Information services not elsewhere classified		
	Systems auditing		Publicity studies		
	Data management		Public relations		
	Systems analysis & design not elsewhere classified		Publicity studies not elsewhere classified		
	Software engineering		Media studies		
	Software design		Television studies		
	Programming		Radio studies		
	Procedural programming		Film studies		
	Object-oriented programming		Electronic media studies		
	Declarative programming		Paper-based media studies		
	Software engineering not elsewhere classified		Media production		
	Artificial intelligence		Television production		
	Speech & natural language processing		Radio production		
	Knowledge representation		Film production		
	Neural computing		Media studies not elsewhere classified		
	Computer vision		Publishing		
	Cognitive modelling		Electronic publishing		
	Machine learning		Publishing on audio/video tape		
	Automated reasoning		Publishing on CD-ROM		
	Artificial intelligence not elsewhere classified		Publishing via the World Wide Web		
	Others in mathematical and computer sciences		Multimedia publishing		
	Others in mathematical sciences		Interactive publishing		
	Others in computer sciences		Publishing not elsewhere classified		
			Journalism		
			Factual reporting		
			Journalism not elsewhere classified		
			Others in mass communications & documentation		
			Mass communications & documentation not elsewhere classified		

Source: HESA

STEM definition

One of the key degree subject demand forecasts in this report relates to STEM subjects given the importance and profile of the soon to be completed STEM Review in NI. For consistency the same broad definition of STEM subjects used in the STEM Review is applied here. This definition includes the following subjects:

- Medicine & dentistry
- Subjects allied to medicine
- Biological sciences
- Veterinary sciences
- Agriculture & related subjects
- Physical sciences
- Mathematical sciences
- Computer science
- Engineering & technology
- Architecture, building and planning

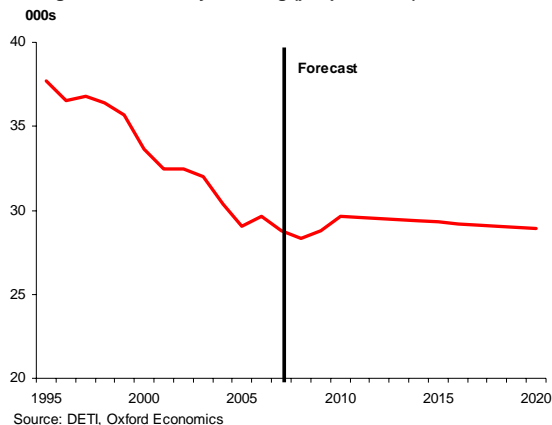
Annex E: Baseline scenario forecasts

This annex presents detailed forecasts for the baseline scenario, including:

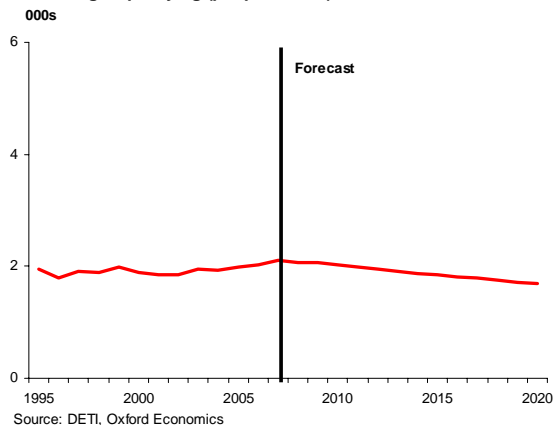
- Employment forecasts by industry sector and occupation
- Detailed replacement demand analysis by industry and occupation
- Graduate subject demand annual forecast charts for selected broad subject areas (based on the sectoral approach, scaled to the occupational replacement demand forecast approach)

Part 1: Sectoral employment forecasts

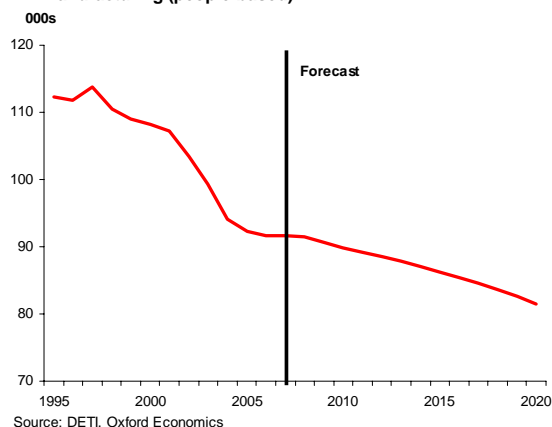
NI: Agriculture, forestry & fishing (people-based)



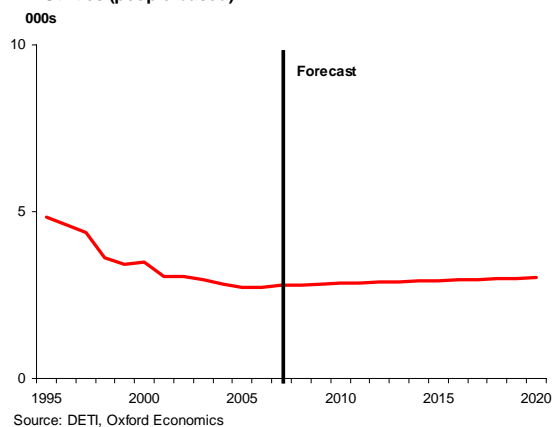
NI: Mining & quarrying (people-based)



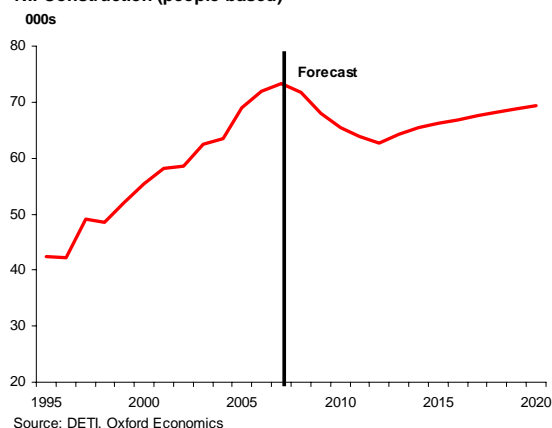
NI: Manufacturing (people-based)



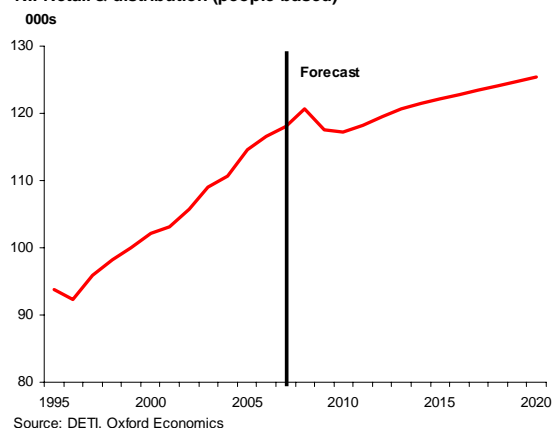
NI: Utilities (people-based)

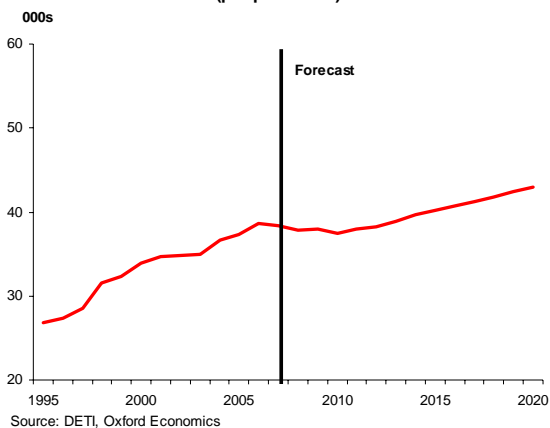
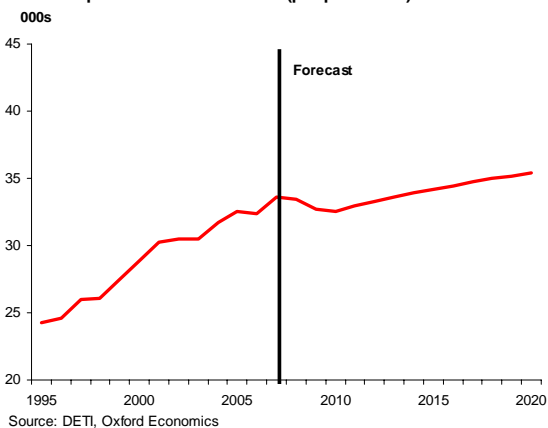
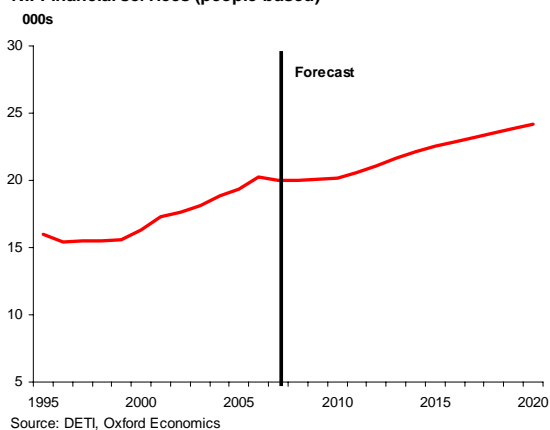
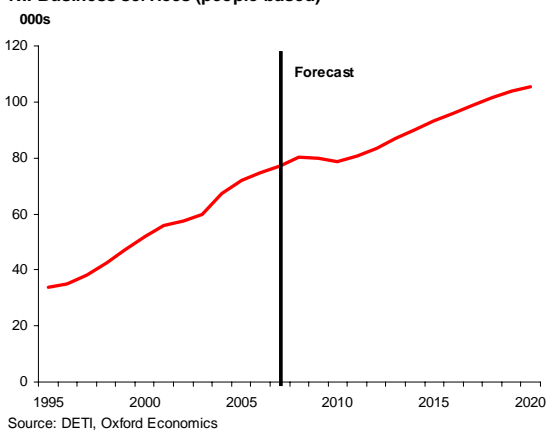
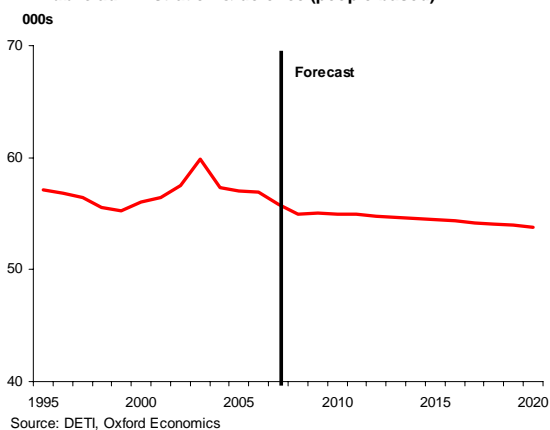
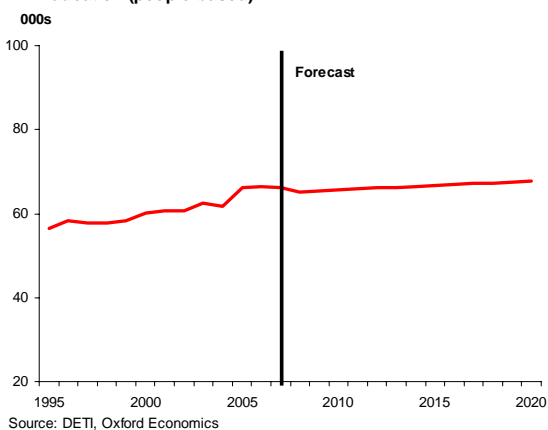


NI: Construction (people-based)

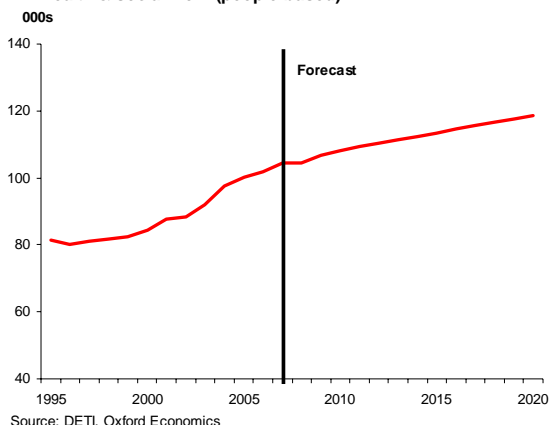


NI: Retail & distribution (people-based)

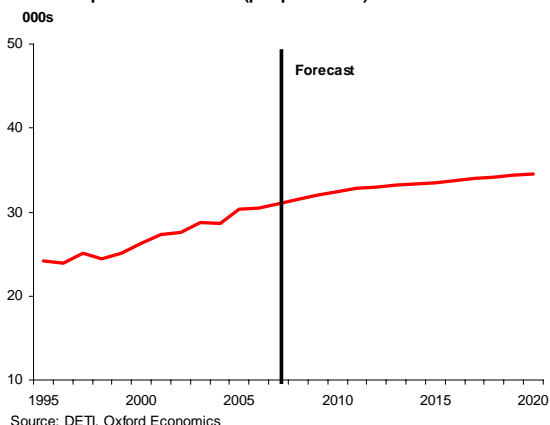


NI: Hotels & restaurants (people-based)

NI: Transport & communications (people-based)

NI: Financial services (people-based)

NI: Business services (people-based)

NI: Public administration & defence (people-based)

NI: Education (people-based)


NI: Health & social work (people-based)

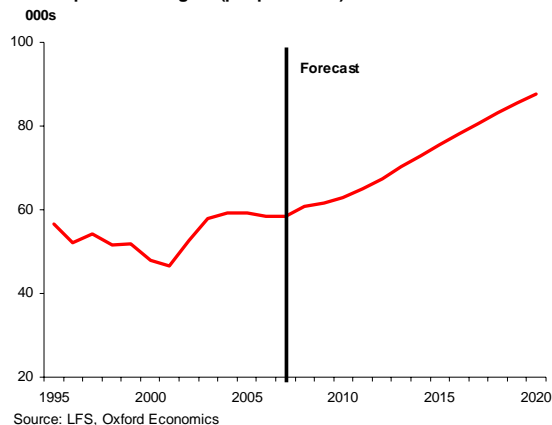


NI: Other personal services (people-based)

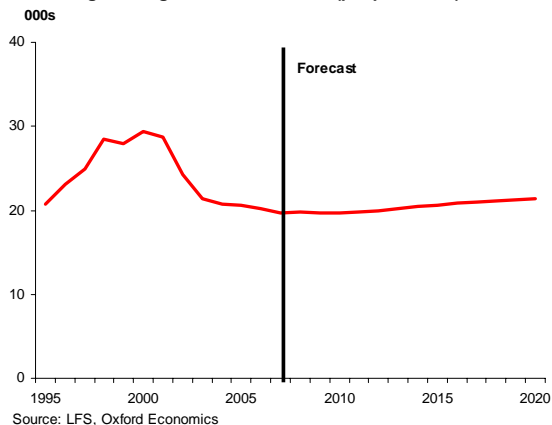


Part 2: Occupation employment forecasts

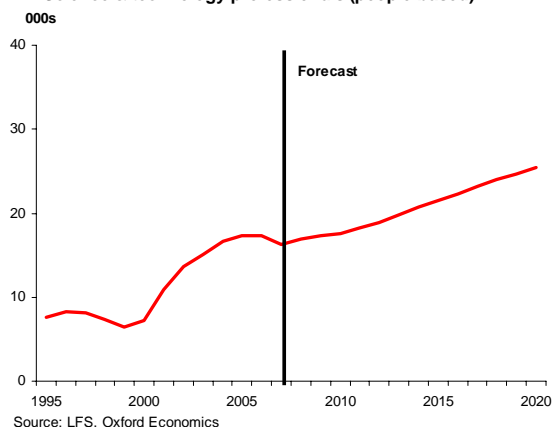
NI: Corporate managers (people-based)



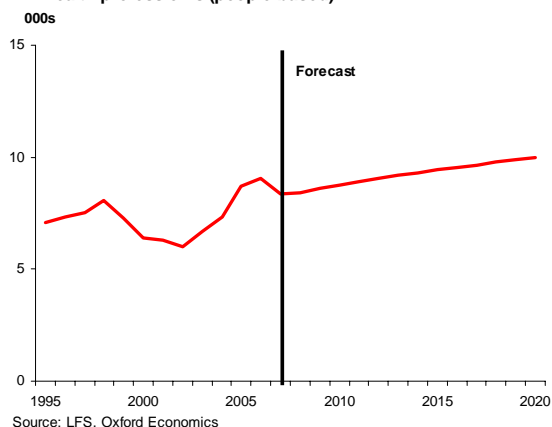
NI: Managers in agriculture & services (people-based)



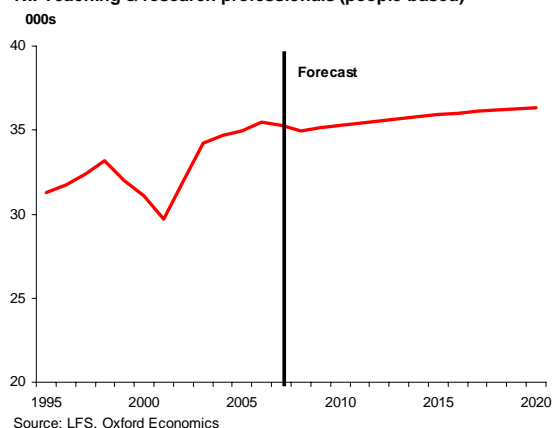
NI: Science & technology professionals (people-based)



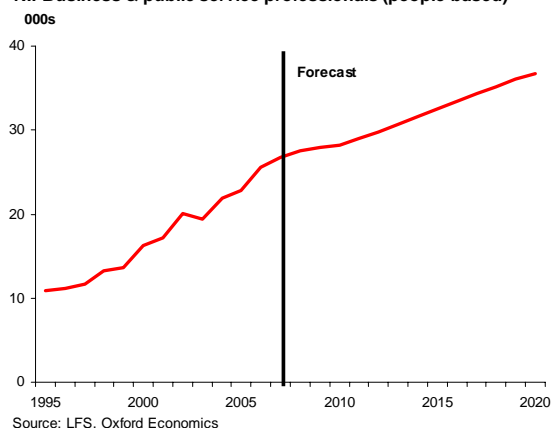
NI: Health professionals (people-based)



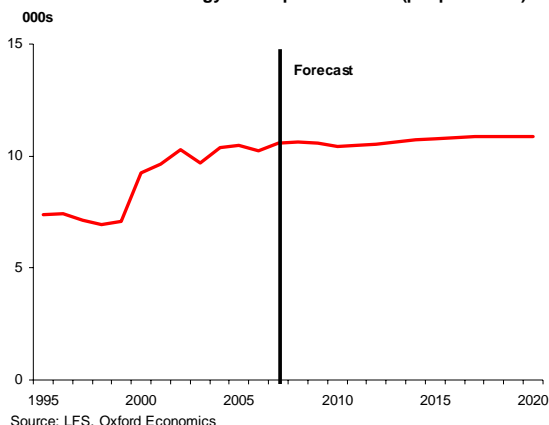
NI: Teaching & research professionals (people-based)



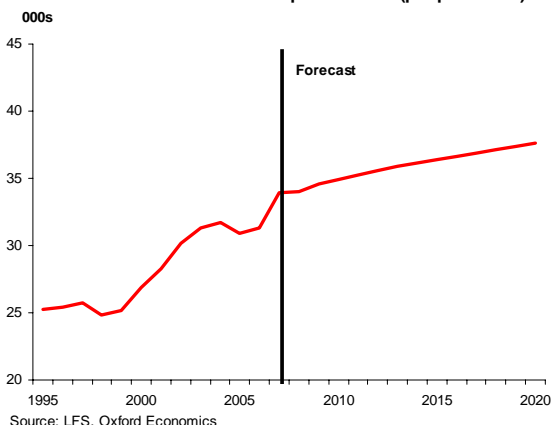
NI: Business & public service professionals (people-based)



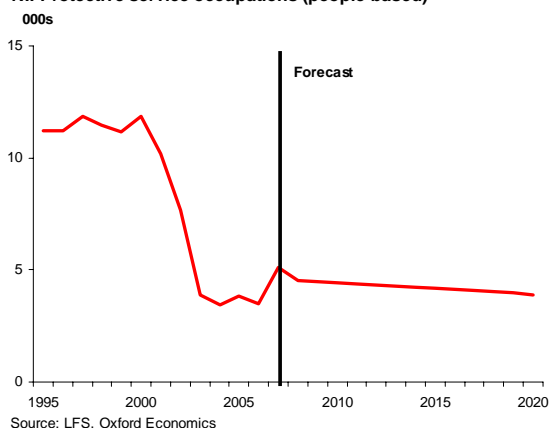
NI: Science & technology assoc professionals (people-based)



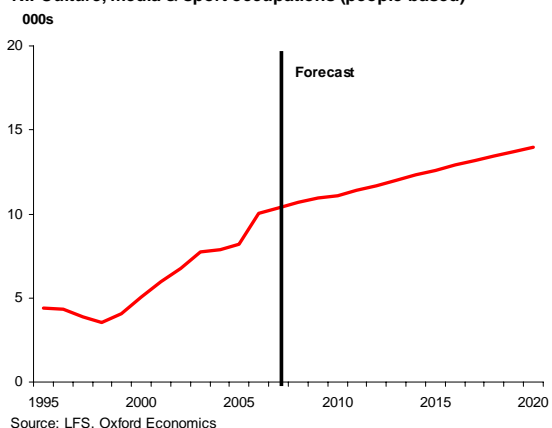
NI: Health & social welfare assoc professional (people-based)



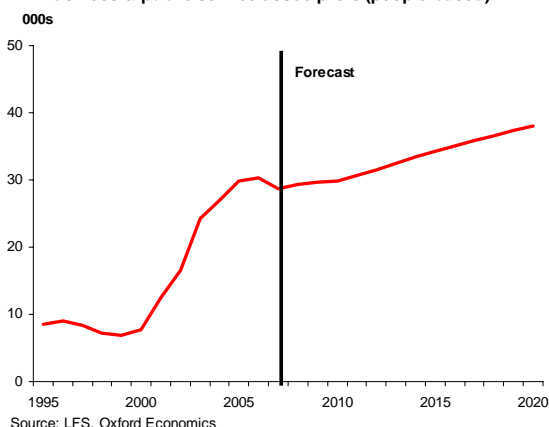
NI: Protective service occupations (people-based)



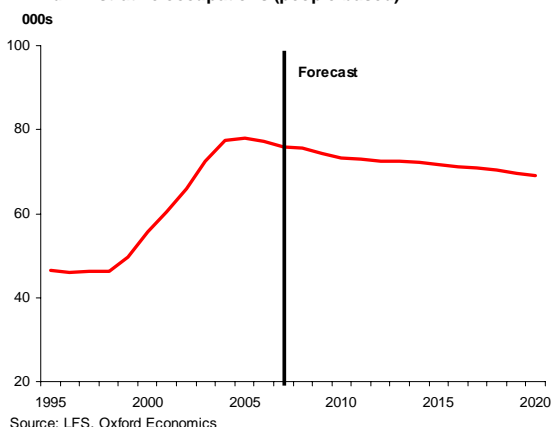
NI: Culture, media & sport occupations (people-based)

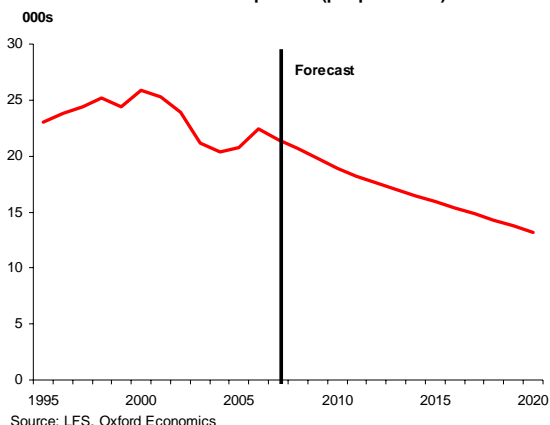
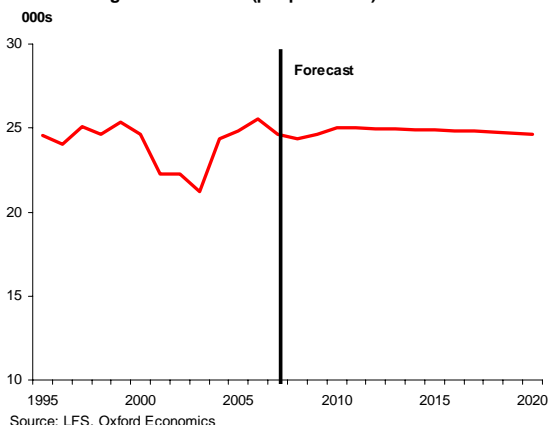
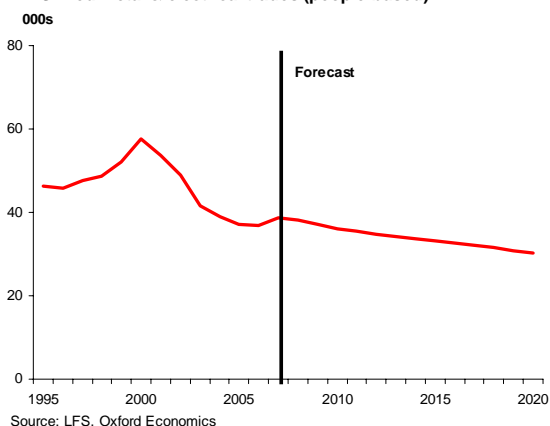
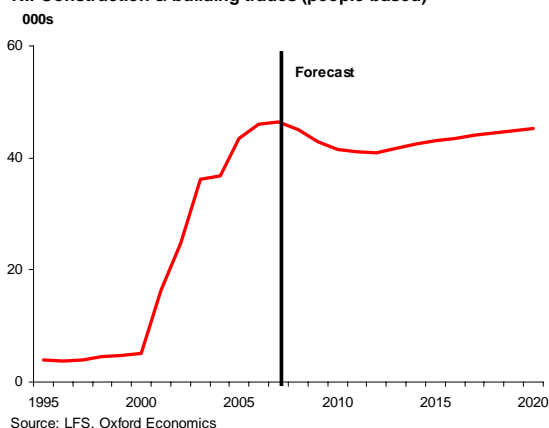
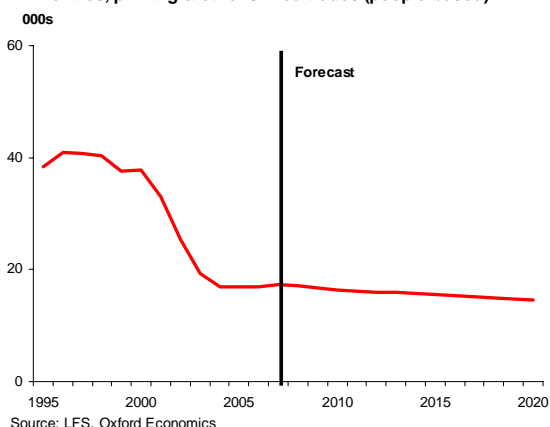
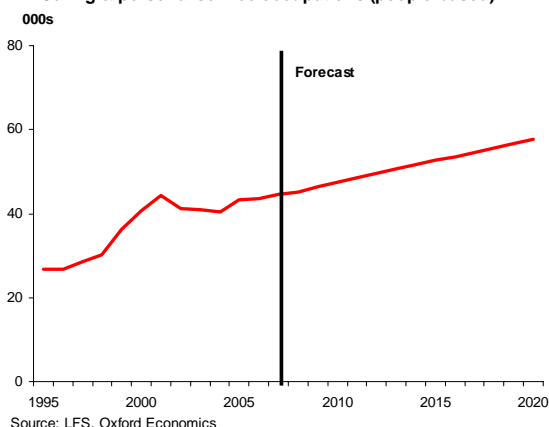


NI: Business & public service assoc profs (people-based)

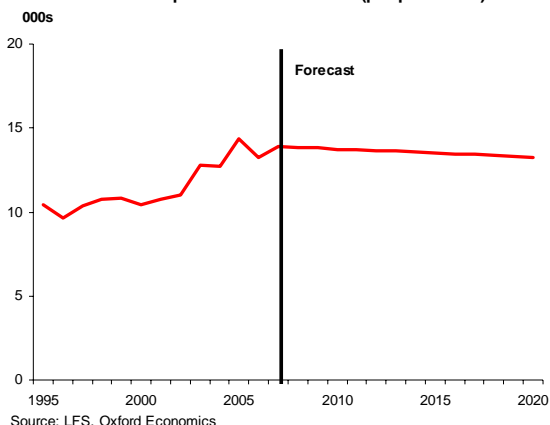


NI: Administrative occupations (people-based)

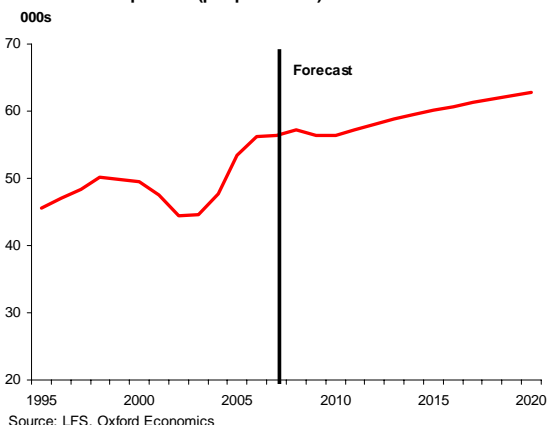


NI: Secretarial & related occupations (people-based)

NI: Skilled agriculture trades (people-based)

NI: Skilled metal & electrical trades (people-based)

NI: Construction & building trades (people-based)

NI: Textiles, printing & other skilled trades (people-based)

NI: Caring & personal service occupations (people-based)


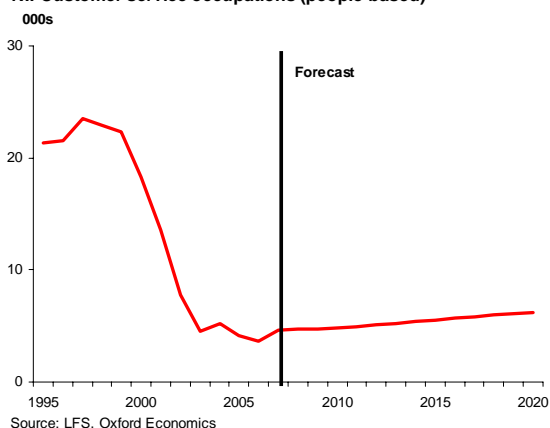
NI: Leisure & other personal service occs (people-based)



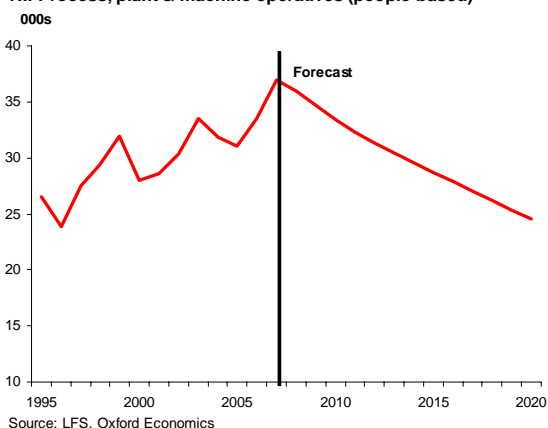
NI: Sales occupations (people-based)



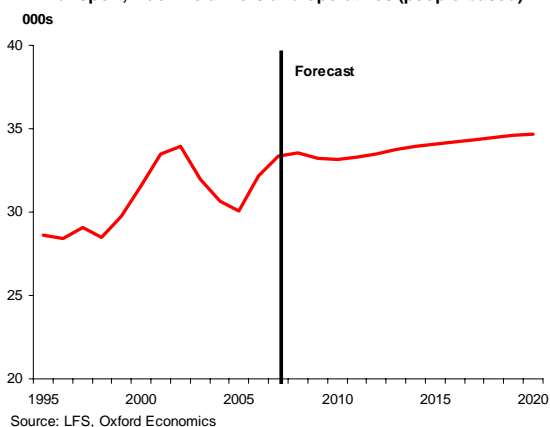
NI: Customer service occupations (people-based)



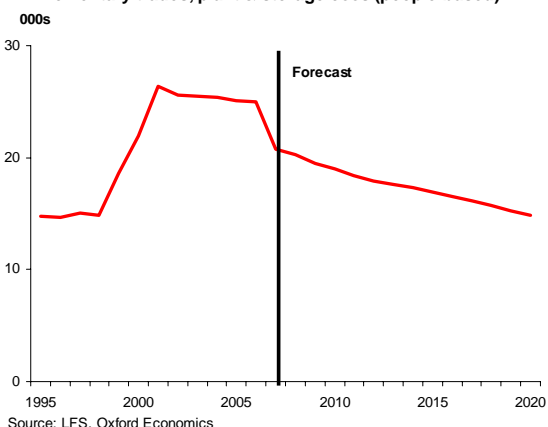
NI: Process, plant & machine operatives (people-based)

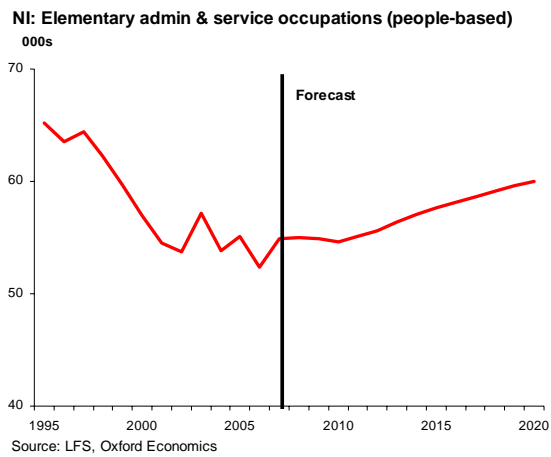


NI: Transport, machine drivers and operatives (people-based)



NI: Elementary trades, plant & storage occs (people-based)





Part 3: Replacement demand analysis by industry and occupation (2010-2020)

Industry

	Expansion demand	Leavers to death	Leavers to unemployment / training schemes	Leavers to inactivity excluding retirement	Leavers to retirement	Leavers to occupations	Leavers to out migration	Gross expansion and replacement demand	Joiners from unemployment / training schemes	Joiners from inactivity (excluding inactive students)	Joiners from other occupations	Total returnees	Net requirement from education and migrants
Agriculture, forestry and fishing	-0.7	1.3	0.0	0.7	2.5	0.9	0.0	4.7	1.3	2.6	4.0	7.9	-3.2
Mining & quarrying	-0.3	0.1	0.0	0.8	0.0	0.2	0.0	0.8	0.0	0.0	2.0	2.0	-1.2
Manufacturing	-8.4	2.2	18.3	13.7	8.1	35.2	13.7	82.8	17.6	6.3	15.2	39.1	43.7
Utilities	0.2	0.1	0.0	0.0	0.0	0.8	0.0	1.1	0.0	0.0	1.3	1.3	-0.2
Construction	4.1	1.5	15.2	15.2	4.5	9.9	0.0	50.3	18.5	5.0	16.2	39.7	10.6
Retail & distribution	8.2	2.6	17.3	19.2	13.7	51.5	4.1	116.6	31.4	13.4	27.3	72.1	44.6
Hotel & restaurants	5.5	0.8	6.1	16.1	0.0	22.9	0.9	52.3	7.6	3.7	15.4	26.8	25.6
Transport & communications	2.9	0.8	5.6	10.1	0.0	9.5	0.7	29.6	8.0	4.3	9.3	21.6	7.9
Financial services	4.0	0.4	0.0	3.1	0.8	7.0	0.9	16.1	1.9	2.4	18.5	22.8	-6.6
Business services	27.0	2.2	23.7	15.4	7.0	30.5	8.9	114.7	14.1	4.0	46.0	64.1	50.7
Public administration & defence	-1.2	1.5	4.0	8.0	5.8	6.7	0.8	25.6	10.1	7.0	15.0	32.1	-6.5
Education	2.0	1.9	4.2	12.1	7.7	13.7	0.0	41.5	8.6	6.1	6.0	20.7	20.8
Health & social work	10.4	2.9	9.0	26.0	7.2	20.3	13.5	89.4	16.0	11.7	21.1	48.8	40.6
Other personal services	2.1	0.9	6.7	11.7	4.0	4.2	1.5	31.1	8.2	4.3	16.8	29.2	1.9
Whole economy	55.7	19.0	110.1	152.1	61.2	213.4	45.0	656.5	143.3	70.8	213.9	428.0	228.5
Whole economy (annual)	5.6	1.9	11.0	15.2	6.1	21.3	4.5	65.7	14.3	7.1	21.4	42.8	22.9

Source: Oxford Economics

Occupation

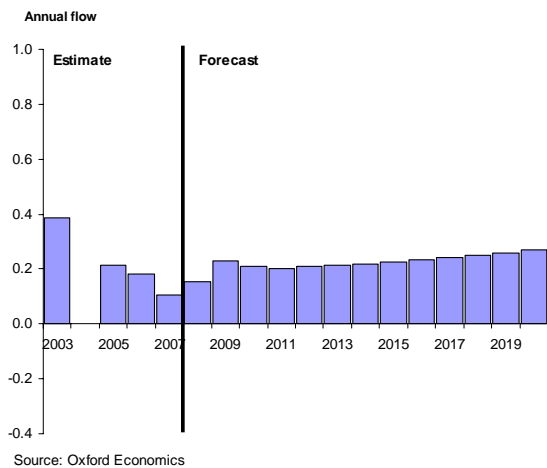
	Expansion demand	Leavers to death	Leavers to unemployment / training schemes	Leavers to inactivity excluding retirement	Leavers to retirement	Leavers to occupations	Leavers to out migration	Gross expansion and replacement demand	Joiners from unemployment / training schemes	Joiners from inactivity (excluding inactive students)	Joiners from other occupations	Total returnees	Net requirement from education and migrants
Corporate Managers	24.9	2.0	8.5	3.9	7.1	15.3	2.6	64.4	3.0	0.9	9.6	13.5	50.8
Managers & Proprietors in Agriculture & Services	1.7	0.6	2.4	1.4	2.4	5.8	0.0	14.2	2.6	0.4	1.9	4.8	9.4
Science & Technology Professionals	7.9	0.5	3.9	3.5	0.0	1.6	0.0	17.4	1.5	1.4	7.4	10.3	7.0
Health Professionals	1.2	0.2	0.0	1.0	1.0	0.0	1.4	4.9	0.8	0.0	0.0	0.8	4.1
Teaching & Research Professionals	1.1	1.0	4.2	7.5	2.6	4.5	0.0	20.8	3.5	1.8	5.4	10.7	10.1
Business & Public Service Professionals	8.6	0.8	4.7	2.8	1.8	2.6	1.3	22.5	0.9	0.5	9.0	10.4	12.1
Science & Technology Associate Professionals	0.4	0.3	0.0	0.0	1.1	1.1	0.0	2.8	1.6	0.5	4.8	6.8	-4.0
Health & Social Welfare Associate Professionals	2.7	0.9	0.0	4.7	1.2	5.0	5.1	19.6	1.5	2.3	14.0	17.8	1.7
Protective Service Occupations	-0.5	0.1	0.0	1.8	0.4	1.0	0.0	2.8	0.0	0.0	0.0	0.0	2.8
Culture, Media & Sports Occupations	2.9	0.4	0.0	0.0	0.0	1.3	0.0	4.6	3.3	0.0	1.3	4.6	-0.1
Business & Public Service Associate Professionals	8.1	0.8	2.3	1.1	4.5	10.2	0.0	27.0	2.7	2.5	8.0	13.2	13.9
Administrative Occupations	-4.4	1.6	11.8	16.2	5.6	17.6	1.3	49.7	16.6	6.9	10.3	33.7	15.9
Secretarial & Related Occupations	-5.7	0.4	1.4	0.6	1.9	4.2	0.0	2.8	0.0	1.9	7.9	9.8	-7.0
Skilled Agricultural Trades	-0.4	1.2	0.0	2.7	2.4	1.1	0.0	7.1	0.7	1.8	0.9	3.3	3.8
Skilled Metal & Electrical Trades	-5.8	0.8	4.8	3.5	2.2	12.2	2.2	20.0	6.0	2.2	9.1	17.3	2.7
Skilled Construction & Building Trades	3.7	0.9	15.0	10.8	3.4	4.2	0.0	37.9	11.3	3.2	8.1	22.7	15.3
Textiles, Printing & Other Skilled Trades	-1.9	0.4	1.0	0.8	1.8	6.0	0.4	8.5	3.1	2.4	6.7	12.1	-3.7
Caring Personal Service Occupations	10.0	1.2	6.1	18.0	4.0	12.3	7.3	58.9	14.1	6.4	9.4	30.0	29.0
Leisure & Other Personal Service Occupations	-0.5	0.3	4.6	4.8	1.7	3.3	0.0	14.1	4.1	2.4	5.3	11.8	2.3
Sales Occupations	6.3	1.1	8.9	9.3	5.1	30.5	0.0	61.2	18.0	11.2	31.3	60.5	0.7
Customer Service Occupations	1.4	0.1	0.0	1.8	0.0	1.5	0.0	4.8	0.0	0.5	1.8	2.2	2.6
Process, Plant & Machine Operatives	-8.8	0.8	4.2	6.6	1.9	18.5	8.2	31.3	8.5	2.9	10.4	21.9	9.5
Transport & Mobile Machine Drivers & Operatives	1.5	1.0	2.1	7.1	2.1	6.8	3.3	24.0	6.5	2.4	6.9	15.8	8.2
Elementary Trades, Plant & Storage Related Occupations	-4.1	0.4	5.8	5.6	3.6	7.7	0.5	19.5	10.3	2.6	6.1	19.0	0.5
Elementary Administration & Service Occupations	5.5	1.6	10.0	29.5	3.8	15.7	5.1	71.1	22.2	13.4	15.0	50.5	20.6
Whole economy	55.7	19.1	101.7	144.9	61.6	190.2	38.7	612.0	142.7	70.4	190.6	403.7	208.3
Whole economy (annual)	5.6	1.9	10.2	14.5	6.2	19.0	3.9	61.2	14.3	7.0	19.1	40.4	20.8

Source: Oxford Economics

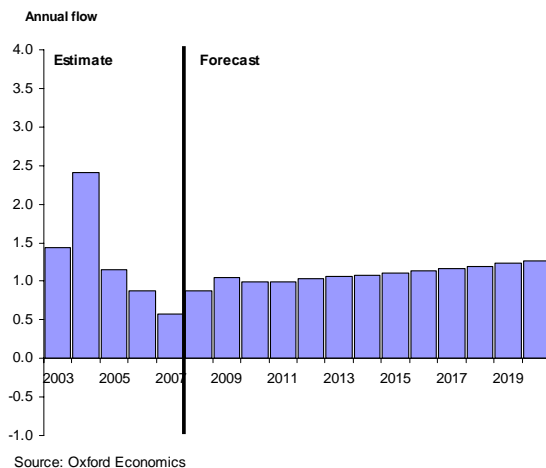
Part 4: Graduate subject demand

Note other subject demand forecasts can be provided upon request

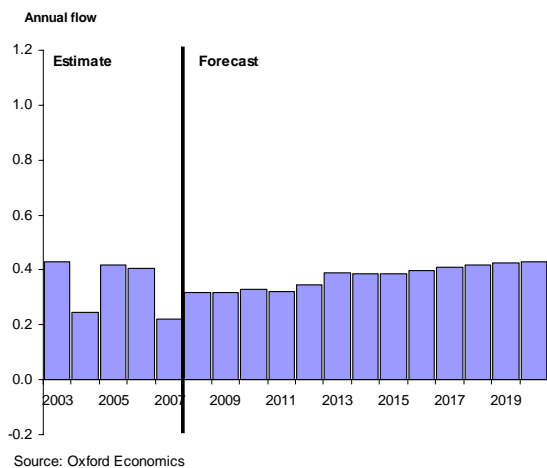
NI: Medicine & dentistry



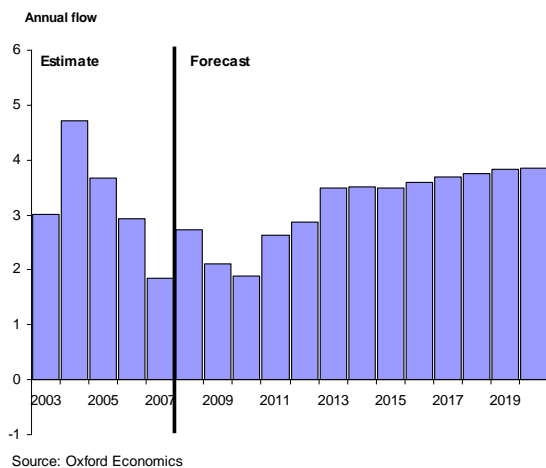
NI: Subjects allied to medicine



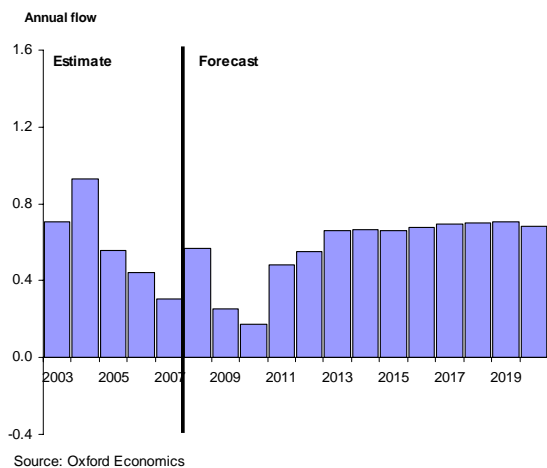
NI: Biological, veterinary and agricultural sciences



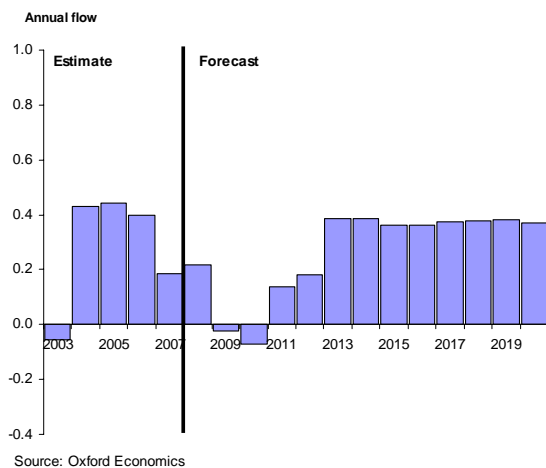
NI: STEM (broad definition)

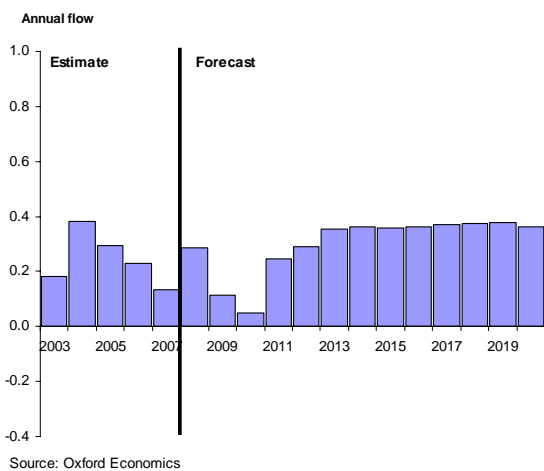
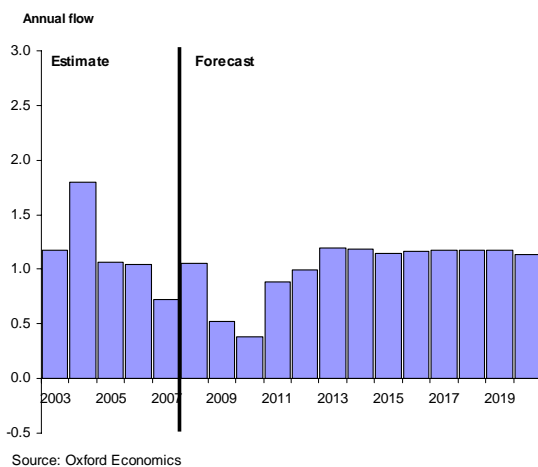
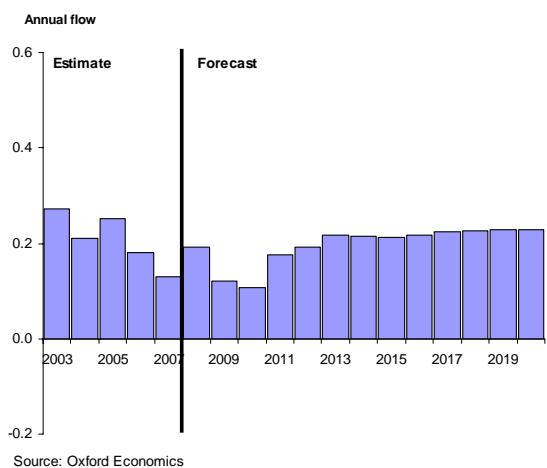
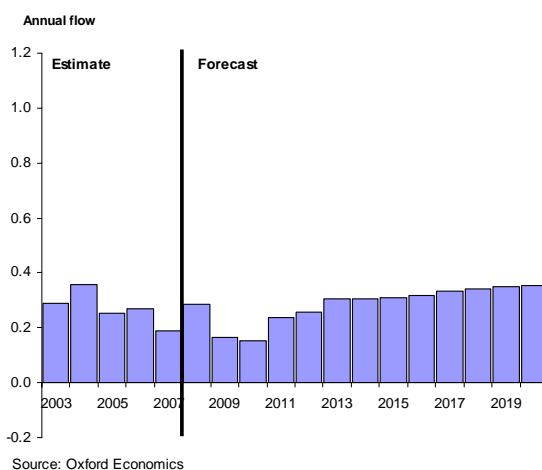
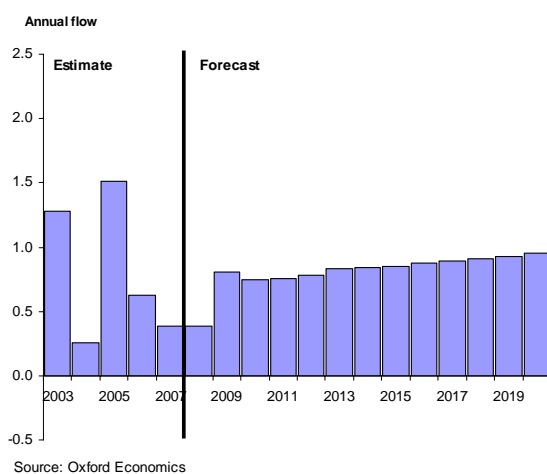
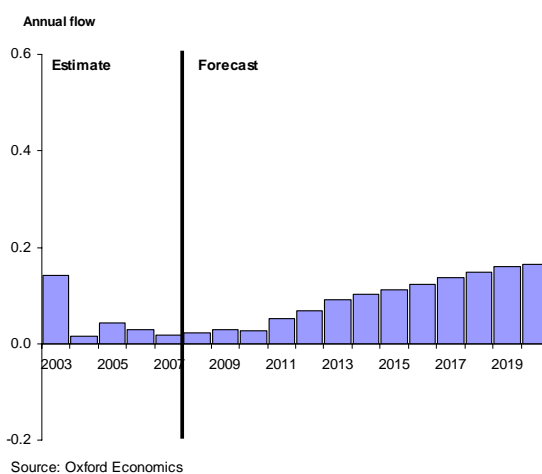


NI: Computer science



NI: Architecture, building and planning



NI: Law

NI: Business & administration

NI: Languages

NI: Creative arts & design

NI: Education

NI: Combined degrees


Annex F: Aspirational scenario forecasts

This annex presents additional background information and assumptions, and detailed forecasts for the aspirational scenario (similar to the annex for the baseline scenario). It is structured as follows:

- Outline of Government's published economic goals
- Description of the original approach adopted for the aspirational scenario – 'mimicking' Leitch scenarios for Northern Ireland
- Outline of the methodological skill demand assumptions specific to the aspirational scenario
- Employment forecasts by industry sector and occupation
- Detailed replacement demand analysis by industry and occupation
- Annual forecast charts for components of the net requirement from education & migration and the upskilling requirement
- Graduate subject demand annual forecast charts for selected broad subject areas

Part 1: Published economic goals

Programme for Government key goals (examples)

- Halve the private sector productivity gap with the UK average (excluding the Greater South East) by 2015
- Increase the employment rate from 70% to 75% by 2020
- Secure inward investment commitments promising over 6,500 new jobs by 2011, of which 5,500 will provide salaries above the Northern Ireland private sector median
- 70% of new FDI projects secured to locate within 10 miles of an area of economic disadvantage
- Increase the number of tourists visiting each year from 1.98m to 2.5m by 2011 and increasing tourism revenue from £370m to £520m each year by the same date
- Ensure by 2015 that 80% of the working age population is qualified to at least GCSE level or equivalent
- Increase by 25% the numbers of students, especially those from disadvantaged communities, at graduate and postgraduate level studying Science, Technology, Engineering and Mathematics (STEM subjects) by 2015

Part 2: Original ‘mimicking’ of Leitch scenarios

- One of the starting points for predicting skill needs in the Leitch Review was to reflect on the valuable information contained in SSC reports. The conclusion reached by Leitch was similar to our own – that the wealth of information in Sector Skill Agreement reports provide more precise skills information than is worthwhile or useful to replicate at macro level.

“One method would be to gather information from Sector Skills Councils (SSCs) about their assessments of recent trends and possible futures. This information would typically be qualitative, and often very specific, but would provide well-grounded ‘bottom-up’ information. Such assessments often suffer from excessive influence from very recent trends, but the same could be said of other methods. We do not pursue this approach. Rather, we focus on quantitative methods, intended to complement a qualitative assessment, to give some idea of scale and a means of aggregating to allow summary lessons to be drawn” Leitch 2006

- Looking at the work carried out by Leitch (and also for ‘Tomorrow’s Skills’ in ROI), an aspirational scenario ‘mimicking’ Leitch was originally modeled. This modeling took the form of replication of both the ‘catch-up’ and ‘restructuring’ scenarios within the Leitch report. These essentially relate to different potential routes to faster growth – either by growth in new high growth potential sectors (re-structuring) or through further investment in sectors which had underperformed in the recent past (catch-up). A more simplistic summary might be a strategy towards new areas of high potential or a strategy of investment in what we already have. Of course the two are not mutually exclusive and there is a potential for a ‘bit of both’ in the two scenarios.
- **Neither of the Leitch scenarios are job creation scenarios.** In many cases employment forecasts are lower as productivity improvements result in lower employment for a given output. This means that job numbers are lower in certain sectors under Leitch type scenarios, unlikely an outcome which NI would aspire to given its lagging relative employment rate.
- The results of this original analysis showed that if the rest of the UK implemented Leitch and Northern Ireland did not, unsurprisingly, relative economic performance would suffer. Implementing a catch-up or a restructuring Leitch scenario (technically by mirroring the faster rate of growth in productivity and employment growth) would, equally unsurprisingly, be insufficient to achieve the PfG PSA 1 productivity target by 2015 (as all regions would be improving simultaneously).
- A further ‘Leitch plus’ top up would be required. By extending the ethos of restructuring and catch-up, two alternate paths to achieving the policy goal were developed and presented at the Stakeholder Conference in November 2008. As said in the main report, the lively debate broadly concluded that it was difficult to be certain as to whether catch-up or re-structuring was the best approach – instead a hybrid taking something from both was endorsed as the best way forward.

Part 3: Technical details of the aspirational scenario

Employment and productivity growth differentials relative to baseline

	Annual average growth difference from baseline (2008-2020)	
	Employment	Productivity
Agriculture, forestry & fishing	0.2%	0.2%
Mining & quarrying	0.0%	0.0%
Manufacturing	0.1%	-
Food products, beverages & tobacco	0.4%	0.5%
Textiles & leather	0.1%	0.2%
Wood & wood products	0.7%	0.5%
Pulp, paper & printing	0.0%	-0.1%
Coke, oil refining & nuclear fuel	0.2%	0.4%
Chemicals & man-made fibres	0.2%	0.9%
Rubber & plastic products	0.2%	0.9%
Other non-metallic mineral	0.1%	0.9%
Metals	0.2%	0.5%
Machinery & equipment nec	0.2%	0.6%
Electrical and optical equipment	0.2%	0.6%
Transport equipment	0.1%	0.6%
Manufacturing nec	0.0%	0.5%
Utilities	0.2%	0.0%
Construction	0.3%	0.0%
Retail & distribution	0.4%	0.0%
Hotels & restaurants	0.4%	0.2%
Transport & communications	0.6%	0.3%
Financial services	0.7%	0.5%
Business services	0.0%	1.0%
Public administration & defence	0.0%	0.0%
Education	0.0%	0.0%
Health & social work	0.3%	0.0%
Other personal services	0.0%	0.2%

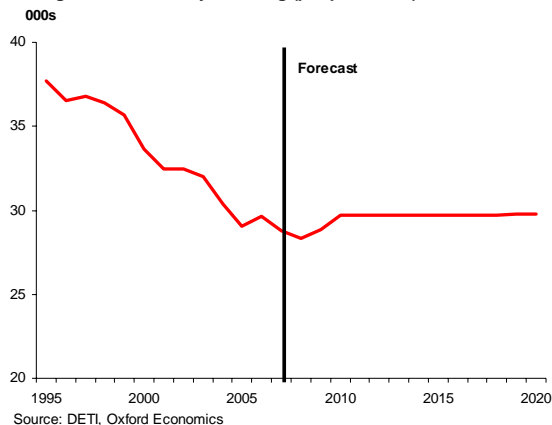
Source: Oxford Economics

Determining 'skills creep' and 'upskilling' requirements to achieve PSA

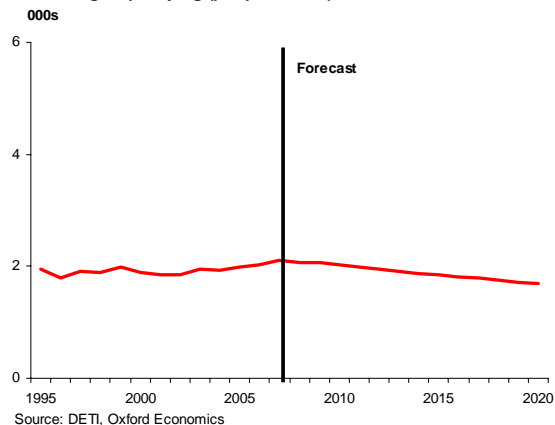
- Essentially to estimate the skill requirements of the aspirational scenario involved working out what the stock of workforce skill needs to be in 2015, taking into consideration the additional jobs, to create the additional target GVA above the baseline consistent with achievement of PSA 1.
- Three main factors influence the stock of skills in the aspirational scenario relative to the baseline – (1) the sectoral composition of additional jobs (a majority of additional jobs are in skills hungry sectors); (2) higher assumed 'skills creep' of new entrants from education and migration; and (c) higher annual upskilling rates.
- Using academic results on the wage returns to different qualifications levels [Harmon and Walker (2000)] and HESA data on starting graduate wages at different higher NQF 4-8 levels, and assuming wages are a proxy for productivity, we adjusted 'skills creep' and upskilling assumptions relative to the baseline until the resulting workforce skills stock difference between the aspiration and baseline was consistent with the GVA target (multiplying out employment totals at different skill levels by skill-adjusted average economy productivities).

Part 4: Sectoral employment forecasts

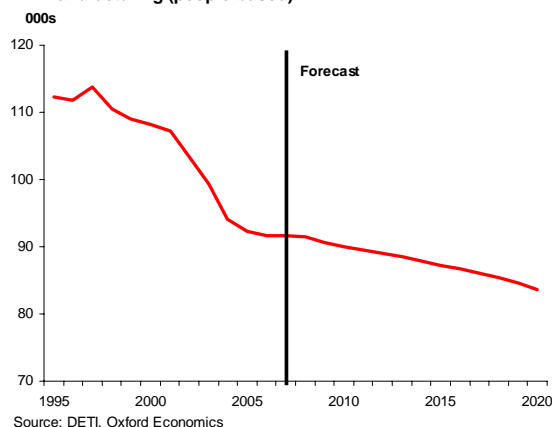
NI: Agriculture, forestry & fishing (people-based)



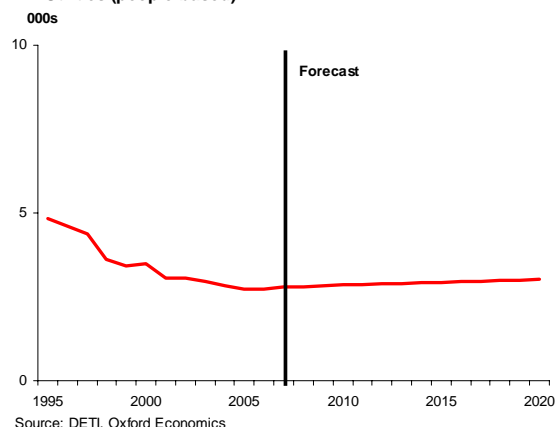
NI: Mining & quarrying (people-based)



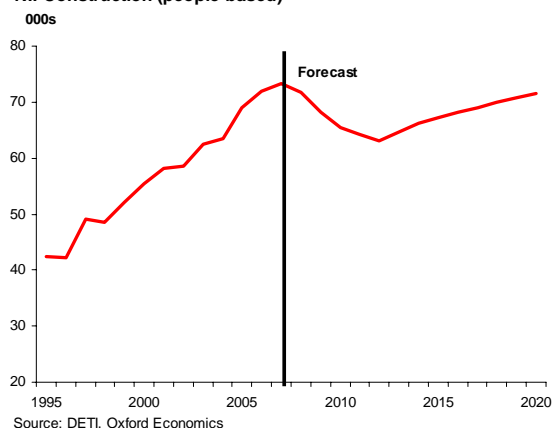
NI: Manufacturing (people-based)



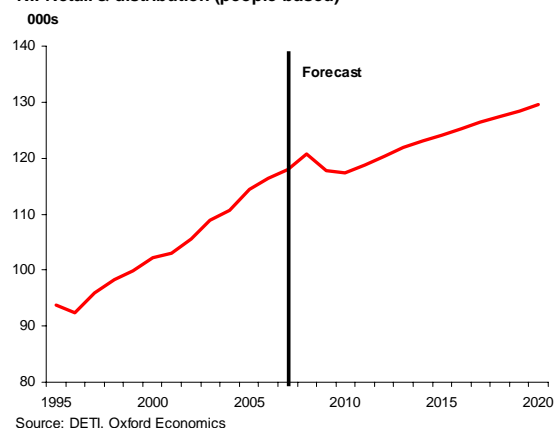
NI: Utilities (people-based)

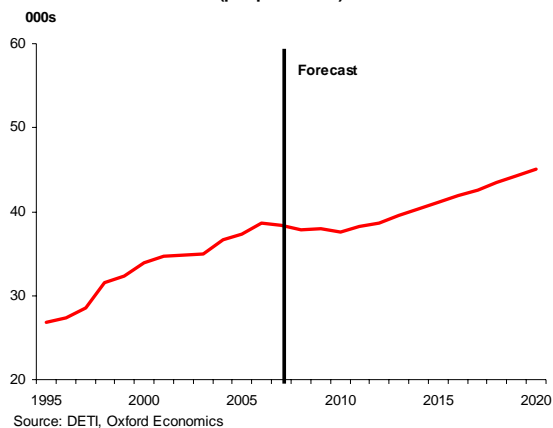
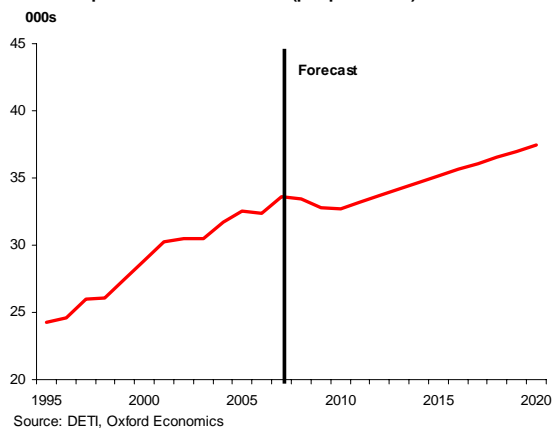
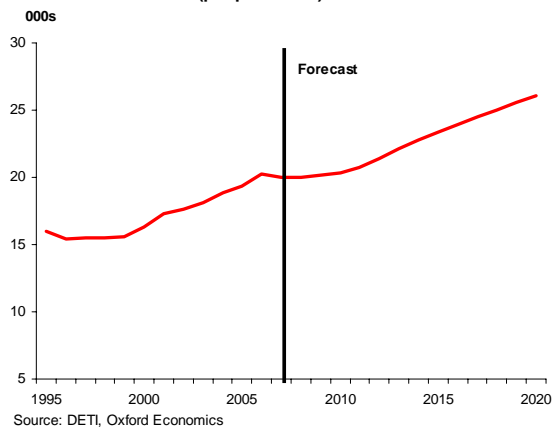
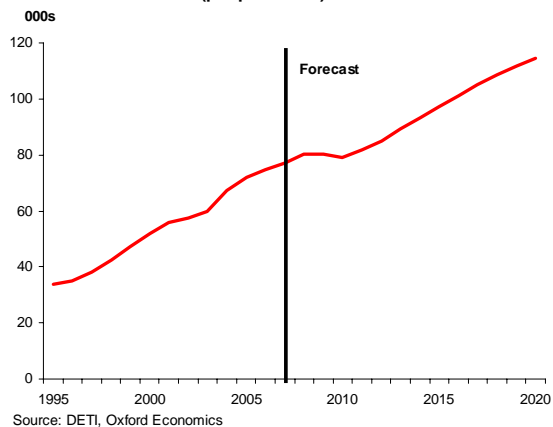
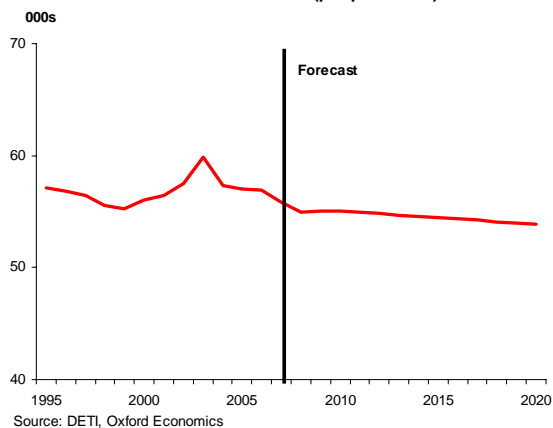
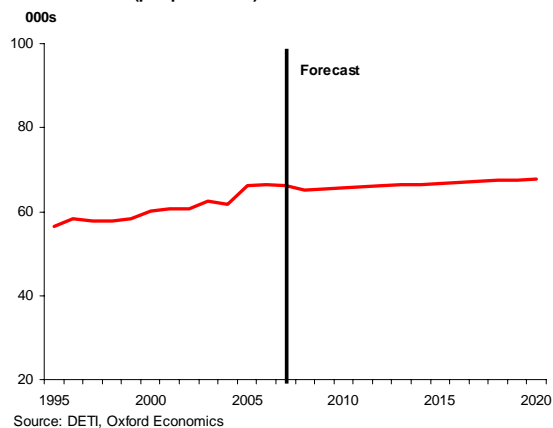


NI: Construction (people-based)

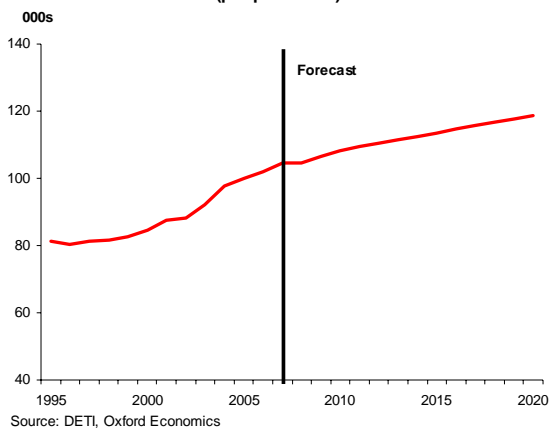


NI: Retail & distribution (people-based)

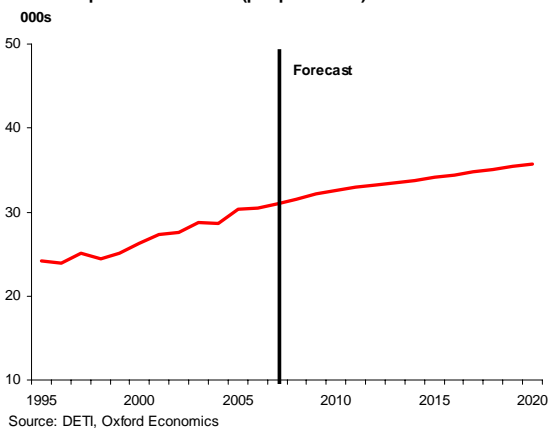


NI: Hotels & restaurants (people-based)

NI: Transport & communications (people-based)

NI: Financial services (people-based)

NI: Business services (people-based)

NI: Public administration & defence (people-based)

NI: Education (people-based)


NI: Health & social work (people-based)

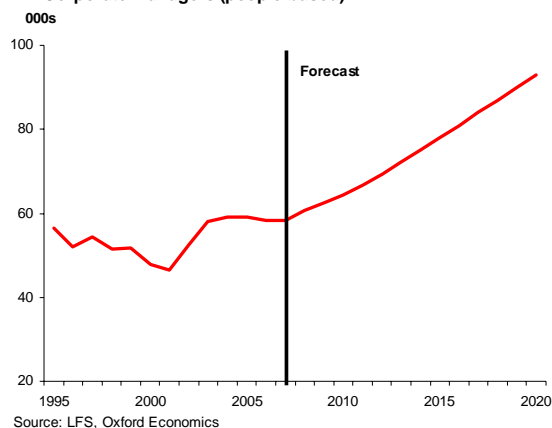


NI: Other personal services (people-based)

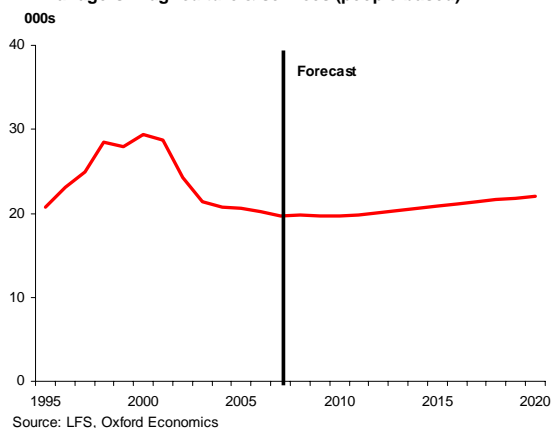


Part 5: Occupation employment forecasts

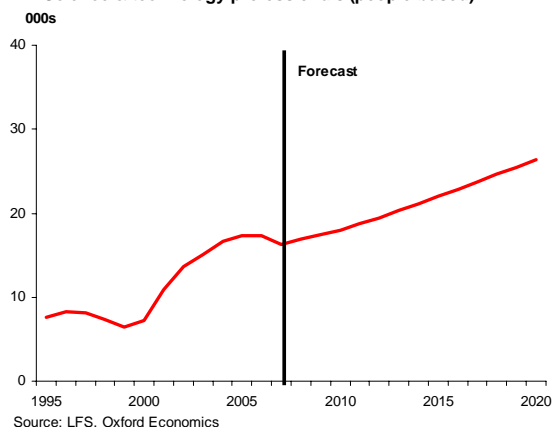
NI: Corporate managers (people-based)



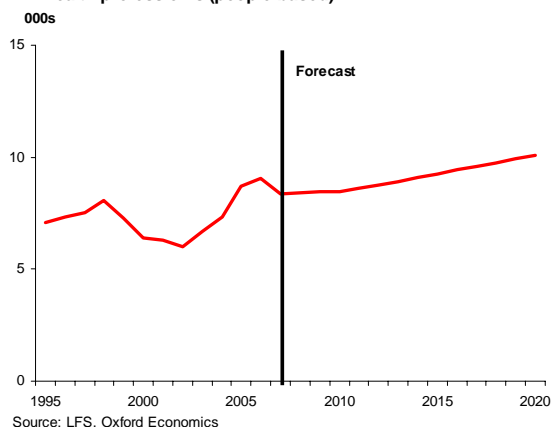
NI: Managers in agriculture & services (people-based)



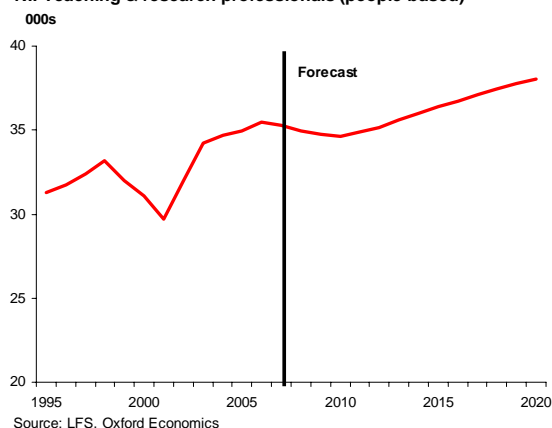
NI: Science & technology professionals (people-based)



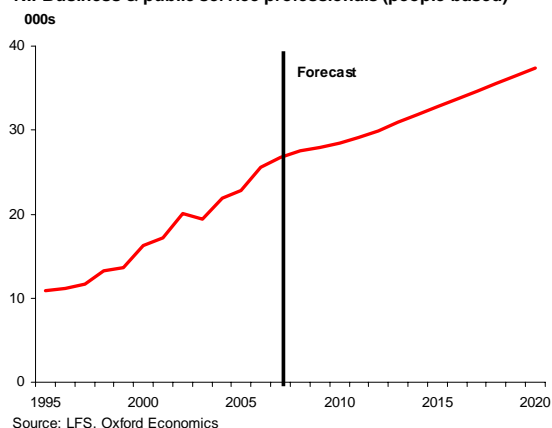
NI: Health professionals (people-based)



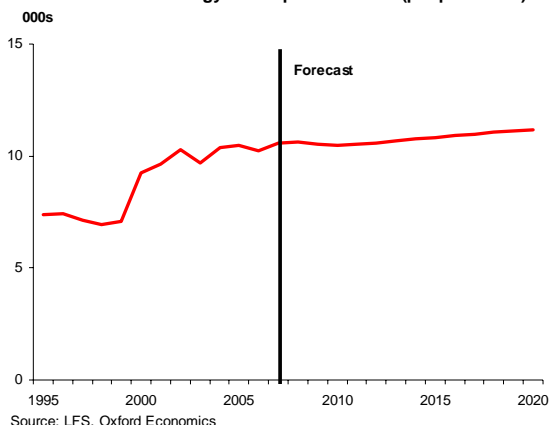
NI: Teaching & research professionals (people-based)



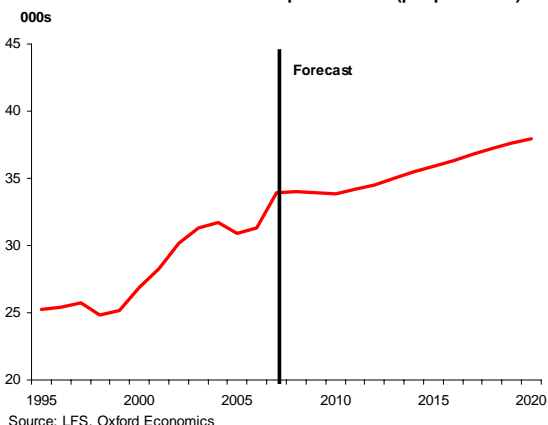
NI: Business & public service professionals (people-based)



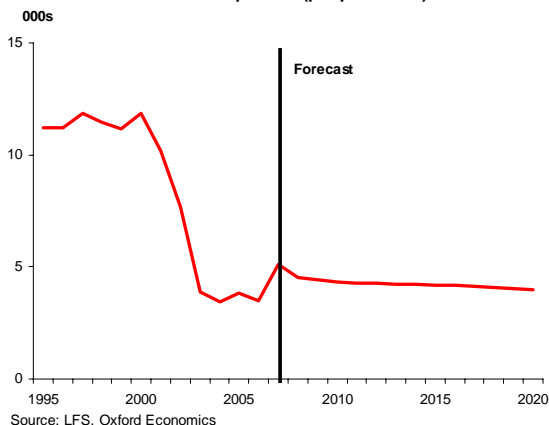
NI: Science & technology assoc professionals (people-based)



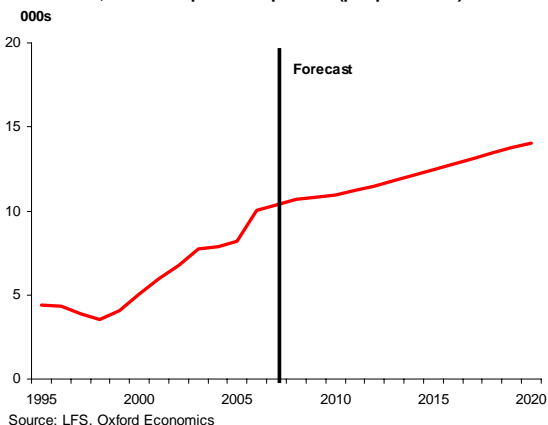
NI: Health & social welfare assoc professional (people-based)



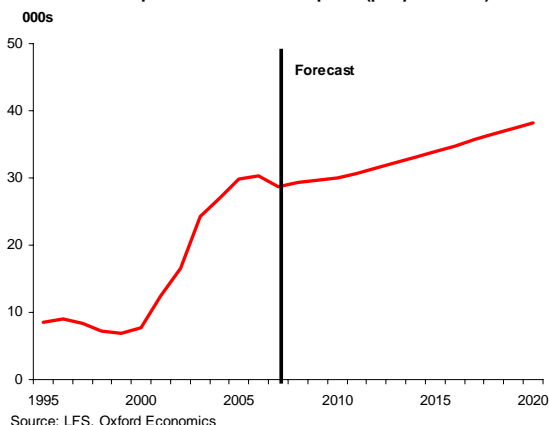
NI: Protective service occupations (people-based)



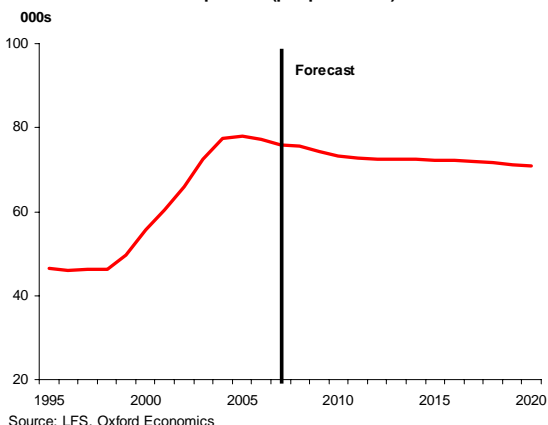
NI: Culture, media & sport occupations (people-based)



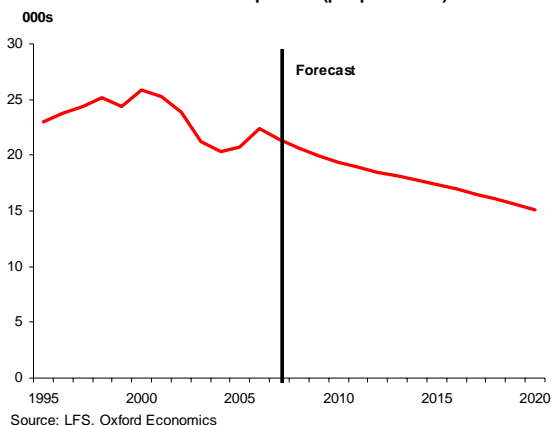
NI: Business & public service assoc profs (people-based)



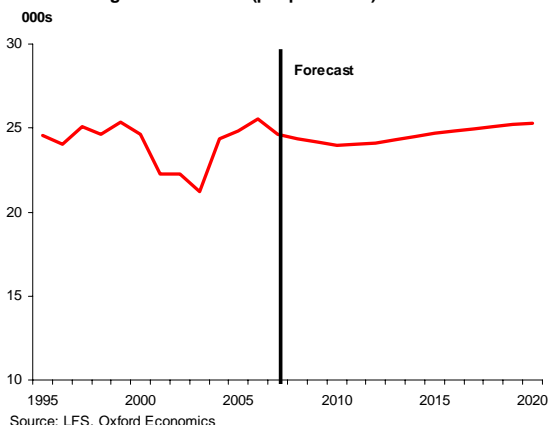
NI: Administrative occupations (people-based)



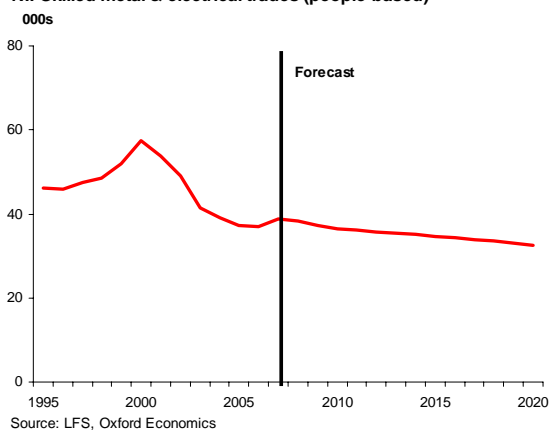
NI: Secretarial & related occupations (people-based)



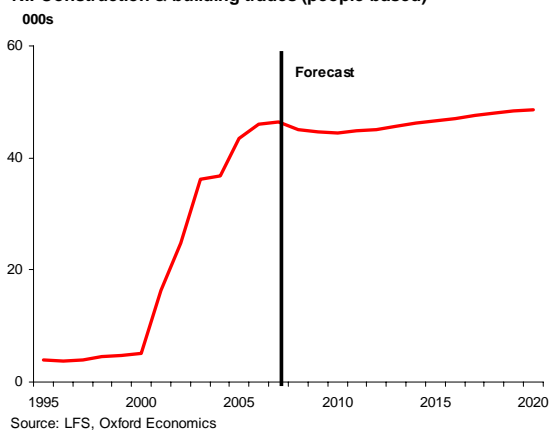
NI: Skilled agriculture trades (people-based)



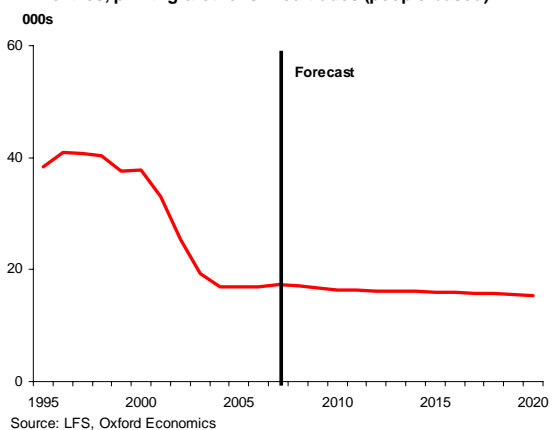
NI: Skilled metal & electrical trades (people-based)



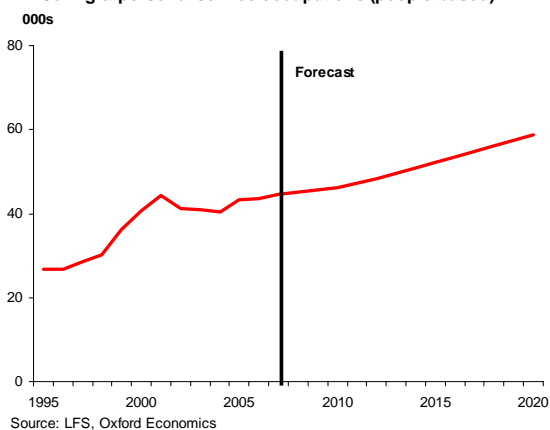
NI: Construction & building trades (people-based)



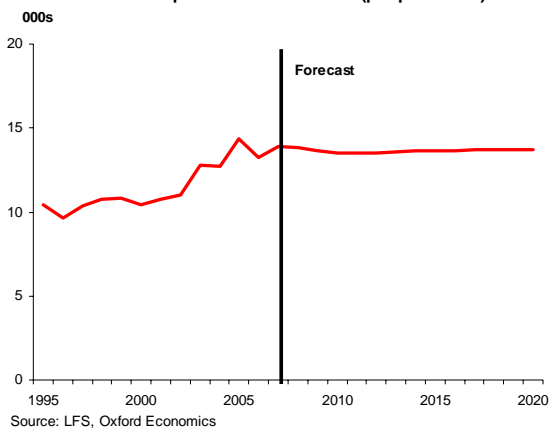
NI: Textiles, printing & other skilled trades (people-based)



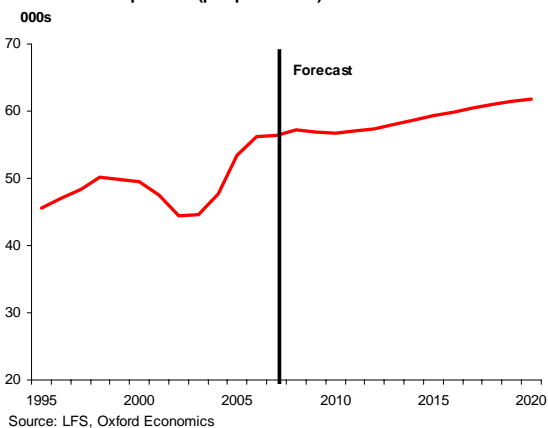
NI: Caring & personal service occupations (people-based)



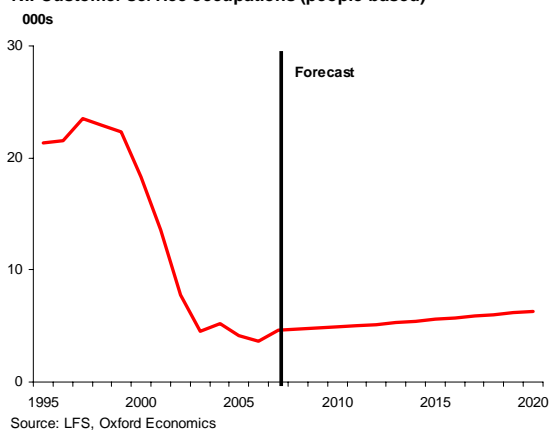
NI: Leisure & other personal service occs (people-based)



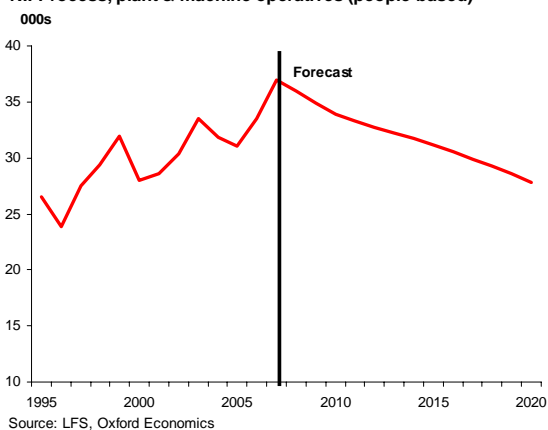
NI: Sales occupations (people-based)



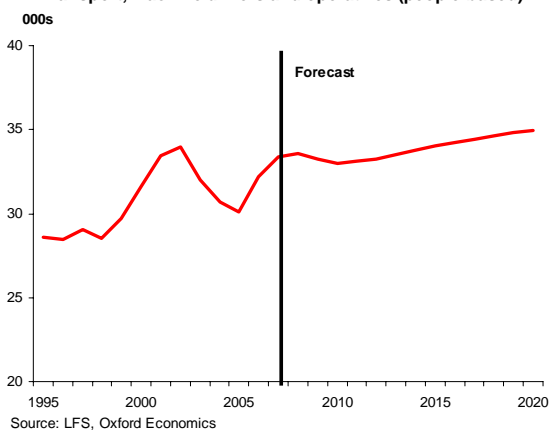
NI: Customer service occupations (people-based)



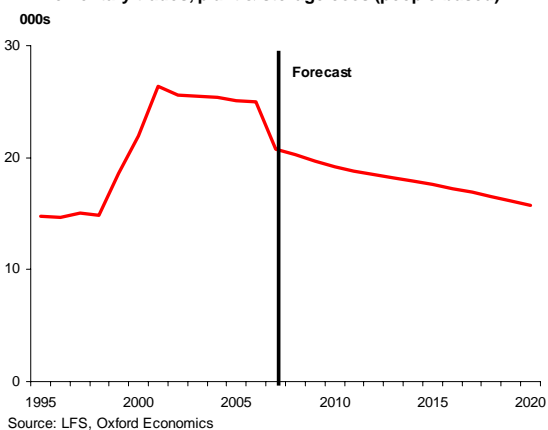
NI: Process, plant & machine operatives (people-based)



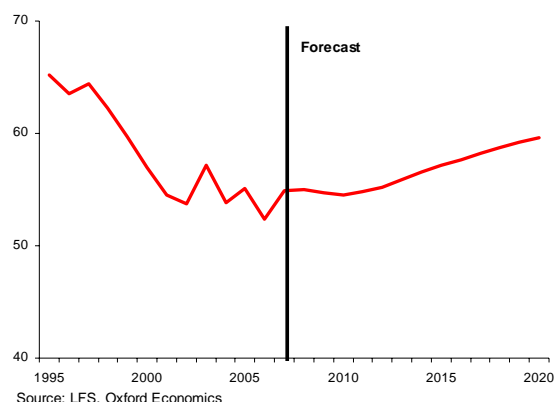
NI: Transport, machine drivers and operatives (people-based)



NI: Elementary trades, plant & storage occs (people-based)



NI: Elementary admin & service occupations (people-based)
000s



Part 6: Replacement demand analysis by industry and occupation (2010-2020)

Industry

	Expansion demand	Leavers to death	Leavers to unemployment / training schemes	Leavers to inactivity excluding retirement	Leavers to retirement	Leavers to occupations	Leavers to out migration	Gross expansion and replacement demand	Joiners from unemployment / training schemes	Joiners from inactivity (excluding inactive students)	Joiners from other occupations	Total returnees	Net requirement from education and migrants
Agriculture, forestry and fishing	0.0	1.3	0.0	0.7	2.6	0.9	0.0	5.5	1.3	2.5	4.0	7.9	-2.4
Mining & quarrying	-0.3	0.1	0.0	0.8	0.0	0.2	0.0	0.8	0.0	0.0	2.0	2.0	-1.2
Manufacturing	-6.4	2.2	18.6	13.9	8.2	35.7	13.8	85.9	17.9	6.1	15.4	39.4	46.5
Utilities	0.2	0.1	0.0	0.0	0.0	0.8	0.0	1.1	0.0	0.0	1.3	1.3	-0.2
Construction	6.1	1.5	15.4	15.4	4.6	10.1	0.0	53.0	18.8	4.9	16.4	40.1	12.9
Retail & distribution	12.1	2.7	17.6	19.5	13.9	52.4	4.2	122.3	31.9	13.1	27.7	72.7	49.6
Hotel & restaurants	7.5	0.9	6.2	16.5	0.0	23.4	0.9	55.4	7.8	3.7	15.7	27.1	28.2
Transport & communications	4.8	0.8	5.8	10.3	0.0	9.7	0.7	32.1	8.1	4.2	9.5	21.9	10.2
Financial services	5.7	0.4	0.0	3.2	0.8	7.3	0.9	18.3	1.9	2.3	19.2	23.4	-5.1
Business services	35.5	2.3	24.7	16.0	7.3	31.8	9.3	127.0	14.4	3.9	47.9	66.1	60.9
Public administration & defence	-1.2	1.5	4.1	8.0	5.8	6.7	0.8	25.7	10.3	6.8	15.0	32.1	-6.4
Education	2.0	1.9	4.2	12.1	7.7	13.7	0.0	41.6	8.7	6.0	6.0	20.7	20.9
Health & social work	10.5	2.9	9.0	26.1	7.2	20.4	13.5	89.6	16.2	11.5	21.1	48.8	40.7
Other personal services	3.2	0.9	6.8	11.9	4.0	4.3	1.5	32.6	8.3	4.2	17.0	29.5	3.1
Whole economy	79.7	19.3	112.2	154.3	62.0	217.4	45.7	690.6	145.8	69.2	218.1	433.0	257.6
Whole economy (annual)	8.0	1.9	11.2	15.4	6.2	21.7	4.6	69.1	14.6	6.9	21.8	43.3	25.8

Occupation

	Expansion demand	Leavers to death	Leavers to unemployment / training schemes	Leavers to inactivity excluding retirement	Leavers to retirement	Leavers to occupations	Leavers to out migration	Gross expansion and replacement demand	Joiners from unemployment / training schemes	Joiners from inactivity (excluding inactive students)	Joiners from other occupations	Total returnees	Net requirement from education and migrants
Corporate Managers	28.6	2.0	8.8	4.0	7.4	15.9	2.7	69.5	3.1	0.9	10.0	13.9	55.6
Managers & Proprietors in Agriculture & Services	2.3	0.6	2.4	1.4	2.4	5.8	0.0	15.0	2.6	0.4	1.9	4.9	10.1
Science & Technology Professionals	8.4	0.5	4.0	3.6	0.0	1.6	0.0	18.1	1.5	1.4	7.6	10.5	7.6
Health Professionals	1.6	0.2	0.0	1.0	1.0	0.0	1.4	5.2	0.8	0.0	0.0	0.8	4.4
Teaching & Research Professionals	3.4	1.0	4.3	7.6	2.6	4.5	0.0	23.4	3.6	1.8	5.5	10.8	12.6
Business & Public Service Professionals	9.0	0.8	4.8	2.8	1.8	2.6	1.3	23.1	1.0	0.4	9.1	10.5	12.6
Science & Technology Associate Professionals	0.7	0.3	0.0	0.0	1.1	1.1	0.0	3.1	1.6	0.4	4.8	6.9	-3.7
Health & Social Welfare Associate Professionals	4.1	0.9	0.0	4.6	1.2	5.0	5.0	20.7	1.5	2.3	13.8	17.6	3.2
Protective Service Occupations	-0.3	0.1	0.0	1.8	0.4	1.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0
Culture, Media & Sports Occupations	3.1	0.4	0.0	0.0	0.0	1.3	0.0	4.8	3.4	0.0	1.3	4.7	0.1
Business & Public Service Associate Professionals	8.1	0.8	2.3	1.1	4.5	10.1	0.0	27.0	2.8	2.4	8.0	13.2	13.8
Administrative Occupations	-2.3	1.6	11.8	16.3	5.7	17.7	1.3	52.1	16.9	6.7	10.4	34.0	18.2
Secretarial & Related Occupations	-4.3	0.4	1.5	0.7	2.1	4.6	0.0	4.9	0.0	1.8	8.5	10.4	-5.5
Skilled Agricultural Trades	1.3	1.2	0.0	2.7	2.4	1.1	0.0	8.7	0.7	1.7	0.8	3.3	5.4
Skilled Metal & Electrical Trades	-4.0	0.9	5.0	3.6	2.3	12.7	2.3	22.9	6.1	2.1	9.5	17.7	5.2
Skilled Construction & Building Trades	4.1	0.9	16.2	11.7	3.7	4.6	0.0	41.2	11.5	3.2	8.8	23.5	17.7
Textiles, Printing & Other Skilled Trades	-1.0	0.4	1.1	0.8	1.8	6.1	0.4	9.6	3.1	2.3	6.9	12.3	-2.7
Caring Personal Service Occupations	12.5	1.2	6.1	17.8	3.9	12.2	7.2	61.0	14.3	6.3	9.4	30.0	31.0
Leisure & Other Personal Service Occupations	0.2	0.3	4.6	4.8	1.7	3.3	0.0	14.9	4.1	2.4	5.3	11.8	3.0
Sales Occupations	5.2	1.1	8.8	9.2	5.0	30.2	0.0	59.5	18.3	11.0	31.0	60.3	-0.8
Customer Service Occupations	1.4	0.1	0.0	1.9	0.0	1.5	0.0	4.9	0.0	0.4	1.8	2.3	2.6
Process, Plant & Machine Operatives	-6.1	0.8	4.5	7.1	2.1	19.9	8.8	36.9	8.7	2.8	11.2	22.7	14.2
Transport & Mobile Machine Drivers & Operatives	1.9	1.0	2.1	7.1	2.1	6.8	3.3	24.4	6.6	2.4	6.9	15.9	8.5
Elementary Trades, Plant & Storage Related Occupations	-3.4	0.4	6.0	5.8	3.7	8.0	0.5	21.0	10.5	2.6	6.3	19.3	1.7
Elementary Administration & Service Occupations	5.1	1.6	9.9	29.3	3.8	15.6	5.0	70.4	22.5	13.1	14.9	50.5	19.9
Whole economy	79.7	19.4	104.2	146.6	62.6	193.2	39.3	645.0	145.2	68.9	193.6	407.6	237.4
Whole economy (annual)	8.0	1.9	10.4	14.7	6.3	19.3	3.9	64.5	14.5	6.9	19.4	40.8	23.7

Part 7: Replacement demand and skill requirements

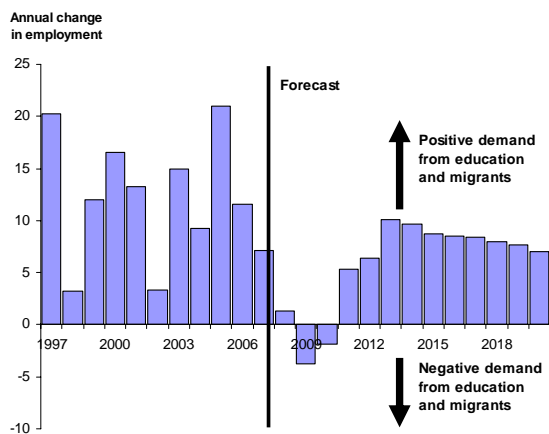
Net requirement from education and migration (2010-2020)

	Expansion demand	Gross expansion and replacement demand	Total returnees	Net requirement from education and migrants
Managers & senior officials	31.0	84.5	18.8	65.7
Professional occupations	22.4	69.8	32.7	37.1
Associate professional & technical occupations	15.6	58.6	42.3	16.3
Administrative and secretarial occupations	-6.6	57.0	44.3	12.7
Skilled trades occupations	0.4	82.4	56.8	25.6
Personal service occupations	12.7	75.8	41.8	34.1
Sales and customer service occupations	6.6	64.3	62.5	1.8
Process, plant and machine operatives	-4.2	61.3	38.5	22.7
Elementary occupations	1.7	91.4	69.8	21.5
Whole economy	79.7	645.0	407.6	237.4
Whole economy (annual)	8.0	64.5	40.8	23.7
Whole economy (annual) - baseline	5.6	61.2	40.4	20.8

Source: Oxford Economics

Expansion demand

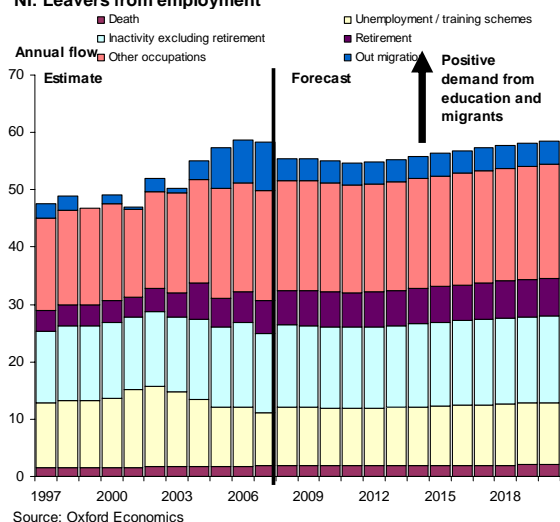
NI: Expansion demand



Source: DETI, LFS, Oxford Economics

Leavers from employment

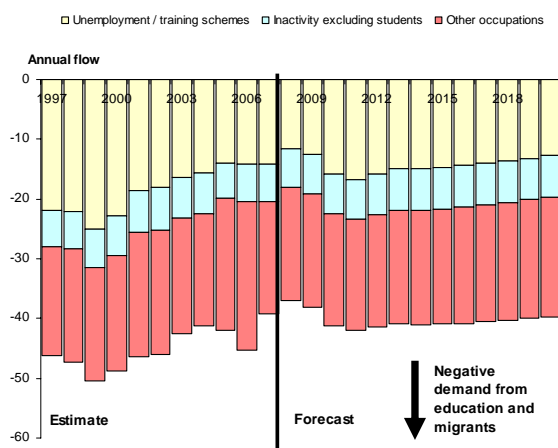
NI: Leavers from employment



Source: Oxford Economics

Joiners to employment

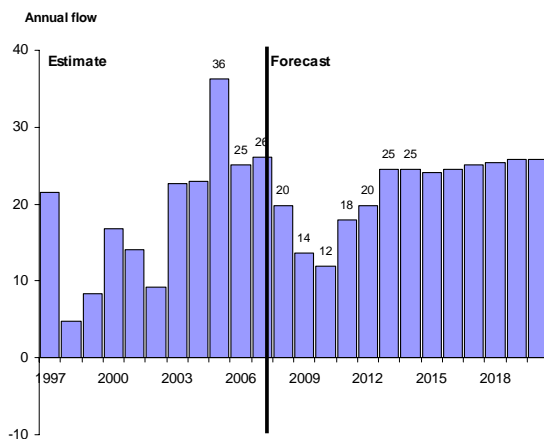
NI: Joiners to employment



Source: Oxford Economics

Net requirement from education and migration

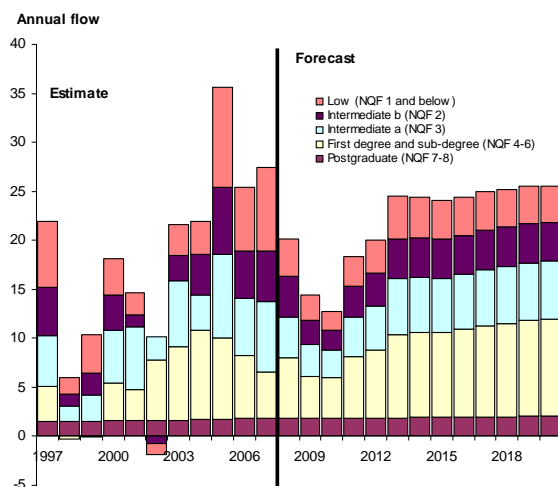
NI: Net requirement from education system and in-migration



Source: Oxford Economics

Net requirement from education and migration – NQF qualifications

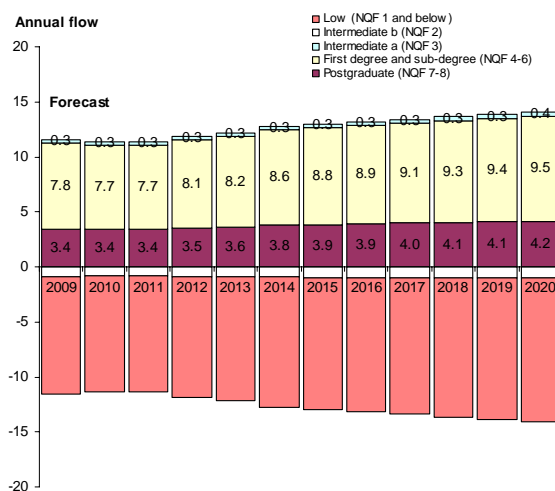
NI: Net requirement from education system and in-migration



Source: Oxford Economics

Upskilling of existing workforce requirement

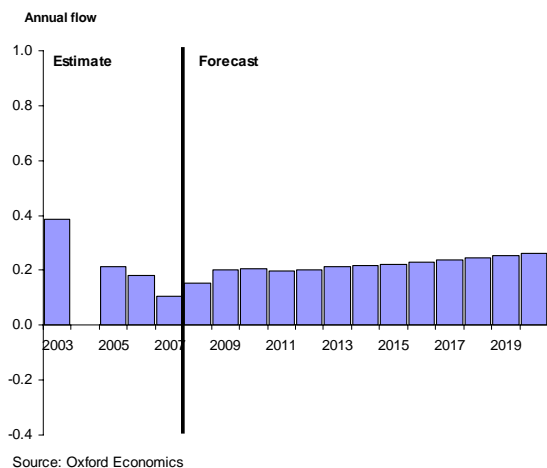
NI: Upskilling



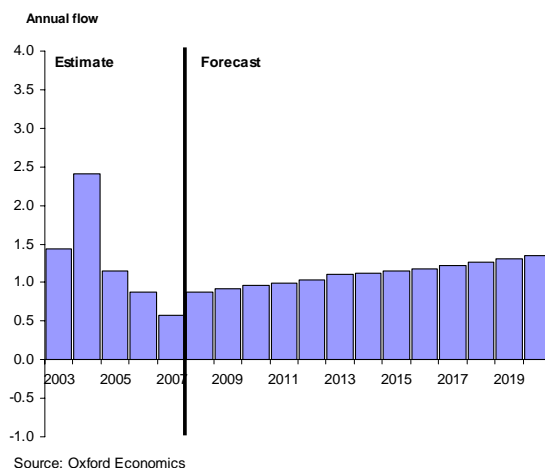
Source: Oxford Economics

Part 8: Graduate subject demand

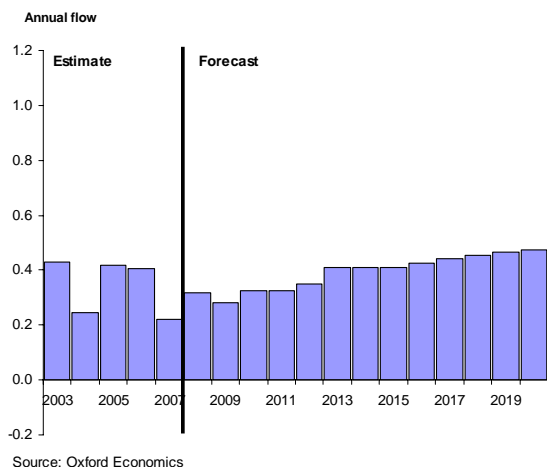
NI: Medicine & dentistry



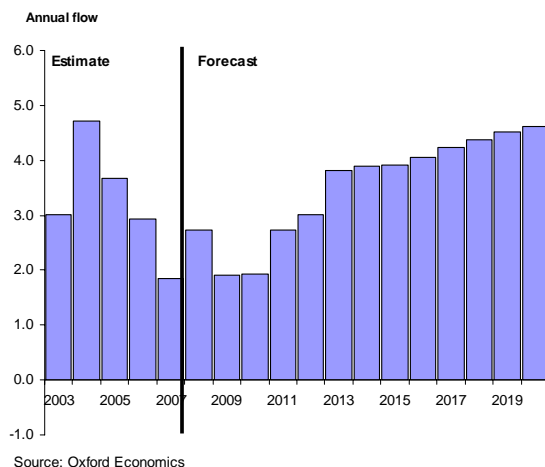
NI: Subjects allied to medicine



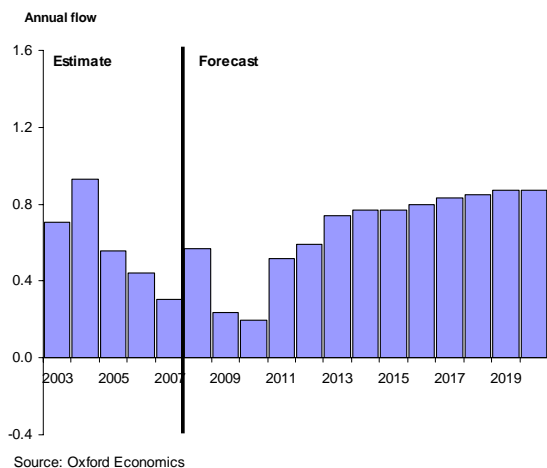
NI: Biological, veterinary and agricultural sciences



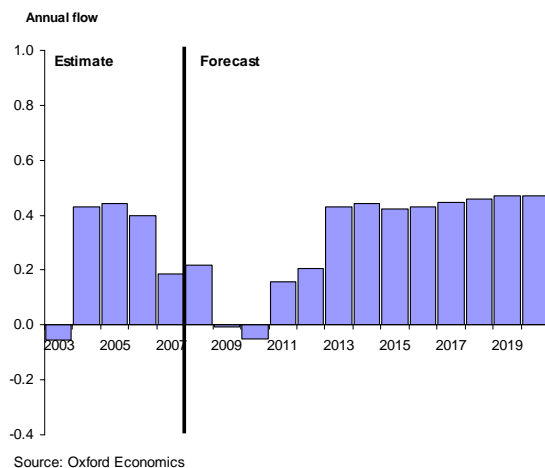
NI: STEM (broad definition)



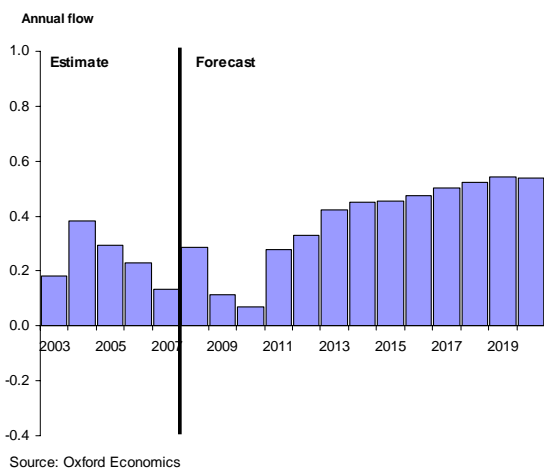
NI: Computer science



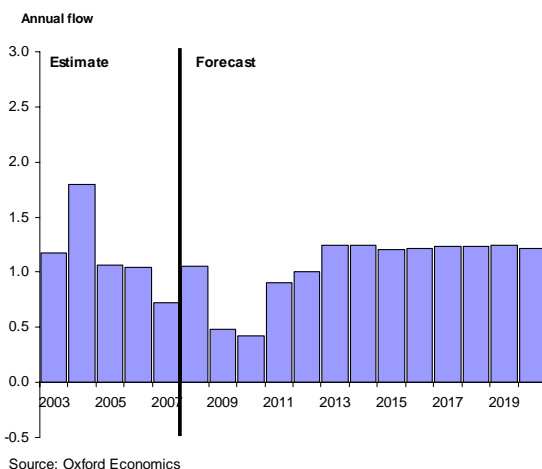
NI: Architecture, building and planning



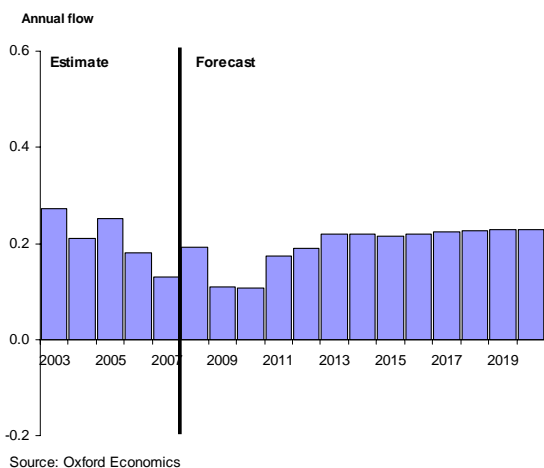
NI: Law



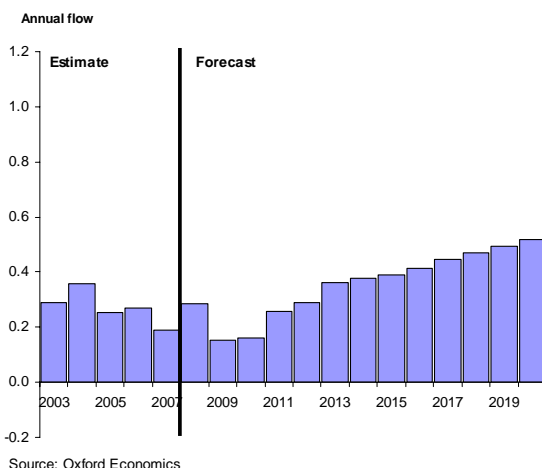
NI: Business & administration



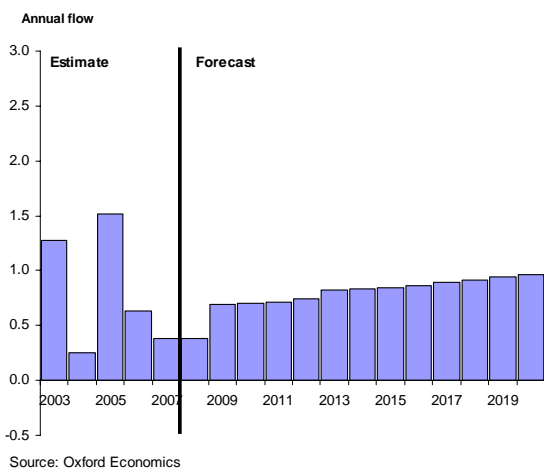
NI: Languages



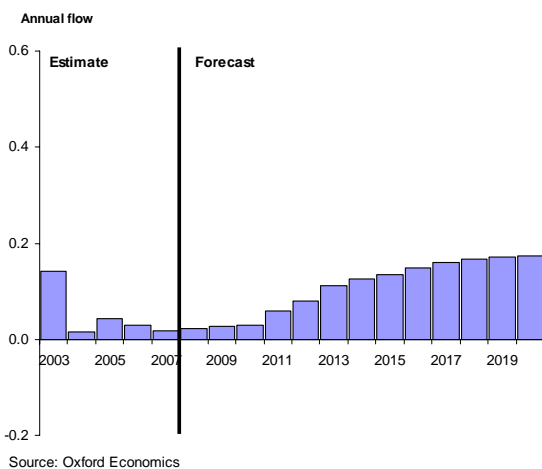
NI: Creative arts & design



NI: Education



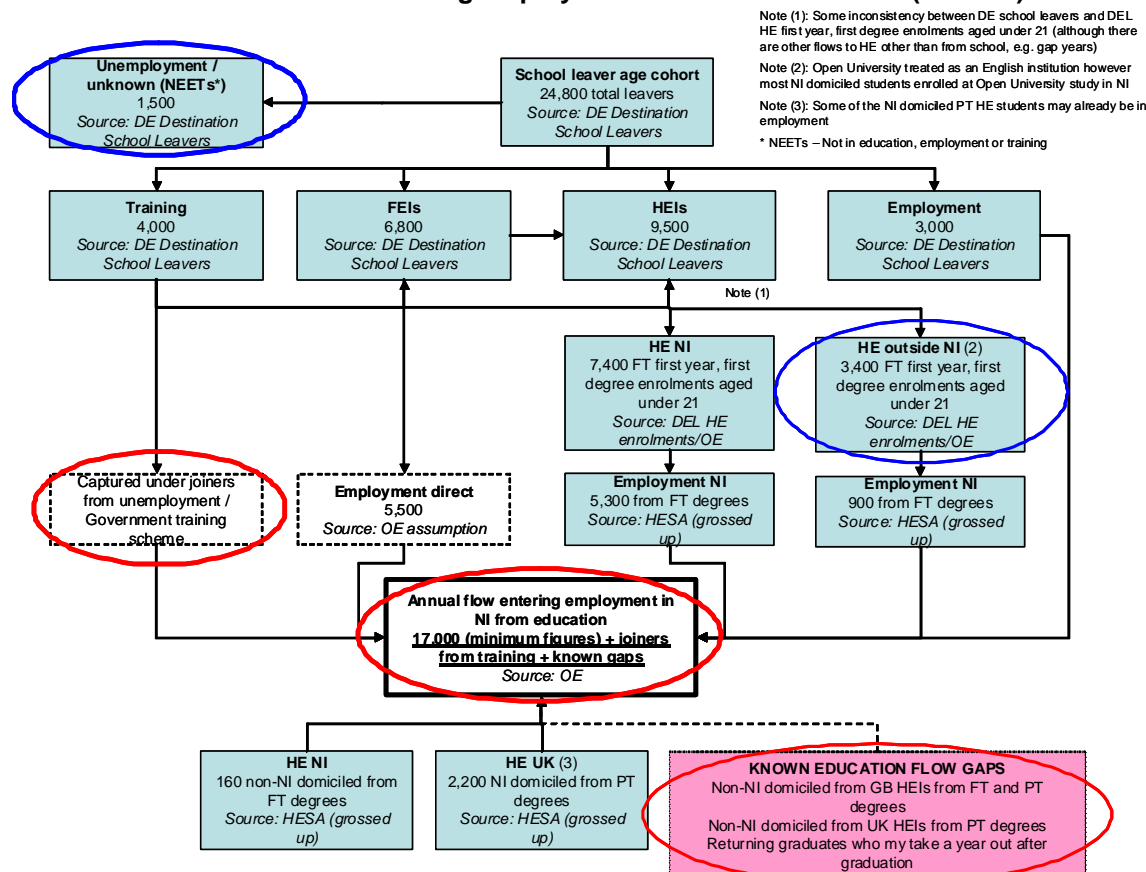
NI: Combined degrees



Annex G: Flows from NI education into employment

- This annex chapter looks briefly at the supply of skills to the NI labour market and leakages from the local education system. This is to roughly determine what proportion of the total education leaver age cohort (approximately 25,000) enters employment on an annual basis to make an assessment of migrant requirements and what a sustainable rate of employment growth is for NI. Note this is by no means comprehensive as the focus of this study is primarily the demand-side and therefore a more detailed examination of the supply-side is outside the research scope.
- The diagram below is a first attempt by Oxford Economics to trace education leaver flows into employment in NI (and leakages outside the labour market). Note sources for the education flows are provided within the diagram.
- This framework has required some assumptions, for example numbers entering employment from FE – there is no comprehensive FE destination survey as there is for HE. In addition not all flows can be easily captured, e.g. returning graduates who may take a year out after graduation.
- The summed figure presented below for the annual inflow to employment, 17,000, should be seen as a minimum inflow. In addition to this, as well as flows we have not captured or been able to quantify, we need to add joiners from training schemes which are already accounted for in the replacement demand analysis (but are not separated from joiners from unemployment).

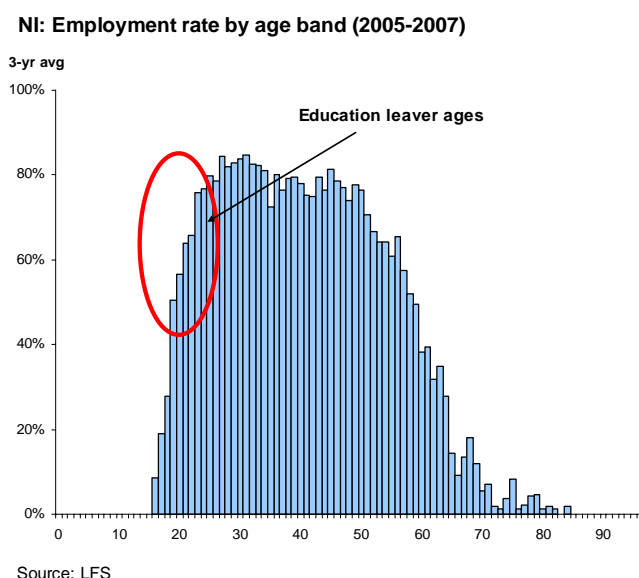
Annual flow entering employment in NI from education (2006/07)



Source: DE, DEL, HESA, Oxford Economics

- Elements of the flows in the diagram highlighted by a blue circle represent the main NI labour market **leakages** from the school leaver age. These include school leavers going straight to unemployment / inactivity and the still high 'brain drain' to education institutions outside NI (though some eventually return).
- The chart below looks at employment rates for young persons in NI by age band to compare with the above analysis on flows into employment from a 25,000 age cohort. According to the LFS, the proportion of 16 year olds in an employee job or self-employed is 9 per cent, rising to 76 per cent for 23 year olds. An employment rate of 76 per cent is roughly equivalent to 19,000 out of the 25,000 age cohort. This is close to the 17,000 figure estimated in the previous diagram for education leavers into employment, plus a top up for joiners from training and other known-gaps. This analysis still suggests there are leakages from NI's education output, both to outside NI from students studying in GB, ROI etc and not returning to work, and school leavers not entering employment.

NI employment rates by age band



- The table below identifies the economic activity status of 23 year olds not in employment, averaged over a 3-year period 2005-2007. The largest share of those not in work are still students, though at least 1 in 10 are either unemployed or looking after the family / home.

NI economic activity of 23 year olds

	2005-2007
Employee	70%
Inactive - not seeking w ork, not like to w ork, student	9%
Inactive - not seeking w ork, not like to w ork, looking after family / home	6%
Self-employed	6%
ILO unemployed	4%
Inactive - not seeking w ork, would like to w ork, student	1%
Other	4%

Source: LFS

Annex H: Evidence from consultations and Sector Skill Councils

Whilst requiring a sound empirical evidence base, Oxford Economics and FGS Consulting recognised that this research could not be entirely based on official data and quantitative modelling [especially given the plethora of literature available from Sector Skills Councils (SSCs) and industry views from Invest NI and other trade and sector bodies]. In light of this our team undertook an intensive programme of qualitative and desk-based research including a literature review and consultations / engagement with a range of key stakeholders including SSCs, trade associations and local economists.

This element of the research is not a stand-alone element of the report but rather provides a fully integrated element of research and feeds into some of the assumptions made to forecast the future demand for occupations and skills and influenced our thinking on how to develop an aspirational scenario for the NI economy. **However it should be noted that as the project did not require forecasts by individual SSC industry classifications (the requirement was to provide forecasts for broad SIC sectors and SOC occupations), evidence from the SSAs is less directly useful to inform the forecasts than if the project had required forecasts by individual SSC industry classifications.**

In order to bring focus to the consultations and research (in an otherwise wide-ranging area of research), two main outcomes to pursue were agreed with the project steering group for this element of the research.

1. Receive guidance from consultees on how a more aspirational economic scenario for NI should / might be achieved (which will have implications for future skill demand)
2. Receive guidance from consultees on specific skill demand issues and future skill trends

Consultation and desk-based research stages

The consultations and desk-based research were carried out between October and December 2008. This involved the following four stages:

1. Face-to-face and telephone interviews
2. Presentations to SSCs and selected Invest NI sector representatives
3. Survey of SSCs and selected Invest NI sector representatives
4. Stakeholder Conference

(1) Face-to-face and telephone interviews

This phase consisted of a total of 5 face-to-face interviews and 6 telephone interviews with key stakeholders including government, trade, education and sector bodies, as well as local economists (Table H.1).

Interviews focussed specifically on a number of key areas, as agreed with the project steering group, including:

1. A review of Oxford Economics' baseline forecasts for the NI economy (EDF September 2008 forecasts) and the applicability of these forecasts to individual sectors

2. Qualifications and occupations today and tomorrow
3. Skills demand issues
4. Graduates
5. Subject demand
6. Transferrable and generic skills
7. Future trends of labour supply

Table H.1: Consultation list of organisations interviewed

	Proposed number of consultations	Actual consultations took place
Government representatives	5	Education & Skills Committee (Jonathan Guest) STEM Review (Alan Blair)
Trade bodies	6	Institute of Directors (James Toland) MATRIX (Alan Blair)
Education bodies	3	Association of NI Colleges (Alan Blair)
Local economists	2	PricewaterhouseCoopers (Philip McDonagh)
Sector bodies	5-10	Manufacturing - Food and Drink Association (Michael Bell) Tourism - NI Hotels Federation (Janice Gault) Voluntary - NICVA (Gordon McCullough) ICT - Momentum (Michael Noble)
Sector Skill Councils	-	Association of Sector Skill Councils (Laurence Downey)

Source: Oxford Economics

The initial agreement with DEL was to carry out a total of 30 consultations, to be split between a mix of face-to-face and telephone interviews.

For various reasons it was not possible to interview all 30 organisations. (A list of organisations not interviewed and record of contact made is provided in Table H.2). These reasons included the short timeframe and unavailability of key personnel, and perhaps most importantly, **a common suggestion made by several trade and sector bodies to refer to Sector Skills Agreements (SSAs) as the definitive source on future projections and skill needs.**

This phase ultimately indicated a need for a deeper insight into the work carried out by the SSCs in Northern Ireland, which shaped the emphasis of this phase of the research (notwithstanding that skill forecasts were not required to be provided on a SSC basis).

Table H.2: Consultation list of organisations not interviewed and record of contact

Organisation	No. times contacted		Organisation	No. times contacted	
	Telephone	Email		Telephone	Email
Government representatives			Education bodies		
NILGA	2	-	Queen's University Belfast	3	-
Department of Education	2	1	University of Ulster Jordanstown	3	-
NI Skills Advisor	3	2			
			Sector bodies		
Trade bodies			Ulster Farmers' Union	4	-
NI Chamber of Commerce	3	-	NI Water	2	-
Federation of Small Businesses	3	-	Construction Employers' Federation	1	-
Centre for Competitiveness	2	-	Engineering Employers' Federation	3	-
Confederation of Business Industry	3	-	Translink	2	-
			NI Bankers' Association	1	-
Local economists			Institute of Chartered Accountants	1	-
Bank of Ireland	2	-	Law Society	2	-
			NICS HRConnect	1	-
			SEELB	2	1

Source: Oxford Economics

(2) Presentations to SSCs and Invest NI sector representatives

As outlined above it was evident following on from the interview phase that close coordination with SSC representatives as well as Invest NI sector representatives was required to obtain more evidenced opinions regarding future skills needs in NI.

In conjunction with Laurence Downey (SSDA NI Manager), Oxford Economics organised a focus group presentation session to which all 26 SSCs were invited. The following SSCs were able to attend – Cogent, Energy & Utility Skills, Financial Services, Lifelong Learning, People First, SEMTA, Skills Active and Summit Skills. (It was originally intended to arrange two sessions but due to lack of availability of SSC representatives the second session did not take place)

A follow on presentation was also arranged in November 2008 at which 4 SSCs were present – Government Skills, Skills for Health and Skills for Justice and Skills Active.

The main objectives of the presentation to SSC representatives were to:

1. Develop an understanding of the role of SSCs in NI and the progress of SSA reports
2. Receive guidance from SSC managers on how a more aspirational economic scenario for NI should / might be achieved in terms of sectors and what role their sector will play
3. Receive guidance from SSC Managers on specific skill demand issues and future skill and occupation trends for each sector, including subject demand

In order to build upon the SSC presentations, two additional sector presentations were also organised in liaison with Tracey Walsh from Invest NI in November 2008. As with other consultations these presentations aimed to receive guidance from Invest NI sector representatives on how a more aspirational economic scenario for NI should be achieved (specifically in terms of sectors for growth uplift) and skill / subject demand and future occupation trends for each sector. The following sectors were represented: software; life sciences, tourism, construction and creative industries.

(3) Survey of SSCs and selected Invest NI sector representatives

From our own perspective and a view agreed by presentation attendees (at both the SSC and Invest NI sessions), it was considered that a short session was not a sufficient timeframe or fully appropriate forum to provide key information relevant to each sector. It was therefore agreed at the conclusion of each presentation that in order to enhance the research, a survey was required to give SSCs ample opportunity to respond to the issues guidance was sought on.

The survey was split into two components - quantitative and qualitative. The quantitative survey was intended to provide a better insight into the forecasting work of SSC research teams, in terms of individual sectoral employment projections, as well as obtaining other quantitative information on occupation and skill structures within sectors. This information and in particular growth forecasts, where available and up-to-date, were used as a sanity check against which to compare Oxford Economics' baseline sectoral employment forecasts.

The qualitative survey followed the original consultation approach looking more specifically at guidance from SSCs and Invest NI representatives on how a more aspirational scenario for NI should/ might be achieved in terms of sectors and what role their sector will play as well as guidance from consultees on specific skill demand issues and future skill trends. Table H.3 below provides an overview of which SSCs and Invest NI sector representatives submitted survey responses.

Table H.3: SSC and Invest NI respondents to survey

	Qualitative	Quantitative
SSC		
NI Social Care Council	x	x
SEMTA	x	
Summit Skills		
Improve Limited	x	x
People 1st	x	x
Proskills	x	x
Skillsmart Retail	x	
EU Skills		x
Lifelong Learning	x	x
E Skills		x
Construction Skills	x	x
Automotive	x	x
Financial Services	x	x
Government Skills	x	
Skills for Justice		
Skills Active		
Skills for Health		
Cogent		
Invest NI		
Food Division	x	n/a
Software	x	
Construction		
Tourism		
International ICT	x	n/a
Aerospace and Automotive	x	n/a
Creative Industries	x	n/a
Life Sciences	x	n/a

Source: Oxford Economics

(4) Stakeholder Conference

A Stakeholder Conference was held at the end of November 2008 at which Oxford Economics presented preliminary research findings. A number of diverse individuals and organisations attended the conference, representing a wide range of audience.

In addition to the presentation, the conference incorporated a focus group session giving key stakeholders the opportunity to further contribute to the research and debate issues such as; sectors for growth and the rate of employment growth in an aspirational scenario, and the appropriateness of the Leitch restructuring and catch up scenarios for the NI economy.

Rather than report findings from the individual phases of the consultations and desk-based research, key issues are summarised next around the following set of themes with responses from the SSC and Invest NI surveys interwoven into the relevant themes. Commentary around themes is deliberately presented as the direct views and opinions expressed by consultees, which do not necessarily reflect the views of Oxford Economics and FGS Consulting. Quotes are also provided though not sourced for confidentiality. Note commentary on themes is far from exhaustive given the wealth of literature available. The themes are as follows:

- How to achieve a better NI

- Skill and occupation requirements
- Higher level skill needs
- Graduate subject demand
- Generic skills
- Other issues of note

A more comprehensive review of SSC literature is well beyond the scope of this largely empirical skills forecasting exercise. As an overview and introduction to this chapter, we have provided a brief summary of SSA reports.

Sector Skill Agreements (SSAs)

Given the context of this research and the steer given by interviewees towards SSCs, it was recognised that the Sector Skills Agreements (SSAs) hold valuable information for this project in terms of both quantitative and qualitative evidence.

SSAs, which are developed in 5 stages (see Box H.1 below), map out (or at least are intended to) current and future skills needs across the 26 SSCs and how these skills and qualifications will be developed from a supply-side perspective. As such with this evidence base, the SSA reports aim to influence the direction of the future provision of workforce skills in Northern Ireland.

Box H.1: SSAs – five stages

Development of SSAs involves five key stages:

1. Assessment of current and future skills needs of the sector (Skills Needs Assessment)
2. Assessment of current learning provision available to the sector
3. Analysis of the gaps and weaknesses in current workforce development activity, based on stages 1 and 2, leading to agreed objectives
4. Assessment of the scope and level of collaborative action and commitment of resources by employers
5. Development of an action plan with key delivery partners

Table H.4 below first summarises the sectors / activities which fall under each SSC, followed by Table H.5 which sets out progress by each SSC against the five SSA stages.

Table H.4: SSC sectors and activities

SSC	Sectors and activities
Asset Skills	Property services, housing, cleaning services and facilities management
Automotive Skills	Retail motor industry
Cogent	Chemical, nuclear, oil and gas, petroleum and polymer industries
Construction Skills	Construction
Creative and Cultural Skills	Arts, museums and galleries, heritage, crafts and design
Energy and Utility Skills	Electricity, gas, waste management and water industries
E-Skills UK	Information technology, telecommunications and contact centres
Financial Services	Financial services industry
Go Skills	Passenger transport
Government Skills	Government
Improve Ltd	Food and drink manufacturing and processing
LANTRA	Environmental and land-based industries
Lifelong Learning UK	Employers who deliver and/or support the delivery of lifelong learning
People 1st	Hospitality, leisure, travel and tourism
Pro Skills	Process and manufacturing industry
SEMTA	Science, engineering and manufacturing technologies
Skills Active	Active leisure and learning
Skillfast UK	Apparel, footwear and textiles and related businesses industry
Skills for Care and Development	Social care, children and young people
Skills for Health	Health sector
Skills for Justice	Custodial care, community justice, court services, customs and excise, police
Skills for Logistics	Freight logistics industry
Skillset	Broadcast, film, video, interactive media and photo imaging
Skillsmart Retail	Retail
Summit Skills	Building services engineering

Source: SSDA, Oxford Economics

Table H.5: SSC SSA progress

	Report stages complete	Report length (pages)		Report stages complete	Report length (pages)
Asset Skills	1-5	Stages 1-3 = 118 Stages 4-5 = unknown	People 1st	1-5	-
Automotive Skills	1-5	Stages 1,2,3,5 = 405 Stage 4 = unknown	Pro Skills	1-5	Stages 1-2 = 462 Stages 3-5 = unknown
Cogent	1-3	Stages 1-3 = 90 Stages 4-5 = awaiting sign off	SEMTA	1-5	176
Construction Skills	1-5	183	Skillfast UK	1-5	85
Creative and Cultural Skills	1-5	-	Skills Active	1-5	74
Energy and Utility Skills	1-5	103	Skills for Care and Development	1-5	Stages 1-2 = 52 Stages 3-5 = unknown
E-Skills UK	1-5	-	Skills for Health	1-5	75
Financial Services	1-3	Stages 1-3 = unknown Stages 4-5 = awaiting sign off	Skills for Justice	1-5	Stage 1 = 161 Stages 2,3,4 = unknown Stage 5 = 64
Go Skills	1-5	Stage 1 = 45 Stage 2 = 44 Stage 3 - 5 = unknown	Skills for Logistics	1-5	Stages 1-3 = 55
Government Skills	1-5	Stages 1-3 (Exec Sum) = 16	Skillset	1-5	70
Improve Ltd	1-5	95	Skills smart Retail	1-5	Stages 1-3 summary = 77 Stage 4 = unknown Stage 5 = 51
LANTRA	1-5	24	Summit Skills	1-5	-
Lifelong Learning UK	1-5	381			

Source: SSAs, Oxford Economics

Given the wealth of information available in SSAs (as indicated by the report lengths / no. pages in Table H.5), it was beyond the scope of this project to review each SSA in detail. However a brief summary of employment growth prospects (UK and NI) and skill issues from each SSA, two issues most relevant to this research, is provided in the Table H.6 below. (Note it is not possible to provide a full set of expansion and replacement demand forecasts, skill requirements and subject demand etc as this is not universally available from reports. Also NI figures are not always directly available from sometimes UK focused national reports). **In addition gaps, shortages etc under selected skills issues refer to those prevailing at the time of publication of the SSA and therefore do not reflect the current situation which has been significantly impacted by the economic downturn, for example labour and skill shortages in construction.** As Table H.6 shows many of the SSAs are dated 2006 and 2007, emphasising the above point.

Table H.6: Summary of SSAs – growth prospects and skills needs

	Employment growth prospects	Selected skills issues
Asset Skills	<p>UK: Employment growth for the whole of the UK is projected to be around a quarter of a million net additional jobs between 2004 and 2014 (almost 30% increase on 2004 level)</p> <p>NI: No specific figures available for NI</p> <p>Date of research: March 2006</p>	<p>Skill gaps include IT user skills, communication skills, management skills and customer handling skills. Skills gaps are most apparent amongst managers and elementary staff</p>
Automotive Skills	<p>UK: Employment forecast to fall by 0.2% per annum over the period 2004-2014.</p> <p>NI: Although the increase in total employment in the sector in Northern Ireland is expected to be only modest, substantial replacement demand is forecast to be required to replace those that retire or leave the sector for other reasons. It is projected that 35% of the sector's 2004 workforce will need to be replaced during 2004-2014</p> <p>Date of research: September 2006</p>	<p>Skill needs include technical and practical skills and problem solving skills. Almost a third of NI employers say they have a skills gap in management. 1 in 4 establishments say they have a skills gap in craft and related occupations.</p>
Construction Skills	<p>UK: N/A</p> <p>NI: Annual increase of 2,900 jobs per annum. Over the five year period 2008-2012, This adds up to over 11,000 new workers needing to join the NI industry to deliver forecasted construction output, after taking into account those entering and leaving the industry</p> <p>Date of research: Experian, February 2008</p> <p>N.B. LMI provides a mid-year forecast for 2008 stating that annual recruitment requirements between 2009-2013 will be 1,070</p>	<p>The most commonly identified skills gaps at management level are understanding and keeping up to date with legislation, health and safety, employment and environmental legislation, IT, financial understanding, risk management, identifying new markets/clients, and keeping up to date with the latest products and techniques. General operatives/ labourers are identified as being difficult to source (This analysis is now likely to be out of date given that it does not reflect the recent economic downturn and the negative impact that this has had on the construction industry in NI)</p>
Creative and Cultural Skills	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: N/A</p>	-
EU Skills	<p>UK: Expansion demand -39,000 by 2014 (though replacement demand estimated at 135,000 jobs)</p> <p>NI: No specific figures available for NI</p> <p>Date of research : 2006</p>	<p>Lack of core/ key skills amongst those within elementary occupations. Within skilled trade occupations there is a shortage of skilled labour</p>
e-skills	<p>UK: N/A</p> <p>NI: Forecast to grow at 2.4% a year from 2006 to 2021, over 3 times the rate of overall employment growth in Northern Ireland, resulting in an additional on average 360 workers each year from 2006 to 2021</p> <p>Date of research: August 2006</p>	<p>Entrants will need increasingly advanced skills as traditional entry-level jobs are out-sourced. Skills said to be lacking include technical skills, business skills and interpersonal skills. There will be increased emphasis on higher skills levels and on specific competencies in architecture and systems planning, information management and security, and management and procurement.</p> <p>Graduates will continue to be a priority</p>

	Employment growth prospects	Selected skills issues
Go Skills	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: N/A</p>	<p>Future skills needs have been identified as driving skills, driving instruction, disability awareness and basic IT skills</p>
Government Skills	<p>UK: N/A</p> <p>NI: Forecast to decrease by 0.1% during 2004-2014</p> <p>Date of research: 2007</p>	<p>Priority focus is on leadership and project / people management. At administrative grades there is a need for administrative and customer service skills followed by team working and oral communication. At higher levels, there is a greater need for strategic thinking. Policy making is a key priority skills gap</p> <p>Unless job specific/ need for a degree, skills will be required across all levels with competency levels being most important</p>
Improve Ltd.	<p>UK: N/A</p> <p>NI: Total employment in the NI food and drink sector is forecast to fall by around 4% between 2004-2014 (though 6,000 replacement demand jobs to be filled)</p> <p>Date of research: March 2007</p>	<p>Core skills gaps exist in supervisory and management roles. There are a lack of soft skills including man-management, communication skills, motivation and team building. There is evidence of low general literacy and numeracy levels amongst the workforce and increasing need for basic IT literacy</p> <p>Future demand will require skills at all levels from level 2 upwards with occupations moving away from low level towards technician qualified</p>
LANTRA	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: March 2007</p>	<p>Skills gaps include management skills in planning and organisation, communications, literacy and numeracy skills, and finance and accounting skills. Future skills needs identified are health and safety training, computing/ IT, improving self learning and technical skills</p>
Lifelong Learning UK	<p>UK: Almost 300,000 new recruits will be required across the UK in the lifelong learning workforce by the year 2014 to satisfy both replacement and expansion demand.</p> <p>NI: N/A</p> <p>Date of research: 2006</p>	<p>This sector is expected to become even more dominated by a higher number of professional occupations - 56% by 2014, an increase of 3%. The lifelong learning sector has a high replacement demand raising considerable issues in relation to skills development, career progression and succession planning. There is a need for skills related to leadership and management and an increasing demand for transferable and wider employability skills including ICT and customer service skills and skills for professionals such as teaching and supporting learning</p>
People First	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: April- October 2005</p>	<p>Employers are most worried about the level of chef skills, customer handling and communication skills. In addition, but to a lesser extent, employers are reporting skill gaps for management and leadership with the prevalence of effective managers essential for future performance</p>
Pro Skills	<p>UK: The Proskills UK workforce is expected to fall by 10% by 2014. Most of these losses are forecast to occur in the Skilled, Operative and Elementary occupational areas</p> <p>NI: No figures specific to NI available</p> <p>Date of research: November 2006</p>	<p>Basic skills and attitude to work have been highlighted as a priority amongst employers making recruitment difficult</p>

	Employment growth prospects	Selected skills issues
SEMTA	<p>UK: N/A</p> <p>NI: Employment projections between 2005 and 2014 point to an overall net increase in 600 employees within the engineering sector or an average annual growth rate of 0.2%. The projections point to a net requirement of about 12,000 new employees (1,350 per annum) to replace those who leave their jobs because of retirement etc.</p> <p>Date of research: N/A</p>	<p>Hard to fill vacancies include skilled trades, process plant and machine operatives, managers and professional staff. Skills gaps exist for operators, craftspersons and technicians. Technical and engineering skills lacking at all levels e.g. welding, metal working skills and mechanical engineering skills</p> <p>2008-2014 need for NVQ Levels 3, 4 and 2 (1,900, 1700 and 1,600 employees respectively). General demand for a higher level of academic qualifications</p>
Skillfast	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: N/A</p>	<p>The recruitment needs of the industry centres on operator roles and suitably skilled designers and marketing professionals. Gaps in core technical skills and knowledge. Gaps exist in terms of product development and ICT</p>
Skillsactive	<p>UK: N/A</p> <p>NI: Between 2004 and 2009 average annual growth in employment is forecast to be 1.9% with average annual replacement demand of 2,300</p> <p>Date of research: March 2007</p>	<p>The most common areas of skills deficiencies are planning and preparing work, specific technical skills, team working, communications, maintaining safety and management skills</p>
Skillset (Creative media)	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: N/A</p>	<p>Within creative media there is a recognised shortage of business, management and leadership skills. There is a shortage of key talent at producer and senior producer level.</p>
Skills for Care and Development	<p>UK: Employment is expected to expand by almost 10% in the next ten years. This coupled with a high replacement demand ratio gives a total recruitment requirement for the next decade of almost 50% of current employment levels</p> <p>NI: N/A</p> <p>Date of research: 2006</p>	<p>There will be a need for fewer professionals and more generic workers; flexibility; communication and cultural awareness skills. In terms of generic skills, essential skills and language skills will be particularly important along with ICT skills, administration and e learning</p>
Skills for Health	<p>UK: N/A</p> <p>NI: N/A</p> <p>Skills for health: N/A</p>	<p>Essential skills are a key priority. Leadership and management skills are also essential.</p> <p>Increases in qualification levels 2, 3 and 4 to support career and educational progression pathways and underpin new and expanding roles. Supply of training and further and higher education provision will also play a major role for future development of the sector</p>
Skills for Justice	<p>UK: Expansion demand -16,000 by 2014 (though 125,000 replacement demand)</p> <p>NI: N/A</p> <p>Date of research: 2004</p>	<p>The predominant skills gaps identified in NI (2006) are management skills and general IT user skills. Other areas include writing skills, teamwork and an emerging need for foreign language skills. Difficulty in recruiting managers, professionals, administrative and secretarial staff</p>

	Employment growth prospects	Selected skills issues
Skills for Logistics	<p>UK: N/A</p> <p>NI: IER/ SSDA forecasts suggest that the NI logistics industry will not expand in total numbers between now and 2014, however replacement demand will require the sector to gain one-third new workers up to 2014</p> <p>Date of research: 2004</p>	<p>Key areas of skills gaps include communication and customer skills, literacy and numeracy, supervisory skills and ICT skills.</p>
Skillsmart Retail	<p>UK: N/A</p> <p>NI: According to Working Futures II between 2004-2014 14,000 new retail jobs are expected to be created in NI (expansion demand) while a further 32,000 will need to be filled as a result of people leaving the sector (total requirement of 46,000 jobs)</p> <p>Date of research: 2004</p>	<p>Skills deficiencies at store management level; the need for improved skills among independent retailers; the need for upskilling among sales occupations and the need to attract and retain the necessary labour supply</p>
Summit Skills	<p>UK: N/A</p> <p>NI: N/A</p> <p>Date of research: N/A</p>	<p>The basic skills of new entrants to the sector and the IT skills of experienced staff need to be improved to ensure productivity. Skills based around communication skills, IT and multi-skilling will continue to be of great importance</p>
Cogent	<p>UK: The Cogent sector is expected to decline over the next 10 years (negative expansion demand)</p> <p>NI: Total requirement of an additional 2,000 employees needed in NI coming from replacement demand</p> <p>Date of research: 2005</p>	<p>There are issues with regards to a low number of applicants applying for jobs in the Cogent sector and those that do apply lacking experience. These reasons were stated for professional and skilled trade occupations and in particular a lack of generic IT skills was the skills need highlighted by employers. Innovation will be fundamental to the success of the industry and the need to grow a population of technicians</p>
Financial Services	<p>UK: An annual growth of 0.6 per cent for the nation's employment in financial services between 2008-2010</p> <p>NI: From 2007-2010, 100 net additional expansion demand jobs pa (2,800 replacement demand)</p> <p>Date of research: 2006</p>	<p>Workforce attitude to achievement and commitment to the business are considered to be most important for improving productivity levels over the next 5 years. Development through training is considered to be very important and also development of business and interpersonal skills and industry and technical skills.</p> <p>Graduates will continue to be in higher demand (mainly NQF levels 5,4 and 3) although subject studied will be less important</p>

Source: SSAs, Oxford Economics

Theme 1: How to achieve a better NI

- Table H.7 summarises results from the interviews and surveys on how to achieve a better NI economy. The results identify **upskilling** as the most important factor in achieving a better NI. 100 per cent of respondents believed that training and development at all levels from entry to executive management was paramount to the success of the NI economy. (Upskilling across all levels of education was also cited as extremely important for social inclusion and the reduction in the number of long term unemployed)

Table H.7: How to achieve a better NI – consolidated interview and survey responses

	Respondents
Upskilling current workforce	100%
Expansion of indigenous businesses	67%
More FDI	47%
Focus on key priority sectors	47%
Business start ups	40%
Fewer jobs in lower productivity sectors	27%
Single high productivity investments	13%

Source: Oxford Economics consultations and survey

- The **expansion of indigenous business** and more FDI were also cited as important factors in delivering a better NI. The ability to nurture local businesses was considered particularly important as indigenous companies are more likely to stay in the long-run and potentially develop in sectors for which NI is not automatically seen as internationally competitive by inward investors. E.g. companies such as ALMAC.
- Interviewees also believed that across the board FDI was more important than focusing on one sector as economic forces and technology and the prevailing risks and opportunities change too quickly.
- A view was expressed that there is a need to **grow something unique for NI** rather than focussing specifically on sectors such as financial and business services which are already well established in London and Dublin, and in light of the credit crunch may not offer the same assumed growth opportunities as in the past decade. Examples of alternative sectors for growth from those consulted included software development, creative industries and life sciences.

‘90% of businesses within NI employ fewer than 10 people. We don’t have the corporations to compete with London or Dublin’

A selection of responses from SSCs on the question of how to achieve a better NI is provided below.

Table H.8: How to achieve a better NI – selected SSC and Invest NI responses and opinions

SSC / Invest NI sector	How to achieve a better NI
Automotive Skills	<p>Priorities in order of importance:</p> <ol style="list-style-type: none"> 1. Upskilling 2. Expansion of indigenous business 3. Fewer jobs in future in lower productivity occupations (though in many industries including automotive, a significant number of lower grade occupation jobs are always needed for specialist roles such as valeting and tyre fitting) 4. Focus on key priority sectors - need to export 5. New business starts 6. More FDI - Single high productivity investments
Skillsmart Retail	<p>Priorities in order of importance:</p> <ol style="list-style-type: none"> 1. Upskilling - the primary focus must be on improving the skills of existing employees from entry to executive management level. 2. New business starts 3. Expansion of indigenous businesses 4. More FDI - large scale FDI must be long term and without the risk of companies receiving substantial Government support to launch and then moving on 5. Fewer jobs in future in lower productivity occupations - lower productivity jobs, such as those in retail, are still essential for the economy in terms of entry points, social inclusion and upskilling.
Improve – Food and drink	<p>Priorities in order of importance:</p> <ol style="list-style-type: none"> 1. Upskilling – a major contributor to added value is that made by better skilled and hence motivated staff 2. Fewer jobs in future in lower productivity occupations 3. Focus on key priority sectors 4. Single high productivity investments - as part of a robust and holistic development plan which includes training and upskilling 5. Expansion of indigenous businesses 6. More new business starts - this would be important within the SME and craft sub sectors of the F&D industry 7. More FDI - whilst always welcome, the underlying strategic reason should be borne in mind i.e. with a view to European market access and based on short term funding may not always be the best long term positive for Northern Ireland

Source: Oxford Economics survey

Theme 2: Skill and occupation requirements

- It was perceived by some that the longer-term trends in skill demand within many industries could change so rapidly making it difficult to predict future requirements. In saying this developing core skills such as literacy, numeracy and IT will still be essential to delivering a capable workforce.

'The best way to increase productivity for businesses would be to provide more well-rounded, confident individuals with the ability to be trained.'

- In sectors such as tourism skill requirements are across the board and not just focused on graduates.
- For occupations within health, social care, tourism and law/ justice, the availability of foreign language skills will be essential over the next decade

Table H.9: Skill and occupation requirements – selected SSC and Invest NI responses and opinions

SSC / Invest NI sector	Skills and occupation requirements
Skillsmart Retail	<p>At shop floor level a set of fairly general skills and attitudes are needed. At management level the quandary for employers is whether to promote from within relying on able and experienced people to rise through the ranks, or whether to recruit externally from a labour pool with higher levels of formal qualifications.</p> <p>The three main occupations are:</p> <ul style="list-style-type: none"> Sales and customer service (54% of total, source LFS) Managers and senior officials (20%) Elementary occupations (9%) e.g. shelf-fillers, trolley collectors <p>The largest forecast increase in occupations will be in management occupations</p>
Eskills - IT & Telecoms	<p>Detailed analysis of changes across IT & Telecoms professional occupations over the last six years shows that there has been a significant shift into higher level roles.</p> <p>Technological change and globalisation are both contributing to these dynamics, with large volumes of traditional entry level work now being sourced to other countries.</p> <p>In NI the IT employment growth forecasts and scenarios report shows that under the central forecast:</p> <ul style="list-style-type: none"> Software professionals and strategy & planning professionals are expected to grow at the fastest rates over the next 15 years The number of IT operations technicians, IT user support and computer engineers occupations is not expected to change significantly over the period 2006-2010

SSC / Invest NI sector	Skills and occupation requirements
Life Sciences	The Almac Group, the largest employer in this sector, has identified skills shortages particularly for chemists (medicinal and analytical), biologists and bioinformaticians and has and will be required to recruit from outside Northern Ireland to fill positions in these areas

Source: Oxford Economics survey

Theme 3: Higher level skill needs

- Financial / business services, ICT, life sciences and software sectors all suggested that the demand for graduates was critical

‘As competition for skills increases on a global scale there is a need to ensure that supply within NI can keep up. If we can do this the jobs and businesses will continue to grow’

- There is a high demand for graduates from within the IT sector. This need for IT graduates is not only specific to the IT sector but also covers other sectors in the economy with IT-related occupations.

‘Taking into account the current supply of labour, the IT sector will not meet its labour demand locally. If growth occurs in other sectors, the demand for IT graduates will rise again’

- Whilst there is demand for more graduates, the huge variance in quality of degrees is becoming more prominent and employers are becoming more selective with regards to degrees. For example, the manufacturing sector is less impressed with today’s graduates, many of which it terms as ‘broad brush’ graduates.
- There was a general consensus that the undersupply of graduates in some sectors exists due to the lack of awareness of career opportunities available. Some interviewees highlighted the importance of ensuring that careers guidance at all levels of education was well informed.

‘There is a need for more graduates and in particular more software engineers. There is a misconception of the industry that since the dot com bust which discouraged people from studying within the industry there is a general trend against science and technology’

- Not all sectors expressed a strong demand for high level formal qualifications. Some suggested less emphasis should be put on academic students moving towards professions and the public sector, and more gravitating toward business and entrepreneurship.

Table H.10: Higher level skill needs – selected SSC and Invest NI responses and opinions

SSC / Invest NI sector	High level skill needs
Pro Skills - process and manufacturing	There is an under-supply of graduates in the sector probably due to the lack of awareness of opportunities and some employers have had poor experiences when recruiting graduates
Improve Ltd - Food and Drink	An under-supply exists, and this is exemplified with the low numbers taking full time degree courses linked to a career in the Agri-food sector

Source: Oxford Economics survey

Theme 4: Graduate subject demand

- There is a high demand for STEM graduates. More specifically interviewees from within the STEM sector expressed their concern that the number and quality of graduates within science and engineering has been dropping at alarming rates negatively impacting upon the future potential and growth of the NI economy.
- Subject studied is clearly more important for some sectors compared to others. For example the manufacturing sector specifically requires core STEM qualifications as a base as knowledge acquired cannot easily be taught on the job and therefore subject studied is clearly very important. For financial services however subject tends to matter less as the working environment is better suited for on-the-job training and more appropriate for finding professional courses for specific work-related activities.

Table H.11: Graduate subject demand – selected SSC and Invest NI responses and opinions

SSC / Invest NI sector	Subject Demand
Improve Ltd - Food and Drink	<p>The subject area is important e.g. professional qualification important where auditing or sign off is required (major health & safety and Customer requirement)</p> <p>Subject balance of graduates in employment is current considered adequate</p>
SEMTA - Aerospace	Sector requires graduates with a specific sound mechanical engineering background
Life Sciences	In relation to the Almac Group, the SEMTA study found gaps in a range of both scientific and generic skills. The main scientific skills gaps were in: bioscience and molecular biology, analytical and physical chemistry, biochemistry, biotechnology/biopharmaceuticals, genomics / proteomics / metabolomics, synthetic organic chemistry / medicinal chemistry, mathematics and statistics
Energy & Utility Skills	The EU Skills sector is a particularly STEM 'hungry' sector with the proportions of graduates entering the sector with STEM qualifications relatively high across each of electricity, gas and waste, averaging just under 30 per cent compared to just under 10 per cent in the whole economy. Only the mining and construction industries have a higher share of STEM graduates of total graduate entrants to the sector

Source: Oxford Economics survey

Theme 5: Generic skills

- Interview techniques, presentation skills and team work are seen as the major skills lacking in the NI workforce

‘The quality of personnel available for recruitment in NI has been reducing over the last 10 years. Lower entry requirements at universities is one of the major factors contributing to this trend’

- The non-formal skills cited as important for future economic growth in the NI economy were;
 - Flexibility and adaptability;
 - Problem solving;
 - Communication skills;
 - Creative thinking
 - Entrepreneurship;
 - Ability to cope with change;
 - Business acumen;
 - Customer service;
 - People management; and
 - Emotional maturity.
- Changing attitudes, increasing training, and growing more well rounded individuals capable of problem solving and good communication skills, as well as acknowledging the contribution of the private sector in generating wealth, should be a target of government policy.

‘The NI workforce has the capability to achieve a lot more however we have to instil a sense of confidence. One way to do this is through training and development within all levels of education and continuing on through employment’

Table H.12: Transferable / generic skills – selected SSC and Invest NI responses and opinions

SSC / Invest NI sector	Transferable/ generic skills
Improve Ltd - Food and Drink	<p>Future needs - leadership skills, communication skills, crisis management (e.g. food scares etc), marketing skills associated with food (e.g. branding, category management, costing and globalisation).</p>
SEMTA - Aerospace	<p>Need essential skills to operate in modern manufacturing environment. Team building and broader skills can be developed through training, development and experience. A number of companies have raised the issue of poor essential skills in new start job applications</p> <ul style="list-style-type: none"> • Team building; • Innovative – business improvement techniques • Creative thinking – problem solving
Automotive Skills	<p>Basic skills - many employers believe the standard of literacy and numeracy of too many school leavers is inadequate for even the most basic requirements of business.</p> <p>Generic skills - these skills are in short supply, coupled with insufficient proficiency both among existing employees and new recruits. This has a significant impact on quality of service</p> <p>As technology moves on at pace IT skills will increasingly be required in the sector</p>
Construction Skills	<p>Literacy and numeracy are an issue</p> <p>Management and leadership skills also an issue – especially communication and team building as a result of increased supply chain working and partnerships (NI builders working together to deliver larger contracts)</p> <p>Skills which will be more important in future include team building, project management and supply chain working</p>
Skillsmart Retail	<p>Good customer service skills most frequently identified as lacking in potential shop floor recruits.</p> <p>NI retailers have also identified a range of skills, qualities and attributes that are missing among potential store managers that are broadly consistent with those identified by retailers in the UK e.g. people management, leadership, verbal communication, customer service and team working.</p> <p>People-related skills are lacking at both shop floor and management level in retail</p> <p>Conceptual / thinking skills may well become more important in future especially among higher level retail occupations.</p>

SSC / Invest NI sector	Transferable/ generic skills
	<p>The skills required by managers of multiple retailers will continue to grow as their business units expand and the range of activities they are required to perform continues to diversify. Furthermore the skills required by managers and proprietors of independent retail businesses will increase significantly as they seek to compete with the dominant multiple retailers</p>
Government Skills	<ul style="list-style-type: none"> • Basic fundamental skills – IT, literacy, numeracy • People related skills – communication, interpersonal, team working, and customer service • Conceptual/thinking skills – collecting and organising information, problem solving, planning, learning new skills
Software	<p>IT graduates need to be given opportunities to develop software skills and awareness such as management, people related skills and business awareness skills</p>
Financial Services	<ul style="list-style-type: none"> • Employers consider that new entrants' communication skills, both oral and written, are one of the most important business and interpersonal skills that need improvement. • More important non-formal skills will include: problem-solving, reading , industry knowledge, team working, adjusting to change

Source: Oxford Economics survey

Theme 6: Other issues of note

- The plethora of qualifications and range of university and other further education subjects is not well understood and needs some form of management or formalisation.
- Interviewees believed there was a need to focus on essential skills such as literacy and numeracy as well as workplace expectations in schools and other educational institutions. One candidate identified a potential new subject to be offered in schools, preparation for the labour market, as something which could have a positive impact on the readiness of school leavers and graduates.
- Careers guidance within schools needs to provide more relevant information about the current and future job market. This service should have the capability to steer people in the right direction.

‘Careers guidance as well as government policy seems to be shoe horning kids into academia rather than all skills’

‘NI has the top 30% of students but also the lowest 20%, therefore we need to evaluate jobs more evenly. By pushing students into higher education there has been a loss of social cohesion and kids entering trades etc’

- In order to overcome the current shortages in supply of graduates, there is a need for a better system in forecasting the demand for supply of skills from university. Industry feedback as well as input from Invest NI could also play a key role in overcoming this problem.

High level summary of process and findings

By way of summary of this phase of the research, this annex chapter recapped in terms of the consultation and desk-based approach taken and actual findings from the process.

Process

- The importance and relevance of SSC reports (SSAs) was clearly evident throughout the consultation process
- It was difficult to get views from both sector and trade bodies on sectoral employment prospects and skill needs. Sector and trade bodies rely heavily on SSAs
- Consultees found it difficult to think how an aspirational outcome for the NI economy could be achieved
- Given that the requirement of this research was to provide forecasts for broad SIC sectors and SOC occupations, the evidence from the SSAs was less directly useful to inform the forecasts than if the project had required forecasts by individual SSC industry classifications
- The length and number of SSA reports meant that it was beyond the scope of this project to review each SSA in detail (and in any case the focus of this report is primarily an empirical 'macro' skills forecasting exercise)

Findings

- Upskilling was the most important factor from both interviews and surveys to achieve a better NI economy
- Growing something unique for NI is considered important in order to differentiate it from London and Dublin
- Changes across sectors such as IT and telecoms over the last decade show there has been a significant shift towards higher level skill roles
- Rapid changes in technology and global demand make it more difficult for some sectors to predict future skill requirements
- Literacy and numeracy are essential for delivering a capable workforce
- A lack of awareness of career opportunities has resulted in an under supply of graduates within some sectors
- Subject studied is more important for some sectors than it is for others
- The quality of personnel in NI available for recruitment has been diminishing. Generic skills such as customer service, people management and flexibility were cited as important for future development
- Some consultees felt that shoe horning young people into academia rather than a range of skills needs to be addressed by careers advisors and government policy
- There is a need for a system to forecast the demand for and supply of skills from university