

Investment in skills

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1 CONTENTS

Skills and Income: Main Messages	3
2 How Much is Invested in Skills?.....	7
3 Understanding Returns on Investments in Qualifications	18
4 Qualifications and the Life-course.....	27
5 Conclusions.....	32
6 Annex.....	33

Skills and Income: Main messages

- The weight of evidence suggests robust economic returns to individuals from investment in skills (or qualifications), which vary very substantially by type of qualification. In this paper, we elaborate three questions which follow: to what age do 'skills pay'; what are the expected average benefits that flow from some of the principal types of qualification; and how much, overall, is spent by government, individuals and employers on skills investment?
- We estimate total real terms spending on post-16 skills (i.e. working age) at approximately £60.6bn in 2014/2015. This figure is roughly equivalent to 2.81% of UK GDP. This is made up of £22.1bn state investment, £23.7bn from employers and £14.7bn from individuals; individual spending is up 37% in five years and driven by the expansion of loan funding. Note that data for estimating individual investment in skills is lower quality than that for government and employers. Importantly, the estimates exclude the cost of the time it takes to train (and indeed the time of trainers/educators). Individual investment has grown as state spending has retreated, while employer investment has held steady in England, but has dropped in Scotland, Wales and Northern Ireland.
- Noteworthy trends within these spending patterns include: employers are investing much more on management training, while spending less overall on the cost of training each person. There is an increasingly evident movement towards individuals investing more in skills. For government, meanwhile, spending on 16-18s has grown slightly, while spending through the Skills Funding Agency on adults over the age of 19 (aimed most at basic skills as well as vocationally specific skills) has fallen by a quarter between 2010/11 and 2014/15 and higher education (HE) spending (we exclude research and capital, but we include maintenance) has declined by 47% in England, as loan funding has expanded. Spending in the other nations of the UK follow different patterns.
- Using cost-benefit approaches, and drawing on existing research findings, we estimate the average 'net present value'¹ (NPV) of a bachelor's degree at £229,762² (the benefit is higher for women than for men, allowing for costs and different wage uplifts). For each £1 invested, there is a return of £5.15 for men and £8.45 for women. There are also large gains for government from HE in the form of a larger tax take and increased National Insurance contributions. Following a single year's cohort across a 40 year working lifespan, the total NPV is approximately £105.8bn. For vocational qualifications, the costs and the benefits are lower. For Level 2, we estimate the NPV at £35,885 and £53,506 at Level 3. However, in

¹ Net present value refers to the costs of learning subtracted from the benefits; the figures used in this document have been discounted using the HM Treasury recommended rate of 3.5%.

² This figure uses 2013/14 prices, and is weighted in line with the average gender split, as taken from UCAS statistical releases.

investment terms, the return on investment (ROI) is higher from vocational qualifications than from degrees: £10.54 at Level 2 and £15.53 at Level 3. The data on A-levels does not allow direct comparison with degrees and vocational qualifications. However, we estimate that the wage uplift is approximately 15% and the average lifetime gain from undertaking A-levels is approximately £58,100.

- Assuming more people may need to re-skill themselves as working lives lengthen and technological change disrupts economic trajectories, the question of whether there are really 'lifetime gains' from qualifications assumes greater urgency. At what age does re-skilling 'stop paying'? At Level 4+ (this comprises all skill levels above the first year of a degree) we find there are no financial disadvantages to undertaking skills development up to an individual's mid-forties. After 45, there are clear and statistically significant wage penalties. At Level 3 (roughly equivalent to two A-levels) and Level 2 (equivalent to five GCSEs at A*-C), we find that the age-related 'tipping point' for income gains is much lower – at about age 30 at Level 3 and at about the age of 25 for Level 2. There are income related disadvantages after these ages to undertaking Level 2 and 3 qualifications. For Level 4+, the disadvantages are delayed until the age of 45.

1 Introduction: purpose of the paper

- 1.1 Among the many reasons to learn, public policy focuses almost exclusively on the economic. Skills are seen as a form of capital in which investments can be made with costs and benefits shared by the three investing parties: individuals, government and employers. Hence the notion of a 'return'. There is a substantial literature which attempts to explore the nature of returns to skills, or, to be more precise, to qualifications³. In general, the findings can be summarised as, first, 'skills pay'⁴; and, second, that income generally tends to increase with qualification level (albeit with some notable exceptions⁵). However, the intellectual and practical challenge of separating qualifications from the many other possible influences on income - experience, attitude, character, gender, background, life choices, place of residence and general happenstance to name but a few – remains undiminished, and it is important to position qualifications within a wider understanding of factors that shape material and psychological wellbeing.
- 1.2 This paper seeks to contribute three specific elements to this debate.
- First, it aims to quantify the scale of the investment in skills by understanding, as far as is possible, the investments of the different parties (employers, individuals and government) into skills in the UK.
 - Second, it summarises what is known of costs and benefits, using existing research findings in order to do so; it also estimates the overall wage gain from some principal qualification types.
 - And third, it uses data from the Labour Force Survey to estimate when in a person's life-course qualifications are likely to stop being economically worthwhile.
- 1.3 Briefly, it is worth clarifying the scope of the project.
- 1.4 The project restricts analysis to investments in the post-16 education system. Obviously, this excludes a very large proportion of spending in any advanced society

³ Bhutoria, A., 2017. [Economic Returns to Education in the United Kingdom](#). London, UK: Foresight, Government Office for Science.

⁴ See, for example, Blundell, R., Dearden, L., Meghir, C., 1996. *The Determinants and Effects of Work-Related Training in Britain*. London, UK: Institute for Fiscal Studies, 1996; Vignoles, A., Galindo-Rueda, F., Feinstein, L., 2004. *The Labour Market Impact of Adult Education and Training: A Cohort Analysis*. *Scottish Journal of Political Economy* 51(2), pp. 266-280; Dearden, L., Reed, H., Van Reenen, J., 2006. *The impact of training on productivity and wages: Evidence from British panel data*. *Oxford Bulletin of Economics and Statistics* 68(4), pp. 397-42.

⁵ For example, controversy has surrounded the economic value of some Level 2 qualifications. See p.31 of the Review of Vocational Education (The Wolf Report), March 2011. London, UK: Department for Education. However, the jury remains out on this point. For example, using matched education (ILR) and salary data (from HMRC), Peter Urwin and colleagues demonstrate strong returns at Level 2. See Urwin, P., et al., 2015. *Further Education, Social Mobility, Skills and Second Chances*. London, UK: Centre for Employment Research.

on schools and other facilities for young people below the age of 16 (including early years). The focus here is the working age population against the background of the rising importance of skill formation systems within knowledge based societies: as working lives lengthen and disruptive technological advances accrue, more people may need to retrain during their working lives.

- 1.5 There are many different types of qualifications, but research in ‘returns’ tends to concentrate on just a few. Some of the most familiar will be academic qualifications, such as GCSEs, A-levels and bachelor’s degrees. Less well known, but often affecting more people than at least A-levels or degrees, are the perpetually evolving array of vocational qualifications, of which the most familiar will be awards, certificates and diplomas. In addition, there are apprenticeships which are technically jobs rather than qualifications (although qualifications are elements of apprenticeships). Research on returns often muddies the distinctions by invidious comparisons (of apprenticeships and degrees, for example) and potentially clumsy categories such as ‘Level 2’. To demonstrate just how potentially misleading it can be to lump all ‘Level 2s’ in together as if they represent a standardised baseline of skill, it is worth bearing in mind that a Level 2 can stand for five GCSEs at grades A*-C, a couple of hours of training in food safety in retail costing £50 (the cheapest qualification in the Skills Funding Agency’s Level 2 funding catalogue)⁶, and a Level 2 diploma in animal and veterinary science costing £11,300 (the most expensive). For the purposes of research into returns such fundamental differences tend to be glossed over in the pursuit of placing monetary values on qualifications. Our research suffers the same shortcomings.
- 1.6 Finally, arriving at overall estimates for learning investment involves the use of disparate, discontinuous datasets. Assumptions are unavoidable, but we endeavour to describe these clearly and advise on the limitations of the findings that are the most open to challenge. In addition, data limitations have necessitated decisions that open us up to the charge of being inconsistent. For example, in the cost-benefit calculations undertaken in chapter 2 we include ‘opportunity cost’ – the time it take to learn. However, we have excluded opportunity cost for employers from the investment estimates in chapter 1 because we do not have data for individuals and doing so offers (in our view) a clearer understanding of strictly financial investment. Once more, we endeavour to be as straightforward as possible with caveats and cautions.

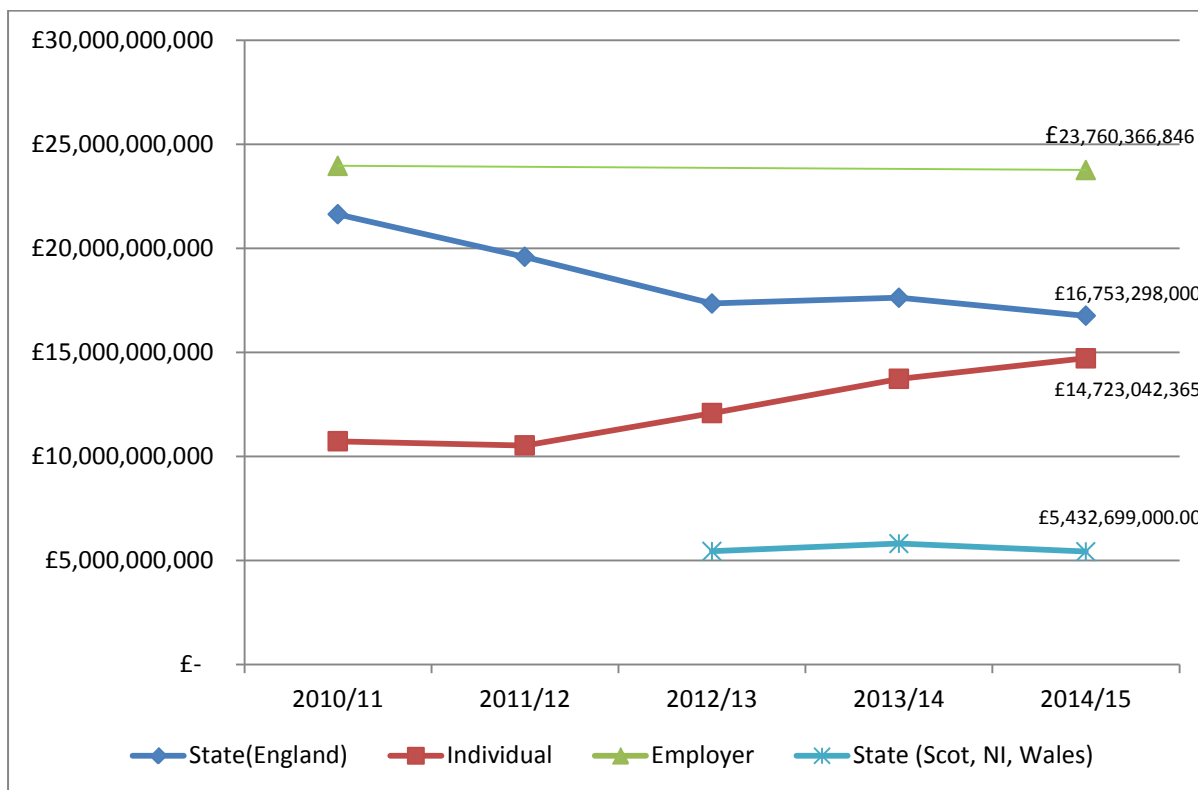
⁶ See Skills Funding Agency, Simplified Funding Rates, 2015/16, available at <https://www.gov.uk/government/publications/qualifications-simplified-funding-rates-2015-to-2016>

2 How much is invested in skills?

- 2.1 We explain more about the limitations and assumptions in the sections below that deal with government, individuals and employers separately. However, the overall estimate for spending on post-16 skills in the UK we put at £60.6billion.
- 2.2 In terms of the trends among the three players in the learning market, employer spending is broadly flat at about £23.7bn, while individual investment in skills, propelled by increasing use of loan funding, has grown by 37% to £14.7bn between 2010/11 and 2014/15. Government spending on learning has fallen by 23% to £16.7bn in England; but spending in the other nations of the UK (especially Scotland) has not witnessed comparable trends.
- 2.3 In considering these sums, it is worth remembering that they do not include the time it takes to learn (the 'opportunity cost'). The decision about whether to include opportunity cost makes a very large difference to the totals; for example, if the opportunity cost for employers of having their staff undertake training is included as part of the 'investment' (as arguably it should be) it almost doubles the assessment of employer spending (from £23.7bn to £45.4bn in 2015. In addition, the source we have used for government spending (the OSCAR public spending database⁷) is not as complete for Scotland, Northern Ireland and Wales (skills is a devolved issue) as it is for England and so does not allow full analysis of trends across the 2010/11-2014/15 years for the UK as a whole. Data for Scotland, Wales and Northern Ireland are shown for three years between 2012/13 and 2014/15 in figure 1 below.

⁷ The Online System for Central Accounting and Reporting (OSCAR);
<https://data.gov.uk/dataset/oscar>

Figure 1: Total real terms spending on post 16 skills from government, employers and individuals, UK, 2010/11-2014/15 (£, bn)



Source: OSCAR public spending database; SFA Annual Reports; UKCES; NALS (New Economy calculations)

2.4 So who spends most on skills in the UK – government, employers or individuals? The answer is almost certainly the state (if we discount opportunity cost). Adding together spending in England, Scotland, Wales and Northern Ireland gives a total of £22.2bn; but to this should also be added the amount the state spends on developing its own employees, as detailed later (about £2.9bn). This suggests the state remains the primary investor in post 16 learning, spending £25bn in 2014/15.

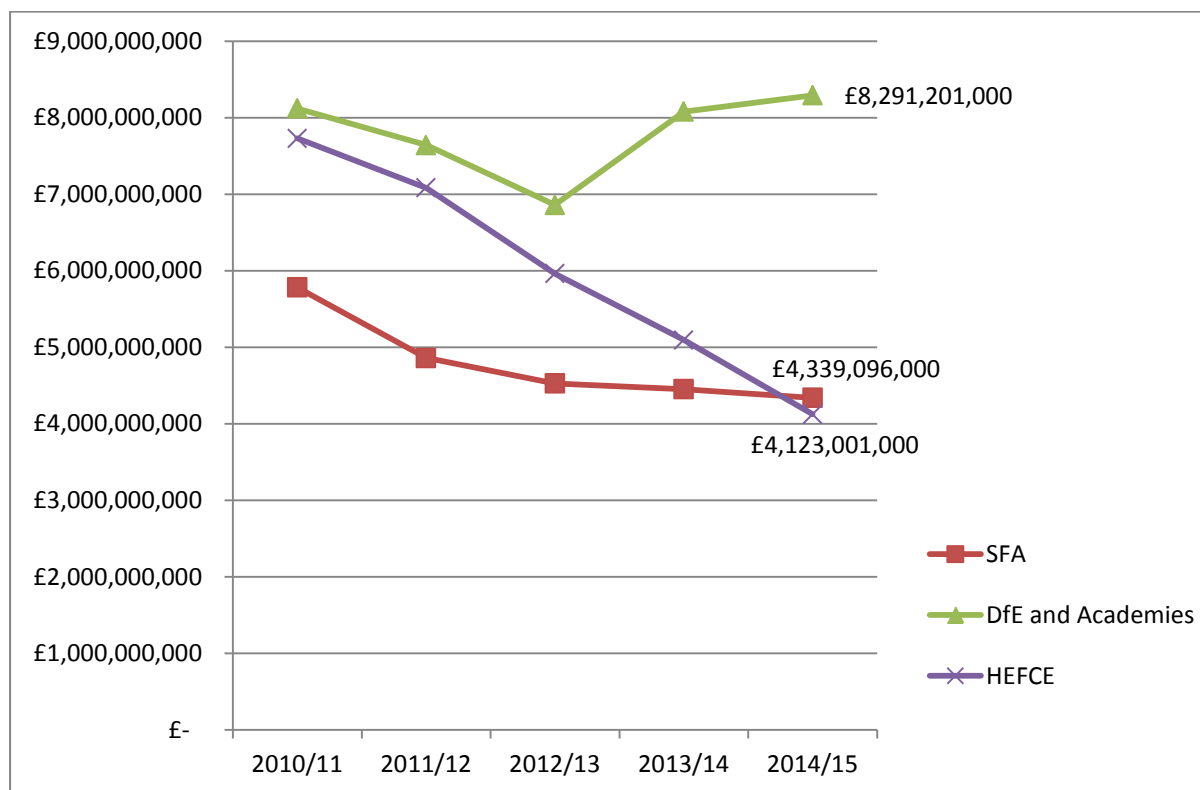
Government spending

England

2.5 The data is derived from the OSCAR public spending database. Of the different elements that make up government spending on post-16 skills, the biggest single item is Department for Education investment in 16-18 learning spent through the Education Funding Agency and the academies programme totalling £8.3bn. This funding was slightly higher than it was five years previously, having declined and risen in the intervening years to stand 2% higher in 2014/15 than it was in 2010/11. Most striking is the rapid fall in investment in HE via HEFCE, which has declined by 47% over the years in question to stand at £4.1bn in 2014/15. The likely interpretation

here is that there has been a reduction in state spending as loan funding from individuals has expanded. The Skills Funding Agency (SFA) budget, meanwhile, dedicated to spending on post 19 learning, has declined by 25% to £4.4bn.

Figure 2: Real terms government spending on post-16 learning in England, 2010/11-2014-15

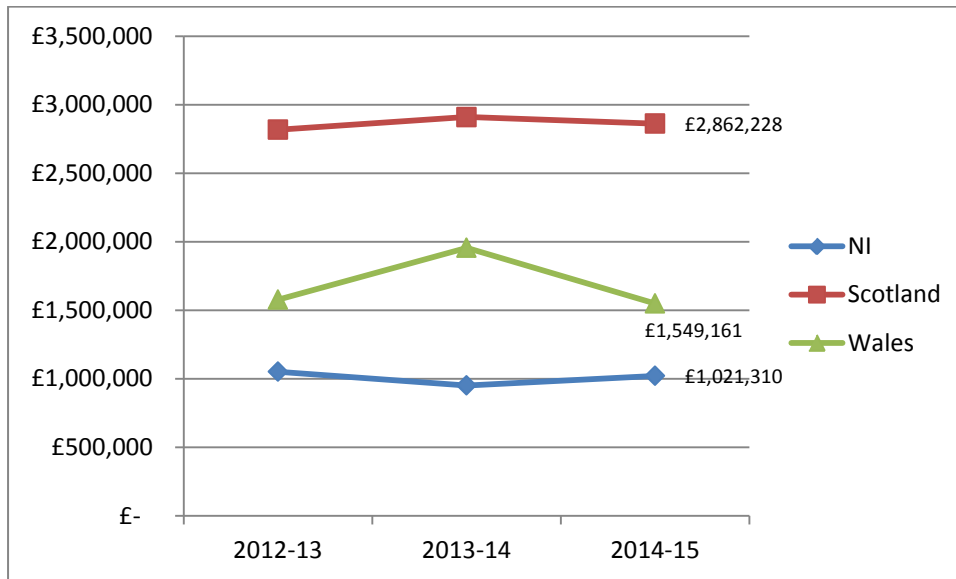


Source: Oscar public spending database; SFA annual reports

Scotland, Wales and Northern Ireland

2.6 Since the late 1990s, education and skills have been devolved to the administrations in Holyrood, Stormont and Cardiff. Data is available on post-16 skills spending in the three areas for 2012/13, 2013/14 and 2014/15 from OSCAR. The data covers a shorter period of time than that which covers England. However, notwithstanding the shortened period, it suggests notably different patterns, especially in Scotland. Scottish spending on skills, once adjusted for inflation has risen slightly over the three years from £2.61bn to £2.86bn. It has dipped fractionally in Northern Ireland (by-2%) from £1.05bn to £1.02bn. Meanwhile, in Wales, spending has risen between 2012/13 and 2013/14 before falling the following year. Overall, in 2014/15 spending on post-16 skills in Wales was £1.54bn.

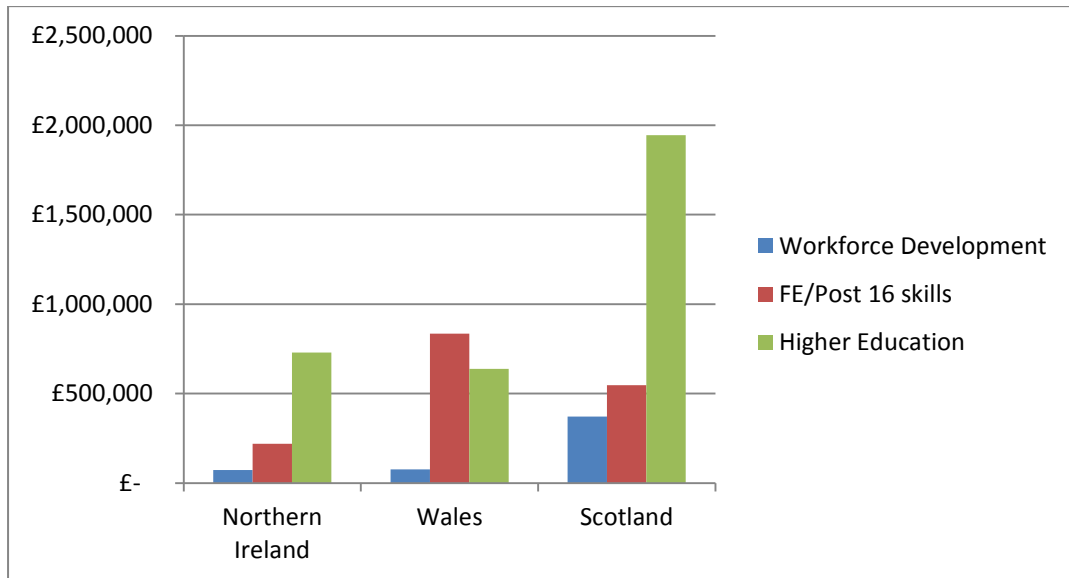
Figure 3: Real terms spending in Scotland, Northern Ireland and Wales, 2012/13-2014/15 (£,m)



Source: OSCAR public spending database

2.7 In terms of the breakdown of how Scotland, Northern Ireland and Wales spend their resources, the categories of spending are phrased differently both from England and from each other, as might be expected in the wake of devolution (for example, OSCAR does not have a FE category for Wales, but does have a ‘post-16 education’ spending line, unlike the others). For this reason the chart should be treated as indicative. The chart shows the broad patterns of spending in the year of 2014/15. Although spending on the Scottish HE system appears to be high, it is actually Northern Ireland that directs the largest proportion of the total resources invested in skills into HE (71% in Northern Ireland; 68% in Scotland).

Figure 4: Skills Investment in Scotland, Wales and Northern Ireland, 2014/15 (£, m)

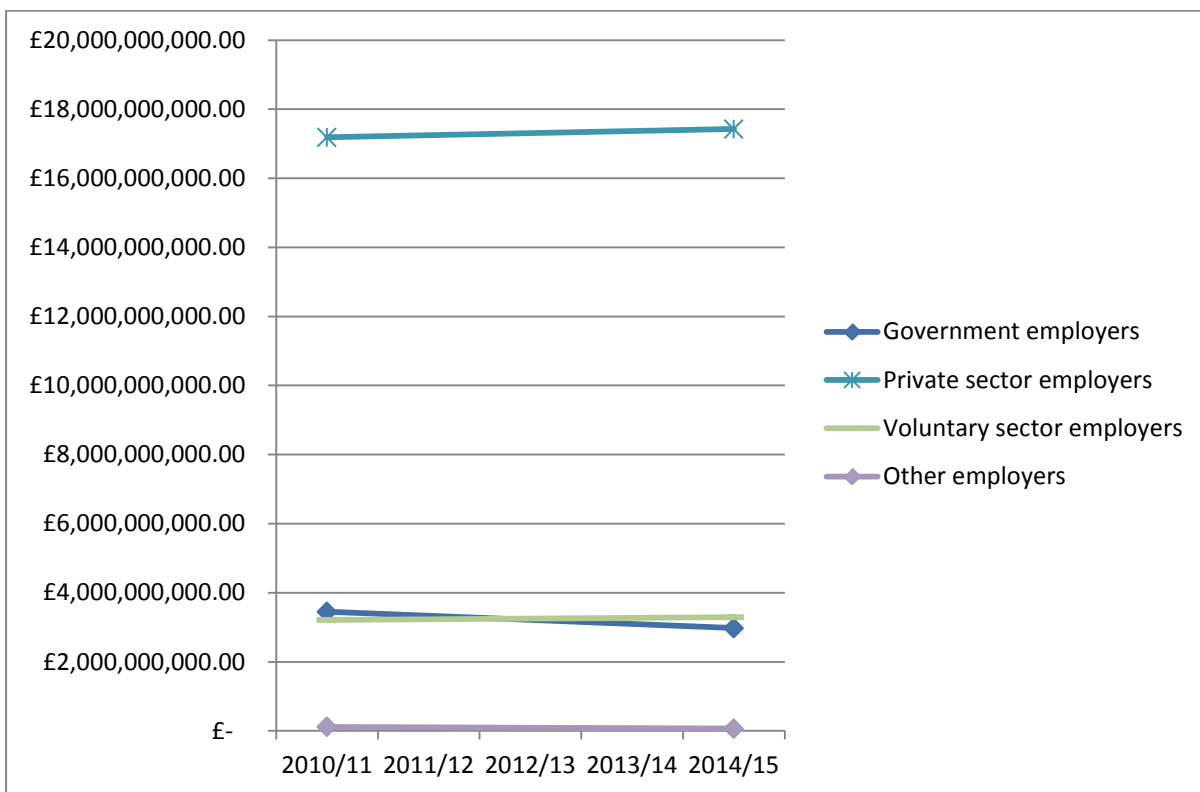


Source: OSCAR public spending database

Employers

2.8 Regarding employers, the chart suggests that it is public sector employers who have reduced their spending relatively substantially, from £3.4 billion down to £2.9 billion, a fall of 14% - another, different reflection of the state's decline in learning investment. The biggest investors in skills are private sector employers, who have slightly increased their levels of investment from £17.1bn to £17.4bn (up 2%). Voluntary sector investment is broadly flat at approximately £3.2bn, while the 'other employers' category (including membership organisations and various other types of employer) has decreased the fastest (by 41%) down to about £68m.

Figure 5: Real terms spending by type of employer, 2010/11-2014/15



Source: UKCES Employer Skills Survey/Investment in Training Survey, 2011 and 2015⁸

Analysing the type of spending undertaken by employers across the years in focus shows that within the broadly flat spending profile of employers, management training is the fastest rising type of skills investment, the scale of which has increased by almost a fifth between 2011 and 2015. Meanwhile, fees awarded to external providers of training have fallen sharply by a quarter. Another notable fall is the amount spent per person trained (-19%). Spending per employee has changed relatively little over the period, but is slightly down over the five years in question. Training during working time has fallen by 7% between 2011 and 2015 while training ‘off-the-job’ has increased very slightly.

⁸ The 2013 Investment in Training Survey does not allow breakdowns by type of employer

Figure 6: Real terms spending by employers on skills by type of investment (UK), 2011-2015

	2011	2013	2015	% change 2011-2015
Total (£,bn)	46.8	44.4	45.4	-3%
On job (£,bn)	24.3	22.4	22.5	-7%
Off job (£,bn)	22.5	22	22.9	2%
Training cost minus wages/opp cost (£,bn)	23.9	22	23.8	0%
Fees to external provider (£,bn)	2.9	2.5	2.2	-24%
Management training (£,bn)	6.5	6.7	7.7	18%
Per person trained £,thousand)	3.2	2.7	2.6	-19%
Per employee (£,thousand)	1.7	1.6	1.6	-6%

Source: ESS/Investment in training survey

2.9 By far the biggest tranche of employer spending in the UK (86%) comes from employers in England. The following four tables show the breakdowns in spending on skills for employers for the four nations of the UK. Spending on management training has risen very substantially across all areas, especially in Wales, over a period during which overall spending has reduced slightly.

2.10 There is a significant and divergent trend between skills investment by English employers and employers elsewhere in the UK. In England, investment has dipped only very slightly in five years (by -2%); contrast that pattern with the large falls elsewhere. Scotland and Northern Ireland have seen the sharpest relative falls in spending on skills investment among employers; in both these areas, spending has plunged by a quarter. Spending on training from external providers has fallen least quickly in England and fastest in Wales. Investment per person trained has fallen fastest in Scotland.

Figure 7: Real terms employer spend in England, 2011-2015

	2011	2013	2015	% change
Total (£,bn)	39.8	37.5	39	-2%
On job (£,bn)	20.9	19	19.6	-6%
Off job (£,bn)	18.9	18.5	19.4	3%
Training cost minus wages/opp cost (£,bn)	20	18.4	20.3	2%
Fees to external provider (£,bn)	2.5	2	1.9	-24%
Management training (£,bn)	5.4	5.7	6.5	20%
Per person trained £,thousand)	3.2	2.7	2.7	-16%
Per employee (£,thousand)	1.7	1.6	1.7	0%

Source: ESS/Investment in training survey

Figure 8: Real terms employer spend in Scotland, 2011-2015

	2011	2013	2015	% change
Total (£,bn)	1.7	1.9	2.1	24%
On job (£,bn)	1	1	1	0%
Off job (£,bn)	0.7	0.9	1.1	57%
Training cost minus wages/opp cost (£,bn)	0.8	1.1	1.1	38%
Fees to external provider (£,bn)	1	0.1	0.1	-90%
Management training (£,bn)	0.2	0.3	0.3	50%
Per person trained £,thousand)	2.7	2.8	2.8	4%
Per employee (£,thousand)	1.5	1.7	1.8	20%

Source: ESS/Investment in training survey

Figure 9: Real terms employer spend in Wales, 2011-2015

	2011	2013	2015	% change
Total (£,bn)	3.9	3.6	3.4	-13%
On job (£,bn)	1.9	1.8	1.6	-16%
Off job (£,bn)	2	1.7	1.8	-10%
Training cost minus wages/opp cost (£,bn)	2.3	1.8	1.9	-17%
Fees to external provider (£,bn)	0.2	0.1	0.1	-50%
Management training (£,bn)	0.5	0.5	0.6	20%
Per person trained £,thousand)	2.9	2.3	2.3	-21%
Per employee (£,thousand)	1.7	1.5	1.4	-18%

Source: ESS/Investment in training survey

Figure 10: Real terms employer spending in Northern Ireland, 2011-2015

	2011	2013	2015	% change
Total (£,bn)	1.2	1.1	0.9	-25%
On job (£,bn)	0.6	0.5	0.4	-33%
Off job (£,bn)	0.6	0.6	0.5	-17%
Training cost minus wages/opp cost (£,bn)	0.7	0.6	0.5	-29%
Fees to external provider (£,bn)	0.1	0.1	0.05	-50%
Management training (£,bn)	0.2	0.2	0.2	0%
Per person trained £,thousand)	2.3	2.7	2	-13%
Per employee (£,thousand)	1.7	1.5	1.3	-24%

Source: ESS/Investment in training survey

Individuals

- 2.11 The figures for estimating individual investment in learning are the least satisfactory part of the calculations we report on in this paper as they have involved assumptions and unpicking learner loan finance; as such, they should be treated with caution.
- 2.12 Start with student loans. We have used data from the Student Loans Company⁹ and have included both tuition and maintenance loans within the total of individual investments. The inclusion of maintenance loans makes a significant difference: for example, in 2014/15, the Student Loans Company reports that of £10.69bn loan funding, £3.74bn was for maintenance. It is, of course, a critical and almost certainly unfounded assumption that all money paid out in loan funding by the state will be ultimately repaid by individuals, but nevertheless we have allocated the yearly loan total to individuals.
- 2.13 The standout point made by the chart below (figure 11) is that funding for learning via loans by individuals has rocketed higher in the years in question – by 79% for higher education.
- 2.14 To this data for HE loans, we have also added the far smaller Further Education learner loan funding system. Loan funding for further education (FE) began in August 2013, but has been expanded since. In 2015, £118.3m was spent supporting FE loans. A tiny drop in the skills funding ocean, one might think. However, loan funding has been an increasingly prominent part of the FE landscape. As of August 2016, anyone above the age of 19 who wants to pursue a vocational qualification above Level 2 (Level 3 is theoretically equivalent to two A-levels) has to self-fund it. In practice, this is likely to lead to lower levels of technical and vocational education among adults.
- 2.15 Regarding investment by individuals in their own skills outside the student and FE loans systems, we lack an equivalent of the Employer Skills Survey for individuals so have relied upon estimates derived from the National Adult Learner Survey¹⁰, the last of which published findings in 2012 using data from 2010¹¹. The survey asked learners about ‘learning episodes’ undertaken in the last three years. These could be ‘formal’, meaning the training was designed to lead to a recognised qualification; ‘non-formal’, in that the learning was taught, but did not lead to a qualification; and ‘informal’, meaning self-study. We have interpreted formal and non-formal learning to mean ‘investment in skills’, but this is arguably an underestimation because it ignores all auto-didacticism. Typically, people who learn have more than one episode of learning (2.06 in 2010), and we have also taken an average ‘cost per learning

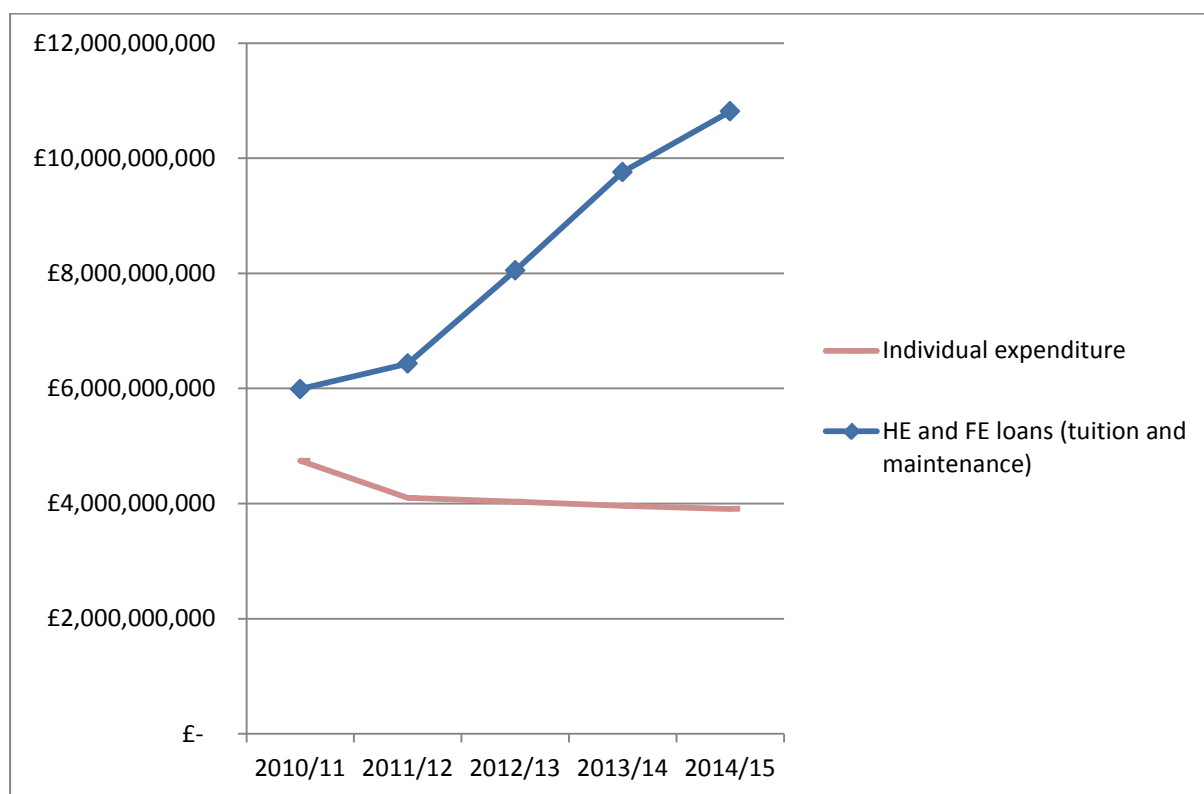
⁹ <http://www.slc.co.uk/official-statistics/full-catalogue-of-official-statistics/student-support-for-higher-education-in-england.aspx>

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34798/12-p164-national-adult-learner-survey-2010.pdf

¹¹ The Adult Participation in Learning Survey, run by NIACE (now The Learning and Work Institute) offers a more consistent data series, but does not contain funding information. See <http://www.learningandwork.org.uk/our-resources/promoting-learning-and-skills/2015-adult-participation-learning-survey>

episode' from the report. This latter figure is clearly subject to considerable flux and was notably higher in 2010 (£1023) than in previous publications of the report¹². This is part of the explanation for why spending in 2010/11 was higher than other years. So to compensate for this volatility we have used an average of 2010 and 2005 (£803) for the estimates for the following years and also assumed a normally lower number of learning episodes (also an average of 2010 and 2005: 2 episodes per learner). A great deal of individual learning is paid for by employers, so we have included just the courses for which individuals paid themselves or shared costs with their employers. The method followed here is adapted from that used by the Inquiry into the Future of Lifelong Learning¹³.

Figure 11: Real terms investment in skills by individuals, 2010/11-2014/15



Source: New Economy calculations from NALS; Student Loans Company

¹² See

<http://webarchive.nationalarchives.gov.uk/20130401151715/http://www.education.gov.uk/publications/eOrderingDownload/RR815.pdf>

¹³ Williams, J., McNair, S., Aldridge, F., 2010. *Expenditure and Funding Models in Lifelong Learning: A Context Paper, Inquiry into the future of Lifelong Learning*. Leicester, UK: NIACE. The inquiry found individual contributions to learning were £3.2bn at 2007-8 prices (p.27), but this figure is broadly in line with our estimate of £3.9bn.

- 2.16 It is worth noting in passing that our task here is to estimate overall investment in skills rather than consider issues such as the participation and duration of learning. As such, our findings do not shed much light on the critical issue of whether there has been a drop in learning driven by the decline in the duration of work-related learning uncovered, for example, by Green et al¹⁴. Using multiple datasets, they argue against using ‘learning participation’ as a *the* relevant indicator and focus more on duration and quality to make the argument there has been “a radical decline in training volumes over 15 years”.
- 2.17 Total investment by individuals in learning we estimate at £14.7bn in 2015.

¹⁴ F. Green, A. Felstead, D. Gallie, H. Inanc, N. Jewson, What Has Been happening to the Training of Workers in Britain?, LLAKES Research Paper 43, 2013

3 Understanding returns on investments in qualifications

- 3.1 A skill is not the same as a qualification. Nevertheless, throughout this discussion about financial values, and a lot of associated literature besides, qualifications are used as a proxy for skill levels due to the conceptual difficulty of standardising and measuring the abstract notion of a 'skill'¹⁵. This chapter presents data on the average return on investments for different qualifications, paying particular attention to undergraduate degrees, A-levels, and vocational courses including apprenticeships¹⁶.
- 3.2 For degrees and vocational qualifications, we examine the expected monetary return per pound invested for both the individual and the government. For A-levels, because of the limited availability of relevant primary data, we focus specifically on the anticipated wage uplift for learners compared to non-learners, and their respective levels of lifetime productivity. To do so, we draw on two related reports published by the Department of Business, Innovation and Skills¹⁷ (2011, 2013), analysis by the Institute for Fiscal Studies (IFS)¹⁸ (2014) as well as the Student Loans Company's most recent statistical returns. All of the figures quoted here represent net lifetime values, assuming a 40 year period of work. As always with analytical work of this type, the uplift relies on a 'counterfactual' to compare with. In this instance the contrast is someone with at least two A-levels, who does not go on to study further.
- 3.3 For the individual, immediate benefits are accrued through any support grants and loans which may be received during the period of study. Overall annual expenditure for each type of grant, as well as the number of students in receipt, have been taken from the latest Student Loan Company statistical releases¹⁹, The delayed benefits occur from the 'graduate premium' – the expected, net wage uplift across the lifecycle, after allowance for tax. The graduate premiums for both men and women have been derived from the net present values reported in BIS 2013 (£168,000 and

¹⁵ For a discussion about the concept of a 'skill' see Green F., 2013. *Skills and Skilled Work, An Economic and Social Analysis*. Oxford University Press, chapter 2.

¹⁶ We treat apprenticeships as being equally split between Level 2 and Level 3 vocational qualifications.

¹⁷ [The Returns to Higher Education Qualifications](#), BIS Research Paper 45, June 2011; [The Impact of University Degrees on the Lifecycle of Earnings; Some Further Analysis](#), BIS Research Paper 112, August 2013.

¹⁸ <https://www.ifs.org.uk/comms/r94.pdf>

¹⁹ <http://www.slc.co.uk/official-statistics/full-catalogue-of-official-statistics/student-support-for-higher-education-in-england.aspx> (accessed July 2017)

£252,000 respectively) taken together with the costs and short-term benefits identified elsewhere in this report. By applying the anticipated trajectory of graduate earnings taken from IFS 2014, we were able to convert the aggregate lifetime premium into a 40 year profile of wage uplift. In total, and drawing on the research, our estimates suggest that the lifetime benefit to each individual of obtaining an undergraduate degree is **£222,573** for men and **£302,046** for women. In other words, an individual with a degree out-earns someone who stopped studying at A-level by around £223,000–302,000.

Figure 12: Return on investment in degrees

		Costs	Benefits	Return on Investment per £1 invested
Individuals	Men	£ 43,259	£ 222,573	5.15
	Women	£ 35,753	£ 302,046	8.45
Government	Men	£ 10,702	£ 264,000	24.67
	Women	£ 12,890	£ 318,000	24.67

Source: New Economy calculations from BIS, 2011/2013²⁰

3.4 The costs for individuals are calculated as the lost earnings or opportunity costs during the period of study and any loan repayments across the 40 year period, proportioned in line with the expected earnings increase. The average graduate median earnings, as well as the rate of repayment, has been taken from the report “Estimating the Public Cost of Student Loans” (IFS, 2014). The IFS report calculates anticipated graduate repayments using the tuition fee system introduced in 2012 (at a maximum of £9,000 per student per year). The total lifetime costs for men and women are therefore **£43,259** and **£35,753** respectively. Taking these figures together, suggests a NPV (using 2013/14 figures) of **£179,313** for men and **£266,293** for women²¹. Applying a weighted average, in line with the gender split of recent graduates, and the differential earnings uplift across the life course, this represents an

²⁰ The government return on investment is equivalent for both men and women (to two decimal places). Each of the figures have been calculated independently; this is simply a mathematical coincidence, strengthened by rounding effects.

²¹ NPV or net present value has been calculated by subtracting the overall lifetime costs from the benefits. The figures have been discounted in keeping with the HM Treasury recommended discount rate of 3.5%. Overall values have been taken from the sources provided, but in order to disaggregate them, allowances for costs/benefits which were not included in the source material (for example, Disabled Student Allowance or other targeted support) have been made using data provided from elsewhere (such as average student loan amounts supplied by the Student Loans Company).

NPV for all students of **£229,762**. When translated into return on investment figures, this represents an ROI of **£5.15** for men and **£8.45** for women for every £1 invested. The lower costs and higher benefits for women reflect lower opportunity costs while undertaking a degree and a higher wage uplift following completion.

3.5 The graphs below depict the expected cost-benefit trajectories mapped over the lifecycle. The first graph represents year-on-year values beginning at the point of matriculation. The second graph presents a cumulative total across the 40 year cycle, highlighting the length of the expected payback period.

Figure 13: Individual returns on investment (return in each year for men and women)

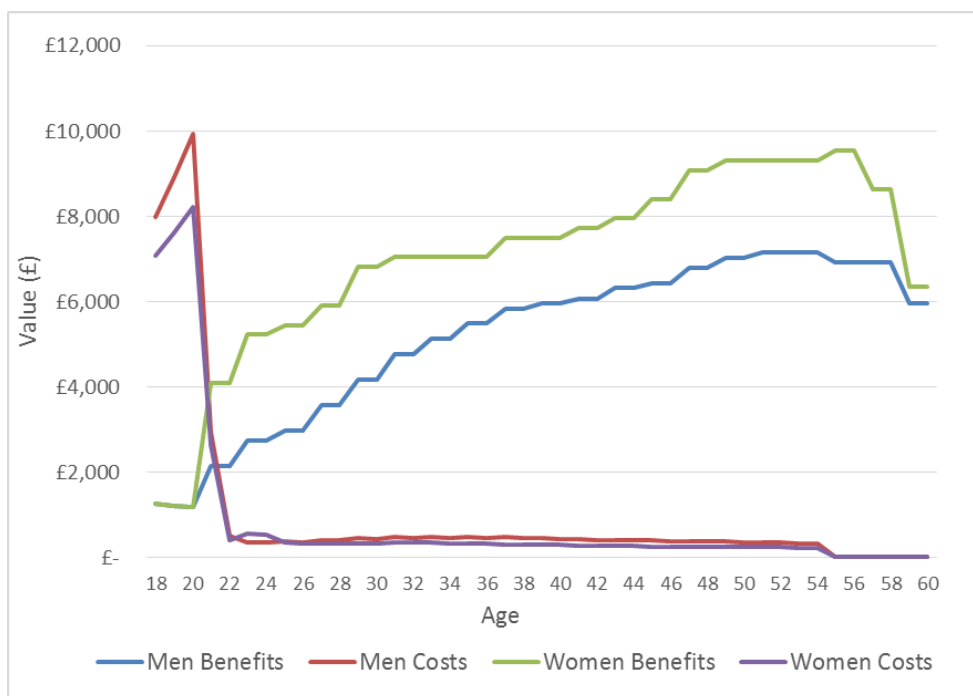
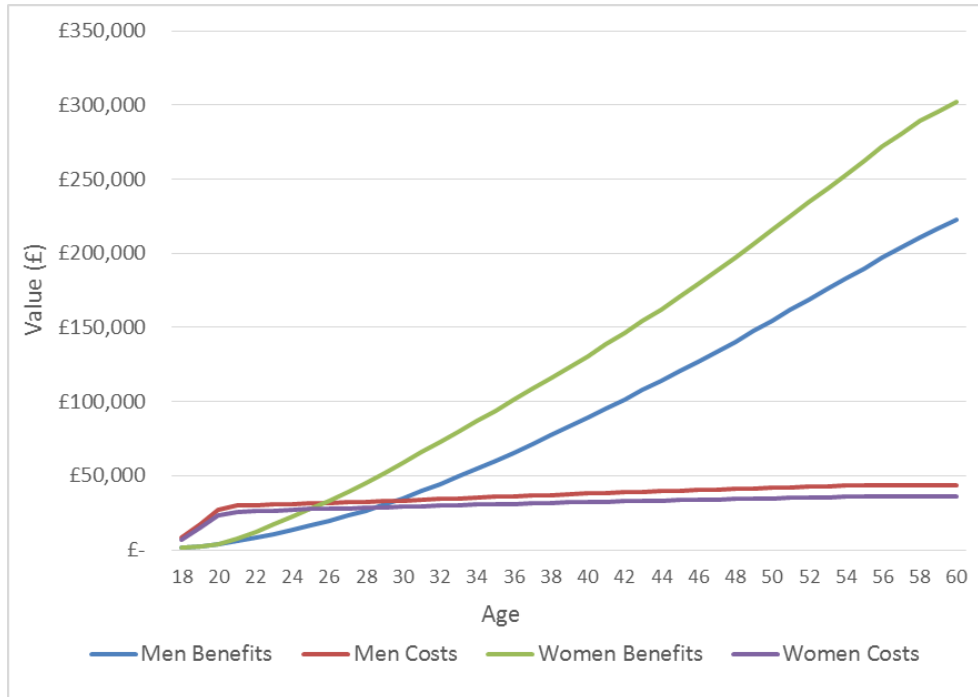


Figure 14: Individual returns on investment (cumulative for men and women)



Source: New Economy calculations from BIS, 2011/2013

3.6 These graphs demonstrate the varying distribution of costs and benefits across the life-course. For both men and women, degrees are characterised by a considerable upfront investment with minimal benefits. The costs then fall sharply at graduation, and remain steady across the remainder of a person’s working life. In comparison, the benefits rise markedly shortly after graduation and continue to increase steadily over the following 35 years. The benefits begin to dip around the late-50s, as the gap between graduate and non-graduate pay closes, perhaps due to graduates leaving the labour market earlier. As highlighted by the cumulative graphs, the expected point of payback (the age at which the aggregate benefits outstrip the respective costs) is 31 for men and 26 for women. If we take a single in-year cohort (expected estimated population of 204,000 for men and 260,000 for women) and map that cohort across a 40 year period, the total NPV for those individuals is roughly £105.8bn across the lifecycle (£36.5bn men, £69.2bn women).

Government

3.7 Our analysis of the costs and benefits to government²² is taken from the same sources referenced above and the various assumptions remain consistent. For the government, benefits are accrued through increased tax intake from the expected

²² Government costs do not include the opportunity cost of lost taxes during the period of study as these are expected to be minimal

graduate wage uplift (income tax, National Insurance and VAT), as well as avoided social security expenditure. In total, these estimates suggest that the lifetime benefits to government equal **£264,000** for men and **£318,000** for women. The costs to government arise through debt write-offs, interest accrued on those write-offs, maintenance grants (which are not repaid by the individual) and Higher Education Funding Council for England (HEFCE) teaching funding (the remaining two aspects of HEFCE funding cannot be directly aligned with student outcomes). It is worth noting we have not included the overall cost of tuition loans within government costs as they are transfer payments (repaid later by the individual). The actual additional cost to the state only arises through the proportion of that debt which students fail to repay, and is thus a net loss to the public purse. The lifetime costs are therefore estimated to be £10,702 for men and £12,890 for women.

- 3.8 Taking these figures together, the NPV to the exchequer is **£253,298** for men and **£305,110** for women. When translated into return on investment figures, that represents an ROI of **£24.67** for both men and women. In other words, the exchequer ‘out-earns’ the graduates (collectively) from the expansion of HE.
- 3.9 As with our analysis of individuals, below are graphs which depict these benefits and costs mapped throughout the lifecycle. As above, the first chart represents annual values, whilst the second depicts cumulative totals.

Figure 15: Government returns on investment (return in each year for men and women)

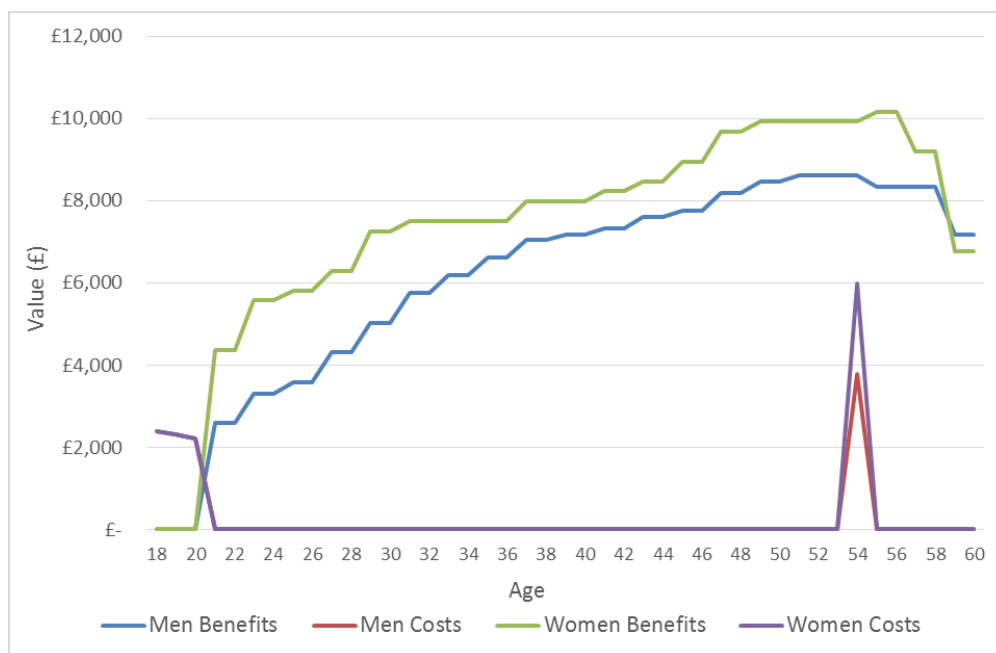
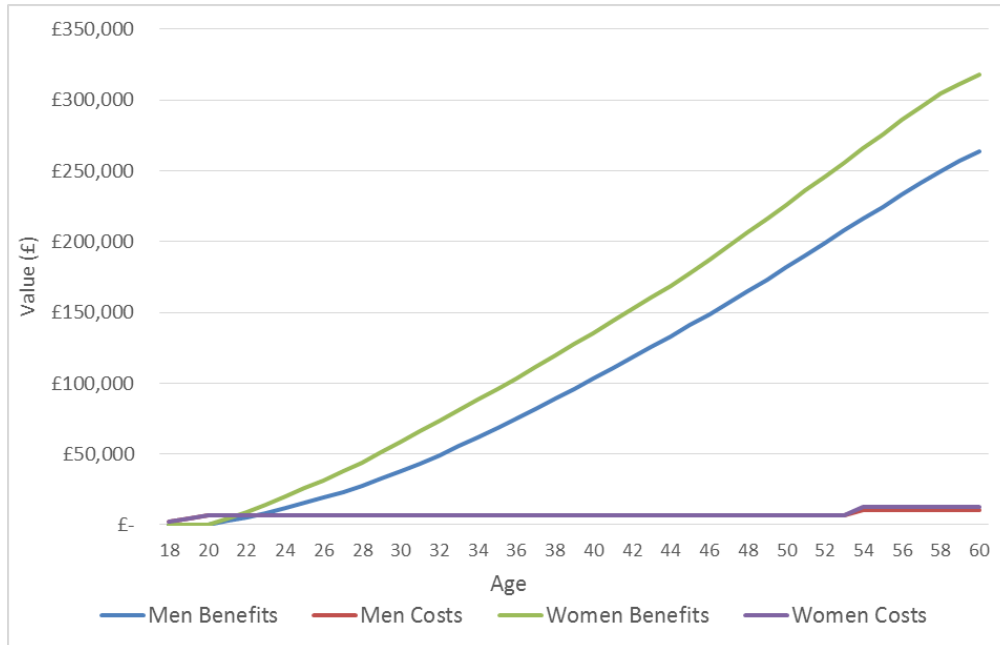


Figure 16: Government returns on investment (cumulative for men and women)



Source: New Economy calculations from BIS, 2011/2013

3.10 As with individual returns, the graphs above present a significant variation of benefits and costs across the lifecycle. For both men and women, there is a small upfront cost (for the various government funding streams and grants), followed by a sharp peak around the age of 54 where the remaining amount of student debt is written-off, including any remaining interest accrued. Following graduation, the tax intake uplift continues to increase steadily over a 30 year period, before entering a slight decline towards the end of the working life. Although at the point at which write-off costs slightly outstrip benefits, the cumulative graph shows that overall, the total benefits markedly outweigh the overall costs. For the government, the payback point of degrees, even when accounting for the expected write-off total, is around 24 years old for men and 23 years old for women. If we take a single in-year cohort as above (with the same population estimates), across a 40 year period, that cohort can be expected to provide the government with £131bn net benefits (£51.6bn for men and £79.3bn for women).

Vocational Qualifications

Individuals

3.11 Our analysis of returns to vocational qualifications is based on a BIS 2011 report²³. Figures quoted here are averaged across NVQs, BTECs, City & Guilds and apprenticeships. All of the totals are net lifetime values, with a lifetime period of 40 working years. For each level, the relevant counterfactual is individuals with similar demographic characteristics, but whose highest qualification is the next lower level down from the comparison group (for instance the counterfactual of Level 3 is Level 2, and for Level 2, the counterfactual is Level 1).

Figure 17: Returns to individuals and government from vocational qualifications

		Costs	Benefits	Return on investment per £1 invested
Individuals	L2	£ 3,760.00	£ 39,645.75	10.54
	L3	£ 3,683.00	£ 57,189.25	15.53
Government	L2	£ 4,332.25	£ 24,375.50	5.63
	L3	£ 7,982.75	£ 41,260.50	5.17

Source: New Economy calculations from BIS, 2011

3.12 For the individual, there are no immediate benefits, but rather delayed expected earnings uplifts, and an increase in their employment probability. In total, our estimates suggest that the lifetime uplift to the individual of a vocational qualification is **£39,646** for Level 2 and **£57,189** for Level 3. The costs to the individual are calculated as the foregone opportunity costs during the period of study. For Level 2, this equates to **£3,760**. For Level 3, the same figure is **£3,683**. The NPV of Level 2 and 3 qualifications is therefore **£35,885** and **£53,506** respectively. When translated into return on investment figures, these estimates represent an ROI of **£10.54** for Level 2 and **£15.53** for Level 3 per £1 invested. In contrast to our analysis of degree qualifications, we were unable to map these overall totals across an individual's lifetime due to a lack of relevant research demonstrating the average trajectory of earnings for individuals with vocational qualifications. If we once again take a single in-year cohort (roughly 499,900 for both Level 2 and 3), and follow their benefits and

²³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32354/11-1282-returns-intermediate-and-low-level-vocational-qualifications.pdf

costs across the 40 year working period, we see a NPV of almost £9bn for Level 2 learners, and £13bn for Level 3.

Government

3.13 The analysis of government returns for vocational qualifications is taken from the same source as noted above (BIS, 2011) and includes the same assumptions. For the government, the benefits of vocational qualifications are the resulting tax from the learner’s earnings uplift. Although the calculations for degrees includes some allowance for VAT, the total benefits to government for vocational qualifications are solely for national insurance and income tax. Our estimates suggest that the lifetime benefits to government total **£24,375** for Level 2 and **£41,260** for Level 3. The costs to government are accrued through the upfront costs of supporting qualifications. For Level 2, this figure is **£4,332**. For Level 3, it is **£7982**. The NPV to government of vocational qualifications at Level 2 is therefore **£20,043**, and **£33,278** for Level 3. As return on investment figures, per £1 invested, this represents an ROI of **£5.63** for Level 2 and **£5.17** for Level 3. For a single cohort over 40 years, these figures can be scaled up to roughly £5bn (Level 2) and £8.3bn (Level 3). Across the board, Level 2 and 3 qualifications therefore represent a sensible investment.

A-Levels

3.14 Due to a shortage of relevant research, our analysis of A-level qualifications focuses on earnings uplifts to individuals and lifetime productivity returns to employers. Unlike the previous findings, the data does not allow costs and benefits for individuals and government to be understood. Our data is taken from a 2014 Department of Education report on the economic value of key intermediate qualifications²⁴.

3.15 When discussing A-levels, the cohort is therefore those individuals who achieve two or more A-levels as their highest qualification, compared to a counterfactual of those individuals who achieve 5-7 good GCSEs but study no further. Once again, the figures noted here are lifetime totals for a posited 40-year working life.

Figure 18: Economic returns to A-levels

	Men	Women
Constant Wage Return %	15%	16%
CWR Value	£ 63,014	£ 53,269
Lifetime Productivity Returns	£ 90,020	£ 76,099

Source: New Economy calculations from Department for Education, 2014

3.16 ‘Constant wage return’ (CWR) represents the average wage uplift someone with at least two A-levels can expect to gain above the counterfactual. The ‘constant’

²⁴https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387160/RR398A-Economic_Value_of_Key_Qualifications.pdf

component represents the standardisation necessary in the calculation of a single lifetime value, as in reality the extent of the earnings increase can be expected to vary across the lifetime. For men, there is a CWR of 15%, which translates to a **£63,014** gross benefit across the lifetime. For women, the CWR is 16%, or **£53,269** as a raw value.

- 3.17** Lifetime productivity returns are the expected increase in economic value an employer can expect from an individual with at least two A-levels versus the alternative. Economic value is expressed in terms of productivity. To calculate productivity, we have utilised a widely accepted conservative methodology which produces a proxy value for minimum productivity. This is derived from adding an additional 30% to the earnings uplift to account for non-wage labour costs (including administration and pensions). As noted above, the lifetime productivity returns are therefore **£90,020** for men and **£76,099** for women.
- 3.18** In relative terms, A-levels therefore present similar financial benefits for both men and women (15% and 16% respectively). Yet in raw values, as a reflection of the wage disparity between the sexes, there is a roughly £25,000 difference.

In summary, drawing on the pre-existing research and using cost-benefit approaches, qualifications clearly pay. Despite the huge expansion of graduates in the labour force, the expanded supply does not yet appear to be eroding the material benefits of graduation. Meanwhile, qualifications at lower levels – academic and vocational – also bring clear wage uplifts, albeit to a lesser extent than degrees.

4 Qualifications and the Life course

- 4.1 In an ageing society that is prone to technological upheaval, the expectation is that more people will need to rethink and update their skills at various points in their working life. So, if we accept the previous, general finding that ‘skills pay’, the question of the age at which qualifications stop paying becomes more socially urgent. Is it really financially worthwhile to embark on a personal project to re-skill oneself in one’s fifties or do the costs at this age outweigh the benefits? This chapter attempts to shed some light on that question using data from the Labour Force Survey²⁵.
- 4.2 Two thoughts are worth emphasising. In using this material we are not concerned with the motivations involved. For example, someone in their fifties may decide to pursue learning for interest rather than career reasons and so enhanced income is neither intended nor expected. Although this may be the case, the focus here is purely on whether there is evidence of an economic connection between learning and income. Second, it is obviously the case that someone who learns later in life is likely to have less time to ‘recoup’ the benefits of their learning. If the exercise stopped at statistical associations the data may simply reflect fewer numbers of years after qualification than anything to do with the qualification itself. We use regression analysis to try and mitigate for this point by controlling for some (but by no means all) of the other possible influences on income and isolate the effect of learning itself.
- 4.3 The chart below (figure 19) shows median wages by highest qualification and the age at which the qualification was obtained. It shows that there appears to be a link between incomes and the timing of completing qualifications, as well as to the level of the qualification obtained. This result is exactly what might be expected.
- 4.4 More revealing, however, is the finding that the higher the qualification, the longer there seems to be a pay advantage in acquiring it. This is likely to be very closely linked to the fact that qualifications at Level 4 and above include *all* higher level qualifications up to a PhD – a gargantuan expanse of notional skill level. At Level 4 and above, the pay advantage only seems to cease once people reach 46 years of age, suggesting that it ‘pays’ to do such qualifications well into one’s mid-forties – or, at least, there is no obvious financial disadvantage to pursuing learning at Level 4+ later in life. This point is reached much earlier for Level 3 qualifications. The turning point at which median incomes for people with this skill level is around the age of 30. Average hourly pay begins to dip after this age for people qualified to Level 3. For Level 2, this relationship seems more mixed and difficult to draw clear conclusions about.

²⁵ The LFS is a representative sample of approximately 100,000 individuals for each quarter. It is the main official source on all aspects of the labour market including skills and qualifications. For further information on methodology and sample, see:

file:///C:/Users/megsoa/Downloads/qmilfsjan2015finalforpubdocx_tcm77-180685.pdf

Figure 19: Median hourly pay by level of qualification and age at which qualification obtained, UK, 2016²⁶



Source: Quarterly Labour Force Survey, January to March 2016

Note: Standard deviations are presented in figure 20 in the annex to this paper

Impact of age and other socio-economic factors on incomes

- 4.5 Since pay is shaped by a variety of different factors, it is important to try and isolate the extent to which *qualifications* affect income, rather than, for example, socio-economic factors, such as gender, ethnicity and place of work. For this purpose a regression analysis was used to identify whether it is the age at which people complete their qualification that is the driving factor behind the median pay trends, or if other issues have a more profound influence.
- 4.6 In the regression, the hourly pay of a control group is compared to that of other groups. This control group was defined as white males living in London or the South East of England who have done their qualifications before they reached the age of 25. This median income for the control group was then compared to other groups to test the influence of socio-economic factors.
- 4.7 For those who have obtained a qualification at Level 4 and above, there does not appear to be a pay penalty for doing it later in life – up to the age of 46 years and above. In fact, doing a Level 4+ qualification after the age of 25 years seems to bring direct pay rewards, as seen in figure 16. This relationship was confirmed as significant in the regression for UK residents with a Level 4+: the age at which a

²⁶ Standard deviation values are available in the data annex

qualification is obtained has a direct influence on pay levels. That said, however, other factors such as gender, ethnicity, and place of work (see analysis below) have a stronger influence on pay than age.

- 4.8 The table below compares those who have obtained their Level 4+ aged under 25 to those who have done so after they turned 25. This model also shows a pay benefit up to the age of 45 years, with UK residents having done their L4+ qualification between 41 to 45 years of age seeing the biggest pay benefit of all age groups. This could be linked to the particular kind of qualification (more likely to have done PhD) and more years of work experience.

Figure 20: Regression model on hourly pay for UK residents with a qualification at Level 4 and above

	Hourly pay	Impact
Control Group - white male from London/ SE of England who obtained highest qualification at under 25 years	£25.85	Control Group
Rest of UK (outside London/ SE of England)	-£6.27	Pay penalty
Women	-£4.63	Pay penalty
Ethnic Minorities	-£1.60	Pay penalty
highest qual. obtained at 25 to 30	£0.79	Pay benefit
highest qual. obtained at 31 to 35	£1.57	Pay benefit
highest qual. obtained at 36 to 40	£0.94	Pay benefit
highest qual. obtained at 41 to 45	£1.51	Pay benefit
highest qual. obtained at 46 and over	-£0.21	Pay penalty

Source: New Economy calculations from Quarterly Labour Force Survey, January to March 2016

- 4.9 For Level 4+, the regression analysis confirms the pay benefit of qualifications up to one's mid-forties. However, other factors such as place of work, gender, and ethnicity have a larger detrimental impact on pay levels. Of these factors, living outside of London and the South East contributes a much bigger pay penalty than all others. Being a woman is the second most detrimental factor for pay. This means women living outside of London and the South East earn significantly less simply based on these two factors.

Level 3

- 4.10 Turning to Level 3, median hourly pay for those with a Level 3 qualification decreases when obtained after the age of 30 – a much lower age than for Level 4+. The table below shows the findings.

Figure 21: Regression model on hourly pay for UK residents with a qualification at Level 3.

	Hourly pay	Impact
Control Group - white male from London/ SE of England who obtained highest qualification at under 25 years	£17.03	Control Group
Rest of UK (outside London/ SE of England)	-£4.27	Pay penalty
Women	-£3.00	Pay penalty
Ethnic Minorities	-£1.42	Pay penalty
highest qual. obtained at 25 to 30	£1.39	Pay benefit
highest qual. obtained at 31 to 35	-£2.09	Pay penalty
highest qual. obtained at 36 to 40	-£1.83	Pay penalty
highest qual. obtained at 41 to 45	-£1.38	Pay penalty
highest qual. obtained at 46 and over	-£1.01	Pay penalty

Source: New Economy calculations from Quarterly Labour Force Survey, January to March 2016

4.11 For Level 3, when people complete their qualification also significantly impacts on their pay. However, there is a pay penalty for obtaining a Level 3 from the age of 31. Again, though, living outside of London and the South East of England and being a woman both have a considerably stronger negative impact on pay than the ages at which a qualification was obtained.

Level 2

4.12 The median pay overview above seems to suggest that if people do their Level 2 qualification between 41-45 years of age they might have a pay benefit. The regression, however, shows that this suggestion is not statistically significant. The regression confirms that doing a Level 2 qualification after the age of 25 years comes with a pay penalty. This pay penalty at Level 2 differs from those at Level 3 and 4+ in that for Level 2, the age pay penalty (after age 30) is more significant than the gender pay penalty.

Figure 22: Regression model on hourly pay for UK residents with a qualification at Level 2

	Hourly pay	Impact
Control Group - white male from London/ SE of England who obtained highest qualification at under 25 years	£15.60	Control Group
Rest of UK (outside London/ SE of England)	−£4.34	Pay penalty
Women	−£1.23	Pay penalty
Ethnic Minorities	−£0.47	Pay penalty
highest qual. obtained at 25 to 30	−£0.88	Pay penalty
highest qual. obtained at 31 to 35	−£2.27	Pay penalty
highest qual. obtained at 36 to 40	−£2.73	Pay penalty
highest qual. obtained at 41 to 45	£0.06	Pay benefit (not significant)
highest qual. obtained at 46 and over	−£1.25	Pay penalty

Source: New Economy calculations from Quarterly Labour Force Survey, January to March 2016

4.13 To summarise the information in this chapter, undertaking Level 4+ qualifications are economically worthwhile up to the age of about 45. However, for qualifications at Level 2 and Level 3, the pay penalties kick in at younger ages (25 for Level 2 and 30 for Level 3) and the uplift is lower overall. However, the age at which an individual undertakes a qualification is one factor among several that affect wages. Gender, place of residence, and ethnicity also affect wages – often to a greater degree than age.

5 Conclusions

- 5.1 Qualifications pay. To this well-evidenced contention, this short project has added three main findings.
- 5.2 First, it has quantified the scale of the overall investment. The UK invests about £55.2 billion in post-16 skills – slightly less than at the start of the decade allowing for inflation. The costs and benefits of skills formation are shared three ways: between government, employers and individuals. Yet we find that government’s role in the overall investment is reducing and that of individuals is growing, notably through higher and FE loans. Meanwhile, employer investment has also fallen very slightly, but is essentially flat. There are surprisingly large differences between employer investment in England, which is holding steady, and in Scotland, Wales and Northern Ireland, which have all seen falls.
- 5.3 The project has also sought to map the costs and benefits of some of the main types of qualification. Degrees, despite their higher cost for individuals in the wake of loan funding and the expansion of the labour supply educated to this level, remain good value: they lift lifetime wages by well over £200,000. For vocational qualifications, the benefits, and also the costs, are much lower, but still significant: a Level 3 qualification, for example, adds over £50,000 to lifetime incomes. This scale of return is broadly the same as that which pertains to A-levels.
- 5.4 Finally, the paper seeks some precision in understanding when benefits from qualifications are likely to begin to decrease. At Level 2 and Level 3, there are clearly advantages to gaining vocational qualifications relatively early: by the age of 25 at Level 2 and 30 by Level 3. The notional expiry of these skills appears to click in young. The contrast, here, with Level 4+ is stark. At Level 4+, there are financial advantages to learning up until the age of 45; after this age there is a marked and statistically significant decline in income. We should not conclude from this analysis, however, that qualifications trump all other socio-economic factors in shaping life earnings. Gender, ethnicity and place of work also have a prominent effect.

6 Annex

Figure 23: Standard deviation for hourly pay by level of qualification and age at which qualification obtained

	L4+	L3	L2
highest qual. obtained at 25 to 30	11.0	8.9	6.3
highest qual. obtained at 31 to 35	10.3	6.9	4.6
highest qual. obtained at 36 to 40	11.1	3.2	6.3
highest qual. obtained at 41 to 45	10.1	4.1	1.1
highest qual. obtained at 46 and over	10.6	2.2	4.6
highest qual. obtained at 25 to 30	9.0	4.0	2.9

Source: Quarterly Labour Force Survey, January to March 2016

- 6.1** The table shows the levels of standard deviation across the different income groups which gives an insight into the levels of variance of median pay for the different ages at which qualifications were obtained. The standard deviation of hourly pay is larger for those respondents with a qualification at Level 4 or higher. This is to be expected due to a wider range of salaries among those with a higher level qualification.