

Returns to BTEC vocational qualifications

Final Report for Pearson

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Executive summary

London Economics were commissioned by Pearson to undertake an analysis of the educational and economic outcomes associated with BTEC vocational qualifications.

The analysis used information from the United Kingdom Labour Force Survey between 1996 and 2009 to assess qualification progression rates and subsequent education attainment associated with BTEC qualification specifically and other vocational qualifications more generally. Following the existing research work by leading academics and the forthcoming analysis undertaken for the Department for Business, Innovation and Skills¹, this analysis estimated the *marginal* returns to intermediate and low level vocational qualifications, where the marginal returns estimate the earnings enhancement achieved when the particular qualification of interest is the individual's highest qualification. We also estimated employment outcomes associated with vocational qualification attainment at both an aggregated level and disaggregated by type of vocational qualification and gender.

In addition to this, through the combination of information on the costs and benefits generated by the individuals and the Exchequer associated with qualification attainment, we also estimated the net lifetime individual and Exchequer benefit associated with qualification attainment and the *rates of return* associated with acquisition of intermediate and low level vocational qualifications.

Some of the main results are as follows:

Progression

- Individuals in possession of vocational qualifications generally continue with their education and acquire a number of other academic and vocational qualifications at different levels. Furthermore, it is not the case that vocational qualifications are substitutes for academic qualifications, rather they are complementary, and within the range of vocational qualifications, those in BTEC qualifications are generally most likely to obtain further qualifications.
- Rather than vocational qualifications being an end in themselves, BTEC qualifications often act as a stepping stone for further qualification attainment. The analysis presented indicates that of those individuals in possession of BTEC Level 1 qualifications, approximately 38.5% are also in possession of 5 or more GCSEs at grades A*-C.
- The proportion of individuals in possession of other academic and vocational qualifications increases as the level of vocational qualification increases. Specifically, of those in possession of BTEC qualifications at Levels 2, 3 and 4, the proportion that are also in possession of 5 or more GCSEs at grades A*-C stands at 42.9%, 59.5% and 63.5% respectively. These rates of attainment are higher than for other routes of vocational qualification attainment.
- The analysis illustrates that there are strong rates of subsequent BTEC attainment amongst individuals already in possession of BTEC qualifications. In particular, of those in possession of BTEC Level 1 qualifications, approximately 25.9% go on to achieve a BTEC Level 2, while the BTEC Level 2-Level 3 and BTEC Level 3-Level 4 transition rates stand at 40.4% and 27.4% respectively. These transition rates are generally in excess of those displayed by those in possession of other forms of vocational qualifications.

¹ 'Returns to intermediate and low level vocational qualifications', a report undertaken for the Department for Business Innovation and Skills, *forthcoming*

Earnings returns

- The findings illustrate that the returns to Level 3 vocational qualifications are relatively significant. At the upper end of the spectrum, individuals in possession of **BTEC Level 3** qualifications achieve a 34.0% earnings premium over those in possession of no formally recognised qualifications. The returns associated with **BTEC Level 3** qualifications are marginally higher for men than for women. The lowest (though still generally positive) returns associated with Level 3 vocational qualifications are posted by those in possession of NVQ Level 3 qualifications
- At the aggregate level, the marginal returns associated with level 2 vocational qualifications are relatively strong compared to those in possession of no formally recognised qualifications, with individuals in possession of RSA Level 2, City & Guilds Level 2 and **BTEC Level 2** qualifications achieving 38.4%, 15.6% and 13.1% earnings premiums. Only those in possession of NVQ Level 2 qualifications that struggle to achieve any earnings return.
- It is not the case that those with vocational qualifications routinely underperform those with academic qualifications. Although individuals in possession of City & Guilds or a NVQ at Level 2 achieve a 3% to 6% earnings penalty when combined with possession of 5 GCSEs at grades A*-C (compared to GCSEs only). Individuals in possession of **BTEC Level 2** qualifications and 5 good GCSEs receive a 5.9% earnings premium compared to possession of 5 or more GCSEs only.
- At level 1, women in possession of RSA and **BTEC qualifications** perform particularly well and post 20% and 17% earning returns respectively, while City & Guilds and **BTEC qualifications** provide earnings returns of up to 20% to men at this level.

Employment returns

- In general, the estimates indicate that there is a strong and positive relationship between vocational qualification attainment at level 3 and the likelihood of being in employment. The impact is in general stronger for women than for men.
- For men, City & Guilds and **BTEC Level 3** qualifications offer a substantial employment boost (11.0 and 5.3 percentage points respectively), while for women, NVQs have the greatest effect of any level 3 vocational qualification on female employment outcomes. **BTEC Level 3** qualifications offer women an 8.2 percentage point employment boost relative to Level 2 qualifications.
- **BTEC Level 2** qualifications offer their holders an 8.7 percentage point increase in the probability of being employed; however, there are some significant differences depending on gender. Men are only marginally more likely to be in full time employment compared to individuals in possession of Level 1 qualifications, although women are approximately 11 percentage points more likely to be in full time employment.
- Women are approximately 14 percentage points more likely to be employed if they possess a RSA Level 1 qualification or 9.2 percentage points if in possession of a **BTEC Level 1** qualification compared to possession of no formally recognised qualifications. Men in possession of a **BTEC Level 1** qualification are on average more than 14 percentage points more likely to be employed relative to men in possession of no formally recognised qualifications

Lifetime benefits and rates of return to the individual

- Compared to Level 2 qualifications, the net present value of the lifetime benefit associated with Level 3 vocational qualifications stands at between £15,000 and £24,000 (for NVQ Level 3) and approximately £59,000 and £92,000 (for **BTEC Level 3** qualifications).
- For Level 2 qualifications, the benefits range between £24,000 and £35,000 (for City & Guilds qualifications) to £28,000 and £42,000 (for **BTEC qualifications**), although the net benefit associated with NVQ Level 2 qualifications is negative.

- For Level 1 qualifications, the benefits associated with City & Guilds qualifications range between £6,000 and £9,000, while the benefits associated with NVQs are again negative (though approach zero under the assumption relating to non-negative earnings and employment outcomes).
- Men achieve higher lifetime benefits from the acquisition of intermediate and low level vocational qualifications compared to women, reaching between £85,000 and £125,000 over a lifetime for **BTEC Level 3** qualifications; however, women do post significant returns from attaining RSA qualification at all levels (£22,000- £51,000).

Exchequer benefits and rates of return

- The Exchequer is estimated to achieve positive returns from the majority of vocational qualifications, with particularly high returns associated with Level 3 qualifications. For these qualifications the net present value of the benefits ranges from £10,000 to £15,000 for NVQ Level 3 qualifications to between £35,000 and £54,000 (for **BTEC Level 3** qualifications)
- The benefits associated with Level 1 and Level 2 qualifications are also generally positive, with the exception of the low estimate for NVQ Level 1 and Level 2 qualifications.
- The benefits associated with City & Guilds Level 2 qualifications (between £28,000 and £36,000) and **BTEC qualifications** (between £25,000 and £31,000) are greater for men than in aggregate; however, the opposite is true for NVQs (at all levels). In particular, the returns to NVQ Level 1 and NVQ Level 2 qualifications are particularly low for men, ranging between -£26,000 to -£16,000 for NVQ Level 1 qualifications and between -£32,000 to -£24,000 for NVQ Level 2 qualifications.
- The net present value associated with City & Guilds and NVQ qualifications acquired by women is particularly small, with negative estimates associated with NVQs and City & Guilds qualifications at Level 1 and Level 2 (and Level 3 in the case of City & Guilds).
- The only qualifications acquired by women offering providing the Exchequer are RSA and **BTEC qualifications**. RSA qualifications generate an Exchequer benefit of between £11,000 and £16,000 at Level 1, and between £15,000 and £25,000 and Level 2, while **BTEC qualifications** deliver an Exchequer benefit of between £5,000 and £17,000 depending on the level of qualification attainment.

1 Introduction and Terms of Reference

London Economics were commissioned by Pearson to undertake an assessment of the economic returns to vocational low level qualifications. There have been a large number of studies in the area that have focused on a range of different aspects of vocational qualification, including the determinants of undertaking vocational qualifications, the earnings and employment outcomes associated with vocational qualifications (both at a aggregated or disaggregated level), and the rates of return associated with different types and levels of vocational qualification attainment. To undertake this research and achieve a robust analysis, significant volumes of data and alternative model specifications have been considered.

In this report, we assess both the education related and economic outcomes associated with vocational qualification attainment and the report is set out as follows:

Following a number of other authors in the field and the forthcoming analysis undertaken for the Department for Business, Innovation and Skills², our methodological approach adopts a number of standard economic and econometric approaches to assess the economic benefits associated with qualification attainment, which we describe in our summary methodology (described in Section 2). In Section 3, we provide some assessment of the different levels and types of qualification held by those in possession of BTEC qualifications and other vocational qualifications, as well as the rate of progression between different levels of attainment within different vocational qualification routes. In section 4, we present detailed findings of the earnings returns associated with different levels and types of vocational qualification attainment, which is presented on an aggregated level and disaggregated by level and type of vocational qualification and gender. In section 5, we replicate the analysis undertaken in section 4 and describe the employment effects associated with vocational qualification attainment. Finally, in Section 6, we provide an assessment of the economic rates of return associated with vocational qualification attainment. This is undertaken for the individual (Section 6.1) and Exchequer (Section 6.2).

² 'Returns to intermediate and low level vocational qualifications', a report undertaken for the Department for Business Innovation and Skills, *forthcoming*

2 Summary Methodology

2.1 Estimating earnings returns to vocational qualifications

To undertake this element of the analysis, we estimated a standard Ordinary Least Squares linear regression model, where the dependent variable is the natural logarithm of hourly earnings and the independent variables include the full range of qualifications held alongside a range of personal, regional and job related characteristics that might be expected to influence earnings. This approach has been used widely in the academic literature. The basic specification of model was as follows (in aggregate and for men and women separately):

$$\ln(\omega_i) = \alpha + \beta X_i + \varepsilon_i \quad \text{for } i = 1 \text{ to } n$$

where $\ln(\omega_i)$ represents the natural logarithm of hourly earnings, X_i provides the independent variable included in the analysis including (but not exhaustively):

- Age
- Age squared
- Ethnic origin
- Region of usual residence
- Marital Status
- Number of dependent children under the age of 16
- Full time/ Part time employment
- Temporary or permanent contract
- Public or private sector employment
- Interaction terms and
- Yearly/Seasonal Dummies

2.1.1 Coefficients

The β coefficients in the model provide information on the extent to which a particular independent variable influences the dependent variable. In the model specifications presented here, it is necessary to compare the earnings outcomes with a reference or comparison group. In this analysis, we have estimated the returns to a range of comparison groups including individuals holding at maximum qualifications at the level immediately below to those held by individuals in the treatment group (e.g. Level 3 qualifications compared to Level 2 qualifications or below), individuals in possession of no formally recognised qualifications, individuals in possession of 5 or more GCSEs at grades A*-C. These comparison groups are detailed explicitly in each of the tables presenting the results.

In all regressions, the coefficients relating to the alternative vocational qualifications indicate the additional effect on (the log of) hourly earnings associated to holding the extra qualification in excess of those in the reference category (e.g. holding a Level 3 qualification compared to those with Level 2 qualifications). For instance, the coefficient assessing the earnings premium to a BTEC Level 3 qualification relative to 5 or more GCSEs at grades A*-C should be interpreted as the return achieved by an individual in possession of *both* a BTEC Level 3 and 5 or more GCSEs at grades A*-C compared to

ε_i

possession of 5 or more GCSEs at grades A*-C alone. The final term represents the error term component.

In the various tables later in the report, the actual coefficients from the regression are presented, while in the text, the precise effect when the dependent variable is in log form is provided (by transforming the coefficient using the transformation $e^{\beta} - 1$). In general terms, for small coefficients (less than 0.10), the coefficient in the regression model will give a reasonable approximation of the actual percentage change; however, for coefficients greater than this, the correction is necessary.

2.2 Estimating employment returns to vocational qualifications

We have estimated a range of probit models to assess the different likelihood of different qualification holders being in employment or otherwise. The specification of the probit model was as follows (in aggregate and for men and women separately):

$$\text{probit}(EMPNOT_i) = \alpha + \gamma'Z_i + \varepsilon_i \quad \text{for } i = 1 \text{ to } n$$

The dependent variable adopted was the binary variable *EMPNOT* which was coded 1 if the individual was in employment and 0 otherwise. As in the previous model, we specified the model to contain a constant terms as well as a number of independent variables including all qualifications held and (though not exclusively):

- Age
- Age squared
- Ethnic origin
- Region of usual residence
- Marital Status
- Number of dependent children under the age of 16 and
- Yearly/seasonal Dummies

2.3 Assessing rates of return

To consider the rate of return associated with a particular level or type of qualification is it necessary to estimate the total direct and indirect costs associated with acquiring the qualification as well as the discounted lifetime economic benefits. The analysis presented here considers the **individual** rate of return and **Exchequer** rate of return associated with qualification attainment. We discuss this in a number of stages below.

2.3.1 Estimating the lifetime earnings associated with qualification attainment

To assess the earnings and employment outcomes associated with different levels of qualification, the lifetime earnings associated with qualification attainment are modelled. The analysis focused on the additional returns associated to holding each qualification of interest as their highest, compared to the relevant counterfactual group (which in this case is always formed by individuals having at maximum qualifications at the level immediately below the qualification of interest). The private benefits associated with qualification attainment are the enhanced post-tax present value of lifetime earnings resulting from the qualification attained. Therefore, based on an age earnings profile (described more fully in the next section) and current income tax and National Insurance rates and levies, we have estimated the enhanced **after-tax earnings** associated with various levels and types of vocational qualification attainment. The analysis involved several stages:

1. We estimate the marginal earnings premium associated with different qualification levels and types. For vocational qualifications, returns are estimated in 5 year age bands across the working age population (16-64 inclusive for men and 16-59 inclusive for women).
2. We estimate the change in the probability of employment associated with the attainment of each qualification (i.e. marginal employment returns) associated with different qualification levels in 5 year age bands across the working age population (16-64 inclusive for men and 16-59 inclusive for women)³.
3. We estimate the annual earnings achieved by individuals in the counterfactual group. For vocational qualifications, the relevant counterfactual group is assumed to consist of those individuals in possession of academic or vocational qualifications at the next highest level of qualification.
4. We estimate the lifetime earnings achieved by individuals holding each qualification, through inflating the earnings of the counterfactual group using the earnings premiums from (1) and the employment probabilities from (2).
5. We adjust earnings to account for the fact that earnings would be expected to increase in real terms over time (assumed to be 2% generally).

2.3.2 Estimating the cost associated with qualification attainment

In terms of the costs associated with qualification attainment, the primary cost relates to the foregone earnings during the period of qualification attainment compared to the “counterfactual group”. We estimate (using the LFS) that the average annual earnings achieved by individuals with no formally recognised qualification stands at £9,713 age 17 (£10,168 for men and £8,332 for women), which increases to approximately £11,036 for individuals in possession of Level 1 qualifications aged 18 (£11,367 for men and £10,383 for women) and £12,634 for individuals in possession of Level 2 qualifications age 19 (£13,204 for men and £11,991 for women).

We have assumed that Level 1 vocational qualifications require approximately ½ year to complete and that these qualifications are started by learners at the age of 17. We have assumed that Level 2 vocational qualifications require 1½ years to complete and are started at the age of 18, while Level 3 qualifications are started at the age of 19 and require approximately 2½ years to complete.

We adjust annual earnings to reflect the fact that many of these qualifications will not be undertaken on a full time basis. Based on recent guidance and analysis undertaken by the Department for Business Innovation and Skills, we have assumed that the average ‘intensities’ of the various vocational qualifications under consideration are as in Table 22 the Annex. These assessments are based on the total number of guided learning hours associated with the different levels and types of qualification and are presented in the form of full time equivalents.

In summary, the modelling approach assumes that the opportunity cost associated with undertaking a Level 2 qualification is 28% of one year’s worth of full time annual earnings spread across 1½ years.

³ Given the difficulty in interpreting the results of the employment equations as causal effects of qualification attainment (as discussed above), we provide a sensitivity case whereby only 50% of the estimated gain in the likelihood of employment is attributed to the qualification.

Similarly, we have assumed that a Level 3 qualification requires 2½ years to complete, and have assumed that the opportunity cost associated with undertaking a Level 3 qualification is approximately 25% of one year's full time annual earnings achieved by those in possession of a Level 2 qualification spread across 2½ years.

2.4 Estimating the net Exchequer benefits to qualification attainment

Clearly, the Exchequer benefits from the increased tax receipts that follow from the enhanced earnings generated by a more qualified workforce. As such, the difference in the working lifetime pre-tax and post-tax earnings calculated will provide an indication of the additional taxation receipts generated.

Qualification attainment will have a number of spill-over effects (such as improved health outcomes and reduced rates of offending and re-offending) with subsequent economic impacts for the individuals and the economy more generally. Given the data sources being adopted for this analysis, we are unable to make any attempt to value these spill-over effects to either the individual or the Exchequer.

2.4.1 Estimating the Exchequer costs associated with qualification provision

The Exchequer rate of return encompasses the costs associated with the provision of the qualification either through fee subsidy or student support, as well as the foregone tax revenue associated with the foregone earnings while the qualification is being attained (as discussed above). We have assumed that the economic costs to the Exchequer associated with qualification provision relate to the direct costs of funding. From detailed work undertaken by McIntosh (2007) estimating the costs to the Exchequer associated with the provision of different types and levels of vocational qualification from 2004/05, we have assumed similar funding arrangements with an up-rating of unit costs to account for inflation. This is presented in Table 25.

2.5 Estimating the rates of return associated with qualification attainment

Having estimated the costs and benefits associated with qualification attainment across the working lifetime, we are able to estimate the rates of return both to individuals and to the Exchequer. The discounted value of the estimated earnings stream achieved by the individual holding a particular qualification was compared with the estimated future earnings of the counterfactual group to identify the net present value of the benefits of qualification attainment. In addition, we estimate internal rate of return for each qualification.⁴ The discount rate was assumed to be 3.5% for the duration of an individual's working life.

Full details of the methodological approach are presented in the Annex.

⁴ The internal rate of return is the discount rate required for the present value of the benefits to equal the present value of the costs.

3 Progression routes and rates

In this section, we consider the progression rates associated with different vocational qualifications, and the wider educational attainment achieved by those individuals in possession of different vocational qualifications. The analysis presented in Table 1 uses information from the UK Labour Force Survey between 1996 and 2009 to illustrate the range of qualifications that the vocationally trained hold; however, given data limitations in earlier years, the analysis is unable to distinguish the sequential order in which qualifications are obtained or whether individuals obtain more than one specific type of qualification (e.g. different levels of National Vocational Qualification). However, following significant improvement in the quality of the information collected by the ONS between 2008 and 2009 relating to particular routes of qualification attainment, we illustrate the progression rates between different levels of vocational qualification in the remaining tables in this section (Table 2 to Table 4).

The first point to note from the information presented in Table 1 is that individuals in possession of vocational qualifications generally continue with their education and acquire a number of other academic and vocational qualifications at different levels. Furthermore, it is not the case that vocational qualifications are substitutes for academic qualifications, rather they are complementary, and within the range of vocational qualification, those in possession of BTEC qualifications are generally most likely to obtain further qualifications. Thus, rather than vocational qualifications being an end in themselves, they often act as a stepping stone for further qualification attainment. Taking an example, the analysis presented indicates that of those individuals in possession of BTEC Level 1 qualifications, approximately 38.5% are also in possession of 5 or more GCSEs at grades A*-C. This compares to 42.1% for those in possession of RSA Level 1 qualifications, 27.1% for those with City & Guilds Level 1 qualifications and 28.2% for those with NVQ Level 1 qualifications. In addition, a further 35.8% of BTEC Level 1 holders also possess between 1 and 4 GCSEs at grades A*-C.

The proportion of individuals in possession of other academic and vocational qualifications increases as the level of vocational qualification increases. Specifically, of those in possession of BTEC qualifications at Levels 2, 3 and 4, the proportion that are also in possession of 5 or more GCSEs at grades A*-C stands at 42.9%, 59.5% and 63.5% respectively. These levels of qualification attainment exceed the levels of qualification attainment amongst those with occupational related vocational qualifications.

A similar phenomenon in terms of increasing attainment is demonstrated at all levels of existing attainment. For instance, there is a high proportion of individuals in possession of BTEC qualifications that also acquire higher education qualifications. Amongst those in possession of BTEC Level 1 qualifications, approximately 7.1% also possess undergraduate degrees (with a further 4.7% also holding other higher education qualifications). At BTEC Levels 2, 3 and 4, the equivalent estimate of the proportion of individuals in possession of undergraduate degrees stands at 9.2%, 14.7% and 17.3% respectively. These proportions are significantly higher than any other route of vocational qualification attainment.

Reinforcing this point about progression rates, in Table 2, we have presented information from the Labour Force Survey between 2008 and 2009 illustrating the proportion of individuals in possession of given levels of vocational qualification that go on to achieve the subsequent level. The analysis illustrates that there are strong rates of subsequent attainment amongst individuals in possession of BTEC qualifications. In particular, of those in possession of BTEC Level 1 qualifications, approximately 25.9% go on to achieve a BTEC Level 2, while the BTEC Level 2 - Level 3 and BTEC Level 3 - Level 4 transition rates stand at 40.4% and 27.4% respectively.

Table 1: Alternative qualification acquisition amongst vocationally qualified

| | BTEC 1 | BTEC 2 | BTEC 3 | BTEC 4 | RSA 1 | RSA 2 | RSA 3 | RSA 4 | C&G 1 | C&G 2 | C&G 3 | NVQ 1 | NVQ 2 | NVQ 3 | NVQ 4 | NVQ 5 |
|-------------------------------------------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Higher degree | 1.3% | 1.0% | 2.2% | 3.0% | 0.7% | 1.3% | 1.0% | 1.2% | 0.8% | 0.5% | 0.9% | 0.5% | 0.4% | 1.0% | 2.9% | 4.8% |
| First degree | 7.1% | 9.2% | 14.7% | 17.3% | 5.9% | 10.1% | 7.5% | 8.4% | 6.0% | 3.3% | 4.0% | 3.9% | 3.5% | 7.6% | 14.7% | 18.5% |
| Other HE/degree not specified | 1.4% | 1.6% | 1.5% | 1.7% | 1.4% | 2.0% | 2.5% | 2.3% | 1.2% | 0.8% | 1.1% | 0.8% | 0.9% | 1.4% | 3.0% | 4.1% |
| Higher education diploma | 2.0% | 1.4% | 2.3% | 2.4% | 1.8% | 3.6% | 3.4% | 4.6% | 1.6% | 1.2% | 1.5% | 1.2% | 1.3% | 2.3% | 4.3% | 6.3% |
| Has 2 or more A levels or equivalent | 10.2% | 9.0% | 10.8% | 27.3% | 12.1% | 19.7% | 18.2% | 21.4% | 8.8% | 4.6% | 4.9% | 8.0% | 7.9% | 12.0% | 22.6% | 24.2% |
| Has 1 and only 1 A level or equivalent | 5.1% | 5.2% | 6.8% | 10.3% | 4.9% | 6.2% | 6.7% | 7.0% | 3.5% | 2.5% | 2.3% | 3.0% | 3.2% | 5.3% | 6.7% | 4.3% |
| Any A-S levels | 0.7% | 0.9% | 0.7% | 0.6% | 0.7% | 0.7% | 0.7% | 0.6% | 0.6% | 0.3% | 0.2% | 1.0% | 1.0% | 1.2% | 0.8% | 1.3% |
| 5+ GCSEs grade A*-C | 38.5% | 42.9% | 59.5% | 63.5% | 41.2% | 46.8% | 47.9% | 49.1% | 27.1% | 22.3% | 25.0% | 28.2% | 30.9% | 44.6% | 53.3% | 50.8% |
| <5 GCSEs grade A*-C | 35.8% | 37.4% | 25.8% | 20.2% | 32.7% | 28.1% | 29.1% | 30.2% | 28.9% | 29.8% | 28.8% | 29.6% | 31.4% | 28.8% | 23.1% | 21.6% |
| Any other GCSEs | 9.9% | 9.5% | 3.7% | 2.8% | 7.4% | 5.4% | 4.7% | 3.9% | 12.5% | 11.8% | 8.8% | 13.0% | 11.8% | 7.8% | 4.8% | 4.3% |
| Prof/other qualification - postgraduate | 0.4% | 0.3% | 0.8% | 1.1% | 0.3% | 0.6% | 0.6% | 0.4% | 0.3% | 0.1% | 0.3% | 0.2% | 0.1% | 0.3% | 1.1% | 1.8% |
| Prof/other qualification - graduate level | 0.6% | 0.7% | 2.8% | 3.3% | 0.7% | 0.7% | 1.1% | 2.5% | 0.5% | 0.4% | 0.8% | 0.3% | 0.2% | 0.6% | 2.8% | 3.5% |
| Postgraduate certificate in education | 0.4% | 0.4% | 0.7% | 0.8% | 0.6% | 1.3% | 1.5% | 1.4% | 0.5% | 0.2% | 0.3% | 0.3% | 0.2% | 0.5% | 1.5% | 1.3% |
| Other teaching qualification (excl PGCE) | 1.2% | 0.6% | 1.4% | 1.7% | 1.8% | 5.0% | 3.7% | 4.0% | 1.7% | 1.2% | 2.1% | 0.7% | 0.8% | 1.8% | 4.2% | 4.0% |
| Nursing qualification | 2.2% | 1.5% | 1.2% | 0.9% | 2.3% | 2.0% | 1.5% | 1.8% | 2.0% | 0.7% | 0.6% | 1.1% | 1.3% | 2.2% | 4.5% | 4.3% |
| BTEC level 4-Higher level | - | - | - | - | 3.0% | 3.9% | 4.1% | 7.4% | 5.0% | 5.0% | 9.6% | 3.1% | 3.1% | 7.4% | 11.9% | 12.1% |
| BTEC level 3-National Certificate | - | - | - | - | 4.4% | 3.9% | 3.6% | 4.1% | 5.7% | 5.7% | 7.0% | 3.3% | 4.0% | 6.0% | 9.0% | 6.9% |
| BTEC level 2-First or general diploma | - | - | - | - | 0.9% | 1.1% | 0.9% | 0.4% | 1.0% | 0.6% | 0.4% | 1.0% | 1.1% | 1.1% | 0.9% | 0.8% |
| BTEC level 1-First or general certificate | - | - | - | - | 0.8% | 0.6% | 0.6% | 0.6% | 1.2% | 0.6% | 0.5% | 0.8% | 0.7% | 0.7% | 0.7% | 0.4% |
| RSA higher diploma | 0.1% | 0.1% | 0.1% | 0.1% | - | - | - | - | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% | 0.8% | 0.3% |
| RSA advanced diploma | 0.3% | 0.3% | 0.2% | 0.1% | - | - | - | - | 0.3% | 0.1% | 0.1% | 0.2% | 0.2% | 0.3% | 0.5% | 0.1% |
| RSA straight diploma | 0.4% | 0.6% | 0.3% | 0.2% | - | - | - | - | 0.5% | 0.3% | 0.2% | 0.3% | 0.4% | 0.5% | 0.7% | 0.3% |
| RSA other | 11.1% | 9.9% | 6.0% | 3.2% | - | - | - | - | 8.9% | 4.0% | 2.3% | 5.9% | 7.5% | 7.4% | 8.2% | 4.2% |
| City and guilds advanced craft level | 4.7% | 3.0% | 6.4% | 6.9% | 1.5% | 3.1% | 3.0% | 3.7% | - | - | - | 3.3% | 2.9% | 6.1% | 7.3% | 9.5% |
| City and guilds craft level | 4.0% | 3.6% | 4.0% | 2.8% | 2.0% | 2.6% | 2.2% | 1.8% | - | - | - | 2.8% | 4.1% | 3.7% | 3.6% | 2.4% |
| City and guilds other (part 1) | 5.6% | 3.9% | 2.7% | 1.9% | 3.1% | 3.5% | 2.9% | 2.2% | - | - | - | 3.9% | 3.0% | 2.4% | 2.1% | 1.4% |
| NVQ level 5 | 0.2% | 0.2% | 0.3% | 0.4% | 0.1% | 0.2% | 0.1% | 0.4% | 0.1% | 0.1% | 0.4% | - | - | - | - | - |
| NVQ level 4 | 0.9% | 0.9% | 1.2% | 1.2% | 0.8% | 1.3% | 1.5% | 4.1% | 0.6% | 0.7% | 1.0% | - | - | - | - | - |
| NVQ level 3/GNVQ Advanced | 6.3% | 7.4% | 5.1% | 5.0% | 4.6% | 6.0% | 5.2% | 6.8% | 4.3% | 4.4% | 5.7% | - | - | - | - | - |
| NVQ level 2/GNVQ intermediate | 8.1% | 9.8% | 4.5% | 2.8% | 6.2% | 6.3% | 4.1% | 6.5% | 7.3% | 6.6% | 3.6% | - | - | - | - | - |
| NVQ level 1/GNVQ foundation | 3.5% | 3.7% | 1.5% | 1.1% | 2.0% | 2.0% | 1.8% | 2.9% | 3.7% | 1.8% | 1.6% | - | - | - | - | - |
| Other prof./voc/foreign qualification | 32.6% | 30.6% | 35.2% | 34.4% | 38.0% | 37.7% | 42.6% | 40.7% | 37.9% | 40.0% | 40.1% | 31.0% | 31.7% | 34.2% | 46.2% | 44.9% |
| Professional qualification- not specified | 3.7% | 4.1% | 5.9% | 6.7% | 4.0% | 4.1% | 3.0% | 2.9% | 2.3% | 2.3% | 2.6% | 4.0% | 4.4% | 5.4% | 6.3% | 4.3% |

Source: London Economics' analysis of the labour Force Survey 1996-2009

Table 2: Proportion of respondents holding BTECs at different levels, 2008-2009

| | BTEC 1 | BTEC 2 | BTEC 3 | BTEC 4 |
|--------|--------|--------|--------|--------|
| BTEC 1 | 100.0% | 25.9% | 26.4% | 12.8% |
| BTEC 2 | 14.9% | 100.0% | 40.4% | 12.6% |
| BTEC 3 | 3.4% | 9.2% | 100.0% | 27.4% |
| BTEC 4 | 1.3% | 2.2% | 20.7% | 100.0% |

Source: London Economics' analysis of the Labour Force Survey

These transition rates are generally in excess of those displayed by those in possession of other types of vocational qualification. In particular, only 3.0% of those in possession of RSA Level qualifications make the jump to level 2, while the RSA Level 2-Level 3 and RSA Level 3-Level 4 transition rates stand at just 10.2% and 5.5% respectively. This information is presented in Table 3.

Table 3: Proportion of respondents holding RSAs at different levels, 2008-2009

| | RSA 1 | RSA 2 | RSA 3 | RSA 4 |
|-------|--------|--------|--------|--------|
| RSA 1 | 100.0% | 3.0% | 1.5% | 0.5% |
| RSA 2 | 36.5% | 100.0% | 10.2% | 3.6% |
| RSA 3 | 37.5% | 21.9% | 100.0% | 5.5% |
| RSA 4 | 29.5% | 16.4% | 11.5% | 100.0% |

Source: London Economics' analysis of the Labour Force Survey

We have also been able to assess the transition rates within the National Vocational Qualification route ladder of attainment. Although the NVQ Level 1–NVQ Level 2 transition rate is reasonably good (estimated to be 55.6%), it appears that there is relatively limited attainment beyond this level. The information in Table 4 indicates that the proportion of individuals in possession of a NVQ Level 2 qualification that go on to achieve a NVQ Level 3 stands at 26.6%, while the NVQ Level 3-Level 4 transition rate stands at just 6.4%⁵.

Table 4: Proportion of respondents holding NVQs at different levels, 2007-2009

| | NVQ 1 | NVQ 2 | NVQ 3 | NVQ 4 |
|-------|--------|--------|--------|--------|
| NVQ 1 | 100.0% | 55.6% | 24.2% | 2.8% |
| NVQ 2 | 27.4% | 100.0% | 26.6% | 2.9% |
| NVQ 3 | 16.5% | 36.8% | 100.0% | 6.4% |
| NVQ 4 | 12.1% | 26.1% | 40.8% | 100.0% |

Source: London Economics' analysis of the Labour Force Survey

There has always been a suggestion that academic and vocational qualification attainment are mutually exclusive, with those considered more able undertaking the academic route of qualification attainment, while those considered less well suited to the academic route undertake vocational qualifications. The analysis strongly suggests that attaining vocational qualifications acts as a route to further qualification attainment; and that the common perception that different routes of qualification attainment being substitutes for each other is unfounded. The analysis also illustrates that not all vocational qualifications are the same. In particular, the analysis indicates that progression rates (within and between established routes of qualification attainment) are very different depending on the qualification in question. Those qualification routes providing their holders general transferable skills (rather than occupational skills) appear to offer better rates of further educational attainment.

In the next section, we consider whether the outcomes associated with vocational qualification attainment varies depending on the nature of the vocational qualification attained.

⁵ Unfortunately data on further City and Guilds qualifications attained (when more than one) are not available even in recent datasets.

4 Marginal earnings returns to qualification attainment

4.1 Marginal earnings returns to Level 3 Qualifications

In Table 5, we present the aggregate econometric findings relating to the earnings returns to different Level 3 vocational qualifications versus a range of counterfactuals. The equivalent results for men and women are presented in Table 6. Specifically, we consider the marginal returns to RSA, City & Guilds, BTEC and NVQ Level 3 qualifications versus comparison groups consisting of those with Level 2 academic or vocational qualifications; those with Level 2 vocational and/or Level 1 academic qualifications; no qualifications; and those in possession of 5 or more GCSEs at grades A*-C⁶.

As with other studies in the field, the findings illustrate that the returns to Level 3 vocational qualifications are relatively significant. At the upper end of the spectrum, individuals in possession of **BTEC Level 3** qualifications achieve a 34.0% ($\beta=0.294$) earnings premium over those in possession of no formally recognised qualifications; a 14.2% ($\beta=0.134$) premium over those in possession of Level 2 academic or vocational qualifications; an 18.9% ($\beta=0.173$) premium over those in possession of Level 2 vocational and/or Level 1 academic qualifications; and a 12.8% ($\beta=0.121$) premium over those in possession of 5 or more GCSEs at grades A*-C. Interestingly, the marginal returns associated with **BTEC Level 3** qualifications are marginally higher for men than for women.

| Table 5: Marginal returns to Level 3 qualifications – All | | | | |
|-----------------------------------------------------------|------------------------------|---------------------|---------------------|---------------------|
| | Males and females aggregated | | | |
| Comparison | Level 2 | L2V/L1A | No Qualifications | 5+ GCSEs A*-C |
| RSA Level 3 | 0.093*** (0.018) | 0.142*** (0.021) | 0.289*** (0.049) | 0.022 (0.033) |
| C&G Level 3 | 0.111*** (0.004) | 0.136*** (0.005) | 0.220*** (0.009) | 0.034*** (0.011) |
| BTEC Level 3 | 0.134*** (0.005) | 0.173*** (0.007) | 0.294*** (0.025) | 0.121*** (0.008) |
| NVQ Level 3 | 0.045*** (0.004) | 0.056*** (0.005) | 0.141*** (0.014) | 0.058*** (0.008) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009. **Level 2:** Level 2 vocational and/or Level 2 academic qualifications as a maximum; **L2V/L1A:** Level 2 vocational and/or Level 1 academic qualifications as a maximum; * 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance. Standard errors in parentheses.

Source: London Economics

The lowest (though still generally positive) marginal returns associated with Level 3 vocational qualifications are posted by those in possession of NVQ Level 3 qualifications, though again there are some differences between men and women, with men achieving higher returns to the qualification compared to women. In aggregate, the earnings premium associated with these qualifications stands at 4.6% ($\beta=0.045$) compared to those in possession of Level 2 qualifications (at a maximum), 15.1% ($\beta=0.141$) compared to those with no formally recognised qualifications, and 6.0% ($\beta=0.058$) compared to those in possession of 5 or more GCSEs at grades A*-C.

⁶ In the various tables, the actual coefficients from the regression analyses are presented, while in the text, the precise effect is provided when the dependent variable is in log form (by transforming the coefficient (β) using the transformation $e^{\beta} - 1$). In general terms, for small coefficients (less than 0.1) the coefficient in the regression model will give a reasonable approximation of the percentage change, however, for coefficients greater than this, the correction is necessary.

Apart from the examples already mentioned, there are some other significant gender differences between the aggregated and disaggregated results presented in Table 5 and Table 6. Specifically, although the aggregate return associated with RSA Level 3 qualifications is relatively modest, the returns to these qualifications for women are greater than any other type of Level 3 qualification (compared to possession of no formally recognised qualifications).

Table 6: Marginal returns to Level 3 qualifications – Males and females separately

| Comparison | Males | | | | Females | | | |
|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Level 2 | L2V/L1A | No Qual. | GCSEs | Level 2 | L2V/L1A | No Qual. | GCSEs |
| RSA Level 3 | 0.047 (0.055) | 0.009 (0.061) | -0.030 (0.057) | 0.144 (0.170) | 0.116*** (0.019) | 0.179*** (0.023) | 0.317*** (0.052) | 0.036 (0.032) |
| C&G Level 3 | 0.110*** (0.004) | 0.136*** (0.005) | 0.217*** (0.010) | 0.019 (0.012) | 0.016 (0.014) | 0.035** (0.017) | 0.143*** (0.042) | -0.028 (0.027) |
| BTEC Level 3 | 0.145*** (0.006) | 0.189*** (0.009) | 0.322*** (0.030) | 0.111*** (0.011) | 0.095*** (0.008) | 0.116*** (0.012) | 0.194*** (0.039) | 0.109*** (0.012) |
| NVQ Level 3 | 0.068*** (0.006) | 0.078*** (0.008) | 0.182*** (0.022) | 0.087*** (0.013) | 0.020*** (0.005) | 0.030*** (0.007) | 0.089*** (0.017) | 0.028*** (0.011) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009.

Level 2: Level 2 vocational and/or Level 2 academic qualifications as a maximum; **L2V/L1A:** Level 2 vocational and/or Level 1 academic qualifications as a maximum; **No Qual:** No formally recognised qualifications; **GCSEs:** 5 or more GCSEs at grades A*-C

* 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance. Standard errors in parentheses.

Source: London Economics

4.2 Marginal earnings returns to Level 2 Qualifications

In Table 7 and Table 8, we present the equivalent results for those in possession of Level 2 vocational qualifications. At the aggregate level, the marginal returns associated with level 2 vocational qualifications are relatively strong compared to those in possession of no formally recognised qualifications, with individuals in possession of RSA Level 2, City & Guilds Level 2 and **BTEC Level 2** qualifications achieving 38.4%, 15.6% and 13.1% premiums ($\beta=0.325$, 0.145 and 0.123) over those with no qualifications. Similarly, possession of these Level 2 qualifications provides a modest return over those in possession of Level 1 academic and/or vocational qualifications.

Table 7: Marginal returns to Level 2 qualifications – All

| Comparison | Males and females aggregated | | |
|--------------|------------------------------|---------------------|----------------------|
| | Level 1 | No Qualifications | 5+ GCSEs A*-C |
| RSA Level 2 | 0.170*** (0.029) | 0.325*** (0.052) | 0.045 (0.034) |
| C&G Level 2 | 0.088*** (0.007) | 0.145*** (0.010) | -0.026** (0.013) |
| BTEC Level 2 | 0.075*** (0.021) | 0.123** (0.058) | 0.057** (0.023) |
| NVQ Level 2 | -0.016*** (0.005) | -0.005 (0.009) | -0.062*** (0.009) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009

Level 1: Level 1 vocational and/or Level 1 academic qualifications as a maximum. ** 5% level of statistical significance; *** 1% level of statistical significance. Standard errors in parentheses.

Source: London Economics

It is only those in possession of NVQ Level 2 qualifications that struggle to achieve any earnings return, with these individuals suffering a 2.0% ($\beta=-0.016$) penalty compared to those in possession of Level 1 academic and/or vocational qualifications. Compared to those in possession of 5 GCSEs at grades A*-C,

it not the case that those with vocational qualifications routinely underperform those with academic qualifications. Although individuals in possession of City & Guilds or a NVQ at Level 2 achieve a 3% to 6% earnings penalty when combined with possession of 5 GCSEs at grades A*-C (compared to GCSEs only), individuals in possession of both **BTEC Level 2** qualifications and 5 good GCSEs receive a 5.9% earnings premium compared to possession of 5 or more GCSEs only.

At the disaggregated level, again the evidence suggests that in general there are reasonable earnings premiums compared to those in possession of no formally recognised qualifications, with men posting earnings returns of more than 16.1% ($\beta=0.149$ for City & Guilds Level 2), while men in possession of **BTEC Level 2** qualifications achieve a premium of approximately 13.1% ($\beta=0.123$) over those with no formally recognised qualifications. Men in possession of NVQs and City & Guilds vocational qualifications earn less than those men in possession of 5 or more GCSEs at grades A*-C (by between 4% and 6%), while men in possession of RSA Level 2 and **BTEC Level 2** qualifications post a (statistically insignificant) earnings premium.

Table 8: Marginal returns to Level 2 qualifications – Males and females separately

| Comparison | Males | | | Females | | |
|--------------|---------------------|---------------------|----------------------|----------------------|---------------------|----------------------|
| | Level 1 | No Qual. | 5+ GCSE A*-C | Level 1 | No Qual. | 5+ GCSEs A*-C |
| RSA Level 2 | 0.156* (0.089) | 0.220* (0.113) | 0.122 (0.084) | 0.174*** (0.030) | 0.342*** (0.056) | 0.071** (0.035) |
| C&G Level 2 | 0.093*** (0.007) | 0.149*** (0.010) | -0.042*** (0.014) | -0.013 (0.019) | 0.007 (0.031) | -0.022 (0.027) |
| BTEC Level 2 | 0.077** (0.034) | 0.129 (0.079) | 0.049 (0.034) | 0.054** (0.027) | 0.099 (0.089) | 0.056* (0.032) |
| NVQ Level 2 | -0.018** (0.008) | 0.009 (0.013) | -0.062*** (0.014) | -0.027*** (0.007) | -0.026** (0.012) | -0.069*** (0.012) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009

Level 1: Level 1 vocational and/or Level 1 academic qualifications as a maximum; **No Qual:** No formally recognised qualifications;

GCSEs: 5 or more GCSEs at grades A*-C. * 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance. Standard errors in parentheses.

Source: London Economics

Again, the analysis illustrates that RSA qualifications confer significant benefits upon female recipients. Women in possession of RSA Level 2 qualifications achieve a 40.6% premium ($\beta=0.342$) over those in possession of no formally recognised qualifications and a 19.0% premium over those women in possession of Level 1 academic and/or vocational qualifications ($\beta=0.174$). These qualifications offer women the greatest earnings enhancement of any of the qualifications considered at this level; although **BTEC Level 2** qualifications do provide a substantial earnings premium to women at this level ($\beta=0.099$).

4.2.1 Earnings by age

We have also considered the impact of qualification attainment on earnings at different ages in order to assess whether individuals with different types of vocational qualification see their qualifications embed in the workplace and generate higher remuneration from employers than would otherwise be the case. For most vocational qualifications, the earnings premium increases with age, although this is not the case with National Vocational Qualifications. For individuals in possession of **BTEC Level 2** qualifications, the earnings premium increases from 1.3% ($\beta=0.013$) aged between 21 and 25 to more than 12.0% ($\beta=0.113$) for those aged between 51 and 55 (compared to level 1 qualifications). In contrast, for those in possession of National Vocational Qualifications at Level 2, the earnings premium is statistically insignificant between the ages of 21 and 25; however, the qualification holder suffer an

earnings penalty of between 4.5% and 6.7% ($\beta=-0.046$ and -0.069) between the ages of 31 and 50. This information is presented in Table 9 overleaf.

| Age Band | 16-20 | 21-25 | 26-30 | 31-35 | 36-40 | 41-45 | 46-50 | 51-55 | 56-60 | 61-64 |
|--------------|----------------------|--------------------|--------------------|---------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|
| RSA Level 2 | -0.268*** (0.043) | 0.014 (0.106) | 0.127* (0.069) | 0.183 (0.116) | -0.024 (0.069) | 0.255*** (0.054) | 0.164*** (0.062) | 0.233*** (0.081) | 0.182* (0.095) | 0.212** (0.087) |
| C&G Level 2 | -0.044 (0.049) | 0.072** (0.029) | 0.042** (0.019) | 0.043*** (0.016) | 0.064*** (0.017) | 0.067*** (0.018) | 0.110*** (0.016) | 0.119*** (0.019) | 0.104*** (0.025) | 0.187*** (0.048) |
| BTEC Level 2 | 0.053 (0.075) | 0.013 (0.043) | 0.009 (0.034) | 0.185*** (0.052) | 0.047 (0.054) | -0.054 (0.058) | -0.147 (0.124) | 0.113* (0.058) | 0.316* (0.165) | 0.000 (0.000) |
| NVQ Level 2 | -0.012 (0.015) | -0.006 (0.011) | -0.011 (0.015) | -0.039** (0.018) | -0.069*** (0.017) | -0.060*** (0.016) | -0.046*** (0.016) | -0.020 (0.020) | 0.012 (0.021) | 0.004 (0.093) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009
Comparison group consists of **Level 1 qualifications**, i.e. Level 1 vocational and/or Level 2 academic qualifications as a maximum
* 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance.

Source: London Economics

4.3 Marginal earnings returns to Level 1 Qualifications

In Table 10 below, we present the returns associated with Level 1 vocational qualifications – both in aggregate and broken down by gender. The results generally follow those relating to Level 3 and Level 2 qualifications detailed above, with all qualifications generally offering a positive return over possession of no formally recognised qualifications (between 9.1% and 17.9% ($\beta=0.087$ and 0.165 respectively) in aggregate (with the exception of NVQ Level 1 qualifications)). Women in possession of RSA and **BTEC qualifications** perform particularly well and post 20% and 17% earning returns ($\beta=0.182$ and 0.156 respectively), while City & Guilds and **BTEC qualifications** provide the best earnings returns at this level to men (up to 20% ($\beta=0.185$)).

| Comparison | All | Males | Females |
|--------------|----------------------|----------------------|----------------------|
| | No Qualifications | No Qualifications | No Qualifications |
| RSA Level 1 | 0.165*** (0.0088) | 0.082** (0.0320) | 0.182*** (0.0090) |
| C&G Level 1 | 0.087*** (0.0108) | 0.099*** (0.0122) | -0.003 (0.0216) |
| BTEC Level 1 | 0.156*** (0.0395) | 0.185*** (0.0417) | 0.093 (0.0768) |
| NVQ Level 1 | -0.020 (0.0124) | -0.010 (0.0172) | -0.043** (0.0177) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009

No Qual: No formally recognised qualifications, **GCSEs:** 5 or more GCSEs at grades A*-C. * 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance. Standard errors in parentheses.

Source: London Economics

5 Marginal employment returns to qualification attainment

5.1 Marginal employment returns to Level 3 qualifications

In this chapter, we consider the marginal employment returns associated with intermediate and low level vocational qualifications. It is important to remember the fact that a number of these vocational qualifications are obtained through workplace training or while in employment. Therefore, there may be a strong possibility of reverse causality and it is always difficult to infer causality between the attainment of qualifications and employment outcomes.

In Table 11, we present information on the difference in the likelihood of being in full time employment for those in possession of Level 3 vocational qualifications compared to individuals in possession of either Level 2 academic or vocational qualifications at a maximum. At this level of qualification attainment, the estimates indicate that there is a strong and positive relationship between vocational qualification attainment and the likelihood of being in employment with the association slightly more concentrated amongst women. In particular, men in possession of Level 3 National Vocational Qualifications as their highest qualification are approximately 8.7 percentage points more likely to be employed compared to a male in possession of Level 2 qualifications as a maximum, while women in possession of this qualification are approximately 16.8 percentage points more likely to be employed. Compared to NVQ Level 3 qualifications, for men, City & Guilds and **BTEC Level 3** qualifications offer a substantial employment boost (11.0 and 5.3 percentage points respectively). For women, National Vocational Qualifications have the greatest effect of any level 3 vocational qualification on female employment outcomes, although again, **BTEC Level 3** qualifications offer women an 8.2 percentage point employment boost relative to those in possession of Level 2 qualifications.

| | All | Males | Females |
|-----------------------|-----------------------|----------------------|----------------------|
| RSA Level 3 | 0.063*** (0.0183) | 0.002 (0.0617) | 0.074*** (0.0184) |
| City & Guilds Level 3 | 0.136*** (0.00393) | 0.110*** (0.0319) | 0.038*** (0.0099) |
| BTEC Level 3 | 0.075*** (0.0498) | 0.053*** (0.0058) | 0.082*** (0.0694) |
| NVQ Level 3 | 0.152*** (0.0446) | 0.088*** (0.0598) | 0.168*** (0.0567) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009

Comparison group consists of those individuals in possession of either academic or vocational qualifications at Level 2 or below
* 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance.

Source: *London Economics*

5.2 Marginal employment returns to Level 2 qualifications

In Table 12, we provide the equivalent results for men and women in possession of Level 2 vocational qualifications compared to individuals in possession of Level 1 academic or vocational qualifications at a maximum. The estimates of the change in employment probabilities associated with the different types of vocational training are similar to those estimates relating to Level 3 qualifications. For instance, in aggregate **BTEC Level 2** qualifications offer their holders an 8.7 percentage point increase in the probability of being employed, however, there are some significant differences depending on gender. Men are only marginally more likely to be in full time employment compared to individuals in possession of Level 1 qualifications; however, women are

approximately 11 percentage points more likely to be in employment. Unsurprisingly, RSA Level 2 qualifications increase the probability of women being employed by more than 10 percentage points while City & Guilds Level 2 qualifications boost the employment outcomes of men by almost 12 percentage points. National Vocational Qualifications offer a significant boost to the probability of men being in employment with males achieving a 6.4 percentage point statistically significant increase in the probability of being employed while women are approximately 13.1 percentage points more likely to be employed relative to the comparison group.

Table 12: Marginal employment returns to Level 2 Qualifications

| | All | Males | Females |
|-----------------------|---------------------|---------------------|---------------------|
| RSA Level 2 | 0.091*** (0.024) | -0.049 (0.073) | 0.102*** (0.023) |
| City & Guilds Level 2 | 0.118*** (0.006) | 0.119*** (0.006) | 0.028** (0.011) |
| BTEC Level 2 | 0.087*** (0.020) | 0.011 (0.030) | 0.113*** (0.022) |
| NVQ Level 2 | 0.125*** (0.005) | 0.064*** (0.008) | 0.131*** (0.006) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009
Comparison group consists of those individuals in possession of either academic or vocational qualifications at Level 1 or below
* 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance.

Source: London Economics

5.3 Marginal employment returns to Level 1 qualifications

The results in Table 13 referring to the marginal employment returns associated with Level 1 vocational qualifications again illustrate relatively positive and robust returns to qualifications compared to those in possession of no formally recognised qualifications; however, in a number of cases, the impact appears to be more focused amongst females, who (for example) are approximately 14 percentage points more likely to be employed if they possess a RSA Level 1 or 9.2 percentage points if in possession of a **BTEC Level 1** qualification. Men in possession of a **BTEC Level 1** qualification are on average more than 14 percentage points more likely to be employed relative to men in possession of no formally recognised qualifications, compared to just 2.7 percentage points more likely to be employed if in possession of NVQ Level 1 qualifications.

Table 13: Marginal employment returns to Level 1 Qualifications

| | All | Males | Females |
|-----------------------|----------------------|----------------------|----------------------|
| RSA Level 1 | 0.155*** (0.0723) | 0.011 (0.0250) | 0.141*** (0.0068) |
| City & Guilds Level 1 | 0.104*** (0.0091) | 0.099*** (0.0103) | 0.089*** (0.0151) |
| BTEC Level 1 | 0.130*** (0.0351) | 0.142*** (0.0460) | 0.092** (0.0415) |
| NVQ Level 1 | 0.084*** (0.0115) | 0.027* (0.0161) | 0.110*** (0.0127) |

Note: Aggregated marginal returns to vocational qualifications – pooled Labour Force Survey data 1996-2009
Comparison group consists of those individuals in possession of no formally recognised qualifications
* 10% level of statistical significance; ** 5% level of statistical significance; *** 1% level of statistical significance.

Source: London Economics

6 Rates of return to vocational education and training

In this section, we provide an estimate of the individual rates of return associated with different levels and types of vocational qualifications.

6.1 Individual rates of return

In the three tables overleaf (Table 14 to Table 16), we provide summaries of the net present values and internal rates of return relating to each of the types and levels of vocational qualification. Due to small sample sizes, for some qualifications (RSA qualifications for men, and BTEC Level 1 qualifications for both men and women), the estimates were not sufficiently robust and as such are not presented. In each case, we present a range of estimates, reflecting different assumptions relating to the proportion of the employment effect that is attributed to the particular qualification. This follows the approach of McIntosh (2007). In general, the lower estimate reflects an assumption that 50% of the employment benefit is attributed to the qualification, while the higher estimate is based on an assumption that 100% of the employment gain is a result of obtaining the qualification. These are presented in black text.

In addition to this apportionment of the impact of qualification attainment on employment outcomes, following the approach suggested by the Department for Business, Innovation and Skills, we have also undertaken a sensitivity analysis to illustrate the impact on the net present value of the benefits of qualification attainment and the rate of return to the individual and Exchequer under two alternative scenarios. The first scenario assumes that the earnings premium associated with vocational qualification attainment is non-negative (presented in red), while the second scenario assumes that the both the earnings premium and enhanced employment probabilities associated with vocational qualification attainment are non-negative (presented in green). We have presented these alternative scenarios as it has been suggested that the possession of any qualification cannot reduce either earnings or the probability of being employed relative to a *proper* counterfactual (i.e. that same individual without the qualification in question), and that earnings penalties or reduced probabilities of being in employment must be as a result of fundamentally different characteristics between the treatment and control groups. All estimates have been rounded to the nearest thousand pounds.

It is important to remember that the rate of return associated with the different qualifications is driven by the relationship between the costs and benefits associated with the particular qualifications but also their timing. It is therefore possible for a qualification to be associated with an aggregate negative net present value but a (small) positive rate of return. In those cases where there appears to be a very high rate of return, this is generally as a result of the relatively insignificant costs associated with qualification attainment. This is especially the case in relation to the assessment of the individual rate of return for Level 1 qualifications, where the opportunity cost associated with gaining these vocational qualifications is especially low due to the weak earnings and the relatively low probability of employment for those in the counterfactual group (i.e. those aged 17 with no formal qualifications). Amending opportunity costs will (in general) have a relatively small impact on the net present value of the benefits associated with the qualifications, but a significant impact on the rate of return estimated by the model.

Under the baseline assumptions, the analysis indicates that in general there are positive rates of returns to individuals associated with vocational qualifications. For men and women combined, for

example, Level 3 qualifications are associated with benefits with a net present value of between £15,000 and £24,000 (for NVQ Level 3) and between £59,000 and £92,000 (for **BTEC Level 3** qualifications). These estimates for the lifetime benefits and rates of return are unchanged under the alternative scenarios as there were no circumstances where Level 3 qualifications were associated with negative earnings outcomes or reduced employment probabilities.

For Level 2 qualifications, under the baseline scenario, the lifetime benefits range between £24,000 and £35,000 (for City & Guilds qualifications) and between £28,000 and £42,000 (for **BTEC Level 2** qualifications), however, the net benefit associated with NVQs is negative (-£36,000 to -£21,000). Under scenario 1 (where earnings premiums are non-negative, the lifetime benefit associated with NVQ Level 2 qualifications is increased by approximately £5,000, while under scenario 2 (non-negative earnings and employment probabilities), lifetime earnings approach zero.

For Level 1 qualifications, the benefits associated with City & Guilds qualifications range between £7,000 and £9,000, while the benefits associated with NVQs are again negative (-£32,000 to -£18,000). Under scenario 1, lifetime benefits increase by approximately £3,000, while under scenario 2, lifetime benefits are zero.

Table 14: Individual rates of return associated with vocational qualification attainment (all)

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-----|-------------------------------------------------------------|-------------------|-----------------------------------------------------------------|
| Level 1 | NPV Benefits | - | £7,000 - £9,000 £7,000 - £9,000 £13,000 - £15,000 | - | -£32,000 - -£18,000 -£29,000 - -£15,000 -£0 - -£0 |
| | Rate of return | - | 18% - 37% 18% - 37% 78% - 81% | - | - - - |
| Level 2 | NPV Benefits | - | £24,000 - £35,000 £25,000 - £35,000 £25,000 - £35,000 | £28,000 - £42,000 | -£36,000 - -£21,000 -£31,000 - -£16,000 -£1,000 - -£1,000 |
| | Rate of return | - | 34% - 43% 37% - 46% 40% - 50% | 28% - 34% | - - - |
| Level 3 | NPV Benefits | - | £48,000 - £74,000 | £59,000 - £92,000 | £15,000 - £24,000 |
| | Rate of return | - | 84% - 108% | 48% - 60% | 43% - 59% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

The benefits and rates of return to men only are presented in Table 15 overleaf. Again, relatively high returns are associated with all Level 3 qualifications, with benefits ranging between £28,000 and £41,000 (for NVQ Level 3 qualifications) and between £85,000 and £125,000 (for **BTEC Level 3** qualifications). The internal rates of return associated with these qualifications are also consistently high.

With the exception of National Vocational Qualifications, the benefits associated with Level 2 qualifications to men are less dispersed than those for Level 3 qualifications. City & Guilds and **BTEC Level 2** qualifications are again estimated to provide substantial benefits (between £41,000 and £55,000 and between £36,000 and £47,000 respectively). The net present value of the earnings stream associated with NVQ Level 2 qualifications are between -£43,000 and -£27,000 for men under the baseline scenario and increasing by approximately £10,000 under scenario 1 and a further £16,000 to £32,000 under scenario 2.

Positive returns were associated with City & Guilds qualifications at Level 1 (between £24,000 and £25,000), while NVQ Level 1 qualifications were again associated with negative returns (between -£39,000 and -£22,000), although these negative returns disappear under scenario 2.

Table 15: Individual rates of return associated with vocational qualification attainment (Male)

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-----|-------------------------------------------------------------|--------------------|---------------------------------------------------------|
| Level 1 | NPV Benefits | - | £24,000 - £25,000 £24,000 - £25,000 £27,000 - £30,000 | - | -£39,000 - -£22,000 -£34,000 - -£17,000 £0 - £0 |
| | Rate of return | - | 68% - 96% 68% - 96% 159% - 169% | - | - - 8% - 8% |
| Level 2 | NPV Benefits | - | £41,000 - £55,000 £41,000 - £56,000 £41,000 - £56,000 | £36,000 - £47,000 | -£43,000 - -£27,000 -£33,000 - -£16,000 -£0 - -£0 |
| | Rate of return | - | 47% - 56% 49% - 58% 49% - 58% | 49% - 67% | - - 3% - 3% |
| Level 3 | NPV Benefits | - | £68,000 - £100,000 | £85,000 - £125,000 | £28,000 - £41,000 |
| | Rate of return | - | 83% - 104% | 52% - 64% | 61% - 79% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

Table 16 presents the net present values of the benefits and internal rates of return attained by women undertaking intermediate and low level vocational qualifications. The returns for RSA Level 3 qualifications (for which it was not possible to provide estimates for men due to small sample sizes) and **BTEC Level 3** qualifications are at higher levels compared to other vocational qualifications (£31,000 to £51,000 and £27,000 and £44,000 respectively). There is some significant variation in returns with the benefits associated with either NVQ qualifications or City & Guilds qualifications are only marginally positive under the baseline scenario (zero to £7,000).

Table 16: Individual rates of return associated with vocational qualification attainment (Female)

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------|
| Level 1 | NPV Benefits | £22,000 - £33,000 | -£18,000 - -£10,000 -£17,000 - -£8,000 £1,000 - £1,000 | - | -£22,000 - -£12,000 -£20,000 - -£10,000 £0 - £0 |
| | Rate of return | 523% - 818% | - - 18% - 19% | - | - - 8% - 8% |
| Level 2 | NPV Benefits | £31,000 - £50,000 £32,000 - £52,000 £32,000 - £52,000 | -£17,000 - -£11,000 -£13,000 - -£6,000 £0 - £0 | £13,000 - £25,000 £17,000 - £30,000 £19,000 - £33,000 | -£30,000 - -£17,000 -£27,000 - -£14,000 -£1,000 - -£1,000 |
| | Rate of return | 52% - 109% 89% - 161% 89% - 161% | - - 5% - 6% | 16% - 20% 20% - 22% 24% - 30% | - - - |
| Level 3 | NPV Benefits | £31,000 - £51,000 | £0 - £0 £1,000 - £1,000 £3,000 - £4,000 | £27,000 - £44,000 | £4,000 - £7,000 |
| | Rate of return | 86% - 112% | 9% - 11% 15% - 16% 20% - 26% | 39% - 50% | 13% - 17% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

Women in possession of Level 2 RSA and **BTEC qualifications** again receive significant returns (between £31,000 to £50,000 and between £13,000 and £25,000 respectively); however, the lifetime net benefit associated with NVQ and City & Guilds qualifications at Level 2 are negative (-£30,000 to -£10,000) under the baseline scenario. A similar picture emerges when considering the lifetime benefits associated with Level 1 qualifications.

6.2 Exchequer rates of return

In addition to the rates of return to individuals, we have also estimated the rates of return to the Exchequer, based on the up-front costs of supporting qualification attainment, and the change in tax revenue associated with qualification attainment.

Table 17 displays the results of the analysis for men and women combined. The Exchequer is estimated to achieve positive returns from the majority of vocational qualifications, with particularly high returns associated with Level 3 qualifications. For these qualifications the net present value of the benefits ranges from £10,000 to £15,000 for NVQ Level 3 qualifications to £35,000 to £54,000 for **BTEC Level 3** qualifications. The benefits associated with Level 1 and Level 2 qualifications are also generally positive, with the exception of the low estimates for NVQ Level 1 and Level 2 qualifications (between -£21,000 and -£13,000 and -£22,000 and -£16,000 respectively). **BTEC Level 2** qualifications offer the most significant Exchequer benefit at Level 2 (between £18,000 and £28,000).

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-----|-------------------------------------------------------------|-------------------|-----------------------------------------------------------------|
| Level 1 | NPV Benefits | - | £5,000 - £6,000 £5,000 - £6,000 £13,000 - £15,000 | - | -£21,000 - -£13,000 -£19,000 - -£11,000 -£3,000 - -£3,000 |
| | Rate of return | - | 8% - 10% 8% - 10% 78% - 81% | - | - - - |
| Level 2 | NPV Benefits | - | £17,000 - £24,000 £17,000 - £24,000 £17,000 - £24,000 | £18,000 - £28,000 | -£22,000 - -£17,000 -£18,000 - -£12,000 -£4,000 - -£3,000 |
| | Rate of return | - | 9% - 11% 9% - 11% 9% - 11% | 9% - 10% | - - - |
| Level 3 | NPV Benefits | - | £26,000 - £41,000 | £35,000 - £54,000 | £10,000 - £15,000 |
| | Rate of return | - | 11% - 15% | 12% - 15% | 14% - 18% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

Similar Exchequer benefits are illustrated for qualifications attained by men, as shown in Table 18. The Exchequer benefits associated with City & Guilds qualifications and **BTEC qualifications** are greater than those estimated in aggregate. At Level 3, **BTEC qualifications** provide a net Exchequer benefit of between £57,000 and £81,000 while City & Guilds Level 3 qualifications provide a net Exchequer benefit of between £43,000 and £61,000.

There are generally strong returns to the Exchequer from the provision of vocational qualifications at Level 2, with the analysis demonstrating returns of between £28,000 and £36,000 for City & Guilds and £25,000 and £31,000 for **BTEC Level 2** qualifications. The returns to NVQ Level 2 qualifications are particularly low for men, ranging between -£32,000 to -£24,000 respectively. Under scenario 2, the net Exchequer cost associated with the provision of NVQ Level 2 qualifications stands at approximately £5,000. Similar outcomes are generated at Level 1.

Table 18: Exchequer rates of return associated with vocational qualification attainment (Male)

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-----|-------------------------------------------------------------|-------------------|-----------------------------------------------------------------|
| Level 1 | NPV Benefits | - | £18,000 - £19,000 £18,000 - £19,000 £20,000 - £22,000 | - | -£26,000 - -£17,000 -£22,000 - -£13,000 -£3,000 - -£3,000 |
| | Rate of return | - | 20% - 20% 20% - 20% 21% - 23% | - | - - - |
| Level 2 | NPV Benefits | - | £28,000 - £36,000 £28,000 - £36,000 £28,000 - £36,000 | £25,000 - £31,000 | -£32,000 - -£24,000 -£23,000 - -£14,000 -£5,000 - -£5,000 |
| | Rate of return | - | 12% - 13% 12% - 13% 12% - 13% | 11% - 11% | - - - |
| Level 3 | NPV Benefits | - | £43,000 - £61,000 | £57,000 - £81,000 | £18,000 - £25,000 |
| | Rate of return | - | 15% - 18% | 16% - 18% | 23% - 28% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

Finally, Table 19 presents the returns to the Exchequer associated with qualification attainment by women. The results find that the returns are positive for most qualifications, although lower than those associated with attainment by men. As with the individual returns (reported above), the net present value associated with City & Guilds and NVQ qualifications acquired by women is particularly small, with negative estimates associated with these qualifications at Level 1 and Level 2 (and Level 3 in the case of City & Guilds). Even under the alternative scenarios, the net Exchequer benefit from providing these qualifications is marginally negative. The only qualifications offering consistently positive Exchequer returns are RSA and BTEC qualifications. RSA qualifications provide a benefit of between £11,000 and £16,000 at Level 1, between £15,000 and £25,000 at Level 2 and between £12,000 and £22,000 at Level 3. BTEC qualifications deliver an Exchequer benefit of between £5,000 and £17,000 depending on the level of qualification.

Table 19: Exchequer rates of return associated with vocational qualification attainment (Female)

| | | RSA | City & Guilds | BTEC | NVQ |
|---------|----------------|-------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------|
| Level 1 | NPV Benefits | £11,000 - £16,000 | -£10,000 - -£6,000 -£10,000 - -£6,000 -£1,000 - -£1,000 | - | -£13,000 - -£9,000 -£12,000 - -£7,000 -£3,000 - -£3,000 |
| | Rate of return | 21% - 30% | - - - | - | - - - |
| Level 2 | NPV Benefits | £15,000 - £25,000 £16,000 - £26,000 £16,000 - £26,000 | -£10,000 - -£9,000 -£7,000 - -£6,000 -£3,000 - -£2,000 | £5,000 - £13,000 £8,000 - £16,000 £9,000 - £17,000 | -£17,000 - -£13,000 -£16,000 - -£11,000 -£5,000 - -£4,000 |
| | Rate of return | 10% - 14% 11% - 15% 11% - 15% | - - - | 6% - 8% 7% - 9% 7% - 9% | - - - |
| Level 3 | NPV Benefits | £12,000 - £22,000 | -£6,000 - -£5,000 -£5,000 - -£4,000 -£5,000 - -£3,000 | £8,000 - £17,000 | £2,000 - £5,000 |
| | Rate of return | 8% - 11% | - - - | 7% - 10% | 6% - 9% |

Note: A “-” indicates that it was not possible to provide robust estimates of the NPV and IRR, due to small sample sizes or the rate of return could not be calculated, due the stream of future earnings being negative for every possible value of the discount rate.

Source: London Economics' analysis

Annex 1 References

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McIntosh, S., (2002), “Further analysis of the returns to academic and vocational qualifications”, Department for Education and Skills Research Report RR370.

McIntosh, S., (2007), “A cost benefit analysis of apprenticeships and other vocational qualifications”, Department for Education and Skills Research Report RR834.

McIntosh, S., (2009), “The economic value of intermediate vocational education and qualifications”, UK Commission for Employment and Skills Evidence Report 11, December 2009.

Annex 2 Methodology

In this section, we provide a summary of the methodological approach adopted throughout the various analyses. This approach replicates that of the forthcoming work undertaken for the Department for Business, Innovation and Skills on the returns to intermediate and low level vocational qualifications.

A2.1 Estimating earnings returns using the Labour Force Surveys

Throughout the analysis, we have adopted a standard Ordinary Least Squares linear regression model, where the dependent variable is the natural logarithm of hourly earnings and the independent variables includes a range of personal, regional and job related characteristics that might be expected to influence earnings. Although there may generally be a number of biases in the specification of a model of this nature, the work of Dearden⁷ (1999) has presented strong evidence to illustrate the fact that OLS regression specifications remain a good estimator of the earnings associated with qualification attainment (the various biases generally negate each other). This approach has been used widely in the academic literature. The basic specification of model was as follows (in aggregate and for men and women separately):

$$\ln(\omega_i) = \alpha + \beta' X_i + \varepsilon_i \quad \text{for } i = 1 \text{ to } n$$

where $\ln(\omega_i)$ represents the natural logarithm of hourly earnings, X_i provides the independent variable included in the analysis including (but not exhaustively):

- Age
- Age squared
- Ethnic origin
- Region of usual residence
- Qualifications held
- Marital Status
- Number of dependent children under the age of 16
- Full time/ Part time employment
- Temporary or permanent contract
- Public or private sector employment
- Interaction terms and
- Yearly/Seasonal Dummies

Coefficients

Specifically, in the relevant specification, the β coefficients in the model provide information on the extent to which a particular independent variable influences the dependent variable. In the model specifications presented here, it is necessary to compare the earnings outcomes with a

⁷ Dearden, L. (1999), "Qualifications and Earnings in Britain: How reliable are conventional OLS estimates of the returns to education" Royal Economic Society Annual Conference, March 1999.

reference or comparison group. In this analysis, we have estimated the returns to a range of comparison groups including individuals in possession of no formally recognised qualifications, individuals in possession of 5 or more GCSEs at grades A*-C, and individuals in possession of certain (lower or equivalent) levels of academic and/or vocational qualifications at a maximum. These comparison groups are detailed explicitly in each of the tables presenting the results.

The coefficients relating to the alternative vocational qualifications indicate the extent to which the log of hourly earnings achieved by those in possession of different qualification exceed those in the reference category (e.g. those with Level 2 qualifications). The interpretation of the estimated coefficients from the wage equation depends upon the control group used. In all specifications, we are interested in the wage gain from completing a specific vocational qualification, compared to those in the reference category. The final term ε_i represents an error term. In the various tables in the report, the actual coefficients from the regression are presented, while in the text, the precise effect when the dependent variable is in log form is provided (by transforming the coefficient using the transformation $e^\beta - 1$). In general terms, for small coefficients (less than 0.1), the coefficient in the regression model will give a reasonable approximation of the actual percentage change; however, for coefficients greater than this, the correction is necessary.

General interpretation

It is important to note that when considering the results, the estimates relating to the marginal returns are likely to exceed the estimates associated with average returns. The reason for this is that marginal returns assess the returns associated with the highest level of qualification (compared to 'no qualifications' for instance), while the average returns estimate the earnings premium achieved by anyone in possession of that qualification (including individuals with higher level qualifications who might have a low return associated with the vocational qualification, and individuals with no other formally recognised qualifications where the return may be higher).

A2.2 Estimating employment returns using the Labour Force Surveys

We have estimated a range of probit models to assess the different likelihood of different qualification holders being in employment or otherwise. As per the standard ILO definition of employment, we will define an individual's labour market outcome to be either in employment (working for payment or profit for more than 1 hour in the reference week) or not in employment (being either unemployed or economically inactive). The specification of the probit model was as follows (in aggregate and for men and women separately):

$$\text{probit}(EMPNOT_i) = \alpha + \gamma'Z_i + \varepsilon_i$$

The dependent variable adopted was the binary variable *EMPNOT* which was coded 1 if the individual was in employment and 0 otherwise. As in the previous model, we specified the model to contain a constant terms as well as a number of independent variables including (though not exclusively):

- Age
- Age squared

- Ethnic origin
- Region of usual residence
- Qualifications held
- Marital Status
- Number of dependent children under the age of 16 and
- Yearly/seasonal Dummies

In addition to the consideration of employment outcomes, we have also undertaken a number of model specifications where we have considered the impact of qualification attainment on being employed, but also the change in the probability of being in full time employment. The different model specifications are presented explicitly throughout the report.

A2.2.1 Labour Force Survey Data

In general, we have used Labour Force Survey information between 1996 and 2009 where available. In each year, we have merged each of the four quarters of LFS data to increase the available sample size and include yearly/seasonal dummies in the analysis to remove the possible impact of annual wage inflation or other time trends that might bias the results. The Labour Force Survey is made up from a revolving panel of respondents with 20% of respondents dropping out each quarter (having participated in the survey for the 5th consecutive quarter (Wave 1 to Wave 5)) and replaced by a new wave of participants (Wave 1). Given the fact that respondents participate in 5 separate quarters, and that income questions are asked only of individuals in Wave 1 and Wave 5, we ensure that duplicate earnings information from Wave 1/Wave 5 respondents are removed.

Caveats

It is important to note that there are a number of significant issues relating to the availability and comparability of some of the Labour Force Survey over time. In particular, we have noted that in 2005/2006 there was a fundamental change in the administration and collection of Labour Force Survey data following the movement from seasonal to quarterly data. In particular, information relating to a number of the variables (including the location where the qualification was attained) prior the change in data collection method became unavailable on a consistent basis, making some comparisons with other academic work difficult.

A2.3 Assessing rates of return

To consider the rate of return associated with a particular level or type of qualification is it necessary to estimate the total direct and indirect costs associated with acquiring the qualification as well as the discounted lifetime economic benefits. The analysis presented here considers the **individual** rate of return and **Exchequer** rate of return associated with qualification attainment. We discuss this in a number of stages below.

A2.3.1 Estimating the lifetime earnings associated with qualification attainment

To assess the earnings and employment outcomes associated with different levels of qualification, the lifetime earnings associated with qualification attainment are modelled. The analysis focuses

on the marginal returns to each qualification of interest – that is the returns obtained by individuals for who the qualification of interest would be their highest qualification. This involved several stages:

1. We estimated the marginal earnings premium associated with different qualification levels and types. For vocational qualifications, returns are estimated in 5 year age bands across the working age population (16-64 inclusive for men and 16-59 inclusive for women), with the returns then smoothed within individual five year age bands⁸. The estimation procedure followed the methodology outlined above, using the point estimate of the annual earnings return.

Individuals are assumed to gain the earnings premium associated with a qualification the year following completion of that qualification. As detailed in a later section, we have assumed that Level 1 qualifications are started at the age of 17 (and last ½ year); Level 2 qualifications are started at the age of 18 and last 1½ years; and Level 3 qualifications are started at the age of 19 and last 2½ years.

2. We estimated the change in the probability of employment associated with the attainment of each qualification (i.e. marginal employment returns) associated with different qualification levels in 5 year age bands across the working age population (16-64 inclusive for men and 16-59 inclusive for women).

Given the difficulty in interpreting the results of the employment equations as causal effects of qualification attainment (as discussed above), we provide a sensitivity case whereby only 50% of the estimated gain in the likelihood of employment is attributed to the qualification.

3. We estimated the annual earnings achieved by individuals in the counterfactual group. For vocational qualifications, the relevant counterfactual group is assumed to consist of those individuals in possession of academic or vocational qualifications at the next highest level of qualification. (For instance, for Level 2 qualifications the counterfactual group consists of those holding qualifications at Level 1 or below.)
4. We estimated the lifetime earnings achieved by individuals holding each qualification, through inflating the earnings of the counterfactual group using the earnings premiums from (1) and the employment probabilities from (2).
5. We adjusted earnings to account for the fact that earnings would be expected to increase in real terms over time (assumed to be 2% generally).

A2.3.2 Estimating the individual benefits to qualification attainment

The private benefits associated with qualification attainment are the enhanced post tax present value of lifetime earnings resulting from the qualification attained. Therefore, based on the age

⁸ Where it was not possible to estimate earnings returns due to small sample sizes, the estimate was interpolated using the estimates for neighbouring age bands.

earnings profile generated in the previous section and current income tax and National Insurance rates and levies, we have estimated the enhanced **after-tax earnings** associated with various levels and types of vocational qualification attainment.

A2.3.3 Estimating the Exchequer benefits to qualification attainment

Clearly, the Exchequer benefits from the increased tax receipts that should follow from the enhanced earnings generated by a more qualified workforce. As such, the difference in the pre-tax and post-tax earnings calculated in section A2.3.2 will provide an indication of the additional taxation receipts generated.

It is clear that qualification attainment will have a number of spill-over effects (such as improved health outcomes and reduced rates of offending and re-offending) with subsequent economic impacts for the individuals and the economy more generally. Given the data sources being adopted for this analysis, we are unable to make any attempt to value these spill-over effects to either the individual or the Exchequer.

Taxation rates and reliefs

We have assumed that income tax rates and allowances and National Insurance contributions are as presented in Table 20 and Table 21 below. As it is not possible to identify tax rates in the future, we utilise the most forward looking government announcements regarding both tax rates and allowances.

Table 20: Income tax rates (2010-11) and allowances (2011-12)

| <i>Income Level</i> | Income Tax on band |
|---------------------|---------------------------|
| £0-£7,475 | 0% |
| £7,476 - £44,875 | 20% |
| £44,876 - £100,000 | 40% |
| £100,001 - £112,950 | 60%* |
| £112,950 - £150,000 | 40% |
| £150,001+ | 50% |

Note: The effective tax rate of 60% in incomes between £100,000 and £112,950 results from the removal of the personal allowance commencing at incomes in excess of £100,000 along a 0.50 taper.

Source: *London Economics assessment of HM Revenue and Customs information*

Table 21: National Insurance rates (2010-11) and allowances (2010-11)

| <i>Income Level</i> | National Insurance Contributions on band |
|-------------------------------|-------------------------------------------------|
| Employee contributions | |
| £0-£5,715 | 0% |
| £5,716 - £43,875 | 11% |
| £43,876+ | 1% |
| Employer contributions | |
| £0-£5,715 | 0% |
| £5,716+ | 12.8% |

Source: *London Economics assessment of HM Revenue and Customs information*

Value Added Tax

We have assumed that the enhanced earnings achieved by those in possession of higher levels of qualification result in higher subsequent spending in the wider economy and enhanced indirect tax receipts accruing to the Exchequer. In particular, following previous analysis undertaken by the Department for Business, Innovation and Skills, we have assumed that the marginal propensity to consume out of enhanced income stands at 0.64 and that the average marginal rate of VAT stands at 9.7% (given the fact that food and children's clothing attract a zero rate, while general expenditure on goods and services attract a VAT rate of 17.5%)⁹. We have also assumed that there is an equivalent reduction in VAT receipts associated with the foregone earnings during the period in which qualifications were being undertaken. As part of this element of research, we have undertaken a sensitivity analysis to consider alternative VAT rates (and found the results to be relatively insensitive to the different assumptions).

A2.3.4 Estimating the individual direct and indirect costs associated with qualification attainment

Direct costs associated with qualification attainment

In the case of direct costs incurred by the individual, these encompass items such as tuition fees and other course related costs. We have assumed that the costs to the individual are zero.

Indirect costs associated with qualification attainment

Individuals will incur indirect costs when undertaking qualifications through foregone earnings while studying. The size of these costs depends on a number of factors, outlined in turn below.

Age of commencement and time to complete

Normally the most significant cost associated with undertaking vocational education and training relate to the opportunity costs associated with qualification attainment. Based on a previous rate of return analysis undertaken by McIntosh (2007), we have assumed that the average lengths of time to complete the various qualifications are as in Table 23 overleaf.

In particular, we have assumed that Level 1 vocational qualifications require approximately ½ year to complete and that these qualifications are started by learners at the age of 17. We have assumed that Level 2 vocational qualifications require 1½ years to complete and are started at the age of 18, while Level 3 qualifications are started at the age of 19 and require approximately 2½ years to complete. This information is presented in Table 23.

Earnings in the counterfactual scenario

As discussed above, an important element of the analysis involved estimating the lifetime earnings associated with the “counterfactual group”. This information is also required to estimate the

⁹ This was calculated by dividing VAT paid to the UK government (ONS code NZGF) by household and NPISH final consumption expenditure (ONS code NSSG) in 2008. This analysis is based on information taken from the UK National Accounts - Blue Book, 2009

opportunity costs of qualification attainment, as it reflects the earnings that are foregone during their period of study. In particular, we estimate (using the LFS) that the average annual earnings achieved by individuals with no formally recognised qualification stands at £9,713 age 17 (£10,168 for men and £8,332 for women), which increases to approximately £11,036 for individuals in possession of Level 1 qualifications aged 18 (£11,367 for men and £10,383 for women) and £12,634 for individuals in possession of Level 2 qualifications age 19 (£13,204 for men and £11,991 for women).

Intensity of study

To assess the opportunity costs associated with the different levels of vocational training, we need to adjust annual earnings to reflect the fact that many of these qualifications will not be undertaken on a full time basis. Based on guidance and analysis undertaken by the Department for Business Innovation and Skills, we have assumed that the average ‘intensities’ of the various vocational qualifications under consideration are as in Table 22 overleaf. These assessments are based on the total number of guided learning hours associated with the different levels and types of qualification and are presented in the form of full time equivalents.

In other words, the analysis undertaken by the Department suggests that undertaking Level 2 vocational qualifications accounts for 28% of full time activity – or that the opportunity cost associated with undertaking a Level 2 qualification is 28% of one year’s worth of full time annual earnings spread across 1½ years. Similarly, we have assumed that a Level 3 qualification requires 2½ years to complete, and have assumed that the opportunity cost associated with undertaking a Level 3 qualification is approximately 25% of one year’s full time annual earnings achieved by those in possession of a Level 2 qualification spread across 2½ years.

We have also considered the average number of guided learning hours and credits associated with Level 1 and Level 2 vocational qualifications. Although there is some degree of variation, a simple estimate suggests that a representative Level 2 vocational qualification consists of approximately 350 guided learning hours compared to approximately 160 for Level 1 qualifications. We have therefore scaled the intensity associated with Level 2 qualifications by (160/350 (0.457)) to reflect the lower intensity associated with Level 1 qualifications. These opportunity costs are then spread approximately over the period of attainment (with qualifications assumed to begin half way through the first year).

Table 22: Proportion of 1 year FTE required to complete alternative levels of vocational qualifications

| | 16-18 year olds | 19+ year olds |
|---------|---------------------------------|---------------------------------|
| Level 1 | 13% of 1 year FTE over ½ year | 6% of 1 year FTE over ½ year |
| Level 2 | 28% of 1 year FTE over 1½ years | 12% of 1 year FTE over 1½ years |
| Level 3 | 96% of 1 year FTE over 2½ years | 25% of 1 year FTE over 2½ years |

Source: Department for Business Innovation and Skills analysis of the Individual Learner Record

Combining the various pieces of information relating to the age of commencement, time taken to complete the qualification, and average earnings (in the counterfactual scenario), provides an indication of the gross (i.e. pre-tax) indirect or opportunity costs associated with attaining the different types of vocational training.

Table 23: Qualification completion times and and opportunity costs (men)

| | Age of commencement | Length of course | Annual Earnings (Level n-1) | Opportunity Costs (men) |
|---------|---------------------|------------------|-------------------------------------------------------|--------------------------|
| Level 1 | 17 | 0.5 years | Age 17: £10,168 | £1,322 |
| Level 2 | 18 | 1.5 years | Age 18: £11,367 Age 19: £13,114 | £1,137 £2,623 |
| Level 3 | 19 | 2.5 years | Age 19: £13,204 Age 20: £14,688 Age 21: £15,540 | £660 £1,469 £1,554 |

Note: Opportunity costs estimated on the basis that Level 1 students incur costs of 13% of an FTE in year 1, Level 2 students incur costs of 10% of an FTE in year 1 and 20% of an FTE in year 2. Level 3 students incur costs of 5% FTE in year 1 and 10% in subsequent years.

Source: London Economics' analysis

Table 24: Qualification completion times and and opportunity costs (women)

| | Age of commencement | Length of course | Annual Earnings (Level n-1) | Opportunity Costs (women) |
|---------|---------------------|------------------|-------------------------------------------------------|---------------------------|
| Level 1 | 17 | 0.5 years | Age 17: £8,332 | £1,083 |
| Level 2 | 18 | 1.5 years | Age 18: £10,383 Age 19: £11,726 | £1,038 £2,345 |
| Level 3 | 19 | 2.5 years | Age 19: £10,663 Age 20: £11,991 Age 21: £12,962 | £532 £1,199 £1,296 |

Note: Opportunity costs estimated on the basis that Level 1 students incur costs of 13% of an FTE in year 1, Level 2 students incur costs of 10% of an FTE in year 1 and 20% of an FTE in year 2. Level 3 students incur costs of 5% FTE in year 1 and 10% in subsequent years.

Source: London Economics' analysis

The foregone earnings reflected in the tables above are used to calculate the opportunity costs associated with undertaking a qualification, through adjusting for the effects of taxation and multiplying for the probability of being in employment in the absence of holding the qualification.¹⁰

A2.3.5 Estimating the Exchequer costs associated with qualification attainment

The Exchequer rate of return encompasses the costs associated with the provision of the qualification either through fee subsidy or student support, as well as the foregone tax revenue associated with the foregone earnings while the qualification is being attained (as discussed above).

We have assumed that the economic costs to the Exchequer associated with qualification provision relate to the direct costs of funding. From detailed work undertaken by McIntosh (2007) estimating the costs to the Exchequer associated with the provision of different types and levels of vocational qualification from 2004/05, we have assumed similar funding arrangements with an up-rating of unit costs to account for inflation. To achieve this, we have assumed an annual average

¹⁰ Essentially this assumes that the opportunity cost of qualification attainment is zero for individuals that would be unemployed in the absence of undertaking the qualification. In reality, there be some cost to the time spent (e.g. in terms of lost leisure time). However, it is not possible to accurately value this figure. Further, given the low intensities of study for low level vocational qualifications these costs seem unlikely to be significant.

inflation rate of 2.0%. We have also assumed that the direct Exchequer costs associated with the provision of vocational education and training is spread evenly over the duration of the qualifications in question.

| | Level | Average Unit Cost (2004/05) | Approximate GLH | Estimated Unit Cost (2009/10) |
|------------------------------------|--------------|------------------------------------------|------------------------|-------------------------------------------|
| National Vocational Qualifications | Level 1 | £1,481 (£3,015 (16-18)-£864 (19+)) | 160 | £1,635 (£3,329 (16-18)-£954 (19+)) |
| | Level 2 | £3,240 (£6,597 (16-18)-£1,891 (19+)) | 350 | £3,577 (£7,283 (16-18)-£2,087 (19+)) |
| | Level 3 | £3,119 (£9,050 (16-18)-£2,067 (19+)) | | £3,444 (£9,991 (16-18)-£2,282 (19+)) |
| Vocational Related Qualifications | Level 1 | £1,770 (£1,997 (16-18)-£1,254 (19+)) | 160 | £1,954 (£2,205 (16-18)-£1,384 (19+)) |
| | Level 2 | £3,872 (£5,223 (16-18)-£3,279 (19+)) | 350 | £4,275 (£5,766 (16-18)-£3,620 (19+)) |
| | Level 3 | £9,633 (£11,829 (16-18)-£7,853 (19+)) | | £10,636 (£13,060 (16-18)-£8,670 (19+)) |

Source: London Economics' analysis based on information presented in McIntosh (2007)

A2.3.6 Estimating the rates of return associated with qualification attainment

Having estimated the costs and benefits associated with qualification attainment across the working lifetime, we are able to estimate the rates of return both to individuals and to the Exchequer. The discounted value of the estimated earnings stream achieved by the individual holding a particular qualification was compared with the estimated future earnings of the counterfactual group to identify the net present value of the benefits of qualification attainment. In addition, we estimate internal rate of return for each qualification.¹¹ The discount rate was assumed to be 3.5% for the duration of an individual's working life.

¹¹ The internal rate of return is the discount rate required for the present value of the benefits to equal the present value of the costs.

Annex 3 LFS Marginal regressions – Cell Sizes

| Comparison group | Level (n-1) or below | | | No qualification | | | 5+ Good GCSEs | | | |
|------------------|----------------------|-------|---------|------------------|-------|---------|---------------|-------|---------|-------|
| | Qualification | Males | Females | All | Males | Females | All | Males | Females | All |
| RSA - Level 3 | | 32 | 257 | 289 | 9 | 55 | 64 | 6 | 83 | 89 |
| C & G - Level 3 | | 8,441 | 638 | 9,079 | 3,134 | 170 | 3,304 | 1,549 | 171 | 1,720 |
| BTEC - Level 3 | | 4,275 | 2,160 | 6,435 | 513 | 153 | 666 | 1,895 | 1,129 | 3,024 |
| NVQ - Level 3 | | 3,259 | 3,732 | 6,991 | 711 | 706 | 1,417 | 949 | 1,295 | 2,244 |
| RSA - Level 2 | | 39 | 189 | 228 | 18 | 55 | 73 | 10 | 88 | 98 |
| C & G - Level 2 | | 5,348 | 625 | 5,973 | 2,415 | 217 | 2,632 | 922 | 212 | 1,134 |
| BTEC - Level 2 | | 237 | 236 | 473 | 35 | 27 | 62 | 147 | 146 | 293 |
| NVQ - Level 2 | | 3,392 | 3,497 | 6,889 | 1,254 | 1,302 | 2,556 | 844 | 1,226 | 2,070 |
| RSA - Level 1 | | 182 | 1437 | 1619 | Na | Na | Na | 147 | 2261 | 2408 |
| C & G - Level 1 | | 1,054 | 204 | 1,258 | Na | Na | Na | 373 | 135 | 508 |
| BTEC - Level 1 | | 51 | 34 | 85 | Na | Na | Na | 84 | 78 | 162 |
| NVQ - Level 1 | | 400 | 278 | 678 | Na | Na | Na | 221 | 220 | 441 |

Source: London Economics

