The Returns to Academic and Vocational Qualifications in Britain

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Executive Summary

Previous work looking at the returns to qualifications in Britain has generally focussed on the return to the highest qualification obtained by that individual. Almost all of this work has also grouped together 'similar' vocational and academic qualifications. From the small number of studies that have distinguished between academic and vocational qualifications, the evidence is mixed. It is therefore still unclear whether there are significant differences in the returns to academic and vocational qualifications. The only study that we are aware of for Britain, does, however argue that the returns to academic qualifications are higher than vocational qualifications at 'equivalent' levels. The paucity of evidence on this issue is a prime motivation behind this research.

In this research we measure the impact of each qualification held by an individual on their earnings, as opposed to simply including the individual's highest qualification in the equation. For example, if an individual has both O levels and A levels, we include both sets of qualifications in the wage equation. We also use the most disaggregated qualification level possible. For instance, we do not group all the City and Guilds qualifications into one category but rather separate them into three. This approach is advantageous for two reasons. Firstly, we can add substantially to the economic literature on the returns to education by measuring the returns to particular qualifications that have not yet been evaluated, especially some vocational qualifications. Secondly, this approach means we can investigate the financial gain associated with different qualification profiles. In other words we can determine whether previous estimates of the average return to a particular qualification, such as a degree, hide differing returns depending on the route taken to acquire that qualification. For example, we can determine whether non-traditional HE students who do not have A levels earn a different return to their degree than those who enter HE via the A level system.

The key findings are**:**

- The additional returns associated with academic qualifications, taking no account of the time taken to acquire such qualifications, are typically higher than those associated with vocational qualifications at the same level.
- When consideration is given to the time required to obtain the various qualifications, the returns per year of study for vocational qualifications move closer on average to those accruing to academic qualifications, although the extent of the variation in the former is higher.
- Gender differences exist. With respect to academic qualifications, women tend to earn a higher return than men do, particularly to degrees. For vocational qualifications, men and women earn their highest returns with different types of qualifications. The vocational qualifications with the highest returns for men are HNC/HNDs, ONC/ONDs and higher level City and Guilds qualifications. For women, the vocational qualifications with the highest returns are teaching and nursing qualifications.
- The estimated returns to A levels are the same, whatever the subsequent academic career of individuals. However, the returns to O levels and CSEs are higher if the individuals subsequently study for a vocational rather than an academic qualification.
- The returns to academic qualifications do not differ significantly between low and high ability individuals. However, the returns to vocational qualifications are significantly higher for low ability individuals.
- The returns to academic qualifications are higher if individuals subsequently acquire a skilled rather than an unskilled job. Amongst vocational qualifications, only professional

qualifications attract a statistically significantly different return according to job type, again earning a higher return in skilled jobs.

- The estimated returns to qualifications using the NCDS data set are consistently smaller than results obtained using IALS or LFS data. Since the NCDS equations are the only specifications that control for ability at an early age, this suggests that estimates that do not control for ability may be upwardly biased. On the other hand, once we take into account ability bias ***and*** measurement error bias in the NCDS equations, the results are similar to those derived using the other two data sets, suggesting that estimates that only control for employer characteristics, region and gender (as with the LFS) appear to be reasonable estimates of the true returns.

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1. Introduction

This paper offers a comprehensive analysis of the returns to UK qualifications. We use data from three large data sets to determine by how much earnings are raised, on average, when particular qualifications are held. The three data sets are the 1991 sweep of the National Child Development Study (NCDS), the British data from the 1995 International Adult Literacy Survey (IALS), and the 1998 Labour Force Survey (LFS). The analysis benefits from the extensive nature of the qualifications data in each of these surveys. We have information on a large number of qualifications, and so can estimate the returns to a wider range of qualifications than is usually the case in such studies. The benefit of this is that we can estimate separately the returns to both academic and vocational qualifications, in order to determine the relative benefits of each. This is of crucial importance for the design of education and training, as it offers information as to which qualifications are most highly valued in the labour market, in terms of greater productivity and hence higher earnings. With one exception of which we are aware in the UK, previous studies have often grouped together 'similar' academic and vocational qualifications, and estimated a return to reaching a particular level, implicitly assuming that the returns to academic and vocational qualifications at a similar level are the same. As was shown by Robinson (1997) for the UK, this need not be the case, as we also show here.

Most studies of returns to qualifications only analyse the wages associated with individuals' *highest* qualification held, because of data limitations. Another benefit of the three surveys that we use is that they allow respondents to code all the qualifications that they hold[1]. Thus, we can include in our estimated wage equations *all* qualifications held by individuals at a very disaggregated level, an approach that has two distinct advantages over the usual approach of including only the highest qualification held. First, we can add substantially to the economic literature on the returns to education by measuring the returns to particular qualifications that have not yet been evaluated, especially some vocational qualifications. Second, this approach means that we can investigate the financial gain associated with different qualification profiles. In other words, we can determine whether previous estimates of the average return to a particular qualification, such as a degree, hide differing returns depending on the route taken to acquire that qualification. For example, we can determine whether non-traditional HE students who do not have A levels earn a different return to their degree to those who enter HE via the A level route.

A final advantage of using the three data sets is that we can compare the results obtained using the NCDS with the results obtained using IALS and the LFS. The NCDS, because of its very nature as a cohort study, contains a huge amount of information about the respondents, covering their entire lives. This means that we are able to control for many characteristics that are usually excluded from, thus biasing, studies of the returns to education. For example, if individuals' natural ability is excluded from estimated wage

[1] The IALS data only code the three highest qualifications held by respondents, necessitating some manipulation of the data (see Section 3).

equations, then this will bias the estimated returns to education upwards, on the assumption that higher ability individuals obtain more education and receive higher earnings. By controlling for early ability in the NCDS equations, and comparing the results to those estimated on IALS and LFS data, we can derive information about the possible size of this ability bias.

The paper is organised as follows. The following section offers a brief review of relevant literature on the returns to education. Section 3 describes the three data sets that we use, followed by an outlining of our methodology in Section 4. The results are contained in Section 5, while a final section concludes.

2. Literature Review

Most international studies looking at the returns to education focus on the returns to an additional year of (full-time) education. This is particularly true of the US returns to schooling literature. It has long been argued in the US studies that the returns to an additional year of education are extremely homogeneous and hence the type of qualification being undertaken is generally not important. The British literature, on the other hand, has found much more evidence of heterogeneity in the returns to education and it is widely accepted that it is important to distinguish between different types of qualifications. This is not always possible because of data limitations. For instance, the well-knwon study by Harmon and Walker (1995) uses Family Expenditure Survey data, which only allows them to identify the age at which a person first left full-time education.

A number of more recent studies, however, have used data that allows one to estimate how rates of returns vary among different qualifications. The study by Dearden (1999) comes closest to the approach that we will adopt here. Using data from the British National Child Development Study (NCDS), the paper aims to determine the reliability of conventional OLS estimates of the returns to education that generally only control for region, age and gender. Dearden argues that the detailed nature of the NCDS data allows her to directly assess the relative importance of omitted ability and family background bias, as well as biases arising from measurement error in education qualification variables. She also looks at the importance of what she terms 'composition bias' arising from self-selection into employment[2]. Dearden finds that simple OLS estimates that only control for a minimum of background variables are reasonable estimates of the true causal impact of qualifications on wages, with the possible exception of O and A level qualifications. She argues that, in general, the effect of measurement error bias and composition bias directly offset the countervailing effect of unobserved ability and family background bias. For O level and A level qualifications, conventional OLS estimates probably over-estimate the true causal impact of education on wages. Dearden concludes that simple OLS estimates that have a minimum of controls can be reasonably relied upon for policy decisions. She finds that the annual rate of return to obtaining an A level qualification (compared to an O level qualification) is around 6.5% for men and 5.8% for women. The annual rate of return for obtaining a degree is around 6% for men and 12% per annum for women. The paper, however, only identifies the highest school and post-school qualification the individuals have obtained, and therefore does not explicitly look at differences between academic and vocational routes, as we do here.

The study by Dearden (1999) also only considers the returns for one cohort of individuals in 1991. Harkness and Machin (1999) use the General Household Survey (GHS) to look at changes in qualification levels and returns that have occurred since the 1970s.

[2] This is generally ignored in the returns to schooling literature and is part of the justification for most studies focusing on just men, for whom this is assumed to be much less of a problem.

They find evidence of considerable educational upgrading over this period, with the increase occurring most rapidly in the 1970s, then slowing down in the 1980s and then speeding up again in the 1990s. In addition, despite the increases in the qualification levels of the workforce during the 1980s and the 1990s, the wage returns to education also increased considerably. The largest increases in relative wages occurred between graduates and A level holders vis-à-vis individuals with no educational qualifications. The relative wage growth of those with degrees compared to those with A levels was much slower.

Again, Harkness and Machin (1999) cannot fully compare the returns to academic and vocational qualifications, because of data limitations. Most of the literature which does directly make this comparison comes from developing countries. Psacharopoulos (1994) provides a comprehensive review of rates of return estimates to "general" and "vocational" secondary education from 24 countries. As in his earlier work (Psacharopoulos, 1985, 1987), the author argues that returns "to the academic/general secondary school track are higher than the vocational track. The difference between the profitability of the two is much more dramatic regarding the social returns because of the much higher unit cost of vocational/technical education". Psacharopoulos (1994) calculates averages based on estimates of returns to vocational and academic qualifications from 32 studies and reports that social returns to academic qualifications are around 15.5% per annum whereas the social returns to vocational qualifications are 11.7% per annum. The corresponding private returns are 10.6% and 10.5% respectively.

Bennell (1996) questions Psacharopoulos's methodology and his conclusions. He points out problems with the sample on which the averages were based and heterogeneity of the method of estimation of returns in different countries, concluding that "the aggregate RORs (rates of return) for general and vocational secondary education presented in the 1993 update are totally invalid" (Bennell, 1996). Combining data from Psacharopoulos (1994) and Psacharopoulos and Ng (1992) for Latin American and Caribbean countries, for which estimates are more reliable, Bennell calculates that average social rates of return to general and vocational education are almost identical (13.3% and 13.1% respectively). Corresponding figures for private returns are not provided but given the higher costs of academic qualifications, we would expect the private vocational returns to be higher than the private academic returns. Bennell (1996) refers to a study by Neuman and Zidermann (1991) that used data on high school qualifications in Israel. The authors point out the importance of matching jobs and vocational qualifications. They estimate that vocational high school graduates with training-related jobs earn between 8 to 10% more than those with academic qualifications. Earnings of those with unmatched jobs are not significantly different from those of academic high school graduates. Concluding his article, Bennell argues that there is no "convincing evidence" to support the common view that social returns to vocational secondary qualifications are lower than returns to academic secondary education.

In the US, various studies have shown that curriculum *does* affect learning outcomes, with high school students who followed an academic programme doing better in standardised tests than those students who followed a vocational or "non-academic" curriculum (see Rumberger and Daymont, 1984; Alexander and Pallas, 1984; and Bishop, 1996). These results, however, only suggest a relationship between the followed curriculum and test scores, which does not have to translate into higher productivity and thus higher earnings. In fact, studies based on US data comparing returns to academic and vocational high school qualifications (reviewed in Zymelman, 1976) give contradictory conclusions. "Two studies conclude that vocational schooling is more profitable than general schooling, while two reach the opposite conclusion, and one concludes that there is no difference" (Zymelman, 1976, p. 107).

As far as British evidence is concerned, a recent paper by Robinson (1997), using data on individuals' highest qualifications rather than the detailed qualifications used here, finds

that the returns to academic qualifications are significantly higher than the returns to vocational qualifications at an 'equivalent' NVQ level. For example, the earnings of men whose highest qualification is an 'other' HE degree qualification are on average 16% higher than the earnings of men with notionally equivalent qualifications at HND/HNC standard, though both of these are assigned the same level in the National Qualifications framework. For females the corresponding difference is 23%. Similarly, Robinson finds that men with two or more A-Levels earn on average around 19% more than men with OND/ONC or BTEC National qualifications, which again may question the equivalence of the two qualifications. The corresponding difference for females is 13%.

Robinson (1997) provides some evidence that the returns to academic qualifications may be much larger than equivalent vocational qualifications. There are, however, several reasons why the estimates of returns to academic qualifications are likely to be overstated and why the analysis may not do justice to vocational education. First, it controls for years of "potential" experience (rather than age) and estimates the returns to qualifications assuming 20 years of potential labour market experience. This ignores the fact that a potentially large cost of undertaking academic qualifications is the wages foregone in the labour market whilst these academic qualifications are being completed. We investigate the implications of such an assumption below.

Second, Robinson does not control for either ability or family background, and assumes the bias resulting from the lack of these controls to be small. While this may be a reasonable assumption for vocational qualifications, the study by Dearden (1999) suggests that this may not be true for some academic qualifications. Again, we examine the validity of this assumption.

Finally, while there are generally well-established qualification routes to most academic qualifications, this is much less so for vocational qualifications. By only focusing on the highest vocational or academic qualification a person has received, Robinson is not able to disentangle the contribution of each educational choice that an individual has made. This may affect the estimates of the returns reported in his paper. Again, we consider this point below.

3. Data

3.1 The National Child Development Study

The National Child Development Study (NCDS) is a continuing longitudinal survey of people living in Great Britain who were born between 3 and 9 March, 1958. There have been 5 waves of the NCDS, the last full survey having been undertaken in 1991 when the cohort members were 33 years of age. We use variables identifying the individuals' academic and vocational qualifications, their ability at the age of 7, school and family background variables, as well as labour market, wage, regional and employer information from the 1991 survey. We drop from our sample individuals who are employed but who have missing observations on wages, those who did not sit ability tests at the age of 7 and those for whom we do not have information on qualifications from any source. We also drop individuals who are self-employed or in full-time education[3]. This leaves us with a final sample of 3737 males of whom 3292 are employed in 1991 and 4455 women of whom 2866 are employed in 1991.

We break down all the qualifications that individuals have ever completed in the way shown in Table A1 in the appendix. This breakdown distinguishes between academic and

[3] Rather than dropping individuals who have missing information on other variables of interest, we include missing dummy variables. The self-employed are omitted from all wage equations in this report, because we do not have wage data for them in either the NCDS or LFS data sets.

vocational qualifications at as fine a level as the NCDS data can sustain[4]. Each qualification is allocated to a particular NVQ level, as shown in the final column of Table A1.

To obtain the qualifications data, we use the questions in the 1981 and 1991 surveys that ask for detailed information on when the courses started and finished, the subjects of the courses and whether they were successfully completed. There is also a 1978 exams file which has details of all school results completed by that date. The problem with using data from these questions is that we can only include individuals who participated in both the 1981 and 1991 surveys. This limits our sample size to 3007 males, of whom 2597 are employed, and 3860 women, of whom 2363 are employed. Also, in the education and training section of the 1991 questionnaire, individuals are only asked about the two highest qualification courses and three most recent training courses completed since March 1981. Clearly if there is a recall problem about when a particular course was completed (before or after March 1981), or if individuals have undertaken a large number of qualification courses, we may miss some qualifications in using these questions[5].

The wage data used in the analysis are taken from the 1991 survey. The survey responses are used to construct real gross hourly wage data (1995=100). Turning to the control variables, since all individuals in the sample are born in the same week of March 1958, age (or potential labour market experience) is controlled for in all our models. We measure ethnicity through a non-white dummy variable.

Another set of variables control for childhood background factors. We use data from the first wave of the NCDS to construct dummy variables identifying the teacher's assessment of the interest shown by the mother and father in the education of the child at that age. From the third wave of the survey we construct dummy variables identifying the type of school the individual attended in 1974 (comprehensive, grammar, secondary modern, private or special). We also use the 1974 survey to construct variables identifying the father's social class; the years of full-time education undertaken by the child's mother and father at that age; and whether the family was experiencing financial difficulties in 1969 or 1974[6].

Considering the variables that control for natural ability, in our analysis we use measures of reading and mathematics ability based on tests undertaken when the child was aged seven. We use the seven-year-old test results, as these are much less likely to be affected by knowledge gained at school. From these ability tests we construct 10 dummy variables that rank the individuals' by quintiles.

The final set of variables control for labour market factors. We have information on actual labour market experience, which is used in some of the analyses. We use the 1991 data to identify whether the individual was working in a large firm (more than 500 workers), in the private sector and whether he or she was a member of a trade union. Finally we construct 11 regional dummy variables identifying the person's region of residence in 1991[7].

[4] The distinction between academic and vocational qualifications is perhaps not quite as clear cut as we present it. For example, there are degrees and higher degrees such as medicine and law, which have a clear vocational purpose, but which are classified here as being academic qualifications. Similarly, certain qualifications classified as vocational in this paper, for example teaching qualifications, may have a considerable academic element.

[5] In Dearden *et al* (2000), we also estimate equations based on a larger sample of individuals who answered a question in 1991 asking for all qualifications they have ever obtained. This variable may also be subject to recall bias. Comparing the responses to this question, with the responses to the questions that we actually used from the 1981 and 1991 surveys, suggests that there is some measurement error in the recorded qualifications data, particularly for vocational qualifications.

[6] Following Micklewright (1988), this identifies individuals who received free school meals in 1969 or 1974 or whose parents were seriously troubled financially in the year prior to the 1969 or 1974 survey.

[7] Detailed summary statistics for employed individuals on all variables used in the NCDS analysis can be found in Table A2 in the appendix.

3.2 The International Adult Literacy Survey

The International Adult Literacy Survey (IALS) was carried out in Great Britain in 1995, as part of an international survey of adult literacy in twelve countries (Germany, Sweden, the Netherlands, Switzerland, Poland, the USA, Canada, New Zealand, Ireland, Northern Ireland and Belgium being the other eleven). The British Survey was conducted by the Office for National Statistics and was the first literacy survey to be carried out in Britain on a national random sample of adults of working age[8]. Once we had dropped observations with missing data on variables of interest, we were left with 751 male and 782 female observations on which to estimate the wage equations.

The main problem with the qualification data in IALS is that respondents are only asked to list their highest three qualifications. About 30% of respondents list three qualifications, and for these people, we have no way of knowing whether they actually have more, lower level qualifications. If we are omitting lower level qualifications then the estimated returns to the observed qualifications will include the returns to the unobserved qualifications as well, and hence will be biased upwards. We try to mitigate this problem to some extent by allocating qualifications to individuals that they would be expected to hold if they have followed normal routes, but which are not reported because they do not fall into the top three qualifications. For example, an individual who reports his or her three highest qualifications to be a higher degree, a first degree and A levels, is almost certain to also hold O levels. Other examples are less clear cut. A number of respondents hold a higher degree, a first degree and some other higher level qualification, such as a Higher Education Diploma. Other data sources suggest that the majority of individuals with an HE diploma also have A levels and O levels, and so we code all such respondents as having such qualifications. However, in some cases the individual may not actually hold A levels, having used the diploma to gain access to degree level courses. Vocational qualifications are acquired through a more diverse range of routes and we therefore do not attribute additional qualifications to individuals who hold vocational qualifications.

The list of possible qualifications offered to individuals in IALS is long, and in some cases, we combine qualifications to form a single category, either for reasons of small cell sizes, or to make the categories compatible with the NCDS categories described above. This is shown in Table A3 in the appendix, in which the first column contains the categories used in our estimating equations, the second column contains the qualifications in IALS that make up that category, and the third contains the NVQ equivalent level to which those qualifications are allocated.

It can be seen that some categories are slightly different to those used in the NCDS. Primarily, the NCDS merges some of the categories identified in IALS. The differences are mostly found amongst the vocational qualifications. Specifically, the NCDS does not separately identify City and Guilds Craft and Advanced Craft qualifications (parts II and III), and merges these into a single category; City and Guilds High. Similarly, the NCDS does not separately identify ONC/OND qualifications from lower level (first certificate or diploma) BTEC qualifications. The RSA variables are particularly difficult to compare. The NCDS separately identifies RSA stage I from RSA stages II and III, whereas these are merged into a single category in IALS. However, IALS also includes higher level RSA qualifications (diplomas, advanced diplomas and higher diplomas) that are not mentioned in NCDS at all. Thus the two separate RSA qualifications in the NCDS are jointly equivalent to the lower RSA qualification in IALS, while the higher RSA qualification in IALS has no equivalent in NCDS. Similarly, the NVQ qualifications are not mentioned in NCDS, since these qualifications were not in place at the time of the survey. Finally, amongst the academic

[8] The objective of the survey was to profile the literacy of UK adults using internationally agreed measurement instruments and survey protocols (Carey, *et al*., 1997).

qualifications, the two IALS categories 'other HE qualification' and 'HE diploma' are merged into a single category in the NCDS.

The wage data in IALS refers to annual earnings in 1994 and covers all those aged 16-64. The major limitation of the data set is that the wage variable only records the quintile of the earnings distribution, within which the respondents' annual earnings fall, although we use various econometric techniques to overcome this problem. To make the analysis as comparable as possible with the NCDS results, where hourly earnings are used, all wage equations estimated with the IALS data control for weeks worked per year and part-time status. The equations also control for age, ethnicity, mother's and father's education, and workplace size[9].

3.3 The Labour Force Survey

The UK Labour Force Survey (LFS) is a quarterly survey of representative households, which asks respondents about their personal circumstances and labour market status. The LFS covers about 120,000 individuals, in around 60,000 British households and is carried out by the Office for National Statistics. Respondents are surveyed for five consecutive quarterly surveys, but are only asked to report on their wages in the first and the final quarters in which they are in the sample. The analysis was conducted for 1998, and thus for each quarterly survey in 1998, we take only those respondents who were in wave 1 or wave 5, and append them to each other to form a single date set for 1998. Since we only use four quarters of data, and individuals who are in waves 1 and 5, no respondent in the full annual data set is included twice. After deleting observations with missing data on variables of interest, we were left with usable sample sizes of 29,959 for men and 29,803 for women.

The LFS offers respondents a long list of qualifications, and allows them to report as many as they hold. In some cases, we merged a number of qualifications into a single category so that the categories used were identical to those used in the IALS equations. Thus, the comments made above with reference to the comparability of the IALS and NCDS categories are relevant again when comparing the LFS and NCDS categories. Table A5 in the appendix lists the categories used, the LFS qualifications that make up each category, and the NVQ equivalent level to which each qualification was assigned when creating the highest qualification variables.

In theory, since the LFS asks respondents to list all of their qualifications, we should be able to identify every qualification that a respondent holds. In practice, however, this is not the case, because of the structure of the questionnaire. The initial list of qualifications contains some composite categories, such 'degree', 'NVQ', 'RSA', 'City and Guilds', 'BTEC/SCOTVEC' and 'teaching'. If the respondent answers in the affirmative to any of these categories, they are then asked for their *highest* level of that category. For example, if they respond that they have a degree, they are then asked which is their highest classification of degree – higher degree, first degree or other (*eg* member of a professional institute). Similarly, if they respond that they have a City and Guilds qualification, they are asked at which level is their highest City and Guilds – advanced craft, craft or other. Respondents only record one of the possibilities in each case, and so if they actually hold qualifications at more than one level within a single category of qualification, this is not recorded. We attempt to allow for this as far as possible. Thus, respondents who have a higher degree will not report also holding a first degree, but it is reasonable to assume that they will do so, and so we code them as such. Note that respondents will also never report that they have a professional qualification and a degree. Since a number of individuals with a professional qualification, particularly older ones, will not have a degree, it seemed inappropriate to code

[9] Summary statistics are given in Table A4 in the appendix.

them as doing so. However, an unknown proportion of individuals with a professional qualification will also hold a degree of some sort, and thus the returns we observe to such professional qualifications will also include the returns to degrees when held. In the results section, the returns to professional qualifications are estimated to be very large, suggesting that the upward bias caused by this problem is significant. Conversely, some respondents may report holding a degree when they actually hold both a degree and a professional qualification, and so again the observed returns to a degree may also include to some extent the returns to professional qualifications as well (the LFS estimated returns to a degree do turn out to be the highest of the three data sets, particularly for men).

With the vocational qualifications in the RSA and City and Guilds categories, if an individual reports holding a higher level qualification within these categories, but does not have any O levels, then we accredit them with the lower level qualifications in the same category, as qualifying qualifications for the higher level. If a respondent does hold O levels, however, we do not accredit them with the lower level RSA or City and Guilds qualifications, as the O levels may have performed the qualifying role.

Turning to the other variable used in the LFS analysis, the dependent variable is the log of real hourly wages. The background variables allowed us to control for age, ethnicity, region, workplace size, and whether the place of work was public or private sector[10].

4. Methodology

As has been well documented in the returns to schooling literature, estimates of the returns to different types of qualifications may be upward or downward biased if no account is taken of the fact that education decisions are not randomly determined. The qualifications that an individual undertakes will depend on individual choices, attributes and circumstances. If we do not adequately control for these factors, then the measured differences in wages of individuals with different qualifications and basic skills may over- or under- estimate the true causal effect of these qualifications and basic skills on wage outcomes. These biases arise because of correlation between unobserved individual attributes that determine individuals' formal qualifications, as well as employment and wage outcomes. They can also arise if qualifications are measured with error.

A number of approaches have been used in the literature to correct for these biases. These include within-family fixed effect estimation techniques, instrumental variable techniques and proxy or matching methods (see Card, 1999) for a thorough review and critique of the various approaches). The methodological approach that we use in this report involves using matching methods. This approach assumes that an individual's qualification portfolio is determined on the basis of variables that are observable (or well proxied by observable variables) in the data sets used in our report. The ability to proxy unobserved determinants of qualifications and wages is clearly going to depend on the quality of the data used. As we saw in Section 3, the NCDS data is particularly rich in this regard, whilst the IALS and LFS are much weaker.

In the most general model, the returns to academic and vocational qualifications can be estimated from the following wage equations

$$\ln w_i = \begin{array}{l} b_1' AQ_i + b_2' VQ_i + j' X_i + e_i \\ b' S_i + j' X_i + e_i \end{array} \qquad (1)$$

[10] Summary statistics for all variables are provided in Table A6 in the appendix.

where S_i = $(AQ_i$, $VQ_i)$ is a vector of dummy variables identifying the person's academic (AQ_i) and vocational qualifications (VQ_i), w_i is the real hourly wage rate; X_i is a vector of exogenous observed individual characteristics; and β' measures the returns to these qualifications *conditional* on X_i. This is analogous to matching our sample on X_i and assuming common return parameters β'. In this context, $j'X_i$ can be interpreted as the matching function.

OLS estimation of equation 1 gives rise to an unbiased estimate of the returns to qualifications if AQ_i and VQ_i are exogenous (*i.e.* $E(AQ_i, \varepsilon_i)= E(VQ_i, \varepsilon_i)= 0$). This will arise if conditioning on the observable variables (X_i) is sufficient to control for the endogenous choice and/or acquisition of individual's skills and qualifications.

Equation 1 can be viewed as a form of regression-based linear matching. This estimator is a simplified version of the fully non-parametric propensity score-matching estimators described in Heckman *et al.* (1997; 1998). If, however, there are unobserved determinants of wages, which are correlated with higher education choices, then our linear matching approach is not valid and estimation of equation 1 will produce biased estimates of the returns to qualifications and skills.

The model assumes a constant marginal effect for each qualification outcome across individuals. It can easily be extended to allow the returns to qualifications and skills to be heterogeneous (*i.e.* $\beta_i' = \beta' + e_i$ where $var(e_i)>0$). If we assume that only the average population value of e_i, conditional on the observables, is known by the person undertaking the choice of S_i then the average effect β can be identified by the regression:

$$\ln w_i = b'S_i + j'X_i + d'(X_i \otimes S_i) + v_i \qquad (2)$$

where $E(v_i|S_i)=0$. In equation 2 the coefficients δ' reflect the heterogeneity in the returns to qualifications. Given the above assumptions the model can again be estimated by OLS. The standard errors must be computed using White's (1982) adjustment for heteroskedasticity, because the heterogeneous returns imply that the variance of v_i will depend on S_i.

This extension to the estimation methodology allows us to incorporate interactions between our qualification variables and other observable characteristics in our data sets. For example, we look at whether the returns to qualifications vary by ability and job skill level.

Other issues that we consider include selection and measurement error bias. If the qualification variables are measured with error, then the estimated returns to them will be biased downwards. The large amount of information in the NCDS allows us to obtain instruments for the qualification variables, using qualification measures in the 1991 questionnaire as instruments for the detailed education and training questions in the 1981 and 1991 surveys.

Composition bias may exist, because we only estimate the returns to qualifications for men and women in work. Since the characteristics of men and women in and out of work may differ, we should ideally take account of this possible selection bias. Although we were unable to obtain instruments for the labour force participation decision, we can still estimate the effects of qualifications on the probability of employment.

A final complication is that the wage variable in the IALS data set only records the quintile of the earnings distribution within which the respondents' annual earnings fall. We know the cut-off points of each quintile, and therefore estimate our IALS models using Stewart's group dependant variable maximum likelihood procedure (see Stewart, 1983). This method assumes normality in the underlying (log) wage distribution.

5. Results

5.1 The NCDS cohort

Our estimates of the returns to different academic and vocational qualifications for men and women separately are contained in Tables 1 and 2 respectively. The returns in these tables are estimated under four different specifications. Specification 1 shows the raw returns to each qualification with no other controls. In specification 2 we control for ethnicity, employer characteristics and region, while in specification 3 we control for ethnicity, size of employer (500 employees or more) and parents' education. The controls in specification 2 correspond to those available in the LFS, whilst the controls in specification 3 correspond to those available in the IALS data. Specification 4 contains the "full" set of control variables available in the NCDS data. These include ability, ethnicity, family background, and school and employer characteristics. Our NCDS data has allowed us to identify 16 different academic and vocational qualifications. We also identify individuals who have completed apprenticeship training but obtained no qualification. The estimated coefficients reported in Tables 1 and 2 show the return to a particular qualification, as compared to the base of obtaining no qualifications[11]. If a person undertakes more than one qualification, then one must add together the coefficients on all the qualifications they have undertaken to obtain the return to their particular study path.[12] It is important to note that the coefficients in the regressions presented do not measure the annual return to education, but rather the overall return to having, as opposed to not having, a given qualification. Since qualifications vary in terms of their duration we also discuss the implied annual rates of return taking into account the typical full-time equivalent length of different paths of study.

We begin by looking at the results for men that are contained in Table 1. In the full specification it is clear that for men there are significant returns to undertaking most academic qualifications. The return to O levels is just over 12%, whereas the return to A levels is 15.4%. Sub-degree level qualifications have a return of around 14%, while the estimated return to a first degree is 10%. Focusing on vocational qualifications, we see that the return to a City and Guilds lower qualification is essentially zero, a City and Guilds higher 4.1%, an ONC or TEC/BEC 7% and an HNC or TEC/BEC Higher 5.7%. The return to a professional qualification is around 15%.

Comparing the results for different specifications in Table1, we observe that in some cases the bias induced by lack of control variables is very high, particularly for academic qualifications. For example if we compare specifications 1 and 4, the estimate of the return to A-Levels for men is reduced by around 6.5 percentage points or 30%. The reduction in the estimates of the returns to O Levels is around 5.3 percentage points or 30%, and for a first degree around 3.5 percentage points or 25%. For vocational qualifications it appears that including controls is much less important and the difference in the estimated returns between specifications is very small. This point is missed in studies that do not distinguish between academic and vocational qualifications.

It is also clear from the reported R^2's in the NCDS results that the LFS controls, which include region, are better than those in the IALS data, which do not, but both data sets suffer from not having measures of ability.

[11] For comparison with previous work, Tables A7 and A8 in the appendix show, for men and women respectively, the estimated returns when we include in our estimated equations individuals' highest qualification, rather than all qualifications, as here.

[12] This assumes that the returns to particular qualifications are independent of one another. This issue is examined to a certain extent in Section 5.4, by interacting school qualifications with whether the individual has any higher qualifications, and if so whether they are academic or vocational. The results show that, for example, the returns to an A level do not vary according to the further qualifications of the individual, suggesting that this summing of returns across qualifications is legitimate.

The returns to academic and vocational qualifications for women are presented in Table 2. Again there are significant returns to most academic qualifications and these returns tend to be somewhat larger for women than men, particularly higher education qualifications. If we concentrate on specification 4, we see that the return to an O level qualification is 10.4% and the return to an A level qualification is 17.5%. The return to a first degree is 26.2% and to a sub-degree qualification 17.7%. The only vocational qualifications that offer significant returns for women are nursing and professional qualifications. The return to professional qualifications is 19.8% whereas the return to nursing qualifications is around 15.8%. This is higher than the return to vocational qualifications of the same NVQ level for men (namely HNC or TEC/BEC Higher).

If we compare specification 1 (no controls) with specification 4 (full set of controls) we see that it is important to control for background variables and that the estimates of the returns to both academic *and* vocational qualifications are reduced when we include our full set of controls. For example, including the controls reduces the estimate of the return to A levels by around 25%, and the estimated return to a first degree by around 20%. This is also true for the estimates of the returns to nursing and professional qualifications, which are reduced by almost 40 and 25% respectively. As was the case for men, these NCDS results indicate that the lack of regional controls in the IALS data is more serious than the lack of family background variables in the LFS data.

The regressors we use (both qualifications and control variables) account for a higher proportion of variation in the female wage equations than in the respective male equations. For example, while our regressors in specification 4 account for 43% of variation in female wages, they only explain 33% of the variation in male earnings.

Table 3 for men and Table 4 for women look at the most common qualification paths leading to NVQ level 3 and 4 qualifications, and estimate the total and average annual returns to certain combinations of qualifications obtained after the age of 16 (returns to O levels are not included)[13], based on the estimated coefficients in Tables 1 and 2. For men, the results show a significant difference between returns to vocational and academic qualifications at NVQ level 3, although allowing for, on average, less time required to complete an ONC qualification relative to an A level, reduces the difference between the two somewhat. Comparing returns to two different routes to obtaining NVQ4 also shows a slightly higher return to the one with an academic element, *i.e.* the one that involves completing at least one A level. As mentioned earlier, the estimated annual return is extremely sensitive to the assumption made about the average years of full-time study required to complete vocational paths.

For women, the total returns to the academic route to NVQ4 appear to be higher than the total returns to the vocational route to NVQ4, as do the annual returns based on our assumptions about the number of years of full-time study. However, the difference between the returns to the academic and vocational routes are small, due to the strong returns to a nursing qualification for women. The table also suggest that having A levels in combination with a NVQ-4 qualification is much more common among those with academic NVQ4 than among those with its vocational equivalent. While only 20% of nurses (with O levels but without any of the NVQ level 5 qualifications) have both A levels and nursing qualifications, 71% of those with an academic NVQ level 4 qualification have A levels as well.

[13] The average returns are calculated simply as the total returns, divided by the number of years of full-time study. For part-time courses, we allocate the number of full-time equivalent years of study (for example, an individual studying part-time for 1 day per week over 2 years is allocated 0.4 years of full-time study). We are therefore assuming that part-time students are not earning an income only on the days that they are actually studying. For ONC and HNC qualifications, some individuals may obtain them through 2 years' full-time study, while others may receive a day release for 3 years (=0.6 years of full-time study). In the table we allocate 1.25 years' study to these qualifications, as an average of these figures.

5.2 The IALS sample

This section discusses the returns to academic and vocational qualifications using IALS. Most of the discussion will be based on Tables 5 and 6, where the estimates to the detailed qualifications are presented, for males and females respectively. Analogous to the previous section, all the qualifications that individuals hold are included, and the estimated coefficients represent the return to each qualification, relative to the base group with no qualifications. To obtain the total return to combinations of qualifications, their coefficients must be added to each other[14].

In each table, two specifications are presented. The first contains no control variables (with the exception of the part-time and weeks worked variables, as discussed in the data section), while the second contains certain controls: the individuals' age, entered as a quadratic; ethnicity; parents' highest education level and a firm size dummy. The effect of including these control variables is usually to somewhat reduce the estimates of the return to specific qualifications, although this is by no means consistent, particularly for women. Certainly a 'usual' proportion of the returns that can be accounted for by other factors cannot be calculated. In the discussion that follows, we concentrate in each case on the second specification, *i.e.* with the control variables included.

The qualifications that consistently attract statistically significant coefficients for both men and women are the academic qualifications: O levels, A levels, first and higher degrees. For each of these qualifications, the returns appear to be greater for females than for males. For both genders, the academic qualification with the highest return is a higher degree, at 20% for men and 34% for women. Amongst males, the return to a higher degree is approximately matched by the returns to an HNC/HND and professional qualifications. Similarly, for women, professional qualification returns also match higher degree returns. Among the other vocational qualifications for women, nursing and teaching qualifications both attract large returns, of 29% and 18% respectively. In addition, City and Guilds Advanced Craft also surprisingly attracts a very large coefficient, although only 0.3% of women hold this qualification, and so the reliability of this estimate is in doubt.

Table 7 below calculates the returns to various combinations of qualifications for men in the IALS sample. The focus of the analysis is on choices of course after finishing compulsory schooling, and thus the returns to any O levels, or equivalent qualifications that individuals might hold, are not included in the calculations. The returns are annualised, by allowing for the amount of time usually required to obtain each qualification. The table focuses on the qualifications with the highest returns for men, with the exception of professional qualifications, due to the problems of knowing exactly what these professional qualifications are or how long it took to acquire them.

The first line indicates a 17.7% total return to obtaining A levels, which represents a return of 8.9% per year of study, assuming it takes two years to obtain them. The ONC/OND qualification is a typical vocational qualification, obtained by 6% of men, at the same NVQ level, level 3, as the A level. Its return, however, is lower at 12%, although when this is annualised, the return per year is slightly larger than for A levels, at 9.5%[15]. 9% of men hold an HNC/HND, a level 4 vocational qualification. 37% of these men also hold A levels, while 20% hold an ONC/OND. It can be seen that choosing the academic route rather than the vocational route before an HNC/HND leads to higher returns, as would be suggested by the relative returns to A levels and an ONC/OND, although when the returns are calculated per year of study, they are similar. Finally, note that, due to the large estimated returns to an HNC/HND, this vocational level 4 qualification seems to offer better total and annual returns

[14] The returns to highest qualifications are reported in Tables A9 and A10 in the appendix.
[15] Again, this clearly depends crucially on the amount of time allocated to the vocational qualifications.

than a purely academic route to level 5, via A levels and a degree, as shown in the final row of the table.

Table 8 performs a similar analysis for the women in IALS. As the proportion of women who study for a nursing qualification is higher than for an HNC/HND, the former is included in the table as an example of a vocational level 4 qualification. The most common route into nursing is academic, via O levels and, for 30% of women with a nursing qualification, A levels. Only a small proportion of such women hold lower level vocational qualifications. The table therefore omits the latter qualifications, all of which have statistically insignificant returns anyway. Due to the high estimated returns to a nursing qualification, gaining such a qualification appears to offer women a higher total and annual average return than a degree.

5.3 The LFS sample

This section proceeds in much the same way as the previous sections, using LFS data[16]. Two specifications are presented, one without controls and one with. In the majority of cases, though far from exclusively, the effect of controlling for other factors is to reduce the estimated returns to a particular coefficient. The available controls in the LFS are for age (entered as a quadratic), ethnicity, region and employer characteristics (firm size and whether in the public sector or not). The p-values for these variables show that all have a consistently statistically significant effect on hourly earnings. As before, the discussion concerning the returns to various qualifications will be based upon the specification that includes the control variables.

The returns to detailed qualifications in the LFS sample are presented in Tables 9 and 10, for males and females respectively. Due to the large sample sizes in the LFS, the majority of the estimates are very well defined, and the coefficients are mostly statistically significant. Every academic qualification yields a positive return relative to having no qualifications, for both men and women. The estimates are very similar for both genders, with the exception of the level 4 qualifications (Higher Education diploma and other Higher Education qualifications below degree level), where the returns for women are approximately twice those for men, and the returns to a higher degree, which are over double the size for women compared to men. For both genders, the academic qualification with the highest return is a first degree, at 28% for men and 25% for women. The first degree is followed, again for both genders, by O levels, with returns of around 20%.

Turning to the vocational qualifications, the highest return for both genders, indeed the highest returns in the estimated equations as a whole, are found on professional qualifications, at 35% for men and 41% for women. As described in the data section, however, these returns are likely to be upward biased as they may sometimes include the returns to a degree. For men, the HNC/HND is the vocational qualification with the next highest return (15%), while the higher City and Guilds levels also earn a reasonable return. Nursing qualifications also boost men's wages by 13%, although less than 1% of males hold such a qualification. For women, we again see high returns to nursing and teaching qualifications (21% and 28% respectively). Women are more likely than men to study for an RSA qualification than for a City and Guilds qualification, and this is reflected in the returns to women, with a higher RSA qualification increasing women's wages by over 10%, while the higher City and Guilds qualifications have no statistically significant effect.

A number of the vocational qualifications attract statistically significant coefficients that are negative, for example the NVQ levels 1 and 2, and 'other' (low) City and Guilds qualifications. These results should not be interpreted as saying that individuals acquiring such qualifications would actually see their earnings fall, relative to not acquiring the

[16] The returns to highest qualifications are provided in Tables A11 and A12 in the Appendix.

qualification. Rather, such low-level vocational qualifications seem to be associated with low-paying jobs, in a way not controlled for by the analysis. However, an important policy implication of this finding is that, while these qualifications are associated with lower paying jobs, such qualifications can hold little attraction.

Table 11 below displays the returns to common combinations of qualifications for men, showing both the total returns, and the average annualised returns, taking into account the length of time required to obtain such qualifications. As before, the total returns do not include the returns to O levels, as the focus here is on choices at the post-compulsory stage.

Comparing an academic level 3 qualification (A level) and a vocational level 3 qualification (ONC/OND), the returns to the academic route are considerably higher in absolute terms, although again there is little difference between the two once we allow for possible time differences in gaining them (8.4% versus 7.7% respectively in annualised terms). The returns to reaching vocational level 4 (via an HNC/HND) are identical in annualised terms, whether they are preceded by A levels or by an ONC/OND. In the LFS sample, 34% of those with an HNC/HND also hold A levels, while 32% have an ONC/OND. Finally, the total returns to a level 5 academic qualification (via A levels and a degree) are the largest in the table, although the annualised return is very similar to the other qualification routes in the table.

As noted above, higher level City and Guilds qualifications also offer a reasonable return for males. Table 12 performs a similar analysis to Table 11 for City and Guilds, attempting to calculate the returns per year of study. In this table, we illustrate the potential variance in estimates of the annualised returns to vocational qualifications, by showing a possible range of estimates. For such qualifications, there are various study options, ranging from day release to full-time study. The table below assumes that a City and Guilds Craft qualification could be obtained by anything from 3/5 (1 day a week for 3 years) to 2 years of study, in full-time equivalent terms. Similarly, the time taken to obtain a City and Guilds 'other' or a City and Guilds Advanced Craft qualification could range from 1/5 (1 day per week for a year) to 1 year in full-time equivalent terms. The actual time taken often depends on the ability of the individual. The final column in the table presents the range of possible returns per year of study, based on the shortest and longest times taken to obtain these qualifications. The wide range of these results reveals the sensitivity of estimates of returns per year of study, when attached to qualifications such as City and Guilds.

For women, we consider the same combinations of qualifications as for men in Table 11. However, as only 3% of women in the LFS sample hold an HNC/HND, we also include nursing as an alternative vocational level 4 qualification, both with and without A levels. Women with an HNC/HND are more likely than men to have preceded this with A levels (53%), and less likely to have followed the vocational route of an ONC/OND (20%). Amongst those women with a nursing qualification, 34% have A levels.

Comparing the two level 3 qualifications, we clearly observe that the academic qualification (A level) has a higher return than the vocational qualification, ONC/OND. The next 4 rows of the table consider various pathways that lead to a level 4 vocational qualification. The HND/HNC option, less favoured by women, reveals lower returns per year of study than simply studying for A levels, whether the HND/HNC is preceded by A levels or not. The nursing option, however, does reveal healthy returns per year of study, both with and without A level qualifications. Note that for women, the estimated returns per year of study to obtaining A levels and a degree, and thus reaching academic level 5, are less than the returns per year of study to the nursing options, and also less than to simply obtaining A levels.

5.4 Further considerations

We conducted a whole range of additional analyses, examining the robustness of the estimated returns described above[17]. For example, we interacted the school qualifications with an indicator of whether an individual's subsequent highest qualification is academic or vocational, or whether they have no further qualifications. For both males and females, the results reveal that the returns to an A level are similar, particularly for women, whatever qualifications, if any, the individual subsequently acquires. Thus, in the analysis above, when evaluating the return to combinations of qualifications, it was valid to allocate the average A level return to individuals who do go on to study further. However, with respect to O levels, although their return remains positive and statistically significant whatever the future study of the individual, for both males and females the returns to an O level are substantially higher (more than double) if they subsequently study for a vocational qualification rather than an academic one. Thus, if individuals pursue an academic route, the O levels that they took become less relevant, though not insignificant, in determining their future earnings. If individuals obtain vocational qualifications after completing formal education, however, their O level scores remain very important, and indeed appear to be the prime determinant, of their earnings.

A question we examined is whether the returns to qualifications varied according to individuals' ability[18]. Such an analysis was only possible with the NCDS. We split our sample into two ability groups; a high ability group, consisting of all individuals in the top two quintiles of either the maths or reading ability tests at the age of 7, and a low ability group, containing all other individuals. We then interacted the high ability and low ability measures with the qualification variables to see if there was any evidence of heterogeneity by ability. The results suggest that the returns to academic qualifications do not differ significantly between low and high ability individuals. However, the returns to vocational qualifications are significantly higher for low ability individuals. This suggests that vocational qualification paths may have much larger returns to those in the bottom end of the ability distribution.

Another experiment interacted the returns to all qualifications with indicators of individuals' subsequent employment, in particular whether they worked in a skilled or an unskilled job. This was conducted using the NCDS and LFS data sets. However, because of the smaller sample size of the NCDS, and the large number of correlated right-hand-side variables in such a specification, the coefficients on all of the interaction terms proved to be statistically insignificant. The LFS, with its larger sample size, proved to be the most interesting for this particular piece of analysis.

A skilled job was defined as one in the major groups 1 to 5 of the Standard Occupational Classification (SOC); managers and administrators, professional occupations, associate professional/technical occupations, clerical/secretarial occupations and craft and related occupations. An unskilled job was defined as one in the major groups 6 to 9 of the SOC; personal/protective occupations, sales occupations, plant/machine operatives and 'other' occupations.

For males, the academic qualifications differ in their return according to job skill level (*i.e.* O levels, A levels and first degree). In each case, the returns to such qualifications are higher in a skilled job than in an unskilled job. In the case of degrees, their return is more than twice as large when associated with a skilled job rather than an unskilled job. For A levels, the skilled return is three times as large in a skilled rather than an unskilled job (17.3%

[17] Full details of all of these additional specifications can be found in Dearden *at al* (2000).

[18] Most of the earlier work using the NCDS has found that the returns to highest qualifications do not vary by ability (see Dearden, 1999; Blundell, *et al*, 1997). We examine whether this finding holds when we distinguish between academic and vocational qualifications.

versus 5.7%). Amongst the vocational qualifications, only professional qualifications attract a statistically significantly different return according to job type, again earning a higher return in skilled jobs.

For women, there are more statistically significant differences in returns according to job type. All academic qualifications below level 5 earn a higher return in skilled rather than unskilled jobs for women, although the benefit of a skilled job for first degrees and higher degrees is statistically insignificant. Again, job type is less important in affecting the returns to vocational qualifications, although the returns to both teaching and professional qualifications are both significantly higher when the holder works in a skilled job.

A final experiment, that could be conducted only with the NCDS, was to control for the actual work experience of individuals. It is questionable whether we should do this, as part of the cost of obtaining a qualification is the labour market experience foregone. Holding constant years of work experience removes this cost, and so should lead to higher returns than otherwise would be observed. When we include experience in our estimated equations the returns to academic qualifications do indeed rise, although this effect is not observed on the whole for vocational qualifications.

5.5 A comparison of the results from the three data sets

To aid the reader, Tables 14 and 15 summarise the returns to the different academic and vocational qualifications, estimated using the three data sets. The most noticeable feature of these tables is that, for most of the qualifications considered, the results from the three different data sources are reasonably consistent in terms of their relative sizes. We start by considering the major academic qualifications. The estimates suggest that males with O levels or GCSE equivalents earn a 12-21% return. The male return to A levels is an additional 15-18% and to a degree 10-28%. For women, O levels or GCSE equivalents earn a 10-19% return. Females earn an additional 18-23% return to A levels and 21-26% return to a degree. The returns to sub-degree HE qualifications, such as a diploma vary quite widely, partly reflecting the different coding of these qualifications in the different data sets, as discussed earlier. The return to a degree also varies quite considerably for males, from 10% in the NCDS to 28% in the LFS. The fact that the NCDS result comes from a particular cohort at a particular age, whereas the other two samples are cross sections of people of working age, may be important. To check this we re-estimated the LFS result for people age 30-40 but the estimate of a return to a degree remained at around 28% in this restricted LFS sample[19]. An alternative explanation is that the NCDS result is lower because it is less subject to ability bias because of the ability controls in the NCDS equations. However, even when no controls are included in the NCDS equation, the return to a degree for males is only 13.5 (Table 1). Although we cannot be precise we suspect that the high return to a degree for males in LFS is because respondents have to choose between the options of degree and a professional qualification. They cannot choose both. Hence the degree and professional qualification coefficients will be conflated by the fact that individuals with degrees may also have professional qualifications, and vice versa.

Turning to vocational qualifications, lower level NVQ qualifications yield no return, although men with an NVQ3-5 earn around a 6-9% return. The coefficients on the City and Guild Lower variables are insignificant for men but the return to a City and Guilds Higher is approximately 4-7% and to City and Guilds Advanced 7-10%. Some caution is required here however. The NCDS data do not allow us to separate City and Guilds Part II and Part III qualifications. Hence, in the NCDS data these qualifications are combined into City and Guilds Higher/Craft, whereas Part III is included in City and Guilds Advanced in the LFS and

[19] This technique is not ideal since the LFS sample covers a broader age range and the data is from 1998, whereas the NCDS is only 33 year olds in 1991.

IALS data. For an ONC/OND the return is 7-12%, although again there are coding difficulties. The NCDS estimate for ONC/OND includes BTEC, whereas the LFS and IALS estimates for BTEC qualifications are separate. This lack of consistency explains why the NCDS return to ONC/OND is lower than in the other data sets. The male return for an HNC/HND is 6-22%. This large variation in the HNC/HND return is attributable to the very high estimate from IALS (22%), which is estimated on the basis of only around 60 males who have HNC/HNDs in the IALS sample. While this sample size is adequate, greater emphasis might be placed on the LFS results, which are based on larger sample sizes[20]. A nursing qualification yields a return of 12-13% for males, although there are too few male nurses in IALS to use this estimate. The return to professional qualifications is very high, ranging from 15% in NCDS to 35% in LFS. The different data sets code different types of professional qualification into this category, so comparisons are not easy for this 'qualification'. An apprenticeship that does not lead to any qualifications yields no return in the NCDS and IALS data (for men), and around a 4% return (but significant only at the 11% level) in the LFS data.

Females with NVQ3-5 earn around a 1-5% return, although the result is insignificant in IALS. Lower and Higher level City and Guilds qualifications yield no positive return for women in any of the data sets. City and Guilds Advanced yields around a 35% return in IALS but this result is driven by the extremely small numbers of women with this qualification in the IALS data (0.31% of women have this qualification in IALS). In general, the rather mixed results for the returns to vocational qualifications for females reflect the small numbers of women with these qualifications. Women with a BTEC earn a return of between 2 and 18%, an ONC/OND yields around an 8% return, although the coefficient in IALS is negative and insignificant[21], whilst an HNC/HND yields an additional return of 3-12%. Both nursing and teaching yield positive returns for women, of 16-30% and 18-28% respectively. Professional qualifications, with the same caveats as discussed for men, yield a return of 20-40% for women. An apprenticeship without any qualifications yields no return for women.

There are some systematic differences between the data sets. A most noticeable feature of Tables 14 and 15 is that the NCDS results yield lower estimates of the returns to qualifications, in almost all cases. This is consistent with the fact that only the NCDS equations are able to control for early ability, and hence identify the return to education rather than the return to innate ability.

The NCDS data set also allows us to examine the possibility that education is measured with error, through the existence of possible instruments in that data set. If measurement error is indeed present, and is more prevalent that in the other two data sets, then this could explain the lower estimated returns to qualifications when we use the NCDS, since measurement error tends to bias coefficients towards zero. We use the qualification measures in the 1991 questionnaire as instruments for the detailed education and training questions in the 1981 and 1991 surveys. This procedure assumes that the measurement errors in the two questions are uncorrelated with each other. While this may appear a strong assumption, hopefully the time between the two sweeps is long enough to ensure that it is fulfilled[22].

The results reveal that measurement error does appear to be a problem in the qualifications data in the NCDS.[23] As a result of correcting for measurement error, the estimated returns to academic qualifications rise by around 10% for men and 12-20% for

[20] In addition the LFS equations might be considered superior because they control for region which is not possible in the IALS data, and because the IALS wage data are banded.
[21] 30 women have this qualification in IALS.
[22] For further details see Dearden (1999).
[23] The inverse Mills ratio is statistically significant at least at the 10% significance level.

women, while the estimated returns to vocational qualifications rise by between 17 and 40% for men and 25 and 42% for women.

Thus our findings suggest that when the returns to qualifications are estimated without controlling for natural ability, then such estimates will be biased upwards by the omitted variable. Conversely, measurement error in qualifications data may bias estimated returns downwards. Given that the estimated returns using the NCDS data, controlling for both ability and measurement error, are very similar to the estimates using the other two data sets, which control for neither, it can be supposed that basic OLS estimates of the returns to qualifications using, for example, the Labour Force Survey, are reasonably close to the true returns.

The remaining source of potential bias in our results is composition bias or selection bias. Since our samples contain only individuals in employment, whose characteristics may differ sytematically from those not in employment, the estimated coefficients on these characteristics can be biased. Although we do not have instruments in any of our datasets so that we can estimate a selection equation, we can still estimate a probit equation, explaining whether or not individuals are employed. When we do this, we observe some qualifications, particularly academic qualifications, having a large effect on the probability of employment. This in turn implies that some of our estimated returns presented above may be downwardly biased. Essentially, the increased probability of receiving any return at all was not allowed for in the previous estimates[24].

6. Summary

This paper has examined the returns to academic and vocational qualifications in Britain using three data sets, the National Child Development Study, the International Adult Literacy Survey and the Labour Force Survey. The advantage of these data sets is that they all contain information on detailed qualifications, allowing us to estimate the returns to wider range of qualifications than is usually the case. In particular, we can separately identify the returns to academic and vocational qualifications.

The results suggest that the additional returns associated with academic qualifications, taking no account of the time taken to acquire such qualifications, are typically higher than those associated with vocational qualifications at the same level. However, when consideration is given to the time required to obtain the various qualifications, the returns per year of study for vocational qualifications move closer on average to those accruing to academic qualifications. It should be noted, however, that the amount of time it can take to complete vocational qualifications can vary according to whether they are studied for full- or part-time, and so our conclusions depend crucially on the amount of time used in the calculation of the annualised returns.

Gender differences exist in the returns to qualifications. With respect to academic qualifications, women tend to earn a higher return than men, particularly to degrees. For vocational qualifications, men and women earn their highest returns with different types of qualifications. The vocational qualifications with the highest returns for men are HNC/HNDs, ONC/ONDs and higher level City and Guilds qualifications. For women, the vocational qualifications with the highest returns are teaching and nursing qualifications. Professional qualifications earn a high return for both genders, although there is some difficulty in interpreting this result, due to the lack of knowledge of the qualifications actually incorporated in this category.

[24] For further details see Dearden (1999).

Further experiments with the data suggested that the returns to an A level are similar whether or individuals continue their education with academic qualifications, vocational qualifications, or neither. On the other hand, O levels receive their highest return when they are followed by vocational qualifications, and do lose some of their value when individuals obtain further academic qualifications, such as A levels and a degree. We did not find that returns vary according to ability for academic qualifications, although the returns to vocational qualifications are approximately twice as high for individuals of low ability as for individuals of high ability. A final experiment suggested that the returns to academic qualifications are greater if the holder subsequently obtains a skilled job, whereas there is no difference in the returns to vocational qualifications by job type, with the exception of vocational qualifications.

The estimated returns to qualifications using the NCDS data set are consistently smaller than results obtained using IALS or LFS data. Since the NCDS equations are the only specifications that control for ability at an early age, this suggests that estimates that do not control for ability may be upwardly biased. However, we also find evidence to suggest that measurement error can be present in qualifications variables, which will tend to bias the estimated returns downwards. When we use the NCDS data to control for *both* natural ability and measurement error, the estimated returns are similar to those obtained with the other two data sets, which control for neither. Thus, the two biases appear to offset each other, and estimates that only control for employer characteristics, region and gender (as with the LFS, for example) appear to be reasonable estimates of the true returns.

Table 1
Male returns to detailed qualifications (NCDS)

Variables	Specification 1 No controls		Specification 2 LFS controls		Specification 3 IALS controls		Specification 4 Full controls	
	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Constant	1.793	(0.017)	1.896	(0.036)	1.690	(0.070)	1.836	(0.090)
CSEs	0.036	(0.016)	0.018	(0.017)	0.036	(0.016)	0.024	(0.017)
O Levels	0.175	(0.018)	0.178	(0.017)	0.172	(0.018)	0.122	(0.018)
A Levels	0.221	(0.028)	0.184	(0.027)	0.210	(0.028)	0.154	(0.027)
Sub-degree quals	0.122	(0.048)	0.141	(0.046)	0.118	(0.047)	0.140	(0.046)
First Degree	0.135	(0.029)	0.134	(0.028)	0.124	(0.029)	0.100	(0.028)
Higher Degree	-0.049	(0.041)	-0.060	(0.040)	-0.054	(0.040)	-0.052	(0.040)
RSA Level 1	-0.064	(0.111)	-0.033	(0.117)	-0.038	(0.117)	-0.005	(0.107)
RSA Level 2&3	-0.206	(0.086)	-0.191	(0.095)	-0.208	(0.087)	-0.206	(0.094)
C&G lower	0.006	(0.019)	0.007	(0.018)	0.005	(0.019)	0.006	(0.018)
C&G higher	0.038	(0.021)	0.049	(0.020)	0.041	(0.021)	0.041	(0.020)
ONC or TEC/BEC	0.078	(0.027)	0.083	(0.026)	0.078	(0.026)	0.070	(0.026)
HNC or TEC/BEC higher	0.071	(0.031)	0.066	(0.031)	0.062	(0.031)	0.057	(0.031)
Prof. Qualifications	0.167	(0.026)	0.164	(0.026)	0.165	(0.026)	0.152	(0.025)
Nursing	0.094	(0.083)	0.126	(0.096)	0.089	(0.081)	0.119	(0.094)
Other Business	0.042	(0.029)	0.039	(0.029)	0.038	(0.029)	0.044	(0.029)
Other Qualifications	0.025	(0.018)	0.026	(0.017)	0.024	(0.017)	0.015	(0.017)
Apprenticeship no quals	-0.044	(0.043)	0.006	(0.042)	-0.027	(0.042)	0.011	(0.040)
R^2	0.2261		0.3011		0.2447		0.3304	
P-value regional variables			0.000				0.000	
P-value non-white			0.326		0.218		0.173	
P-value ability variables							0.000	
P-value school type variables							0.258	
P-value family variables							0.019	
P-value parents' education					0.154			
P-value parental interest							0.405	
P-value employer variables			0.000		0.000		0.000	
Number of observations	2597		2597		2597		2597	

Table 2
Female returns to detailed qualifications (NCDS)

Variable	Specification 1 No controls		Specification 2 LFS controls		Specification 3 IALS controls		Specification 4 Full controls	
	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Constant	1.384	(0.018)	1.590	(0.037)	1.352	(0.079)	1.644	(0.096)
CSEs	0.012	(0.018)	-0.009	(0.017)	0.011	(0.018)	0.000	(0.018)
O Levels	0.175	(0.020)	0.154	(0.019)	0.164	(0.020)	0.104	(0.020)
A Levels	0.234	(0.027)	0.204	(0.026)	0.223	(0.028)	0.175	(0.027)
Sub-degree quals	0.204	(0.049)	0.180	(0.050)	0.225	(0.049)	0.177	(0.048)
First Degree	0.333	(0.033)	0.278	(0.033)	0.335	(0.033)	0.262	(0.033)
Higher Degree	0.083	(0.045)	0.053	(0.048)	0.082	(0.045)	0.049	(0.048)
RSA Level 1	0.008	(0.033)	0.025	(0.033)	0.003	(0.033)	0.015	(0.033)
RSA Level 2&3	0.017	(0.030)	0.037	(0.029)	0.024	(0.030)	0.021	(0.029)
C&G lower	-0.087	(0.041)	-0.051	(0.040)	-0.076	(0.041)	-0.046	(0.042)
C&G higher	0.034	(0.068)	-0.007	(0.060)	0.029	(0.066)	-0.011	(0.064)
ONC or TEC/BEC	0.142	(0.040)	0.100	(0.037)	0.122	(0.040)	0.079	(0.037)
HNC or TEC/BEC higher	0.012	(0.064)	0.025	(0.065)	0.013	(0.063)	0.028	(0.067)
Prof. Qualifications	0.263	(0.034)	0.217	(0.033)	0.220	(0.034)	0.198	(0.032)
Nursing	0.263	(0.029)	0.167	(0.027)	0.239	(0.028)	0.158	(0.028)
Other Business	0.084	(0.053)	0.075	(0.050)	0.089	(0.054)	0.064	(0.051)
Other Qualifications	0.030	(0.026)	0.013	(0.025)	0.024	(0.026)	0.003	(0.025)
Apprenticeship no quals	-0.072	(0.096)	0.005	(0.102)	-0.042	(0.099)	-0.009	(0.101)
R^2	0.3298		0.4162		0.3535		0.4345	
P-value regional dummies			0				0	
P-value non-white			0.085		0.015		0.013	
P-value ability variables							0.014	
P-value school type variables							0.707	
P-value family variables							0.008	
P-value parents' education					0.456			
P-value parental interest							0.054	
P-value employer variables			0		0		0	
Number of observations	2363		2363		2363		2363	

Table 3
Male returns to academic and vocational paths leading to NVQ level 3 and 4 qualifications (NCDS)

	A Level	ONC or TEC/ BEC	C&G Higher	HNC or TEC/BEC higher	NVQ level; a – academic v – vocational	Estimated total return %	Estimated average return %
Average years of full-time study	2	1.25	1	1.25			
	+	-	-	-	a - 3	15.4	7.7
	-	+	-	-	v - 3	7.0	5.6
	-	-	+		v - 3	4.1	4.1
	+	-	-	+	v - 4	21.1	6.5
	-	+	-	+	v - 4	12.7	5.1

Notes: The last two columns give the total and average annual returns to combinations of qualifications marked (+).

Table 4
Female returns to academic and vocational paths leading to NVQ level 4 qualifications (NCDS)

	A Level	Sub-degree qual	Nursing	% of the relevant NVQ level 4 sample	NVQ level; a - academic v - vocational	Estimated total return	Estimated average return
Average years of study	2	2	2				
	-	+	-	19.4%	a - 4	17.7	8.9
	+	+	-	71.0%	a - 4	35.2	8.8
	+	-	+	19.8%	v - 4	33.3	8.3
	-	-	+	71.0%	v - 4	15.8	7.9

Notes: Column 5 gives proportions of those with a nursing or sub-degree qualifications who have (+) or do not have (-) A levels. Proportions include only those who have O levels. Returns include only returns to qualifications obtained after the age of 16 (and do not include O levels).

Table 5
Male returns to detailed qualifications (IALS)

Variable	Specification 1 No controls		Specification 2 With controls	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	8.289	(0.169)	6.282	(0.254)
CSEs	-0.059	(0.063)	0.061	(0.057)
O levels (grades A-C)	0.110	(0.055)	0.149	(0.047)
A levels	0.199	(0.078)	0.177	(0.060)
Other HE qualification	-0.018	(0.135)	0.022	(0.128)
HE diploma	0.330	(0.187)	0.264	(0.154)
First degree	0.193	(0.094)	0.156	(0.084)
Higher Degree	0.352	(0.104)	0.203	(0.080)
'other' qualifications	0.124	(0.083)	0.064	(0.069)
NVQ level 1	-0.163	(0.103)	-0.036	(0.217)
NVQ level 2	-0.390	(0.139)	-0.193	(0.159)
NVQ level 3-5	0.182	(0.120)	0.088	(0.129)
RSA low	0.111	(0.198)	0.095	(0.240)
RSA high	0.028	(0.401)	0.071	(0.247)
City and Guilds 'other'	0.063	(0.096)	0.106	(0.072)
City and Guilds Craft	0.107	(0.089)	0.041	(0.063)
City and Guilds Adv. Craft	0.151	(0.089)	0.101	(0.069)
BTEC first cert./diploma	0.092	(0.145)	0.040	(0.164)
ONC/OND BTEC National	0.140	(0.091)	0.119	(0.075)
HNC/HND BTEC Higher	0.321	(0.067)	0.222	(0.056)
Nursing	-0.213	(0.197)	-0.147	(0.155)
Teaching	0.261	(0.148)	0.013	(0.128)
Professional qualification	0.249	(0.088)	0.218	(0.072)
Apprenticeship no quals	0.081	(0.126)	0.008	(0.104)
P-value age			0.000	
P-value non-white			0.128	
P-value parents' education			0.260	
P-value firm size			0.002	
Number of observations	751		751	

Table 6
Female returns to detailed qualifications (IALS)

Variable	Specification 1 No controls		Specification 2 With controls	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	8.604	(0.171)	7.126	(0.255)
CSEs	-0.096	(0.054)	0.013	(0.055)
O levels (grades A-C)	0.108	(0.048)	0.183	(0.048)
A levels	0.154	(0.071)	0.225	(0.061)
Other HE qualification	0.046	(0.218)	-0.017	(0.196)
HE diploma	-0.104	(0.113)	-0.104	(0.094)
First degree	0.266	(0.090)	0.207	(0.079)
Higher Degree	0.368	(0.131)	0.335	(0.127)
'other' qualifications	-0.066	(0.064)	-0.055	(0.062)
NVQ level 1	0.070	(0.147)	-0.090	(0.117)
NVQ level 2	-0.245	(0.150)	-0.096	(0.126)
NVQ level 3-5	0.021	(0.109)	0.012	(0.093)
RSA low	0.052	(0.062)	0.005	(0.057)
RSA high	0.142	(0.087)	0.112	(0.084)
City and Guilds 'other'	-0.073	(0.147)	-0.030	(0.118)
City and Guilds Craft	0.245	(0.152)	0.129	(0.121)
City and Guilds Adv. Craft	0.150	(0.182)	0.356	(0.098)
BTEC first cert./diploma	0.084	(0.082)	0.180	(0.097)
ONC/OND BTEC National	-0.078	(0.089)	-0.023	(0.077)
HNC/HND BTEC Higher	0.131	(0.114)	0.119	(0.093)
Nursing	0.347	(0.088)	0.293	(0.088)
Teaching	0.316	(0.092)	0.178	(0.087)
Professional qualification	0.361	(0.126)	0.326	(0.119)
Apprenticeship no quals	-0.531	(0.115)	-0.496	(0.131)
P-value age			0.000	
P-value non-white			0.476	
P-value parents' education			0.898	
P-value firm size			0.003	
number of observations	782		782	

Table 7
Male returns to combinations of post-compulsory education qualifications (IALS)

	A level	ONC/ OND	HNC/ HND	degree	NVQ level a-academic v-vocational	Estimated total return	Estimated average return per year of study
Av. years Of study	2	1.25	1.25	3			
	+	-	-	-	a-3	17.7%	8.9%
	-	+	-	-	v-3	11.9%	9.5%
	+	-	+	-	v-4	39.9%	12.3%
	-	+	+	-	v-4	34.1%	13.6%
	+	-	-	+	a-5	33.3%	6.7%

Table 8
Female returns to combinations of post-compulsory education qualifications (IALS)

	A level	nursing	degree	NVQ level a-academic v-vocational	Estimated total return	Estimated average return per year of study
Av. Years of study	2	2	3			
	+	-	-	a-3	22.5%	11.3%
	-	+	-	v-4	29.3%	14.7%
	+	+	-	v-4	51.8%	13.0%
	+	-	+	a-5	43.2%	8.6%

Table 9
Male returns to detailed qualifications (LFS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	1.791	(0.006)	-0.478	(0.038)
CSEs	-0.036	(0.012)	0.089	(0.011)
O levels (grades A-C)	0.133	(0.008)	0.208	(0.008)
A levels	0.194	(0.011)	0.168	(0.009)
Other HE qualification	0.128	(0.032)	0.055	(0.028)
HE diploma	0.121	(0.028)	0.078	(0.026)
First degree	0.333	(0.013)	0.277	(0.011)
Higher Degree	0.149	(0.019)	0.076	(0.018)
'other' qualifications	0.122	(0.006)	0.052	(0.006)
NVQ level 1	-0.269	(0.033)	-0.111	(0.029)
NVQ level 2	-0.282	(0.018)	-0.074	(0.016)
NVQ level 3-5	-0.067	(0.017)	0.059	(0.015)
RSA low	-0.081	(0.023)	-0.095	(0.020)
RSA high	0.072	(0.083)	0.038	(0.078)
City and Guilds 'other'	-0.016	(0.015)	-0.027	(0.014)
City and Guilds Craft	0.102	(0.017)	0.069	(0.016)
City and Guilds Adv. Craft	0.131	(0.010)	0.069	(0.010)
BTEC first cert./diploma	-0.097	(0.028)	0.010	(0.024)
ONC/OND BTEC National	0.094	(0.012)	0.096	(0.010)
HNC/HND BTEC Higher	0.202	(0.011)	0.150	(0.010)
Nursing	0.165	(0.025)	0.130	(0.025)
Teaching	0.048	(0.020)	-0.030	(0.019)
Professional qualification	0.469	(0.022)	0.349	(0.020)
Apprenticeship no quals	0.055	(0.029)	0.044	(0.028)
R^2	0.215		0.376	
P-value age			0.000	
P-value non-white			0.000	
P-value region			0.000	
P-value employer characteristics			0.000	
Number of observations	29959		29959	

Table 10
Female returns to detailed qualifications (LFS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	1.537	(0.005)	0.168	(0.037)
CSEs	-0.017	(0.012)	0.052	(0.012)
O levels (grades A-C)	0.141	(0.007)	0.193	(0.007)
A levels	0.192	(0.009)	0.185	(0.008)
Other HE qualification	0.148	(0.027)	0.111	(0.025)
HE diploma	0.191	(0.018)	0.156	(0.017)
First degree	0.292	(0.012)	0.254	(0.011)
Higher Degree	0.244	(0.022)	0.177	(0.021)
'other' qualifications	0.087	(0.006)	0.060	(0.005)
NVQ level 1	-0.142	(0.024)	-0.087	(0.023)
NVQ level 2	-0.156	(0.013)	-0.057	(0.012)
NVQ level 3-5	-0.025	(0.015)	0.054	(0.014)
RSA low	0.047	(0.007)	0.016	(0.007)
RSA high	0.156	(0.026)	0.119	(0.027)
City and Guilds 'other'	-0.073	(0.018)	-0.064	(0.018)
City and Guilds Craft	0.018	(0.026)	0.009	(0.026)
City and Guilds Adv. Craft	0.008	(0.028)	-0.013	(0.026)
BTEC first cert./diploma	-0.035	(0.022)	0.023	(0.021)
ONC/OND BTEC National	0.059	(0.016)	0.078	(0.015)
HNC/HND BTEC Higher	0.080	(0.016)	0.091	(0.015)
Nursing	0.295	(0.010)	0.211	(0.010)
Teaching	0.354	(0.014)	0.275	(0.014)
Professional qualification	0.477	(0.024)	0.405	(0.022)
Apprenticeship no quals	-0.042	(0.045)	-0.038	(0.046)
R^2	0.267		0.360	
P-value age			0.000	
P-value non-white			0.000	
P-value region			0.000	
P-value employer characteristics			0.000	
Number of observations	29803		29803	

Table 11
Male returns to combinations of post-compulsory education qualifications (LFS)

	A level	ONC/ OND	HNC/ HND	degree	NVQ level a-academic v-vocational	Estimated total return	Estimated average return per year of study
Av. Years of study	2	1.25	1.25	3			
	+	-	-	-	a-3	16.8%	8.4%
	-	+	-	-	v-3	9.6%	7.7%
	+	-	+	-	v-4	31.8%	9.8%
	-	+	+	-	v-4	24.6%	9.8%
	+	-	-	+	a-5	44.5%	8.9%

Table 12
Male returns to City and Guilds qualifications (LFS)

	C&G 'other'	C&G Craft	C&GAd v. Craft	NVQ level a-academic v-vocational	Estimated total return	Estimated average return per year of study
Av. Years of study	1/5-1	3/5-2	1/5-1			
	+	-	-	v-1	0%	0%
	+	+	-	v-2	6.9%	2.3% - 8.6%
	+	+	+	v-3	13.8%	3.5% - 13.8%

Table 13
Female returns to combinations of post-compulsory education qualifications (LFS)

	A level	ONC/ OND	HNC/ HND	Nurse qual	Degree	NVQ level a-academ. v-vocat.	Estimated total return	Est'd average return per year of study
Av. Years of study	2	1.25	1.25	2	3			
	+	-	-	-	-	a-3	18.5%	9.3%
	-	+	-	-	-	v-3	7.8%	6.2%
	+	-	+	-	-	v-4	27.6%	8.5%
	-	+	+	-	-	v-4	16.9%	6.8%
	-	-	-	+	-	v-4	21.1%	10.5%
	+	-	-	+	-	v-4	39.6%	9.9%
	+	-	-	-	+	a-5	43.9%	8.8%

Table 14
Male returns to detailed qualifications

	NCDS Full Controls		IALS Full Controls		LFS Full Controls	
Qualification	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
CSE	0.024	(0.017)	0.061	(0.057)	0.089	(0.011)
O Levels	0.122	(0.018)	0.149	(0.047)	0.208	(0.008)
A Levels	0.154	(0.027)	0.177	(0.060)	0.168	(0.009)
Other HE qualification			0.022	(0.128)	0.055	(0.028)
HE diploma	0.140	(0.046)	0.264	(0.154)	0.078	(0.026)
First Degree	0.100	(0.028)	0.156	(0.084)	0.277	(0.011)
Higher Degree	-0.052	(0.040)	0.203	(0.080)	0.076	(0.018)
NVQ level 1			-0.036	(0.217)	-0.111	(0.029)
NVQ level 2			-0.193	(0.159)	-0.074	(0.016)
NVQ level 3-5			0.088	(0.129)	0.059	(0.015)
RSA Level 1 / RSA low	-0.005	(0.107)	0.095	(0.240)	-0.095	(0.020)
RSA Level 2&3	-0.206	(0.094)				
RSA high			0.071	(0.247)	0.038	(0.079)
C&G lower	0.006	(0.018)	0.106	(0.072)	-0.027	(0.014)
C&G higher / C&G Craft	0.041	(0.020)	0.041	(0.063)	0.069	(0.016)
City and Guilds Adv. Craft			0.101	(0.069)	0.069	(0.010)
BTEC first cert./diploma			0.040	(0.164)	0.010	(0.024)
ONC or TEC/BEC	0.070	(0.026)	0.119	(0.075)	0.096	(0.010)
HNC or TEC/BEC higher	0.057	(0.031)	0.222	(0.056)	0.150	(0.010)
Nursing	0.119	(0.094)	-0.147	(0.155)	0.130	(0.025)
Teaching			0.013	(0.128)	-0.030	(0.019)
Prof. Qualifications	0.152	(0.025)	0.218	(0.072)	0.349	(0.020)
Apprenticeship no quals	0.011	(0.040)	0.008	(0.104)	0.044	(0.028)
Other Business	0.044	(0.029)				
Other Qualifications	0.015	(0.017)	0.064	(0.069)	0.052	(0.006)
Sample Size	2597		751		29959	
R-squared	0.3304		chi2(35) =		0.3763	
Controls:	Ability, ethnicity, family background and parental education, parental interest, school type, region and employer characteristics		Age, ethnicity, mother and father's education, firm size, part-time and weeks worked		Age, ethnicity, region, firm size and public sector	

Table 15
Female returns to detailed qualifications

	NCDS Full Controls		IALS Full Controls		LFS Full Controls	
Qualification	Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
CSE	0.000	(0.018)	0.013	(0.055)	0.052	(0.012)
O Levels	0.104	(0.020)	0.183	(0.048)	0.193	(0.007)
A Levels	0.175	(0.027)	0.225	(0.061)	0.185	(0.008)
Other HE qualification			-0.017	(0.196)	0.111	(0.025)
HE diploma	0.177	(0.048)	-0.104	(0.094)	0.156	(0.017)
First Degree	0.262	(0.033)	0.207	(0.079)	0.254	(0.011)
Higher Degree	0.049	(0.048)	0.335	(0.127)	0.177	(0.021)
NVQ level 1			-0.090	(0.117)	-0.087	(0.023)
NVQ level 2			-0.096	(0.126)	-0.057	(0.012)
NVQ level 3-5			0.012	(0.093)	0.054	(0.014)
RSA Level 1 / RSA low	0.015	(0.033)	0.005	(0.057)	0.016	(0.007)
RSA Level 2&3	0.021	(0.029)				
RSA high			0.112	(0.084)	0.119	(0.027)
C&G lower	-0.046	(0.042)	-0.030	(0.118)	-0.064	(0.018)
C&G higher / C&G Craft	-0.011	(0.064)	0.129	(0.121)	0.009	(0.026)
City and Guilds Adv. Craft			0.356	(0.098)	-0.013	(0.026)
BTEC first cert./diploma			0.180	(0.097)	0.023	(0.021)
ONC or TEC/BEC	0.079	(0.037)	-0.023	(0.077)	0.078	(0.015)
HNC or TEC/BEC higher	0.028	(0.067)	0.119	(0.093)	0.091	(0.015)
Nursing	0.158	(0.028)	0.293	(0.088)	0.211	(0.010)
Teaching			0.178	(0.087)	0.275	(0.014)
Prof. Qualifications	0.198	(0.032)	0.326	(0.119)	0.405	(0.022)
Apprenticeship no quals	-0.009	(0.101)	-0.496	(0.131)	-0.038	(0.046)
Other Business	0.064	(0.051)				
Other Qualifications	0.003	(0.025)	-0.055	(0.062)	0.060	(0.005)
Sample Size	2363		782		29803	
R-squared	0.4350		chi2(35) =		0.3599	
Controls:	Ability, ethnicity, family background and parental education, parental interest, school type, region and employer characteristics		Age, ethnicity, mother and father's education, firm size, part-time and weeks worked		Age, ethnicity, region, firm size and public sector	

Appendix

Table A1
Description of Academic and Vocational Qualifications –NCDS

Variable Name	Description	NVQ Level
Academic qualifications:		
CSEs	CSE grade 2-5	1
O Levels	CSE grade 1, GCE O level passes or grades A-C, GCSE grades A-C, Scottish O Grade passes or grades A-C, Scottish Standard Grade grades 1-3.	2
A Levels	GCE A level, Scottish Higher Grade or Scottish Certificate of Sixth Year Studies.	3
Sub-degree level qualification	Polytechnic of Central Institute Diploma or Certificate, or University or CNAA Diploma or Certificate	4
First Degree	University or CNAA First Degree	5
Higher Degree	University or CNAA Post-graduate Diploma or Higher Degree	5
Vocational qualifications:		
RSA lower	RSA – Stage 1	1
RSA upper	RSA – Stages 2 and 3	2
C&G lower	City and Guilds Operative/ Craft/ Intermediate/ Ordinary/ Part I or JIB/NJC or other Craft/ Technician Certificate	2
C&G higher	City and Guilds Advanced/ Final/ Part II or III /Full Technological (FTC) or Insignia Award in Technology (CGIA)	3
ONC or TEC/BEC	ONC/ OND, SNC/ SND; TEC/BEC or SCOTEC/ SCOTBEC certificate or diploma	3
HNC or TEC/BEC higher	HNC/ HND, SHNC/ SHND; TEC/BEC or SCOTEC/ SCOTBEC higher or higher national certificate or diploma	4
Prof. Qual'n.	Professional qualification	5
Nursing	Nursing qualification including Nursery Nursing (NNEB)	4
Other business	Other technical or business qualification including HGV, PSV etc	1
Other	Any other qualification	1

Table A2

Summary statistics – NCDS

Variable	Men (2597obs.)		Women (2363 obs.)	
	Mean	(S.D.)	Mean	(S.D.)
Log real hourly wage	2.053	(0.428)	1.682	(0.491)
1981 and 1991 detailed measures::				
Qualifications obtained:				
None	0.087	(0.282)	0.100	(0.300)
CSEs	0.496	(0.500)	0.495	(0.500)
O Levels	0.671	(0.470)	0.725	(0.447)
A Levels	0.267	(0.442)	0.246	(0.431)
Sub-degree quals	0.027	(0.161)	0.042	(0.201)
First Degree	0.154	(0.361)	0.124	(0.330)
Higher Degree	0.039	(0.194)	0.035	(0.183)
RSA Level 1	0.005	(0.071)	0.063	(0.244)
RSA Level 2&3	0.004	(0.065)	0.080	(0.271)
C&G lower	0.159	(0.366)	0.041	(0.197)
C&G higher	0.151	(0.358)	0.014	(0.119)
ONC or TEC/BEC	0.096	(0.294)	0.040	(0.196)
HNC or TEC/BEC higher	0.073	(0.260)	0.022	(0.145)
Prof. Qualifications	0.096	(0.295)	0.080	(0.272)
Nursing	0.008	(0.087)	0.088	(0.284)
Other Business	0.077	(0.267)	0.025	(0.157)
Other Qualifications	0.214	(0.410)	0.142	(0.349)
Apprenticeship w/o qual.	0.026	(0.159)	0.008	(0.089)
Highest Academic Qualification:				
None	0.141	(0.348)	0.119	(0.324)
CSEs	0.185	(0.388)	0.153	(0.360)
O levels	0.386	(0.487)	0.465	(0.499)
A levels	0.115	(0.319)	0.109	(0.312)
Sub-degree qualification	0.014	(0.117)	0.026	(0.159)
Degree	0.159	(0.366)	0.128	(0.334)
Highest Vocational Qualification:				
None	0.388	(0.487)	0.547	(0.498)
NVQ level 1	0.144	(0.351)	0.136	(0.343)
NVQ level 2	0.123	(0.328)	0.101	(0.301)
NVQ level 3	0.185	(0.388)	0.045	(0.208)
NVQ level 4	0.065	(0.246)	0.090	(0.286)
NVQ level 5	0.096	(0.295)	0.080	(0.272)
1991 summary measures::				
Qualifications obtained:				
None	0.080	(0.272)	0.103	(0.304)
CSEs	0.479	(0.500)	0.483	(0.500)
O Levels	0.675	(0.468)	0.728	(0.445)
A Levels	0.273	(0.446)	0.258	(0.437)
Sub-degree quals	0.031	(0.174)	0.055	(0.228)
First Degree	0.156	(0.363)	0.124	(0.330)
Higher Degree	0.043	(0.203)	0.034	(0.182)
RSA Level 1	0.014	(0.119)	0.197	(0.398)
RSA Level 2&3	0.007	(0.085)	0.146	(0.353)
C&G lower	0.286	(0.452)	0.063	(0.243)
C&G higher	0.146	(0.353)	0.009	(0.094)
ONC or TEC/BEC	0.105	(0.307)	0.041	(0.198)
HNC or TEC/BEC higher	0.080	(0.272)	0.026	(0.160)
Prof. Qualifications	0.122	(0.327)	0.091	(0.288)
Nursing	0.006	(0.078)	0.084	(0.277)
Other Business	0.082	(0.275)	0.022	(0.145)
Other Qualifications	0.141	(0.348)	0.139	(0.346)
Highest Academic Qualification:				
None	0.123	(0.329)	0.117	(0.321)
CSEs	0.198	(0.399)	0.150	(0.357)
O levels	0.384	(0.487)	0.458	(0.498)
A levels	0.117	(0.321)	0.116	(0.320)
Sub-degree qualification	0.015	(0.123)	0.030	(0.172)
Degree	0.162	(0.369)	0.128	(0.334)

Highest Vocational Qualification:				
None	0.389	(0.488)	0.485	(0.500)
NVQ level 1	0.099	(0.298)	0.127	(0.333)
NVQ level 2	0.157	(0.364)	0.165	(0.371)
NVQ level 3	0.172	(0.377)	0.038	(0.191)
NVQ level 4	0.062	(0.242)	0.093	(0.291)
NVQ level 5	0.122	(0.327)	0.091	(0.288)
Highest Qualification:				
None	0.080	(0.272)	0.103	(0.304)
NVQ level 1	0.107	(0.309)	0.126	(0.332)
NVQ level 2	0.292	(0.455)	0.377	(0.485)
NVQ level 3	0.221	(0.415)	0.094	(0.292)
NVQ level 4	0.062	(0.241)	0.107	(0.309)
NVQ level 5	0.237	(0.425)	0.193	(0.394)
Non white	0.010	(0.100)	0.009	(0.094)
High ability	0.585	(0.493)	0.645	(0.479)
Maths ability at 7:				
5th quintile (highest)	0.243	(0.429)	0.215	(0.411)
4th quintile	0.211	(0.408)	0.212	(0.409)
3rd quintile	0.213	(0.409)	0.197	(0.398)
2nd quintile	0.175	(0.380)	0.209	(0.406)
1st quintile (lowest)	0.158	(0.365)	0.167	(0.373)
Reading ability at 7:				
5th quintile (highest)	0.186	(0.389)	0.278	(0.448)
4th quintile	0.218	(0.413)	0.234	(0.423)
3rd quintile	0.209	(0.407)	0.208	(0.406)
2nd quintile	0.210	(0.408)	0.169	(0.375)
1st quintile (lowest)	0.177	(0.382)	0.111	(0.314)
Type of school 1974:				
Comprehensive	0.476	(0.500)	0.485	(0.500)
Secondary modern	0.164	(0.371)	0.160	(0.367)
Grammar school	0.104	(0.305)	0.111	(0.315)
Private school	0.052	(0.223)	0.045	(0.208)
Other	0.019	(0.136)	0.015	(0.121)
Parents' education:				
Father's years of education	7.549	(4.641)	7.493	(4.650)
Father's education missing	0.246	(0.431)	0.252	(0.434)
Mother's years of education	7.659	(4.443)	7.712	(4.452)
Mother's education missing	0.234	(0.423)	0.231	(0.422)
Father's social class 1974:				
Professional	0.045	(0.207)	0.042	(0.200)
Intermediate	0.150	(0.357)	0.146	(0.353)
Skilled non-manual	0.085	(0.279)	0.072	(0.258)
Skilled manual	0.315	(0.465)	0.314	(0.464)
Semi-skilled non-manual	0.011	(0.105)	0.012	(0.108)
Semi-skilled manual	0.097	(0.296)	0.090	(0.286)
Bad finances 1969 or 1974	0.149	(0.356)	0.179	(0.384)
Father's interest in education:				
Expects too much	0.014	(0.119)	0.008	(0.087)
Very interested	0.291	(0.455)	0.278	(0.448)
Some interest	0.243	(0.429)	0.222	(0.416)
Mother's interest in education:				
Expects too much	0.035	(0.183)	0.024	(0.153)
Very interested	0.397	(0.489)	0.423	(0.494)
Some interest	0.389	(0.488)	0.375	(0.484)
Employer characteristics:				
Large employer 1991	0.230	(0.421)	0.182	(0.386)
Union member 1991	0.445	(0.497)	0.356	(0.479)
Private sector firm 1991	0.695	(0.460)	0.563	(0.496)
Region 1991:				
North	0.060	(0.238)	0.055	(0.229)
North West	0.103	(0.304)	0.111	(0.314)
Yorkshire and Humberside	0.097	(0.296)	0.096	(0.295)
West Midlands	0.094	(0.291)	0.100	(0.300)
East Midlands	0.082	(0.275)	0.062	(0.241)
East Anglia	0.036	(0.186)	0.042	(0.201)
South West	0.076	(0.265)	0.089	(0.285)
South East	0.238	(0.426)	0.219	(0.414)
London	0.057	(0.233)	0.060	(0.237)
Wales	0.055	(0.229)	0.047	(0.211)
Scotland	0.095	(0.293)	0.112	(0.316)

Table A3
The composition of the qualification categories in IALS

Qualification variable	IALS Qualifications	NVQ level
Academic Qualifications		
CSEs	**CSE below grade 1, GCSE < grade C**	1
O levels (grades A-C)	O-level/GCSE grades A-C, CSE grade 1	2
A levels	A level	
	Scottish Certificate of 6th Year Studies	3
	SCE Higher	
	A/S level	
Other HE qualification	Other HE qualifications below degree level	4
HE diploma	Diplomas in Higher Education	4
First degree	First Degree	5
Higher Degree	Higher Degree	5
Vocational qualifications		
'other' qualifications	YT certificate	
	SCOTVEC National certificate modules	1
	Any other qualifications	
NVQ level 1	NVQ level 1	1
NVQ level 2	NVQ level 2	2
NVQ level 3-5	NVQ level 3	3
	NVQ level 4	4
	NVQ level 5	5
RSA low	RSA other qualifications (Stage I, II and III)	1
RSA high	RSA diploma	2
	RSA Advanced Diploma/Certifcate	3
	RSA Higher Diploma	4
City and Guilds 'other'	City and Guilds 'other'/lower/part I	1
City and Guilds Craft	City and Guilds craft/part II	2
City and Guilds Adv. Craft	City and Guilds Advanced Craft/part III	3
BTEC first cert./diploma	BTEC first certificate	1
	BTEC first diploma	2
ONC/OND BTEC National	ONC/OND, BTEC/SCOTVEC National	3
HNC/HND BTEC Higher	HNC/HND, BTEC/SCOTVEC higher	4
Nursing	Nursing qualification	4
Teaching	Teaching qualification	4
Professional qualification	Other degree level qualification *eg* member of professional institute	5

Table A4

Summary statistics – IALS

	Men		Women	
Detailed Qualifications	Mean	S.D.	Mean	S.D.
CSEs	0.184	(0.387)	0.177	(0.382)
O levels (grades A-C)	0.540	(0.498)	0.576	(0.494)
A levels	0.271	(0.445)	0.250	(0.433)
Other HE qualification	0.014	(0.119)	0.011	(0.102)
HE diploma	0.023	(0.151)	0.046	(0.210)
First degree	0.142	(0.349)	0.107	(0.310)
Higher Degree	0.049	(0.216)	0.025	(0.156)
'other' qualifications	0.122	(0.328)	0.161	(0.367)
NVQ level 1	0.006	(0.077)	0.002	(0.048)
NVQ level 2	0.009	(0.096)	0.018	(0.134)
NVQ level 3-5	0.008	(0.090)	0.008	(0.091)
RSA low	0.006	(0.076)	0.149	(0.356)
RSA high	0.007	(0.082)	0.055	(0.229)
City and Guilds 'other'	0.066	(0.247)	0.038	(0.192)
City and Guilds Craft	0.079	(0.269)	0.010	(0.101)
City and Guilds Adv. Craft	0.074	(0.262)	0.003	(0.056)
BTEC first cert./diploma	0.027	(0.162)	0.026	(0.159)
ONC/OND BTEC National	0.061	(0.239)	0.038	(0.192)
HNC/HND BTEC Higher	0.089	(0.284)	0.028	(0.164)
Nursing	0.009	(0.092)	0.046	(0.210)
Teaching	0.035	(0.185)	0.075	(0.263)
Professional qualification	0.085	(0.279)	0.037	(0.190)
Apprenticeship no quals	0.031	(0.173)	0.010	(0.100)
Highest qualification				
No qualifications	0.186	(0.389)	0.180	0.384
CSEs	0.064	(0.245)	0.061	0.239
O levels (grades A-C)	0.173	(0.378)	0.252	0.434
A levels	0.089	(0.284)	0.078	0.269
Sub degree	0.016	(0.125)	0.030	0.170
Degree	0.154	(0.361)	0.114	0.318
NVQ level 1	0.064	(0.244)	0.084	0.278
NVQ level 2	0.067	(0.250)	0.053	0.224
NVQ level 3	0.076	(0.265)	0.038	0.190
NVQ level 4	0.076	(0.265)	0.096	0.294
NVQ level 5	0.035	(0.184)	0.015	0.121
Other Variables				
Wage (1-5 scale)	3.693	(1.268)	2.620	1.294)
Age	35.656	(12.023)	36.842	11.430)
Non-white	0.018	(0.133)	0.024	0.152)
Mother's education ISCED 0/1	0.061	(0.239)	0.057	0.232)
Mother's education ISCED 2	0.817	(0.386)	0.814	0.389)
Mother's education ISCED 3	0.059	(0.236)	0.044	0.204)
Mother's education ISCED 5/7	0.063	(0.243)	0.085	0.280)
Father's education ISCED 0/1	0.065	(0.246)	0.054	0.226)
Father's education ISCED 2	0.773	(0.419)	0.791	0.406)
Father's education ISCED 3	0.056	(0.231)	0.037	0.190)
Father's education ISCED 5/7	0.106	(0.307)	0.118	0.322)
Large workplace (>25 employees)	0.726	(0.446)	0.645	0.479)
In part-time employment	0.082	(0.274)	0.439	0.496)
Weeks worked per year	49.118	(8.594)	48.627	9.649)

Table A5
The composition of the qualification categories in LFS

Qualification variable	IALS qualifications included	NVQ level
Academic qualifications		
CSEs	CSE below grade 1	1
	GCSE below grade C	
O levels (grades A-C)	O-level/GCSE grades A-C	2
	CSE grade 1	
A levels	A level	
	Scottish Certificate of 6th Year Studies	3
	SCE Higher	
	A/S level	
Other HE qualification	Other HE qualifications below degree level	4
HE diploma	Diplomas in Higher Education	4
First degree	First Degree	5
Higher Degree	Higher Degree	5
Vocational qualifications		
'other' qualifications	YT certificate	
	SCOTVEC National certificate modules	1
	Any other qualifications	
NVQ level 1	NVQ level 1	1
	GNVQ foundation	
NVQ level 2	NVQ level 2	2
	GNVQ intermediate	
NVQ level 3-5	NVQ level 3/GNVQ	3
	GNVQ advanced	3
	NVQ level 4	4
	NVQ level 5	5
RSA low	RSA other qualifications (Stage I, II and III)	1
RSA high	RSA diploma	2
	RSA Advanced Diploma/Certifcate	3
	RSA Higher Diploma	4
City and Guilds 'other'	City and Guilds 'other'/lower/part I	1
City and Guilds Craft	City and Guilds craft/part II	2
City and Guilds Adv. Craft	City and Guilds Advanced Craft/part III	3
BTEC first cert./diploma	BTEC first certificate	1
	BTEC first diploma	2
ONC/OND BTEC National	ONC/OND	3
	BTEC/SCOTVEC National	
HNC/HND BTEC Higher	HNC/HND	4
	BTEC/SCOTVEC higher	
Nursing	Nursing qualification	4
Teaching	Teaching – further education	
	Teaching – secondary education	4
	Teaching – primary	
	Teaching – level not stated	
Professional qualification	Other *eg* member of professional institute	5

Table A6
Summary statistics – LFS

	Men		Women	
Detailed Qualifications	Mean	S.D.	Mean	S.D.
CSEs	0.062	(0.240)	0.048	(0.214)
O levels (grades A-C)	0.578	(0.494)	0.636	(0.481)
A levels	0.248	(0.432)	0.256	(0.436)
Other HE qualification	0.011	(0.105)	0.013	(0.115)
HE diploma	0.017	(0.128)	0.022	(0.146)
First degree	0.121	(0.326)	0.111	(0.314)
Higher Degree	0.037	(0.190)	0.020	(0.140)
'other' qualifications	0.493	(0.500)	0.398	(0.490)
NVQ level 1	0.010	(0.098)	0.012	(0.110)
NVQ level 2	0.026	(0.160)	0.041	(0.197)
NVQ level 3-5	0.027	(0.162)	0.030	(0.170)
RSA low	0.016	(0.124)	0.171	(0.376)
RSA high	0.001	(0.032)	0.008	(0.088)
City and Guilds 'other'	0.129	(0.335)	0.042	(0.201)
City and Guilds Craft	0.100	(0.300)	0.022	(0.146)
City and Guilds Adv. Craft	0.075	(0.263)	0.010	(0.101)
BTEC first cert./diploma	0.012	(0.109)	0.016	(0.124)
ONC/OND BTEC National	0.070	(0.256)	0.034	(0.181)
HNC/HND BTEC Higher	0.088	(0.283)	0.033	(0.178)
Nursing	0.008	(0.092)	0.065	(0.246)
Teaching	0.023	(0.150)	0.052	(0.223)
Professional qualification	0.025	(0.157)	0.014	(0.117)
Apprenticeship no quals	0.010	(0.098)	0.003	(0.051)
Highest qualification				
No qualifications	0.113	(0.317)	0.143	(0.350)
CSEs	0.047	(0.212)	0.046	(0.210)
O levels (grades A-C)	0.171	(0.377)	0.252	(0.434)
A levels	0.067	(0.250)	0.075	(0.263)
Sub degree	0.014	(0.117)	0.020	(0.140)
Degree	0.164	(0.370)	0.136	(0.343)
NVQ level 1	0.144	(0.352)	0.113	(0.317)
NVQ level 2	0.076	(0.266)	0.054	(0.227)
NVQ level 3	0.101	(0.301)	0.047	(0.212)
NVQ level 4	0.080	(0.272)	0.104	(0.305)
NVQ level 5	0.022	(0.147)	0.010	(0.099)
Other Variables				
Log wage	2.078	(0.600)	1.805	(0.551)
Age	38.978	(11.611)	38.368	(10.731)
Non-white	0.040	(0.197)	0.041	(0.197)
Tyne & Wear	0.018	(0.133)	0.017	(0.130)
Rest of Northern Region	0.034	(0.182)	0.036	(0.186)
South Yorkshire	0.022	(0.148)	0.021	(0.145)
West Yorkshire	0.035	(0.185)	0.036	(0.186)
Rest of Yorkshire & Humberside	0.030	(0.169)	0.029	(0.167)
East Midlands	0.071	(0.256)	0.070	(0.255)
East Anglia	0.039	(0.195)	0.037	(0.188)
Inner London	0.030	(0.170)	0.031	(0.174)
Outer London	0.070	(0.255)	0.071	(0.256)
Rest of South East	0.208	(0.406)	0.201	(0.401)
South West	0.087	(0.282)	0.089	(0.284)
West Midlands (metropolitan county)	0.045	(0.207)	0.042	(0.200)
Rest of West Midlands	0.054	(0.226)	0.053	(0.224)
Greater Manchester	0.036	(0.186)	0.038	(0.191)
Merseyside	0.018	(0.134)	0.020	(0.140)

Rest of North West	0.036	(0.186)	0.037	(0.189)
Wales	0.044	(0.205)	0.045	(0.208)
Strathclyde	0.038	(0.192)	0.040	(0.196)
Rest of Scotland	0.055	(0.228)	0.057	(0.232)
Northern Ireland	0.030	(0.170)	0.031	(0.173)
Large workplace (>25 employees)	0.718	(0.450)	0.637	(0.481)
Public sector firm	0.208	(0.406)	0.360	(0.480)

Table A7
Male returns to highest qualifications – NCDS

Variables	Specification 1 No controls		Specification 2 LFS controls		Specification 3 IALS controls		Specification 4 Full controls	
	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)
Constant	1.741	(0.021)	1.838	(0.036)	1.639	(0.070)	1.808	(0.090)
Highest Academic Qualification: QualificationCSEs								
CSEs	0.118	(0.025)	0.099	(0.024)	0.116	(0.024)	0.076	(0.024)
O levels	0.244	(0.024)	0.233	(0.022)	0.239	(0.024)	0.169	(0.023)
A levels	0.448	(0.034)	0.411	(0.032)	0.433	(0.034)	0.317	(0.034)
Sub-degree	0.568	(0.069)	0.541	(0.063)	0.559	(0.068)	0.460	(0.066)
Degree	0.559	(0.026)	0.523	(0.025)	0.535	(0.027)	0.406	(0.030)
Highest Vocational Qualification:								
NVQ Level 1	0.052	(0.023)	0.049	(0.022)	0.054	(0.022)	0.045	(0.022)
NVQ Level 2	0.010	(0.024)	0.011	(0.023)	0.011	(0.023)	0.014	(0.022)
NVQ Level 3	0.053	(0.022)	0.067	(0.021)	0.058	(0.022)	0.060	(0.021)
NVQ Level 4	0.150	(0.032)	0.155	(0.031)	0.143	(0.032)	0.138	(0.031)
NVQ Level 5	0.205	(0.028)	0.204	(0.027)	0.204	(0.028)	0.189	(0.027)
Apprenticeship no quals qualifications	-0.050	(0.043)	0.001	(0.042)	-0.033	(0.042)	0.007	(0.040)
R^2	0.2362		0.3113		0.2552		0.3363	
P-value regional			0				0	
P-value non white								
P-value ability variables							0	
P-value school type							0.348	
P-value family variables							0.040	
P-value parents education					0.219			
P-value parental interest							0.523	
P-value employer char.			0		0		0	
Number of observations	2597		2597		2597		2597	

Table A8
Female returns to highest qualifications – NCDS

	Specification 1 No controls		Specification 2 LFS controls		Specification 3 IALS controls		Specification 4 Full controls	
	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)
Constant	1.348	(0.022)	1.549	(0.039)	1.317	(0.077)	1.624	(0.095)
Highest Academic Qualification: QualificationCSEs								
CSEs	0.065	(0.029)	0.048	(0.027)	0.066	(0.029)	0.032	(0.027)
O levels	0.217	(0.027)	0.180	(0.024)	0.206	(0.026)	0.123	(0.026)
A levels	0.440	(0.035)	0.380	(0.033)	0.422	(0.035)	0.292	(0.036)
Sub-degree	0.585	(0.070)	0.503	(0.072)	0.592	(0.070)	0.424	(0.070)
Degree	0.798	(0.032)	0.683	(0.032)	0.782	(0.033)	0.576	(0.037)
Highest Vocational Qualification:								
NVQ Level 1	0.045	(0.027)	0.034	(0.026)	0.036	(0.027)	0.023	(0.025)
NVQ Level 2	0.013	(0.027)	0.034	(0.026)	0.017	(0.027)	0.020	(0.027)
NVQ Level 3	0.136	(0.039)	0.109	(0.036)	0.122	(0.038)	0.090	(0.036)
NVQ Level 4	0.218	(0.031)	0.143	(0.030)	0.195	(0.030)	0.131	(0.030)
NVQ Level 5	0.327	(0.035)	0.262	(0.034)	0.275	(0.035)	0.237	(0.034)
Apprenticeship no quals	-0.097	(0.094)	-0.015	(0.100)	-0.067	(0.096)	-0.027	(0.099)
R^2	0.3236		0.4144		0.3486		0.4328	
P-value regional			0				0	
P-value non white							0.024	
P-value ability variables							0.020	
P-value school type variables							0.757	
P-value family variables							0.004	
P-value parents' edu. education					0.303			
P-value parental interest							0.078	
P-value employer char. variables			0		0		0	
Number of observations	2363		2363		2363		2363	

Table A9
Male returns to highest qualification (IALS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	8.151	(0.166)	6.184	(0.255)
CSEs	0.118	(0.104)	0.251	(0.095)
O'levels (grades A-C)	0.178	(0.091)	0.248	(0.081)
A levels	0.381	(0.116)	0.409	(0.092)
Sub degree	0.607	(0.145)	0.600	(0.107)
Degree	0.802	(0.091)	0.676	(0.083)
NVQ level 1	0.247	(0.124)	0.213	(0.086)
NVQ level 2	0.167	(0.114)	0.160	(0.088)
NVQ level 3	0.397	(0.102)	0.333	(0.082)
NVQ level 4	0.565	(0.097)	0.474	(0.081)
NVQ level 5	0.735	(0.130)	0.611	(0.108)
Apprenticeship no quals	0.163	(0.135)	0.080	(0.113)
P-value age			0.000	
P-value non-white			0.389	
P-value parents' education			0.232	
P-value firm size			0.002	
Number of observations	751		751	

Table A10
Female returns to highest qualification (IALS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	8.582	(0.174)	6.957	(0.259)
CSEs	-0.162	(0.091)	0.079	(0.102)
O levels (grades A-C)	0.098	(0.067)	0.246	(0.064)
A levels	0.235	(0.102)	0.468	(0.085)
Sub degree	0.180	(0.159)	0.296	(0.133)
Degree	0.719	(0.082)	0.796	(0.082)
NVQ level 1	0.048	(0.100)	0.048	(0.096)
NVQ level 2	0.165	(0.108)	0.380	(0.097)
NVQ level 3	0.090	(0.086)	0.261	(0.083)
NVQ level 4	0.526	(0.079)	0.586	(0.079)
NVQ level 5	0.596	(0.202)	0.654	(0.186)
Apprenticeship no quals	-0.507	(0.119)	-0.431	(0.134)
P-value age			0.000	
P-value non-white			0.931	
P-value parents' education			0.890	
P-value firm size			0.002	
Number of observations	782		782	

Table A11
Male returns to highest qualification (LFS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	1.719	(0.010)	-0.602	(0.038)
CSEs	0.074	(0.016)	0.173	(0.015)
O levels (grades A-C)	0.232	(0.013)	0.285	(0.012)
A levels	0.468	(0.018)	0.491	(0.016)
Sub degree	0.583	(0.028)	0.516	(0.026)
Degree	0.815	(0.013)	0.748	(0.012)
NVQ level 1	0.180	(0.012)	0.119	(0.012)
NVQ level 2	0.177	(0.014)	0.224	(0.013)
NVQ level 3	0.350	(0.013)	0.358	(0.012)
NVQ level 4	0.598	(0.014)	0.556	(0.013)
NVQ level 5	0.905	(0.024)	0.790	(0.022)
Apprenticeship no quals	0.126	(0.030)	0.126	(0.029)
R^2	0.206		0.380	
P-value age			0.000	
P-value non-white			0.000	
P-value region			0.000	
P-value employer characteristics			0.000	
Number of observations	29765		29765	

Table A12
Female returns to highest qualification (LFS)

Variable	Specification 1		Specification 2	
	Coeff.	(S.E)	Coeff.	(S.E.)
Constant	1.483	(0.006)	0.043	(0.037)
CSEs	0.065	(0.013)	0.115	(0.013)
O levels (grades A-C)	0.228	(0.009)	0.266	(0.008)
A levels	0.407	(0.013)	0.448	(0.012)
Sub degree	0.635	(0.023)	0.593	(0.021)
Degree	0.831	(0.010)	0.795	(0.010)
NVQ level 1	0.139	(0.010)	0.113	(0.010)
NVQ level 2	0.089	(0.013)	0.194	(0.013)
NVQ level 3	0.236	(0.014)	0.325	(0.013)
NVQ level 4	0.622	(0.011)	0.594	(0.011)
NVQ level 5	0.926	(0.027)	0.891	(0.025)
Apprenticeship no quals	0.011	(0.046)	0.015	(0.046)
R^2	0.256		0.357	
P-value age			0.000	
P-value non-white			0.000	
P-value region			0.000	
P-value employer characteristics			0.000	
Number of observations	29765		29765	

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