Returns to Education and Skills in the UK for the 1970 Cohort

Matthew Kevin Aldrich

PhD Economics
University of East Anglia
School of Economics
November 2010

Acknowledgements

I would like to thank my supervisors, Dr Sara Connolly and Dr Sue Long for their knowledge, advice and support throughout the course of this research. They are not only my supervisors, but also my friends and colleagues. I would also like to thank everybody who has given me feedback on my work; to Professor Peter Sloane and Doctor Steven McIntosh through the examination process, staff at UEA and fellow PhD students through their helpful comments in seminars and workshops to interesting, informal discussions in the office. Finally, a big thank you to all my friends and family who have supported me and been there throughout the time I have spent on this Thesis.

This research has been funded by the Economic and Social Research Council (ESRC) through a 1+3 Studentship.

University of London. Institute of Education. Centre for Longitudinal Studies, *1970 British Cohort Study:* Colchester, Essex: UK Data Archive [distributor]

Abstract

This Thesis examines the returns to education and skills for a cohort born in one week of 1970. This is the most recent cohort survey available in which individuals are old enough for a returns to education analysis to be undertaken. Moreover, the 2004 sweep of the survey can be compared to an earlier cohort at a similar age to examine the dynamics of the value of qualifications in the labour market given increased educational attainment and participation in post-compulsory schooling. The first empirical chapter finds that returns to qualifications seem rather stable between the two cohorts. The second contribution of this research builds on these results. The literature on over-education and the demand for skills in the labour market shows that there is a mismatch between the supply of qualifications and skills that individuals possess and what is demanded by firms, particularly for graduate-level qualifications. The second empirical chapter of this Thesis argues that the true returns to qualifications are clouded by highly-valued soft skills, and finds that the returns to qualifications fall when soft skills measures are included in the specification. It also considers how firms assess an individual's soft skills, given that they are personal traits that may not be reflected in the qualifications an individual has acquired. The final empirical chapter of this Thesis completes the picture by examining non-monetary returns to qualifications. Typically, due to data limitations, a particular outcome is assessed whereas the dataset used in this analysis exploits the panel dimension of the data to analyse the effect of education on a number of outcomes. This gives a more complete picture of non-monetary returns whilst controlling for unobserved time-invariant effects that may influence outcomes.

Table of Contents

List of Figures

List of Tables

<u>Chapter One:</u>

Introduction

This thesis examines the overall returns of education to an individual across a cohort born in one week of 1970 in the UK. The British Cohort Study 1970 (BCS70) is a cohort that completed their education at a time of change in the system of education and vocational qualifications. They were born when the minimum school leaving age was less than 16, but started their education once it had been raised to 16 years of age. During their school years, there was a concerted effort to create a unified and coordinated system for vocational qualifications – the National Vocational Qualifications Framework (NVQ) accreditation scheme. These individuals completed their education in the late 1980's/early 90's; a time when participation and achievement in post-compulsory schooling began to increase rapidly, particularly higher education. Since then, there has been debate in the literature concerning the impact that the increasing supply of graduates has had on returns to education and even whether there is now a problem of over-supply of graduates, resulting in over-education. The evidence is mixed; some research has found that returns have not fallen, or have even slightly increased, and therefore argue that demand for graduates is rising in line with supply. Others find that returns have decreased, that over-education is increasing, and the variance in returns is increasing. One explanation for the varied evidence in the literature is the sources of data used. Typically, cross-sectional data is used and results are compared across time. However, unlike cohort studies, these data do not typically include information on individuals' ability, which might be relevant as the increasing variance in returns may be due to increased variation in individuals' capabilities as participation has increased. Two empirical chapters of this thesis contribute to this strand of the literature.

The first (Chapter Three) estimates the returns to academic and vocational education for this cohort and compares the results to previous studies, including a study on an earlier cohort. The detailed dataset allows a number of methodologies to be applied to give an accurate representation of returns. The results show that returns to education have fallen slightly (but not all that much) compared to those obtained at a similar stage in their career for the 1958 cohort. This may be an indication that returns are beginning to fall as participation has increased over time. A quantile analysis shows that returns also vary across the pay distribution.

The fourth chapter builds on these results. The over-education literature shows that individuals employed in jobs that are not commensurate with their qualifications are not paid as well as those in jobs their suitably qualified counterparts, and this is a not insignificant problem in the UK. This has led economists to question whether the supply of graduates is too high given the levels of demand for qualified employees, particularly in the light of sharp increases in participation, particularly over the 1990's. There is much, and continuing, debate in the literature concerning this issue, and contrasting views on how this has affected returns to education.

This Thesis argues that when faced with an increased supply of graduates, employers need to find means other than qualifications in order to identify the most able candidates. It argues that employers are increasingly interested in soft skills; that is, transferable skills which cannot be assessed or measured through formal qualifications as a way of distinguishing between equally qualified candidates. A Principle Components Analysis is used to decompose a number of self-reported soft skills in the British Cohort Study 1970 into underlying components, or traits. When included in the returns to education specification in Chapter Three, these skills traits have significant value in the wage equation, and the returns to 'formal' qualifications fall. Added to the slight falls found in the previous chapter, this provides some support for the argument presented in this thesis and may be indicative of a fall in returns to qualifications. This work further contributes to the literature by arguing that a distinction should be made between skills and qualifications in the labour market and human capital literature.

The third empirical chapter of this thesis (Chapter Five) uses the two most recent sweeps of the BCS70 survey to investigate whether there are any immediate non-monetary returns to educational investment. This uses information at ages 30 and 34 to examine whether gaining a qualification within this time period has any effect on well-being, psychological and physical health, and labour market and civic participation. Exploiting the panel dimension of the data in this way allows the researcher to specify a fixed effects model that eliminates any unobservable time-invariant characteristics that may differ between individuals and affect either education itself, or the outcomes investigated. This provides a way to establish a causal effect of education on outcomes, whilst controlling for the influence of the increase in earnings associated with more education. The results show that there are some immediate returns to education, although not all of the effects due to education reported in the literature show through here. This suggests that some of the effects of education take a longer period of time to materialise. To understand these non-monetary returns further, and the mechanisms through which education influences them, it may be rewarding to repeat this analysis on later sweeps of the survey, when available.

Chapter Two:

Literature Review

2.1 Human capital theory

The literature on human capital formation, the causal link between education and earnings, the possible benefits of having a well-educated workforce for consumption, social interaction and macroeconomic growth, and other research in a similar vein has grown tremendously since Schultz's pioneering discussion of investment in human capital (Schultz 1961). His work was the first to explore the extent to which knowledge and skills held by an individual can have an economic value in the labour market, and these outputs constitute a major part of the product of human capital investment. Since expenditures on human capital are primarily a mixture of investment and consumption, Schultz suggested that using levels of expenditure to measure the amount of human capital acquired is somewhat problematic. It would be extremely hard to measure how, and by how much, a given expenditure on a mix of consumption and investment translates into an increase in human capital. To avoid this problem, Schultz argues that a better measure is the yield of an investment – in human capital terms, the wages or salaries received by those individuals who invest.

Although Schultz's work generated much interest in investment in human capital, there was no sufficient theory explaining the actual process of investing in people. The first model to build a general framework which could be used to analyze human capital accumulation was Becker (1975), and his model became the spur for the development of theoretical earnings functions. His argument concentrates on distinguishing between specific and general on-the-job training, where any individual who receives either form of training can earn wages while s/he accumulates human capital. The latter type increases the individual's productivity in any firm, whereas the former can only be utilized in the firm that offers the training.

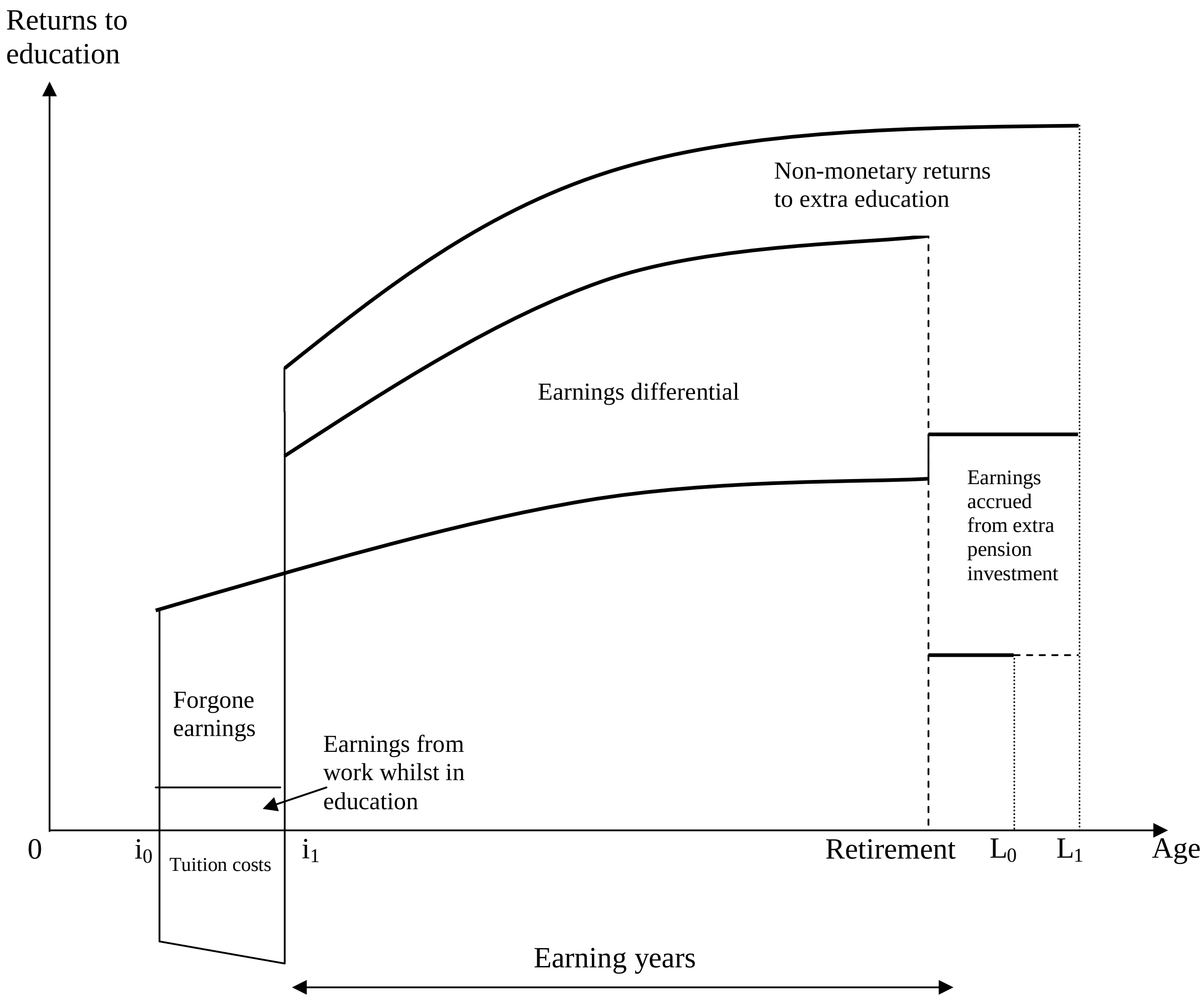
The focus here is not on-the-job training but on schooling, and particularly the returns to schooling in the UK and how these have changed over time given the frequent and continuous reform of the UK education system, to be discussed below. The human capital model developed by Becker treats schooling as a form of general training in a specialized institution – unlike in a firm, the individual receiving training does not earn wages whilst in school but can receive an income by working outside the institution, for example during holidays, or at weekends through part-time work.

Figure 1 (adapted from McMahon 1998) depicts how differing amounts of schooling can provide differing returns to schooling, both in terms of wages and non-monetary returns[1], from entry into the labour market and throughout the life course, even past retirement. The choice the individual makes with respect to their education level will be denoted i_0 or i_1, respectively. Individuals make the choice of either entering the labour market, for example on completion of compulsory education, i_0, or continuing to higher education, delaying entry until graduation, i_1. The immediate leaver i_0 will then experience a return, R, to their education of R_0 until retirement. i_1 – although accruing initial costs to investment in education, in terms of tuition fees, living and studying costs, as well as foregone earnings (although they may gain some earnings from part-time work whilst in higher education) – will then earn R_1 from graduation until retirement, $R_1 > R_0$. Not only will i_1 enter the labour market at a higher level of earnings than i_0, but also earnings will accelerate faster due to career structure and the possibility of more promotion opportunities. As well as monetary returns, i_1 receives non-monetary returns greater than those received by i_0. It is widely stated that if the earnings differential is larger than the costs of entering higher education, the individual will invest. Note that the existence of these costs means that an individual who invests in schooling will not receive an overall return equal to his/her marginal product, but his/her marginal product less total costs. The reason that it is the individual and not the firm who pays these costs is that the extra human capital the individual obtains translates into higher productivity that is potentially beneficial to any firm, so no firm would have the incentive to provide the schooling itself or pay for the individual's schooling[2]. The individual can recoup the costs of training through a higher earned wage, due to a higher marginal product, once training is completed.

---

[1] Non-monetary returns will be discussed later in this Chapter (p75) and investigated in Chapter Five (p270).

[2] It is assumed that the firm cannot tie the individual to a contract which specifies that s/he must work for the firm until retirement following the completion of his/her schooling; if this were the case, it would be beneficial for the firm to pay towards the costs of schooling – in a sense this contract would force the training to be specific to that firm.



This theory explains the observation from a number of earlier studies that individuals invest in human capital early in their careers and age-earnings profiles tend to be steeper among more skilled and educated individuals (Taubman and Wales 1974 is one such study). By investing in human capital at an early age, individuals give themselves more time to recover the costs, and benefit from the higher wages that are generated by the extra human capital that has been obtained (Ben-Porath 1967). In Becker's framework, investment in human capital at younger ages reduces earnings early in the lifecycle and raises them later in the career, steepening the age-earnings profile compared to individuals with less human capital. Another feature of age-earnings profiles that is explained by Becker's model is the fact that earnings increase with age at a decreasing rate, possibly becoming negative late in the career, as human capital depreciates. The extent to which this occurs will depend on the type of human capital, career or occupation, for example individuals in manual jobs the depreciation in human capital could be due to the fact that as individuals get older they become physically weaker, or do not have as much dexterity as they did earlier in their careers. Individuals typically do not invest in as much training later on in their career and as a consequence their stock of human capital may depreciate in occupations which involve the use of technology; individuals may not have the up-to-date knowledge or skills required to operate the most modern technologies employed in a particular firm[3].

Becker foresaw the importance of this type of model, which he claimed could provide the link between formal theory and empirical estimation of individual earnings, and in the sense that the theory could be improved by the empirical findings, they are even integrated. This, Becker argued, provided a foundation that ensured that the theory of human capital would underpin much of the future research in labour economics.

In his famous work on the distribution of earnings, Mincer (1974) developed a testable empirical equation for measuring the internal rate of return to schooling. The 'Mincer equation', or Mincer's earnings function, has become one of the most widely used relationships in labour economics, and is the basis for estimating the returns to investment in human capital. This rate of return equation is not, however, without its flaws. It has also arguably been misused in more recent times in the human capital literature. This will be discussed following an explanation of how Mincer used Becker's theory of human capital to derive an equation to estimate the relationship between the level of schooling and earnings, using Mincer's model in its simplest form – the schooling model.

Investment in human capital would not occur unless the individual's discounted future earnings stream following the extra investment is higher than it would have been had he not invested. Therefore if one compared the ex ante present value of earnings streams with and without investment, they would only be equal at a positive internal rate of return. This is the yield of the investment that, as Schultz argued, is the most appropriate way to measure accumulated human capital.

Assume that a change in an individual's investment does not alter his/her marginal return, the only investment costs are time costs (or alternatively, the monetary costs of schooling are fully paid for through part-time or holiday employment), the

[3] At this stage in one's life, education investment is more likely to be funded through savings, and be more of a consumption good than earlier on in one's life.

individual starts work immediately following the completion of schooling and no further investments in human capital are made, the flow of earnings are constant throughout the working life, the economy is stable in the sense that there are no shocks which affect individual productivity and earnings, and finally the span of working life is the same regardless of the level of schooling. With continuous discounting, it can be shown that an individual's present value of lifetime earnings (V_s) with *s* years of schooling is

$$V_s = Y_s \int_s^{n+s} e^{-rt}.dt = \frac{Y_s}{r} e^{-rs}(1-e^{-rn}),$$

where Y_s is annual income, *n* the length of the working life and *r* the discount rate. If the individual invests in less schooling by *d* years, he has a present value earnings stream

$$V_{s-d} = Y_{s-d} \int_{s-d}^{n+s-d} e^{-rt}.dt = \frac{Y_{s-d}}{r} e^{-r(s-d)}(1-e^{-rn}).$$

Equalizing the above formulae gives a ratio, $k_{s,s-d}$, of the individual's annual earnings given s or s-d years of schooling,

$$k_{s,s-d} = \frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)}}{e^{-rs}} = e^{rd}.$$

It is clear that this ratio depends neither on the level of schooling nor on the length of the earning life. If one now assumes that s=d, so that the individual invests in either s years or 0 years of schooling, $k_{s,0}=Y_s/Y_0=k_s$ then by the previous result $k_s=e^{rs}$. Taking its logarithm and rearranging, $lnY_s=lnY_0+rs$.

This is the Mincer equation for the basic schooling model. Its success stems from its simplicity and the way it is derived from human capital theory which, as discussed, explains many established features of age-earnings profiles. More specifically, the potential for concavity of the age-earnings profile is captured by including an experience-squared term in the above equation. Also, the coefficient on schooling is a marginal internal rate of return (and if it is specified to be linear, it is also the average rate of return), which not only gives an estimate of the rate of return to schooling but it is also directly comparable to the rate of return to other investments (for example the return on physical capital). A key feature of this specification is that the logarithm of earnings is a strict linear function of time spent at school, and therefore implies that each year of schooling provides the same return, regardless of level of qualification.

A benefit of the Mincer model is that it does not require information on complete lifetime earnings for one to estimate the rate of return. As the increase in earnings is steeper for those with more human capital, there is a particular ‘wage overtaking’ level of experience. This ‘short-cut method’ is possible only if there is a unique wage-overtaking level of experience, i.e. the earnings-experience profiles of individuals with different levels of education cross once and only once. This is the case with Mincer’s model, as the functional form of the earnings equation gives a smooth earnings profile, which eliminates any fluctuations in estimated earnings. Mincer proves that the upper limit of this overtaking level of experience is roughly the reciprocal of the internal rate of return (assuming no post-school investments in human capital are made). For example, if the rate of return to schooling is 10%, then the overtaking level of experience would be about ten years. This requirement that only about ten years of data on earnings are needed to estimate the rates of return to schooling rather than information on lifetime earnings is rather convenient for analysis. The basic schooling model is derived above for simplicity, but various parameters may be included in an attempt to increase the explanatory power of the regression, such as experience or ‘potential’ experience, age less years of schooling.

The Mincer equation has provided the basis for most estimates of returns to schooling – and other forms of human capital accumulation – and increasing returns to schooling have consistently been found for almost every country and every time period that has been investigated. Ashenfelter et al. (1999) provide a meta-analysis covering 27 studies over the period 1974-1995, with an average rate of return from all studies, irrespective of estimation method, of 7.9%. Harmon et al. (2003) present Ordinary Least Squares (OLS) estimations of rates of return for males and females separately, using data from the International Social Survey Programme (ISSP), finding similar results to Ashenfelter, with the estimated return to an extra year of schooling ranging between 7% and 9%. The ISSP is designed to collect many national surveys together, and the surveys are intended to be as similar as possible given the varying institutional frameworks across countries, to allow for a direct comparison across countries.

As successful as the Mincer equation has been in terms of its popularity and in the reliability of its results, it does have some drawbacks. The majority of these stem from the assumptions that are used in deriving the Mincer equation from human capital theory, which allow for the schooling coefficient to be interpreted as an internal rate of return. I will discuss the drawbacks of each assumption in turn, drawing from Griliches (1977), Willis (1986) and Bjorklund and Kjellstrom (2002).

Firstly, for the coefficient on schooling to be regarded as a true measure of the rate of return to an investment, the effect of extra schooling on earnings must be causal. This particular proposition of human capital theory is contested in Spence's well-known signalling model (Spence 1973), which proposes that education is a signal of one's productive capacity rather than a productivity-enhancing tool in itself. The major difficulty concerning the causal relationship between schooling and earnings is generally termed the 'self-selection problem' (Willis 1986). It must be noted that the self-selection problem is not unique to human capital formation but can be present in any area of empirical research where the full opportunity set is not known.

In the case of human capital formation, the question is whether the earnings function used to test returns to education can be said to accurately represent the whole opportunity set faced by an individual. It is impossible to observe all possible life-cycle earnings paths available to an individual through the alternative schooling choices open to him/her, so one must assume that each individual chooses the level of schooling that maximises returns, given his/her ability and other characteristics. The econometrician is, then, estimating the returns to education by comparing different individuals with different levels of schooling on the basis that each individual has chosen the level of schooling which maximises his or her return to the investment. Although one could not say that perfect information of this kind is available to individuals considering firstly, whether to invest in extra human capital, and secondly in what subject or skill to invest, individuals are able to observe the earnings of other individuals who already have such human capital and the level and type of qualifications they are considering to undertake themselves.

Montmarquette et al. (2002) construct and test an earnings function which includes an expected earnings variable to estimate the probability of choosing a college major (a degree subject in the UK) in a particular field. This variable takes into account the predicted earnings of all college majors, the probability of success of completing the major chosen and expected earnings if the individual fails to complete the qualification. The role that expected earnings plays in an individual's choice of degree is found to be very important but varies by race and gender (something I will return to in section 2.6, p63, in regard to motivation, aspiration and the different values males and females have in regard to their employment). This provides some evidence, then, that individuals do take expected earnings into account and has a significant influence on an individual's choice of college major. One could probably argue that expected earnings would be a significant component not only of investment in college majors but of most, if not all, qualifications and skills an individual may consider to undertake beyond any compulsory level.

Another problem is that it is impossible to perfectly observe all of the variables that determine an individual's earnings opportunities. For example, cognitive performance, which is the general form of ability test used in the literature, is not necessarily the same as productive ability, and the ability measures used in datasets may not inform the econometrician of how well an individual can transfer this schooling ability into productive ability. The term cognitive performance, rather than cognitive skill, is used here as the cognitive ability test scores reported in datasets are taken from tests that can be rather detailed and take time to complete. Therefore not only ability, but also concentration, motivation, work ethic and other similar traits all affect an individual's cognitive test score.

Other variables crucial to the estimation of returns to human capital that may not be perfectly observed include the amount of education an individual has obtained and their level of work experience. Measurement error in the level of schooling obtained, considering that recalling qualifications completed from some time ago may not be totally accurate, can bias the estimated return downwards.

Surveys generally do not record the level of work experience an individual has at the time of their interview. Even panel surveys – a cross-section of individuals in the population followed over a lengthy period – may not have detailed information on the work histories of each individual. Typically, panel datasets do not survey individuals on an annual basis, so measuring work experience accurately may not be possible. Many models proxy this by using a 'potential work experience' term, first suggested by Mincer, which is age minus the age the individual left education. One must take any return to schooling following some years away from the education system into account. This may occur because the individual had always intended to invest in more schooling but due to financial constraints could not continue their education at the time, or the individual may decide to undertake a different direction in their career after a number of years in the labour market and hence return to education to obtain the required qualifications for his/her newly chosen career path.

As well as increasing returns to education, the possibility that individuals with more ability or productive (human capital) capacity obtain more schooling is a potential problem, as ability also potentially affects wages, i.e. it is endogenous. Here the residual in the earnings function will be positively correlated with schooling resulting in an upward biased estimate, overstating the returns to education that an individual with a given ability can receive through increased schooling. This ability bias has attracted considerable attention in the returns to education literature, and a number of approaches have been used to deal with it.

One possibility is to use a laboratory experiment. The self-selection issue would not be a problem if it were possible to use such a method whereby individuals with different (perfectly known) abilities are randomly labelled with different education levels. Then, the residual error term would be independently distributed from the level of schooling; hence the estimated rate of return to schooling in the labour market would be unbiased. I would argue however that this has some major drawbacks. Firstly, there are both practical and ethical issues that arise in such an experiment. Also, I would argue that an experiment of this kind would not give an estimate of a rate of return to education in the manner of human capital formation, but of the value of education as a Spence-type signal to employers. The increase in wages associated with a higher qualification could not be interpreted as a return to human capital because the higher-qualified individuals will on average be no more productive than an individual with less education, due to the random nature of selection. Research has shown the value of this status signal. In a laboratory experiment, Ball et al. (2001) randomly label high-status to individuals and then allow them to interact in a market with randomly labelled low-status individuals (taking both the role of buyers and sellers in different treatments) and finds that this randomly labelled high-status allows individuals to capture significantly higher earnings than their low-status counterparts, and a greater share of the surplus overall. It is possible that this status-effect may have a similar influence in a labour market; however, this would only support a signalling theory rather than human capital accumulation.

This method, then, of eliminating ability bias is not likely to bear any fruit, so one must assume that individuals have full information on their opportunity set and choose the level of schooling which gives them their most preferred alternative (i.e. for the basic schooling model, the level of schooling which gives each individual their highest rate of return given their level of ability). This is obviously not the case in the real world, so if individuals do not choose their most preferred alternative then it would not be the case that the estimates of rates of return to schooling based on interpersonal differences accurately represent the optimal choice by any individual in the population.

Natural experiments have been more successful in response to other questions in the economics of education literature, particularly for assessing the affects of policy changes. This is because comparing one cohort before a change in policy rule (the untreated) to the cohort immediately following the introduction of the new rule (the treated), for example a change in the compulsory leaving age, can be seen as being randomly assigned to the cohort following the change. The resulting impact on outcomes can be attributed to the policy rule as nothing else has changed (assuming the distribution of individual characteristics are the same for the treated and untreated groups, and the change in policy rule has no affect on the outcome of interest to the researcher).

A second approach to tackling the self-selection problem is to use data on twins or siblings to estimate the rate of return to schooling. This method has a second benefit, namely that it may also eliminate measurement error by using one twin to report the education of the other.

Siblings and twins, particularly monozygotic twins, are likely to be closer in terms of ability, considering that twins share the same genes, and also (usually) experience the same family environment throughout their childhood. Therefore ability and family background are less likely to cause the variation in the earnings of each observed individual. This is a possible method then, especially when analysing data on monozygotic twins, for controlling for the impact of inherited natural ability upon earnings, and may give an unbiased estimate of the rate of return to schooling. However, ability may not be perfectly inherited and could quite possibly have an individual component, even for twins. Therefore the estimates of rates of return for twins may be no less biased than other estimates, or at least some bias may remain.

Blanchflower and Elias (1999) find that although twins are much closer in terms of ability, even for monozygotic twins the correlation is not perfect; the correlation between ability test scores is 0.86 for their sample taken from the National Child Development Survey (NCDS) 1958 birth cohort. This of course is not proof of a lack of correlation between the natural ability of twins; the caveat of how well the tests used in such panel data surveys measure innate ability is a further issue, which will be discussed below. Bonjour et al. (2003) estimate the rate of return for UK twins and find a 7.7% return to years of schooling. One problem with using data on twins is that it is difficult to obtain a large, varied sample. Bonjour et al. encounter this problem and therefore only estimate rates of return for female twins.

The third and seemingly most popular way of controlling for ability in the human capital literature is to include a proxy for ability in the estimation equation. Most panel datasets include early ability test scores. Econometric results have consistently found estimates which include ability controls to be lower than those that do not, supporting the evidence for upward bias in estimates of rates of return when ability is not accounted for. Included among the various ability tests used in UK panel datasets are measures for the competence of children to copy, draw and identify pictures at a young age and reading, mathematics and vocabulary tests. The tests used are typically devised using from academic research by education/child experts.

However, one must consider how well the tests used in such panel datasets, for example the British Cohort Study (BCS), the National Child Development Survey (NCDS) and the NLS (National Longitudinal Study) do proxy for ability. Not only may they be an imperfect measure of ability, but also these test results depend on performance of the individual on the particular day the test was taken, as well as motivation, attitude towards such tests and other characteristics[4]. As will be discussed later, it is not just ability but other performance criteria that are measured by such tests.

A fourth approach to solving the problem of (omitted) ability bias is to use Instrumental Variables to account for the endogeneity of the schooling measure. An individual's level of schooling is clearly correlated with their ability; therefore, if an appropriate measure of ability is not available in the data then OLS would suffer from omitted variable bias and the estimated return to schooling would be biased upwards. If a suitable instrument can be found – that is, the instrument is uncorrelated with the error term and is therefore correctly excluded from the earnings equation, but is correlated with the education measure – then the instrumental variables methodology will give a consistent estimate of the returns to education. However, finding an instrument that fits these criteria is difficult, and weak instruments can severely bias the estimated coefficients. Various instruments have been used in the literature, for example quarter of birth (Angrist and Krueger 1991), college proximity (Card 1995) and changes in the minimum school leaving age (Harmon and Walker 1995).

A final alternative (although not a solution) to the problem of ability bias is to simply use Ordinary Least Squares using cross-section data, without any controls for

[4] These characteristics might, however, also influence aptitude for schooling and application of education later in life.

ability. It has been found in some studies (see, for example, Dearden 2002) that the measurement error associated with education that biases the estimate of returns downwards is roughly equal to the upward ability bias; the measurement error and ability bias roughly cancel each other, giving an, overall, unbiased rate of return to schooling. The term measurement error here refers to the possible errors individuals may make when they are asked in a survey to recall the qualifications they have completed in the past. This would more likely be a problem in a cross-sectional survey such as the Labour Force Survey (LFS) but less of a problem in a panel survey such as the NCDS which follows individuals throughout their life and where questions are asked at a time close to the event.

Given this smaller risk of measurement error in panel surveys, it has been argued therefore that studies using the NCDS control for both measurement error and ability bias whereas those using the LFS controls for neither. Dearden (2002) compares an IV analysis of the rate of return to schooling, using the NCDS with earnings measured in 1991 (including the usual variables to control for ability and family background) to an OLS analysis of the rate of return to schooling from the 1998 Labour Force Survey (LFS 1998), and finds that the difference between the estimated rate of return to qualifications from the NCDS and LFS 1998 are not individually significant. Dearden concludes that these biases therefore do offset one another, hence OLS is a valid methodology for estimating returns to education, although it must be noted that the IV coefficients are jointly significantly different to those in the OLS specification.

The issue of selection that arises when assuming of causality is clearly important. One could say that the methods used to counter this have had some success, although there is no clear cut empirical solution. This assumption of Mincer’s model raises another associated problem; it implies that the marginal return to an extra year of schooling must be fully captured in the individual’s earnings, measured net of taxes. If one is measuring private returns, this means that there must be zero non-pecuniary returns to schooling, however there is evidence of the existence of non-monetary returns to education in the literature, which will be discussed later in this Chapter (section 2.10, p75) and investigated in Chapter Five. If measuring social returns, earnings are typically before-tax measures. Social rate of return estimates should also take into account the cost of state education subsidies and any other social costs of education. Although difficult to measure, there is evidence of the presence of externality effects on macroeconomic growth (Barro and Sala-i-Martin 2004), as well as more direct consequences; for example per capita effects of education such as lower fertility in developing countries (Doyle and Weale 1994), lower crime rates (Feinstein 2002a) or a better standard of health (Feinstein 2002b), or see Sianesi and Van Reenen (2003) for a review relating to the macroeconomic benefits of schooling.

The evidence, although still open to debate due to the issues concerning the measurement of the return to education on macroeconomic growth, does support the human capital accumulation argument presented by Becker rather than Spence's signalling argument; if education were simply a signal to an employer and not a productivity enhancing tool then we would not expect any significant evidence of a social return to education.

Another assumption of the Mincer model that may not hold is that foregone earnings are the only costs of schooling. Alternatively it can be assumed, as Mincer argues, that the individual pays for schooling fully through part-time work. Obviously in the real world many individuals need financial support, for example from their parents, a financial institution or frequently both. If individuals face different financing opportunities through either the amount of support their family can give or different interest rates, this has extra implications for measuring returns to schooling, to be discussed below.

Thirdly, the causal effect of schooling on earnings must be independent of work experience. Mincer expands the simple schooling model specified above by including an additive quadratic experience term. This model would not give an accurate estimate of the rate of return to schooling if in fact schooling is dependent on experience. This would be the case, for example, if experience has a larger effect on earnings at higher schooling levels – then an interaction term between schooling and experience would need to be included in the regression equation. This situation is plausible, given that one would expect experience to be much more important in professional and high-skilled occupations than in lower-skilled occupations.

To measure and compare the present value of earnings streams of individuals with different levels of schooling, the length of working life must be the same regardless of the level of schooling. Both individuals, then, must start work immediately after finishing their schooling and work until retirement. It is implicit in this assumption that individuals who invest in extra schooling must retire later by the amount of extra years invested. This assumption is less likely to hold for women than men; women are more likely to have time out of the labour force for bearing and rearing children. Although it is unlikely that it will strictly hold for men, it is more likely to be a good approximation of the working life of men than of women. The likely failure of this assumption given women's typical labour market involvement and experience leads one to question the concept of applying the schooling model to females in the labour market and directly comparing the associated rate of return to that of men without taking this into account.

Fourth, the assumption of no shocks occurring to the economy that affect productivity or wage growth does not hold in the real world. However, it is not strictly needed if one is estimating ex ante returns. In this case, the earnings function is such that it represents the expected earnings path given the level of schooling obtained, and shocks in the future can be viewed as being random events.

The assumptions used by Mincer to derive the equation depicted above obviously do not strictly hold in the real world. However, they do not necessarily need to hold fully for such a model to have relevance and importance to individual schooling decisions or implications for policy. With any theoretical/econometric model, there is always a trade-off between realism to ensure the model is externally valid, and isolating the most important effects the included variables have on the target variable in question.

One must also take into account the availability of data when attempting to develop a testable econometric model. The information required for testing Mincer's model is not too difficult to obtain, nor does it require full histories of each individual's working life. Models could be developed which make less restrictive assumptions, but then obtaining the data required for testing them could prove to be problematic. One must evaluate whether the model in question can be imposed on the real world such that it can represent it closely enough yet also uncover and highlight the main causes which, in this context, drive the variation in earnings between individuals.

One must surely conclude that, despite the fact that the assumptions above do not strictly hold in the real world, meaning that the schooling coefficient is at best a good estimate of the internal marginal rate of return, the Mincer equation has proven to be one of the major success stories in economics in terms of its usefulness to research, and in its popularity. When applied, the model consistently finds positive returns to education across countries and time periods.

One of the major advances in estimating the returns to education since Mincer's original work was the development of a model of heterogeneous human capital (Willis

1986). Instead of a Mincer-type model in which human capital is a one-dimensional object, Willis proposes a model in which human capital (in the form of a basic schooling model) is specialised to certain tasks, or occupations. Each individual chooses the occupation which maximises the present value of his/her earnings given the amount of schooling required and the piece rate available for that occupation. Willis goes on to show that under certain conditions, Mincer's basic schooling model is a special case of his model of heterogeneous human capital.

Over time, the Mincer equation has been frequently used as the base for estimating returns to education. However, research on returns to education has branched out and no longer estimates a rate of return in the Mincerian sense. As datasets have increased in scope and detail, and as empirical methods have become more rigorous and complex, attempts to move to a more complete analysis of variation in earnings means that the coefficient on schooling can no longer be interpreted as an internal rate of return.

The various attempts to improve econometric accuracy in estimating variation in earnings have weakened the interpretation of the schooling coefficient. Using these estimates – comparing them to investment in other types of capital to assess whether the amount of public funding of education is too little or too much – may no longer be a valid methodology. More recent analyses of returns to schooling estimate instead an average increase in the logarithm of earnings to a year of schooling/a particular qualification, and are important for predicting the value of education for individuals in the labour market and its implications for government policy.

I will now move to the main focus of this research – how the returns to education have changed over time – if this is the case at all – and how returns to other traits may be increasingly important in determining success in the labour market given the various reforms of the UK education system in recent times. I will discuss the more recent research in returns to education – in particular research in the UK – but firstly I will examine the changes to the education system.

2.2 The changing supply of skills through educational reform

Research on the returns to education and has become particularly relevant in the UK in recent years due to the major reforms of the education system over the last few decades.[5] Such work includes estimating the effect of a change in parents' education due to a change in the compulsory school leaving age on their children's post-compulsory educational investment (Chevalier 2004), the effect on reading and English attainment for primary school children after the introduction of a pilot scheme for a compulsory 'Literacy Hour' and its resulting impact on the gender gap in pupil attainment (Machin and McNally 2008) and a broad analysis of the effects of various policy changes to the UK education system which have attempted to tackle the problem of failing students, lack of basic skills, low staying-on rates in post-compulsory education, and to address the poor access to higher education for low socio-economic groups (Machin and Vignoles 2005).

This last area is of particular interest as the recent government response to the poor entry level to higher education in low socio-economic groups has been to increase access to such institutions, and the expansion of entrant numbers has been rather striking. This will be discussed after a brief explanation of the UK education system.

In the UK, there are two broadly defined types of schools; state schools, publicly funded through the Local Education Authority in charge of all state schools in the locality, and independent schools, funded by parents and private bodies. State schools have to follow the National Curriculum (to be discussed below), whereas independent schools do not. One of the recently introduced educational reforms is the City Academies programme in disadvantaged areas. These are categorised as independent schools but are funded by a combination of the Local Education Authority, the Department for Education and Skills and local business and charity groups. The City Academies generally specialise in providing a learning experience relating the school's curriculum to the type of business funding it and to local needs. The City Academies may become an integral part of equipping individuals, particularly from disadvantaged areas, with the skills necessary for their labour force participation, and also improve skills in local regions. The new Conservative-Liberal Democrat coalition government has introduced a policy of encouraging parents to become more involved in their children's schooling through 'free schools'; parents, private companies or both are able to apply state funding to set up and run a school, outside of the local education authority's control. The coalition government has also encouraged more schools to

[5] Indeed, more recent education reform will fuel further interest; for example, the Education Act 2008 (http://www.dcsf.gov.uk/educationandskills), which raises the compulsory school or training leaving age to 18 (by 2015), will generate interest in the effects of this policy rule on the marginal learner, and in returns to education following this change.

apply for Academy status, giving them more freedom and independence (http://www.dcsf.gov.uk). Although independent schools also play an important role in education, here I will concentrate on state school education.

Schooling in the UK is compulsory between ages 5 and 16, with examinations used to measure an individual's progress at the end of each of four 'Key Stages'[6], within a National Curriculum that outlines the compulsory content which all pupils will be taught, and which also sets attainment targets and the criteria under which students should be assessed. Most schools are comprehensive; that is, these schools are open to all pupils whatever their level of attainment or ability and prospective students are not subject to testing prior to enrolment. Some schools do set examinations when pupils move from a primary school to a secondary school – this is at Key Stage two. There are relatively few selective schools in existence – usually termed Grammar schools in the UK – due to a change in policy that lead to the abolition of the selective schooling system in many regions of the UK during the 1960's and 1970's.[7] Although generally perceived as higher quality institutions, there is no substantial evidence that individuals enrolled in selective schools perform significantly better than those in comprehensives, due to issues of selection bias (Manning and Pischke 2006).

At the end of Key Stage 4, at the age of 16, individuals must decide whether to continue to post-compulsory education or enter the labour market. The literature on returns to compulsory schooling is rather thin because, as mentioned previously, estimates of returns to schooling are based on the differences in earnings between individuals with the different levels of schooling; it is, therefore, rather difficult to measure returns to compulsory schooling as the level of schooling is by definition the same across individuals. There is, however, a feature of the UK education system which allows some scope for analysing returns to slight differences in compulsory schooling. There are two specified exit dates from compulsory schooling in the UK (with about three months difference between them), and the date after which any individual may (optionally) leave education in their final year of compulsory schooling depends on his/her date of birth. Del Bono and Galindo-Rueda (2007) exploit this exit rule and use it as the basis for a natural experiment to examine the effect of the different exit dates

[6] See Appendix A1

[7] There are 164 Grammar Schools in England, the largest fraction of which are located in the South East (58), followed by the South West (20), North West, West Midlands, Outer London (each with 19), East Midlands (15), East of England (8) and Yorkshire and the Humber (6). Schools in England, (2004), Statistics of Education, Department for Education and Skills.
There are 70 Grammar Schools in Northern Ireland (2006) NGSA News Release, however the selection test was disbanded in 2008.

on qualifications and adult labour market performance.[8] The authors find that leaving compulsory education at the later date positively affects achievement in compulsory and post-compulsory education, and on employment.

When an individual leaves the education system, whatever their level of attainment, from an efficiency and equity point of view one would hope that the individual concerned has obtained sufficient human capital, through knowledge accumulation and the development of specific skills, to become a valuable participant in the labour market and to receive compensation to prevent the risk of poverty. In addition, the level of human capital acquired should enable employment and promotion prospects such that any individual is able (or at least have the potential) to facilitate social mobility. However, there is evidence of significant intergenerational immobility and the skills and human capital one acquires through education may be strongly influenced by the status and history of one's parents. There are of course many factors that influence earnings and labour market success, either directly or indirectly through transmission mechanisms such as education, so education alone will not be enough to promote social mobility.

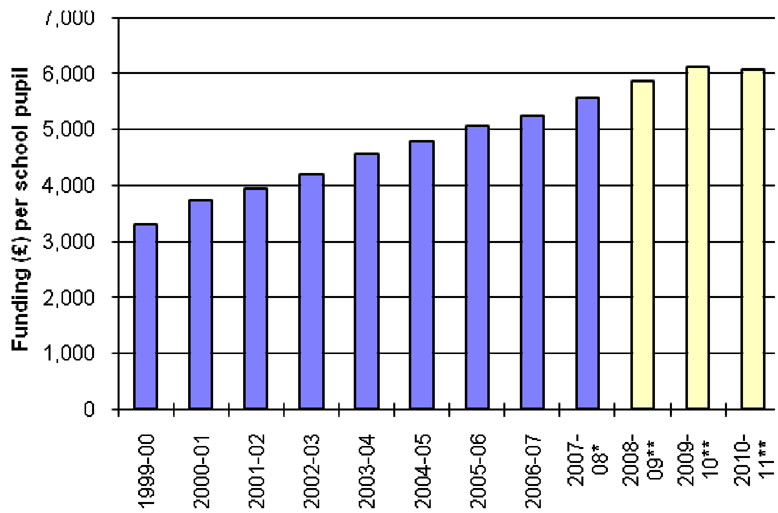
There are issues concerning which skills and what level of attainment is necessary for an individual to be successful in the labour market, and debate over the role the state should play in funding, how much influence it should have in directing what is taught in schools, and how much education should be considered sufficient to give all individuals a solid foundation for successful participation in the labour market.

The main goal of recent educational reform is growth in productivity, improving the competitiveness of the UK economy and improving public services, by having a better educated workforce, and – particularly in regard to Higher Education – innovation in research and encouraging entrepreneurship. However it also has benefits at the micro-economic level, and is particularly important for improving opportunities for individuals in the labour market and for their social well-being as a whole. Chapter Five will investigate the effects of education on well-being and other non-market outcomes associated with education.

[8] Those individuals that do leave at the earlier exit date are able to return to school for their exams, and most do so. However Galindo and Rueda found that a higher proportion of individuals do not take exams when leaving at the earlier date (8% as compared to 4% when leaving at the later date). Although assumed to be true, this may mean that the distribution of quality of those individuals who decide to leave at the earlier date is not the same as the distribution of those who are forced to stay on until the later exit date.

There has been a significant attempt to increase educational attainment in the UK, and this will be outlined through evidence of recent trends, and followed by evidence on the rate of return to various levels of education and to specific qualifications. Spending per pupil has increased consistently over the past decade for reasons to be outlined shortly, shown in the figure below.

Figure 2: Real terms public funding (£) per pupil, England, 1999/00 to 2010/11'[9]



Source: Department for Schools, Children and Families (DCSF), www.dscf.gov.uk

Unsurprisingly, most of the expenditure on education is spent on schooling, with £37.5billion of the 2007-08 (academic year) budget spent on schools. There are an estimated 3,132,000 students in government-maintained secondary schools (excluding sixth forms) in the 2008/09 academic year. 90.8 percent of sixteen year-olds enter post-compulsory education in 2007, falling to 82.4 percent and 63 percent for seventeen and eighteen year-olds respectively. Participation has increased since the turn of the decade for each age group[10].

Evidence on levels of attainment and how this has changed over time is deliberately omitted because of the uncertainty over the relative difficulty of the qualifications compared to previous years, although it can be said that the frequency of awarded qualifications has been increasing over a number of years. A discussion of Higher Education and post-compulsory vocational qualifications follows.

---

9 * denotes estimated expenditure, **planned expenditure, all at 2007/8 prices
10 DCSF, http://www.dcsf.gov.uk

Individuals, when deciding whether to continue their education at a post-compulsory level, can take one of two routes; academic qualifications or vocational qualifications. The majority choose academic qualifications – the more familiar school-based learning following on in a fashion very similar to compulsory schooling. Some choose a more vocational route, which involves a combination of classroom-based learning and on-the-job training and experience. Vocational qualifications have traditionally been perceived as an alternative to academic attainment for lower-ability individuals.

Prior to 1986, the system in place was rather confusing, with numerous bodies covering the various subject areas in which individuals could qualify. The resulting effect was that the level of qualification could not be directly compared to other vocational qualifications due to the diverse, unstructured system that was in place and the varying requirements and components of each qualification dependent on the awarding body concerned.

These vocational qualifications have traditionally been associated with low returns, in part due to the poor organisational structure concerning their award and partly due to the generally lower ability of the individuals whom obtain them. Ability seems to be a determinant of which route individuals take for higher level qualifications; however, for lower-level qualifications the main determinant of which route individuals take is family background and personal characteristics (Conlon 2002). This may, at least in part, be due to the greater need for individuals from lower socio-economic backgrounds to start work at a younger age due to credit constraints and financing their consumption (i.e. they may have higher discount rates) and so their preference is for vocational routes which generally incorporate work experience and on-the-job training, and therefore provide a more immediate return to their investment. There may also be peer pressure effects and social norms that influence the decisions of lower-ability individuals. The determinants of socio-economic success will not only depend on the qualifications obtained, but these individual characteristics and family background may then have subsequent effects on earnings and employment throughout an individual's career. A discussion of research on the returns to vocational qualifications will be presented after an explanation of the vocational qualifications system in the UK.

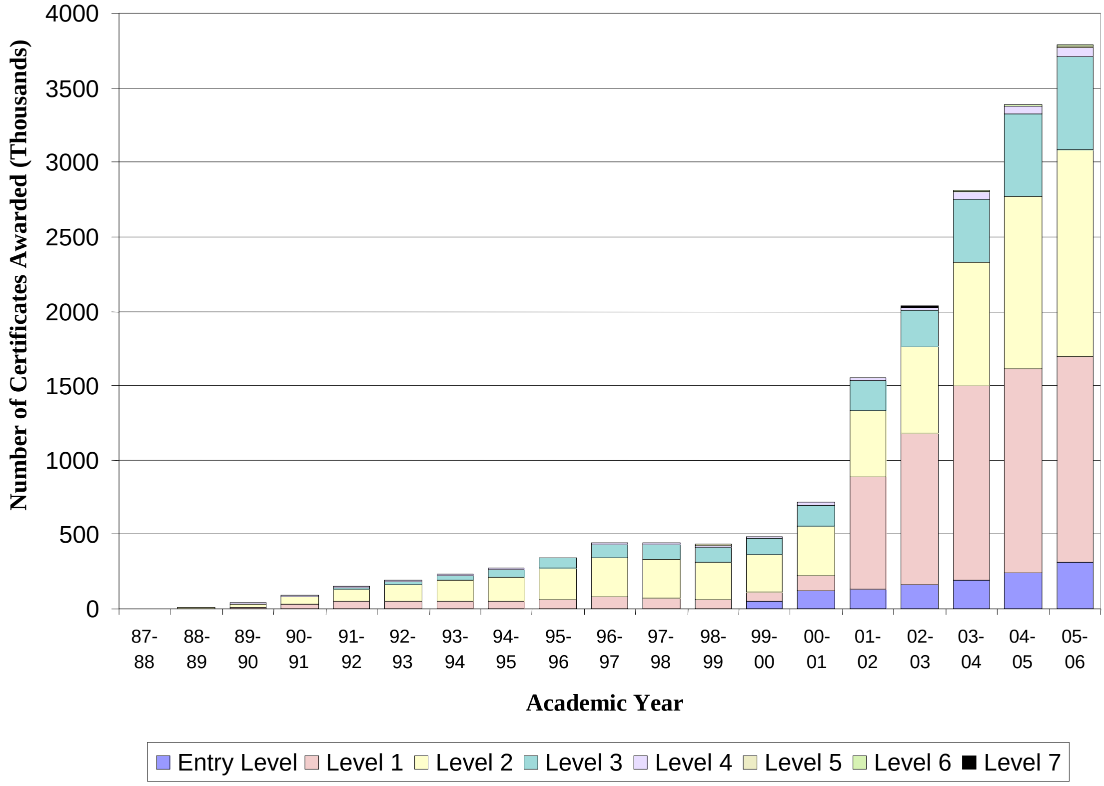
Vocational qualifications were first organised under one comprehensive system, the National Council for Vocational Qualifications (NCVQ), in 1986 and there have been various structural changes since, the major change being the development of a scale of qualifications at five comparable levels, partly to enable a comparison of qualifications within the vocational qualifications framework but also to make them comparable to academic qualifications which are classified in the same way. This, to some extent, has solved some of the problems with the earlier system mentioned above. It must be noted that further changes have been implemented to classify qualifications into eight levels in an attempt to ensure vocational qualifications hold a parity of esteem with academic qualifications. Vocational qualifications now come under the guidance of the Qualifications Curriculum Authority (QCA) alongside academic qualifications.[11]

National Vocational Qualifications (NVQs) have gradually incorporated more general skills as well as sector specific skills in an attempt to make it easier to compare learning outcomes across subjects through the NCVQ framework. Another type of vocational qualification was introduced in a policy reform in 1992, termed General National Vocational Qualifications (GNVQs), the main focus of which is full-time college-based courses, whereas NVQs are more work-related. GNVQs were phased out by 2008. Vocationally Related Qualifications (VRQs) are also available to learners (these are simply other Vocationally Related Qualifications that are accredited by the NCVQ) but the evidence on attainment is limited and unreliable as the data is not fully comprehensive and does not cover all awarded VRQs, so I do not report results here. Greenhalgh (1999), in a comparison of the French and UK vocational training provision, comments that although simplification and consolidation of the system has occurred "it may be concluded that the UK has yet to achieve a transparent system of reliable vocational qualifications"[12]. Galindo-Rueda (2003) finds that employers use the somewhat noisy signals of education at the point of match with an employee, but as employers learn about the individual on the job, observed skill and human capital accumulation of the employee through experience and training becomes more important for the determination of wages. This has strong implications for vocationally qualified individuals given the discussion of the poor structure of vocational qualifications immediately above.

Below is a graphical representation of the trends in the award of vocational qualifications by level[13].

[11] See Appendix A2 for the original and new framework.
[12] Greenhalgh, C. 1999, Adult Vocational Training and Government Policy in France and Britain, Oxford Review of Economic Policy vol. 15 No.1, page 108
[13] See Appendix A3 for the attainment rates in full.

Figure Three: Trends in Vocational Attainment



Source: Department for Children, Schools and Families

As one can see, the majority of vocational qualifications are awarded at level 2, which is equivalent to gaining five or more A*-C grade GCSE's, and a recent trend of falling numbers has been reversed by increases in the academic years 2004, 2005 and 2006. The award of Level 3 qualifications (comparable to A-Levels) have remained relatively stable but again have increased in the last few years, and numbers awarded at levels 4 and 5 (professional and technical qualifications) are small but seem to be on a slight upward trend. In total, approximately 622,000 NVQs and Scottish Vocational Qualifications (SVQs) were awarded in the 2005/06 academic year. This is, in relative terms, a very low proportion of qualifications attained compared to academic qualifications.

There is some research which estimates the returns to vocational qualifications, and it seems consistent with the discussion above that for whatever reason – be it poor organisation, lower ability individuals or simply that the qualifications are not perceived as being of equal quality to academic qualifications despite equal status in the qualifications framework – vocational qualifications result in a rather poor financial returns. Dearden et al. (2004) analyse many features relating to vocational qualifications at NVQ Level 2 (NVQ2) and find that although returns do vary by sector and gender (which has been found by other studies as well, to be discussed below), the majority of level 2 qualifications are associated with low or negative returns, even when the comparison group is restricted to individuals with level 1 or no qualifications. However, individuals holding NVQ2 qualifications do experience an increased probability (four percentage points) of obtaining a qualification at level 3 or above. Vocational qualifications may be taken by individuals as part of their career progression, becoming more qualified as their skill, experience and knowledge increases over time.

Dolton et al. (2001) also find no significant impact on earnings for low-level NVQ qualifications for both men and women. The authors' main concern of the paper, however, is the widely criticised Youth Training Scheme (YTS)[14], and the criticism is perhaps justified given conclusion that there are no earnings benefits or positive employment effects at age 24 as a consequence of completion of YTS.

Other research finds evidence of positive returns to vocational qualifications for under-achieving school-leavers. McIntosh (2004) creates pseudo cohorts (by extracting individuals of successively increasing age from each year of the LFS and pooling data year on year, although a three-year window is used to increase the sample size, i.e. 1996 data is used for individuals aged 17-19, 1999 data for individuals aged 20-22 and so on) and estimates the effects of obtaining low-level vocational qualifications for individuals who left school with no qualifications. McIntosh finds that the gap in employment rates is reduced substantially for individuals (for both men and women) who obtain vocational qualifications at levels 1, 2 and 3 after leaving school with no qualifications, relative to those who obtained equivalent-level academic qualifications whilst at school. The employment rate for individuals who obtained level 2 vocational qualifications was actually higher than for those individuals who left school with GCSEs, at 89 and 88 percent respectively. The reduction in the gap is more significant for women; this is unsurprising given that women in the sample were more likely to be unemployed. Most of the increases in employment rates were found to be statistically significant, *caused* by the vocational qualification attainment, and robust to random effects heterogeneity. The gap in earnings for men between those unqualified school leavers and those who did obtain qualifications is reduced when vocational qualifications are obtained, although this is not the case for women. The importance of the availability of vocational

[14] The Youth Training Scheme was introduced in 1983 and focused on smoothing the school to work transition. Although subjected to various changes over the period of its existence, it seemed to have only a small effect on employment and a negative effect on wages. Dolton, P., G. Makepeace, et al. (1994). "The Youth Training Scheme and the School-To-Work Transition." Oxford Economic Papers **46**: 629-657.

qualifications to low-achievers is highlighted in the research, in the sense that for individuals who did obtain qualifications at school and then went on to obtain vocational qualifications (at levels 1-3) as a base case comparison, there was no statistically significant improvement in the likelihood of employment. Finally, less than one-third of low-achievers in school managed to obtain vocational qualifications at level 2 and slightly less at level 3 (25.3 percent of men and 20.6 percent of women). If low-level vocational qualifications do not generally impact on earnings and employment, this may not be all that worrying. This evidence will now be discussed.

As mentioned above, vocational qualifications have been regarded as the preserve of individuals demanding training for a specific career path and also to gain experience on the job. The wage that individuals receive whilst learning the trade is typically low, and this seems to continue into their careers. Some recent research has tested whether the parity of esteem that the NCVQ has been striving for exists. Conlon (2001) uses two different datasets (the NCDS and a pooled sample of the LFS 1993-1998, which contain different variables on family background and personal characteristics) and three estimation techniques (OLS, IV and a Heckman selection equation) and group together all qualifications reported in the surveys into one of the five qualification levels to compare the rate of return to various levels of qualification. This is obviously a rather general classification system and does not allow for variation within qualification levels, but the focus of the research here is on the issue of the parity of esteem of academic and vocational qualifications. It must be noted that there is a slight discrepancy between the NCDS and LFS concerning the classification of some qualifications, but this does not seem to significantly influence the results. Also, the LFS did not begin reporting all held qualifications until 1996 (before then it asked only for the three highest qualifications held), and so there may be some bias concerning the aggregation of 1993-1996 samples and 1996 onwards. A significant earnings differential is found at every level of the classification system with a higher return to academic qualifications, regardless of which estimation method and which dataset is used. Conlon reports a differential of 8-10 percent at low level qualifications and 12-18 percent at higher levels. Various explanations for the differential are proposed; it could be that the parity of esteem does not hold; it may be that individuals with academic qualifications have more opportunity to exploit their human capital in various occupations whereas vocational qualifications are more specific, i.e. skills are more transferable due to the general nature of academic qualifications. Or, that firms perceive vocational qualifications as a noisier signal of productive capacity due to the large number of bodies that can award vocational qualifications and the various ways these qualifications are assessed, despite the overhauling of the system to concentrate the number of institutions that can award qualifications.

Dearden et al. (2002) undertake a similar analysis, also using the NCDS and LFS, and compare post-compulsory academic and vocational qualifications (using the same 1991 sweep of the NCDS, however Dearden et al. use the 1998 LFS whereas Conlon pools data from 1993-1998). However, as Dearden et al. argue, a basic comparison between academic and vocational qualifications at the same level does not take into account the time it takes to complete the various qualifications, and this is particularly important as vocational qualifications typically take less time to complete. When controlling for time taken to complete qualifications – hence, the return can be interpreted as an average return *per year* of attainment – the differential is reduced significantly, with a statistically insignificant difference between some academic and vocational qualifications. This is encouraging for the parity of esteem argument; however caution must be taken in interpreting the results as the estimated time taken for each qualification depends on the calculation of full-time equivalent years (as many vocational qualifications involve both formal learning and work-based experience), so this is only an approximate measure.

Interestingly, Dearden et al. find that vocational qualifications are twice as valuable to low-ability individuals as academic qualifications. This shows the importance of having a coherent, accessible, well-structured system of vocational qualifications in place to provide valuable alternative routes to the academic system in order to promote socio-economic success for lower-ability individuals. Another, perhaps unsurprising, finding, is that the returns to vocational qualifications vary by the type of qualification for men and women; the highest return for men being from HNC, ONC and City and Guilds qualifications, and for women the highest returns are to nursing and teaching qualifications. This reflects the differences in the occupations that men and women are typically employed in.

In the discussion so far it has been assumed that it is clear *how* the information reported in surveys is used as a proxy of human capital. When estimating the returns to education, one essentially has the choice of one of two ways of utilising the education measure; either returns to years of education or returns to actual qualifications. There are issues with both, and these will be discussed briefly.

Returns to years of education is a more general proxy of human capital, and could almost be interpreted as a measure of 'learning experience' in terms of being an all-encompassing measure of the time an individual has spent accumulating human capital. When using years of education to measure human capital accumulation, one assumes that human capital increases linearly with each extra year and, therefore, the average and marginal return to each year of schooling is the same as any other year.

By using qualifications attained as a measure of educational achievement, one allows for returns to differ in a non-linear fashion. The advantage of this is twofold; firstly, it is unlikely that every qualification has the same (marginal) value in the labour market and, if this is so, it is not the case that each year also holds a constant value. Secondly, by estimating returns to various qualifications, one can make comparisons between total returns to education given the various routes an individual may take through the education system (a method which Dearden et al. follow in their comparison of post-compulsory vocational and academic qualifications discussed above). Also, the qualification itself may have a value in the labour market over and above the time it takes to complete it.

One disadvantage with using completed qualifications as a proxy of human capital is that it does not allow for any years of education that do not result in the award of a qualification. One obvious example of this is in the case of a drop-out, i.e. when an individual begins but does not complete a qualification even though s/he may have completed extra years of education, and therefore possibly increasing his/her stock of human capital. Blundell et al. (2000) find some evidence from the National Child Development Study that beginning but failing to complete a Higher Education course results in a 9% pay penalty compared to those who did not begin a course for men (but no significant negative return associated with failure to complete a course for women).

The trends of education participation rates and particularly the sharp increase in state expenditure levels offer evidence of the drive to increase educational attainment. Whether the education system equips individuals with the skills required for labour market will now be examined, as part of a broader discussion of the recent changes to the UK education system, particularly changes in participation in Higher Education. This is followed by a discussion of the concept of skill, and what skills are valuable to employers in the UK and how this may have changed over time given changes in the education system and the nature of the UK economy.

2.3 Reforms and trends in the UK education system

One might expect that the longer an individual stays in the education system, the greater their skill set will be. The attempt to improve staying-on rates in schooling includes an Education Maintenance Allowance for education to age 18, through the Learning and Skills Council, to pay for expenses whilst in education and widening access to university education (or higher education equivalents) through increasing the scope of possible entry requirements. The implementation of a new system for tuition payment[15] for Higher Education, as well as the increase in the compulsory minimum school leaving age to eighteen, aims to ensure all individuals are thoroughly prepared for the labour market when they leave the education system.

The benefit of the Education Maintenance Allowance is highlighted by research that finds that the residual difference in participation rates for staying in post-compulsory education between the top quartile of the income distribution and the bottom three quartiles, once any early family background influence on children's expectations and their taste for education are controlled for at age 16[16], has increased between 1974 and 1986 (Dearden et al. 2004). The authors find that there is no significant change in the differential in participation rates between the top and lower quartiles for completing Higher Education (i.e. university-level qualifications) compared to qualifications immediately below (A-levels and their equivalents). Therefore targeting individuals at age 16 with the Education Maintenance Allowance, rather than targeting potential university entrants, may be a more efficient use of resources for increasing and widening participation.

The target of the Labour government (1997-2010) was to increase participation towards 50%[17] of all individuals aged 18-30 in higher education[18,19], although the enrolment statistics show that the current participation rate has reached a plateau at around 40% for most of the past decade[20]. Given the demographic projections over the

---

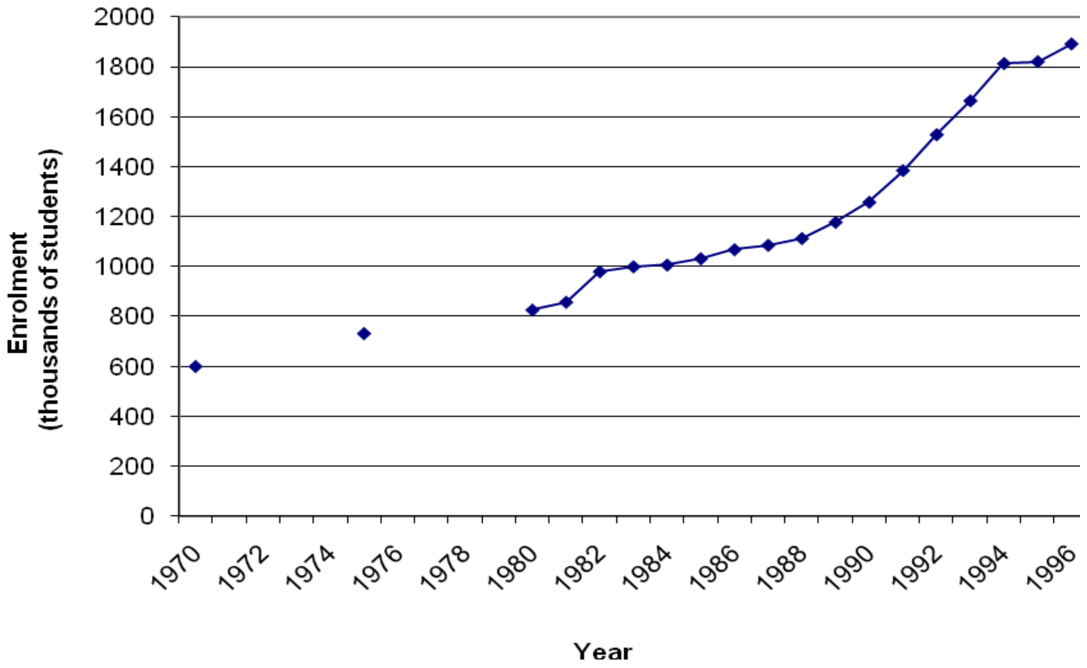
[15] Higher Education Act (2004), and a subsequent increase in tuition fees due in 2012
[16] What the authors term 'short-term credit constraints'.
[17] This includes not just traditional degree qualifications but also 2-year courses such as Foundation Degrees and Higher National Diplomas and Higher National Certificates.
[18] The Future of Higher Education (January 2003), Department for Education and Skills
[19] The participation rate is measured by the Higher Education Initial Participation Rate (HEIPR)
[20]

Academic Year	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07*
Initial entrants (000s)	238	238	244	255	257	261	281	269
HEIPR %	*39*	*40*	*40*	*41*	*40*	*40*	*42*	*40*

next decade or so, the trend in A-level participation rates (individuals with A-levels are the main source of potential university entrants) – particularly the lower participation of males – even when allowing for a new source of potential entrants due to new EU-member states, will not reach the 50% target (Bekhradnia 2006).

Although attempts have been made to increase participation rates, especially from low socio-economic backgrounds, participation in higher education began to increase rather dramatically even before Labour had explicitly set this participation rate target, as depicted in the graph below.

Figure Four: Enrolment in UK Tertiary Education



Source: United Nations Educational, Scientific and Cultural Organisation (UNESCO)

The drive to increase the skill base of the UK workforce has not only focused on improving participation rates in Higher Education, but also on improvements in basic and intermediate skills, as well as 'lifelong learning' (see Layard et al. 1995) whereby individuals are encouraged to improve and update their skills throughout their working lives rather than solely through educational investment and training programmes early on in their careers. The focus on improving and increasing the level

---

* provisional
Source: www.DfES.gov.uk

of educational attainment is founded on the basic premise that the more education individuals acquire, and the more skilled they become, the more productive individuals and hence the UK economy as a whole, will be. However, there have been concerns that whilst levels of attainment have risen, demand for such qualifications may not have increased at the same rate. This could impact in many ways on the economy; firstly, individuals may experience a lower return on their investment through lower wages and this may vary by qualifications, gender, and socio-economic group. Secondly, the continuous investment in education reform and funding by the state could be a waste of resources if these qualifications are not in demand. This will, however, depend not only on the private returns, but on the social returns as well. Thirdly, it may contribute to a skills mismatch in the UK whereby certain sectors fall behind (weakening their competitiveness) whilst other sectors prosper. I will discuss the evidence of all three issues, and considerable attention will be given to the impact of the educational reforms and trends amongst individuals themselves, to which I will now turn.

The trend in participation rates in Higher Education begs the question: what has the increase in the numbers of students whom have participated in Higher Education meant for the return to a university degree and for returns to other qualifications? I will give careful attention to answering this question in Chapter Three, including estimating a returns to education model which may present some evidence of how returns have changed over time, given the increase in participation rates in Higher Education, for these later cohorts.

Part of the answer to this question inevitably lies in the sphere of demand and supply factors that, at least in part, determine the value of a qualification and the value of particular skills in the labour market. The other side of this story rests with two main points: (1) the possible change in the average quality of individuals, and (2) the potentially greater variance in the characteristics and attributes of the individuals that participate in Higher Education and how these characteristics affect an individual's labour market performance. A quantile analysis will be used to examine the variation in returns to qualifications in the UK in Chapter Three.

Some of these characteristics will without doubt be influenced by the lower family income and social environment of the low socioeconomic groups, for example through the social capital one obtains from their early-years environment, which the policy to improve participation rates hopes to address. Family income does affect educational attainment (to be discussed from p64) but other factors may also differ between the past and more recent cohorts that enrol in Higher Education, and these may separately influence the potential returns to education for the individuals from low socio-economic backgrounds, hence reinforcing educational inequality and social immobility. Prior to presenting evidence on this issue, a broad discussion of qualifications, skills, and how the perception and demand for these skills has changed over time will be undertaken.

2.4 The Demand for skills in the labour market

Research has found that there are a significant proportion of adults in the UK that lack basic skills, such as literacy and numeracy. The Moser Report (1999) found that around one in five adults in the UK are functionally illiterate and a larger proportion are innumerate, and this is higher than in many other OECD countries. Across Europe, around 10% of the adult population lack these basic skills (International Adult Literacy Survey, IALS). In the UK, rates of illiteracy and innumeracy are higher amongst older cohorts and this reflects inadequacies in the education system at the time. Although children start compulsory schooling at the age of 5 in the UK (which is relatively early compared to other European countries (Sharp 2002)), the compulsory school leaving age did not reach 16 (the current compulsory school leaving age) until 1972, and until 1947 was just 14 years of age. This is one reason for the higher levels of illiteracy and innumeracy amongst older cohorts. Recent policy changes lead to a drive to improve literacy and numeracy not only for children in school but also for adults who were already well into their working lives.

Following the Moser Report, McIntosh and Vignoles (2001) found that basic skills, particularly numeracy, command a high price in the UK labour market due to the lack of supply of these basic skills, and also have positive effects on employment. There is, however, mixed evidence on what has happened to skill acquisition generally, and its value in the labour market over time. One study investigated whether the price of basic skills has changed by comparing values using data from the 1958 cohort to the 1970 cohort (when each cohort was in their thirties) and hypothesise that any change found would be due to supply effects following the policy changes that were implemented since the Moser Report (Vignoles et al. 2011). The authors find that these skills still hold value in the labour market but their price has decreased over time, and conclude that the policy intended to improve adult literacy skills in the UK was indeed successful. These basic skills do explain a significant part of the determination of earnings at around 10%, although to examine their full value, one would not only have to assess the effects that literacy and numeracy have on employment, but also test for any associated externality effects. These are likely to be present, particularly for numeracy skills.

This reported improvement in the number of people holding basic skills, shown by their lower price in the labour market, is contested by Layard et al (2002) who use three measures of literacy and numeracy, one of which being the IALS tests[21], examining both their value in the labour market and the levels of skills across countries. They find that the situation is not improving among more recent cohorts and if anything more recent cohorts perform worse than older cohorts in basic skills tests (in the US as well as the UK). What is certain is that these skills are important determinants of socio-economic outcomes. McIntosh and Vignoles (2001) find that basic skills are important determinants of both earnings and employment, and so those leaving the education system without these skills are disadvantaged in later life.

It is assumed that a variety of skills that are key for labour market success are acquired through the education system. How these skills, and which skills in particular, affect socio-economic outcomes is obviously of great importance to literature on human capital accumulation, the economics of education and the relevant policy makers designated to improve the performance of the UK economy through the acquisition of skills in the workforce.

There are two main issues concerning the term ‘skill’. Firstly what defines a skill, and secondly, whether its value in the labour market changed over time? Often, the terms skills and qualifications are used interchangeably, but there may be important differences between them when measuring returns to education. A formal qualification awarded by an educational institution may equip an individual with the required knowledge for a particular job; however it is unlikely to give them relevant work experience – which could be used as a measure of skill – or necessarily mean that the individual will have the skills required in a workplace environment to be attractive as a potential employee.

It follows that a qualification is not a perfect measure of an individual’s level of skill or of their productive capacity. Skill is not a one-dimensional characteristic but rather constitutes many factors which may all contribute to productivity, hence labour market success, in a heterogeneous way. At the same time, a qualification may not

[21] The other measures are tests developed by the Basic Skills Agency, and National Curriculum tests.

reflect in an efficient manner the skills an individual has obtained, or reflect the skills a firm may demand. The qualifications and what they entail require constant and continuous reform to mirror the changes that occur in the UK economy if they are to be an effective measure of productive capacity and, therefore, a means through which firms can distinguish between more and less productive individuals.

To answer the first question, namely; what a skill actually *is*, one must consider a wide variety of elements that may have a value in the work place. However, productive (on-the-job) skills are difficult to define and even more difficult to quantify. The skills that individuals have acquired that drive their productive capacity cannot always be directly measured, depending on the task in question. Also, these skills can be cognitive or non-cognitive, and their importance and value to firms and individuals will differ across occupations.

A frequent method of tackling this problem in human capital literature is to use qualifications instead as a proxy for the skills individuals possess and as a measure of their learning ability for future skill development. How effective an individual is in transferring these qualifications to the labour market is likely to differ among individuals. If so, a qualification is therefore likely to be an imperfect measure of the skills an individual possesses. This issue will be raised in detail when I go on to undertake a consideration of different types of skills and behavioural traits and their value in the labour market, but it is worth bearing this issue in mind in what follows. Linked to this is the issue of skills utilisation; how and to what extent an individual uses the skills and qualifications obtained through his/her education in the labour market. Not all individuals fully utilise their skills, particularly early on in their career, and over-education will also be discussed later (p53). In general, the issue of what a skill is or, in other words, which factors or attributes are seen to constitute a skill, hence holding significant value in the labour market, are likely to change over time and therefore the value these skills hold in the labour market is also likely to change over time.

To assess the change in the value of skills over time one must measure the change in demand for skills using rate of return analysis, and then any evidence of changing returns can be used to shape policy. Powdthavee and Vignoles (2006) argue that rates of return analysis can be used to investigate which sectors of the labour market require more investment in people and in their skills, and which sectors require a greater supply of individuals with the appropriate qualifications. If the rate of return to a particular skill or qualification (when used as a proxy for skill) increases compared to other sectors then one could (albeit a quite general statement) say that supply of skills in that area have fallen, and conversely that if it falls then the supply has increased. One must be cautious here as rates of return analysis is inherently backward looking; the authors cite the example of Languages as a particular subject that was pursued by the government as a target area to increase the number of graduates, however by the time the policy took effect the returns to Language-related qualifications had already began to fall. Rate of returns analysis may also be useful to assess the match between supply and demand of vocational qualifications. The authors find that returns to vocational qualifications vary greatly by sector. This is preliminary evidence that using rate of return analysis to investigate the skill needs of particular sectors may be a fruitful way to pursue the research into the value of skills and qualifications as well as implications for policy in a more general context.

Skills have, perhaps surprisingly, not been a substantive issue in economics, at least until the recent research on the economics of education and the expansion of interest in ‘alternative’ measures of human capital (to be discussed on p47). Skills have been more of a concern in the management and sociological literature, inspired by an argument that skill had become degraded through the routine, almost monotonous, single task production-line work that became a feature of the industrialised world in the 20th century (Braverman 1974). To an economist, that is a good thing; increased efficiency and maximisation of profits is accomplished through dividing work in such a way – Adam Smith’s observation of the division of labour in pin manufacture (Smith 1776) being a famous example.

This proposition of the degradation of skill does not strictly seem to be the case however, particularly in recent decades with vastly improving technology aided by IT, and the shift to the dominance of the service sector in the UK, which together has lead to a large increase in the number of managerial, service and technical occupations in the labour market, not only in the UK but in many developed countries.

The Social Change and Economic Life Initiative (SCELI) programme, covering six local labour markets across the UK that experienced contrasting economic change in the mid-late 1980’s, was used to examine the question of skill degradation. Gallie (1994) found evidence of a polarization of skills in the UK, those already in high-skilled jobs benefiting from occupational change and advancement in technology, becoming more skilled, whereas those in low-skilled occupations found little opportunity to enhance their skills through training; rather, the management practice in place increased the control and autonomy over its labour force, and decreased the amount of discretion individuals had in doing their jobs. Skill-biased technological change has been of particular interest to research in the U.S., and has been posited as one of the reasons for the increase in wage inequality in the 1980's and 1990's (Wheeler 2005) and then spread to other countries through the adoption of the same technology (Berman et al. 1998). Agreement on skill-biased technological change as a cause of the rising wage inequality is however, not unanimous. Card and DiNardo (2002) show that U.S. wage inequality stabilised during the 1990's even though technological change was still occurring at a fast pace, and evidence of skill-biased technological change impacting on wage inequality is weak.

The SCELI research found little evidence of deskilling; rather, the evidence pointed towards a situation in which the level of skills had stagnated in lower occupational classes (measured by the Goldthorpe scale), which along with the up-skilling of already higher occupational class workers, lead to the widening differential in skills amongst high- and low-class occupations. The major reason cited for this trend was the growth of the service sector, not because the transition from a manufacturing-based to a service-based economy increased the distribution of skills between the two sectors, but because the varied nature of work in the service sector increased the divide between the skills required in low-skill occupations and high-skill occupations *within* the service sector. Also, the study found evidence of a gender divide in the experience of skill change; women were much less likely to have increased their skills, and the major reason for this was found to be the larger proportion of women found in part-time work, which is typically low-skilled 'front-line' service-based occupations, with little improvement in their skills over time for the reasons argued above. This is supported by Felstead et al. (2004), who find a fourteen percentage point decline in the number of workers reporting they had a great deal of choice in the way they did their jobs, using the 1986 and 2001 National Skills Surveys. A major factor in this was the decline of discretion in tasks for female part-time workers who, as already mentioned, are likely to be in front-line, low occupational class service sector jobs.

Some authors argue that all of this has created a situation in which the UK has been in a 'low skills equilibrium' due to the structure of various institutions which create a vicious circle of the demand and supply of a low-skilled workforce (Finegold and Soskice 1988). However, it has not been empirically proven (see Sloane et al. 2005 for a discussion) although there are some instances where UK qualifications do not provide enough individuals with adequate skills compared to some of their European counterparts. This is particularly apparent for vocational skills (compared to Germany, for example) and the well-publicised deficiencies with the Youth Training Scheme (YTS), which created a situation in which firms employed low-skilled workers, hence paying low wages. Rather than competing on quality, these firms compete on price which acts as a disincentive to invest in training for its workforce, firstly due to the direct costs involved in supplying such training and, secondly, because it would require its higher-skilled workforce to be paid higher wages.

The solution to this problem has been to focus on developing skills through the creation of various government-funded bodies (to be discussed below), encouraging individuals to stay on in education, and the introduction of lifelong learning schemes to improve skills of individuals already well into their careers. One important question that will be addressed in Chapter Three is whether the demand for skills increased considerably, given the increased numbers of UK graduates and the skills shortage in some skilled trades, and whether this has changed the value of various qualifications in the UK labour market over time.

Skill, like human capital in general, is not a one-dimensional characteristic. 'Hard' skills, such as some kind of technical competence, dexterity and other similar traditional skills have, until the recent past, been seen as *the* definition of a skill; being able to perform well at a trade or particular task. These hard skills have become less important over time because of the automated process involved in many production methods and the decline of manufacturing and manual labour. 'Soft' skills – "leadership, motivation, positive attitudes towards change and authority, politeness, compromise and respect"[22] – have recently gained more attention from employers. This may be reflected in an increased return to managerial skills in the labour market. It is not that soft skills have only recently become desirable in the labour market; rather, they have only recently been considered to be skills rather than personal attributes or characteristics. These soft skills, through the dominance of the service sector in the UK, and many other developed economies, seem in recent times to be valued by employers more as *skills* rather than simply as individual characteristics or attributes. Other 'skills' may be motivation, appearance, team-working, problem-solving and other tacit attributes.

[22] Grugulis, I., C. Warhurst, et al. (2004). What's Happening to 'Skill'? The Skills That Matter. C. Warhurst, I. Grugulis and E. Keep. Basingstoke, Palgrave Macmillan.

The service economy is inherently based on intangible skill inputs, such as knowledge and these soft skills, to produce intangible outputs – the service provided. Therefore the demand for management, technical and service skills have been a priority for firms in the UK, as will be evidenced below. These types of skills have become much more important in recent years, as it is the provision of service, and how this service is managed and presented, that allows the firm to be competitive in its sector (Westwood 2004). It may be argued that these soft skills should be developed by the individual throughout the life course and whilst in employment rather than in the education system, as they are not traditional subjects and in the main cannot be assessed by examination or coursework. Whilst soft skills are not singled out for development in the education system specifically – rather they are seen to be developed through participation and interaction – soft skills have become more important in further and higher education. However, there is a case for them having more importance and focus in the curriculum, hence the argument that soft skills should be the responsibility of education institutions. These 'soft' skills and attributes are generic; Grugulis et al. (2004) argue that these competence-based general skills can be utilised in any work environment, hence the development of these skills are now seen to be the responsibility of the education system rather than the firms themselves.

Related to their increased importance, soft skills may frequently be used to differentiate between potential employees that have obtained the same qualification. Considering the massive increase in the number of individuals completing Higher Education, the use of soft skills to differentiate between job applicants may be particularly apparent for graduate-level jobs, especially given that many graduate-level jobs involve 'fast-track' schemes for quick promotion to management level occupations. Managerial and professional vacancies are more likely to use personality tests (Jenkins and Wolf 2002), and since the late 1980's the development and use of these tests has been on the increase (Jenkins 2001) even though they are extremely costly to implement. Jenkins and Wolf (2002) find that firms that provide high levels of off-the-job training are more likely to use selection tests, as are private firms over public sector firms. There is no direct evidence that firms are using tests because of the increased participation in education, however the increase has coincided with the increase in higher education and may, in a small part, have contributed to their increased use. Wolf and Jenkins (2002), in a survey of employers, find that use of tests has increased because of changes in the environment firms are in, decreasing cost of psychometric testing relative to other selection and screening methods, as a defensive ploy in response to legislation and regulation changes and the formalising of human resources departments.

Despite the reforms to the education system already discussed, there seems to be two major problems with skill acquisition in the UK education system, particularly in compulsory schooling. Firstly, as previously mentioned, a significant proportion of the current workforce, particularly older cohorts, lack basic skills such as literacy and numeracy which are the foundation upon which other skills can be developed. Secondly, the education system does not seem to be providing the delivery of and the means for the successful development of intermediate-level soft skills. The 2009 National Employer Skills Survey (published 2010, from here on in referenced as NESS09) is the most recent nation-wide survey of UK employers which attempts to assess the shortages and trends in skills in the UK workforce. The NESS09 reported that across all sectors employers cited skills gaps where customer handling (51%), team-working (50%), oral communication (46%) and problem-solving skills (46%) respectively were not at a proficient level. A skill gap is defined as a situation in which the existing workforce has lower skill levels than necessary to meet the firm's business objectives. Broken down by sector, the survey shows that of all skills gaps cited, 70% of employers in Sales occupations cited employees lacking proficiency in customer care skills; in the Personal Services sector, 55% of employers cited team-working skills as lacking, both higher than the national average. One could not conclude that the lack of proficiency in soft skills is solely due to a failure of the education system; soft skills are not specifically targeted for development per se, but are seen to develop throughout the life course, in part through time spent in schooling. However, as discussed in Chapter Four, the emphasis on the development of soft skills is beginning to change, with business and government putting pressure on universities to ensure these skills are developed; it is of course also important for the universities' attractiveness to new participants as the employability of its graduates is crucial, particularly in the current economic climate.

Of course the measure of these skills gaps is by no means an exact science; it boils down to the perceptions of which skills individuals are perceived to lack by management, and it must be said that not employers do not only identify deficiencies in soft skills – in the skilled trades sector, 75% of skills gaps cited by employers were said to be of a technical and practical nature. This has increased over time; in 2005[23], for example this was 64%, and shows some of the problems regarding shortages in supply

[23] National Employers' Skills Survey 2005 (published 2006).

of workers in skilled trades occupations in the UK. In contrast to the weight of evidence on skills gaps, skill shortages, defined as difficulties recruiting staff with the required skills from the accessible labour market, are more prevalent in high-skill occupations requiring lengthy training. Frogner (2002), in a summary report using data from the 1999 and 2001 Employer Skills Surveys, finds that although only 34 percent of jobs are classified as professional, associate professional and skilled trades, a disproportionate 56 percent of skill shortages were in these occupations. Manufacturing and construction were the prominent skilled trades experiencing skills shortages illustrating, perhaps, the difficulties in matching supply and demand over time. Moreover, the study reports that the attainment of vocational qualifications in traditional subjects such as construction and general and electrical engineering fell in the five years up to 1999. The research also finds that skills shortages result in small increases in wages. This is likely to be due to market forces, with upward pressure on the cost to firms of employing individuals with these skills given the shortage in their supply. This should encourage more individuals to acquire these skills, increasing supply.

Another report (Ruiz 2004) finds that in skilled construction trades and skilled metal trades respectively, 48 percent and 36 percent of vacancies are due to skill shortages, both above national averages. Ruiz also found that there has been an increase in the incidence of firms reporting recruitment difficulties in construction between 2001 and 2002, and the skill shortage is particularly apparent for young workers. One consequence of this current skill shortage was above-average increases in pay in both trades in 2003. Although the report cannot conclusively say this trend is structural rather than temporary, it again highlights a problem of skill shortages in skilled trades, particularly at NVQ Level 3 qualifications, and the evidence points towards future problems given the ageing cohorts of qualified workers. On the supply side, it is reported that workers in these sectors work more overtime than average – at or even more than double the average number of hours of paid overtime in construction and metal trades, across all occupations.

Not only have skills shortages become an interest to policy makers and academic research, it has increasingly become a matter under the spotlight of the media and the sphere of public knowledge. The articles cited are but a very small number of the news reports concerning skilled trades and craft skills and the lack thereof compared to graduates – there has been particular media interest in plumbing and construction, where it seems that some of the excess demand has been met by supply of workers from other countries within the European Union[24]. However, the market forces at work have now re-balanced (and possibly moved to the other end of the scale, with a surge in trainee plumbers far exceeding the required demand[25].

Despite the problems with measuring and precisely defining a 'skills gap' and the inherent problem of different perceptions of the quality of these skills, which will vary across employers and across sectors by the nature of the job in question, this can be seen as a very important issue for the UK labour market. These Skills Surveys are a good indicator of where skills are deficient in the UK workforce, hampering productivity of the firm, and also possibly the UK's competitiveness on an international scale. Westwood (2004) claims that output per worker is 13% higher in Germany and 21% higher in France than in the UK. This is not because of a lack of high-skill workers; he goes on to argue that the UK has a similar number of university graduates as France and Germany, but is lagging behind in the numbers of workers with intermediate-level qualifications and this is the source of the low productivity compared to these internationally comparable economies. This is not a new problem; economic performance has been a long-standing problem in the UK, with the structure of and achievement within the education system at intermediate level (particularly concerning vocational qualifications) a major reason for the low productivity of many sectors of the UK economy compared to Europe and other developed countries (Prais 1993).

The skills identified by the series of National Employer Skills Surveys 1999-2009, along with other research mentioned above, have been recognised by policy makers and various government-funded bodies have been established to investigate the issues concerned, in order to identify mechanisms to increase the supply of these generic skills. Such bodies include the Learning Skills Councils (LSC's), designed to increase the skills of individuals outside of university education but replaced with the

[24] http://news.bbc.co.uk/1/hi/uk/3011439.stm (2003) I Ditched the City for Plumbing. BBC News
http://news.bbc.co.uk/1/hi/programmes/working_lunch/2264169.stm Roan, D. (2002) Time for a Change of Career? BBC News
http://news.bbc.co.uk/1/hi/programmes/file_on_4/6366523.stm (2007) Can We Fix the Skills Shortage? BBC News **Volume**, DOI:
http://news.bbc.co.uk/1/hi/education/6162299.stm Baker, M. (2006) Why Skills Are the New Education. BBC News **Volume**, DOI:
http://www.timesonline.co.uk/tol/news/article831502.ece Carter, K. (2002). Education: Degrees Down the Pan. The Sunday Times. London.
http://property.timesonline.co.uk/tol/life_and_style/property/article1004104.ece Price, J. (2003). For What It's Worth. The Times. London.
http://property.timesonline.co.uk/tol/life_and_style/property/article1181048.ece Brennan, Z. (2002) How To Seduce A Plumber. Times Online **Volume**, DOI:
[25] http://news.bbc.co.uk/1/hi/magazine/6951188.stm
http://www.timesonline.co.uk/tol/news/uk/article717727.ece

Skills Funding Agency and the Young People's Learning Agency in 2009, the National Skills Task Force and the Sector Skills Councils (SSC's) who are charged with ensuring that the UK eliminate the skills gaps, and develop a labour force with good standards in a broad range of skills that will ensure its future international competitiveness.

There is a question mark over the plausibility of these targets however[26], given the low proportion of individuals with basic skills (Payne 2000). Payne argues that the priority should be on improving the skills base so that all individuals have the opportunity to upgrade their skills through the policies implemented via the recommendations made by the LSC's, SSC's and National Skills Task Force. This is particularly important for those who are trapped in low-skill, low-pay jobs which do not offer opportunities for training, through which the improvement of such skills can occur. These basic skills will need to be improved first before any vast improvement in intermediate skills is likely to be seen.

To summarise, the evidence on skills presented above shows that there has been a considerable change in the *demand* for particular skills, partly through the changing nature of the UK economy and partly through policy makers' attempts to ensure the UK remains competitive in terms of productivity. This gives a strong indication that the perception of what constitutes skill has changed over time due to the increased dominance of the service sector over recent decades and the focus of policy to attempt to increase the level of skills held by the UK labour force to maintain and even improve its productivity in a globally competitive environment. This shift to the dominance of the service sector in the UK economy has changed employers' perceptions of skill, with particular attention on soft skills and personal attributes becoming more and more important for individual labour market success.

One problem is the increased skills differential between high and low occupational classes, with far greater opportunities available for individuals to improve skills if they are in a high occupational class. This is likely to exacerbate the pay gap between socioeconomic groups and by gender – particularly for women in part-time employment – and also makes it more difficult for individuals in lower occupational classes to gain the skills required to improve their socio-economic status due to the lack of opportunity for training. There has been an attempt through various bodies to improve the potential for training and skills through widening the access to education and lifelong learning programmes.

[26] Indeed, the LSC's were abolished due to their ineffectiveness, mismanagement and high costs.

Of course, it is not just the demand for skills by employers that is important in ensuring the UK is a competitive economy; what is crucial is that the supply of the same skills is maintained, so the demand for and supply of these skills remains balanced. If demand exceeds supply, there will be a skills gap or skills shortage which may undermine the competitiveness of the UK economy. A skills shortage is distinguished from a skills gap (defined earlier) in that it is the incidence of the stock of potential employees that do not possess the skills required by the firm. The evidence presented above shows the existence of skills shortages in certain sectors, particularly Skilled Trades. These skills are acquired particularly through vocational qualifications.

Alternatively, if the supply of skills outweighs the demand for them because the vast number of reforms used in the attempt to improve the skills of the UK labour-force has been excessive, the state investment and individual investment of the current and future workforce will be wasted and the skills developed will not be utilised. Mavromaras et al. (2007) find that over-skilling is a greater problem in the UK than Australia, and is particularly prominent for degree qualifications. It also incurs a wage penalty in both countries, but again stronger in the UK. Manacorda and Manning (1999) find that the estimated increase in skill mismatch (using a relative measure of skill mismatch - the change in the share of the wage bill to each education group and the proportion of individuals in each education group - to infer changes in the supply and demand of skills in the labour market and compare across countries) in the UK is of such a magnitude that it may be a reasonable explanation for the rising wage inequality in the UK. This may be the case for high-level academic qualifications, particularly those obtained through Higher Education, due to the substantial increases in participation in recent times. This will be examined as part of a more general analysis of how the returns to education have changed over time.

The remainder of the discussion on skills will focus on how the supply of skills interacts with the demand for them through their price, whether the skills the UK labour force holds are fully utilised, and the consequences for returns to qualifications and particular skills in the labour market.

2.5 Utilization of skills

The continuous increase in the levels of educational attainment in the UK over the last few decades, the shift to a service-dominated economy and the changing nature of the demand for skills and the resulting change in the value of skills and qualifications in the labour market has led some researchers to consider the possibility that individuals may be overeducated, i.e. the possibility of an increased incidence of individuals in jobs for which they are overqualified. Over-qualification (also termed over-education, meaning the same thing) here is meant in the sense that individuals have higher qualifications than those required for the job they perform. This may then affect pay, employment and other labour market (and non-market) outcomes. The evidence of the incidence of over-education in the UK will be discussed below.

A related issue is the concept of qualification inflation. The increasing numbers of participants in post-compulsory education and the numerous reforms to the education system in the UK has resulted in more uncertainty over the ability or productive capacity of individuals, given their qualifications. Therefore, employers may increase the required level of education for vacancies to ensure their choice of employee is from a high-quality pool of applicants. Therefore, even if the tasks involved in a particular job remain the same, the required level of education to *get* the job may have increased, resulting in even more workers being defined as over-educated (qualification inflation).

According to human capital theory, an individual is paid his marginal product which is determined by the productive capacity s/he has acquired through increased education (and other human capital investments). Because of this, the concept of over-education (according to human capital theory in a perfect labour market, at least) is meaningless. Each firm would fully utilise the productive capacity of each employee, hence paying them their marginal product.

However, there is evidence to the contrary. There is strong evidence that overeducated individuals experience a pay penalty compared to those similarly qualified in jobs for which their education levels are adequate (Sloane et al. 1999; Dolton and Vignoles 2000; Dolton and Silles 2003). There are two main questions. Firstly, why do firms not fully utilise the skills and productive capacity of its employee, reflected by the level of education obtained? Secondly, from the supply perspective, why would an individual accept a job for which s/he was overeducated, given that there is a pay penalty associated with being employed in a capacity that does not fully utilise their qualifications or skill level? Many factors have been found to affect the likelihood of over-education, and how it is treated in the labour market, however before outlining these factors I will first discuss the three measures of over-education that have been used in the literature. The labels given to each measure are taken from Dolton and Silles (2003).

The first measure is the external assessment measure. This is rather self-explanatory; an expert in occupational titles groups comparable occupations into one of a number of classes. One example of this measure used in datasets, specifically in the United States, is the Dictionary of Occupational Titles (DOT). The advantage of this method is that the measure is objective; however there are disadvantages to this approach. Firstly, the classification of occupations is an expensive and exhaustive process and so it is not continuously updated and may render the classifications inaccurate as the nature of the job changes over time. Also, classifying occupations into groups does not allow for differences between occupations within groups, even though a distribution of qualifications is likely to be required within each occupational class.

The second measure, termed the statistical measure (Verdugo and Verdugo 1989), measures over-education as being one or more standard deviations over the mean level of education in that particular occupation. Conversely, an individual is said to be undereducated if their level of education is one or more standard deviations below the mean. The major advantage of this method is that it reflects changes in the nature of the job in question. However, the choice of the definition for being overeducated (one standard deviation) is arbitrary and by definition there will be some individuals that are over- and under-educated regardless of the extent of the economy's needs. Increasingly, the modal level of education in an occupation is used, rather than the mean, to avoid this problem.

The self assessment measure involves carrying out a survey to ask those in a particular job what qualifications are actually required to do the job in question (not the qualification *required* by the firm to fill that vacancy). This uses information from individuals directly involved in the job which may be more accurate than using an objective 'expert' who has no experience of the job in question, such as the external assessment error. However there may be a response bias associated with self assessment, with individuals possibly masking the actual requirements to protect their own reputation and interests.

These measures have been used to assess the extent of the pay penalty and other outcomes due to over-education, and have also been used to test the predictions of human capital theory. Human capital theory would suggest the reason that surplus education is not paid its marginal product lies in the existence of labour market rigidities. For whatever reason, these rigidities may prevent the firm from utilising the full productive capacity of its employee or prevent the employee from getting a job in which s/he is paid his/her marginal product, or both.

For example, a firm may not have the means to change its work practices to fully utilise the individual's skills straight away, or the presence of the public sector or trade unions may restrict work practices and result in a less competitive environment. There is evidence against the labour market rigidities argument however. Dolton and Vignoles (2000) find no significant difference in the value of being overeducated between the private and public sector and, therefore, claim that the existence of a less competitive environment does not prevent a firm from utilising the productive capacity of its employees, although there is the possibility that this may reflect rigidities that exist in both the private and public sectors. Firm size may also play a crucial role in determining the existence of over-education, as larger firms are likely to direct more resources to the recruitment and screening process to assess the skills of an individual and hence have better information on how to utilise them.

An individual may decide to take a job for which they are overqualified for a number of reasons. High search costs, due to lack of geographical mobility, possibly because of family commitments, or a high debt which may be particular to graduates, may force an individual to take a job they would not otherwise take due to the pressure of loan repayments[27]. The availability of jobs open to an individual will depend on the state of the economy at the time of graduation; if firms are more likely to retain high-skilled workers due to the high training costs involved when employing newly qualified individuals in times of downturns in the economy, then it is likely that more of the vacancies available to recently qualified individuals are lower level jobs, hence making over-education more likely. The recent recession has resulted in such problems for new graduates; the Higher Education Policy Institute reports that the percentage of young unemployed graduates has increased to 14% in 2009 (from 11% in 2008) (Thompson 2010), and the Association of Graduate Recruiters (AGR) show that graduate vacancies have fallen by 6.9% over the past year, with 69 applications per graduate vacancy. The increased competition for jobs has also lead to the majority of firms expecting a minimum of a 2.1 degree classification[28], showing evidence of qualification inflation. Given that the effects of over-education can persist well into an individual's career, the state of the economy at the time of entering the labour market may be an important factor in determining one's career outcomes.

---

[27] With the restructuring of tuition fees and loan payments in 2006/7, this is no longer such an issue as currently, payments start once the individual earns more than £15,000 per year.

[28] From the AGR 2010 Survey, http://www.agr.org.uk/content/Class-of-2010-Faces-Uphill-Struggle-for-Jobs, first accessed 19/08/2010

Another determinant of over-education may be the subject type of the qualification in question, as it may affect the transferability of skills; an individual with vocationally-oriented qualifications is more likely to utilise those skills in his job. A lack of information on the job content may also result in an individual applying for a job which they otherwise would not have, had they full information on the composition and requirements of the vacancy in question (Dolton and Silles 2003). Over-education in first employment results in an estimated 18% pay penalty. This research also finds that OLS estimates the pay penalty in the current job to be 30% but, importantly, due to the endogenous determination of earnings and the type of job, OLS biases the estimates of the pay penalty downwards in the current job and may be up to 87% in a Heckman selection specification – almost three times higher than simple OLS estimation would suggest. Dolton and Vignoles (2000), in another test of human capital theory, examine whether overeducated individuals with better degrees (measured by class of degree) enjoy a significantly higher return to their surplus education than those with lower-class degrees. This should be the case, according to human capital theory, as those with better degrees have more productive capacity. The authors reject the human capital theory in this case also, as there is no significant difference to the surplus education of upper and lower class degrees.

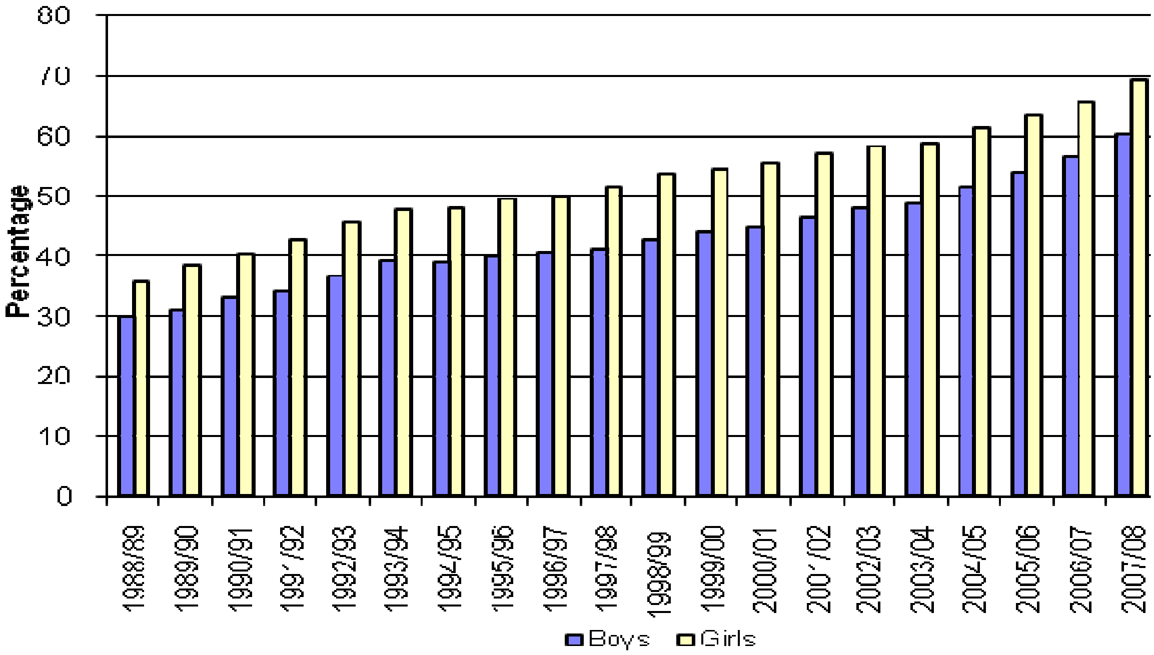
These two studies report high levels of over-education; Dolton and Vignoles (2000) report that from a sample of 1980 graduates, 38 percent were overeducated in their first job, and 30% were still overeducated six years later. Dolton and Silles (2003) find a 52% incidence of over-education in the first job, and 22% of individuals are still over-qualified for the position held six years later. Most of the graduates in their sample, which was designed specifically for the analysis of over-education, graduated in the 1990's. Both of these studies use the self-assessment method. Both studies find that early labour market choices have an effect on later labour market outcomes, particularly in the likelihood of being over-educated later in the career, and suggest this could be due to a signalling effect of lower quality. Dolton and Vignoles conclude that a selection equation, which takes account of the different characteristics of over-educated individuals compared to the total graduate sample, results in an increase in the pay penalty to over-education that has been mentioned above. McGuiness and Bennett (2007) find that males (but not females) with lower ability (proxied by their position in the wage distribution) are more likely to be over-educated. The quality of individuals is one of the many factors that may influence how the increased participation and educational attainment has affected the returns to education in the UK. It is to these factors, and how returns to education may vary by socio-economic groups and such like that I now turn; firstly I will discuss evidence on how educational attainment and consequently returns to education varies by gender.

2.6 Gender differences in achievement and returns to education

There has been a considerable amount of research into the gender gap in returns to education. It is well documented that females earn less than similarly educated males but at the same time the returns to education are higher for females. Much of the research already cited has found the gender gap to be of this order, for example Harmon et al. (2003) finds returns to be 0.13 for males and 0.147 for females. Dearden et al. (2002) find returns to A-Level qualifications are 0.162 for males and 0.192 for females when individuals subsequently obtain further academic qualifications, and returns of 0.131 and 0.171 respectively to A-Levels when subsequent qualifications are vocational. Dougherty (2005) uses U.S. data to study the gender gap in returns to education, and finds that education has a double effect on women; not only does it increase their human capital, but also it reduces differences between males and females in tastes, circumstances and discrimination. It is to this issue I now turn, and will discuss these reasons for the gender pay gap and how it differs across qualifications, beginning with an outline of educational attainment by gender in the UK.

There is a significant gap in male and female educational attainment and this has persisted over time. Females generally perform better than males across most subjects and all levels of schooling, and examples of such differences at various qualification levels are given below. As one can see in Figure 5 below, a higher percentage of females have achieved five or more A* to C grade GCSE's (equivalent to NVQ level 2) and two or more A-Levels (NVQ Level 3). As well as this, there is a higher participation rate of females in Higher Education (Figure 6) – and this gap has increased over recent years – and there are more females than males studying for a qualification in every age group in the 2006 academic year. As one would expect, the percentage of young people studying for a qualification is much higher than for any other group, and generally declines for older cohorts (Figure 7).

Figure Five: Percentage of pupils aged 15 achieving 5 or more grades A* to C at GCSE and equivalent



Source: Department for Children, Schools and Families; Trends in Education and Skills

Figure Six: The Higher Education Initial Participation Rate (HEIPR) to Higher Education Courses by gender

*provisional

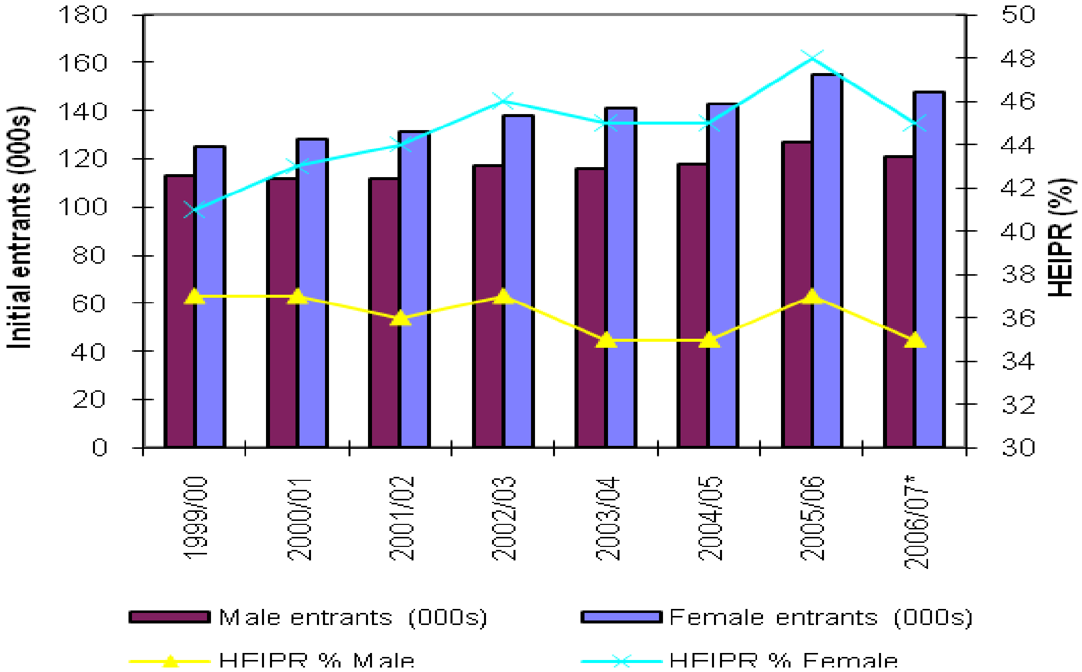
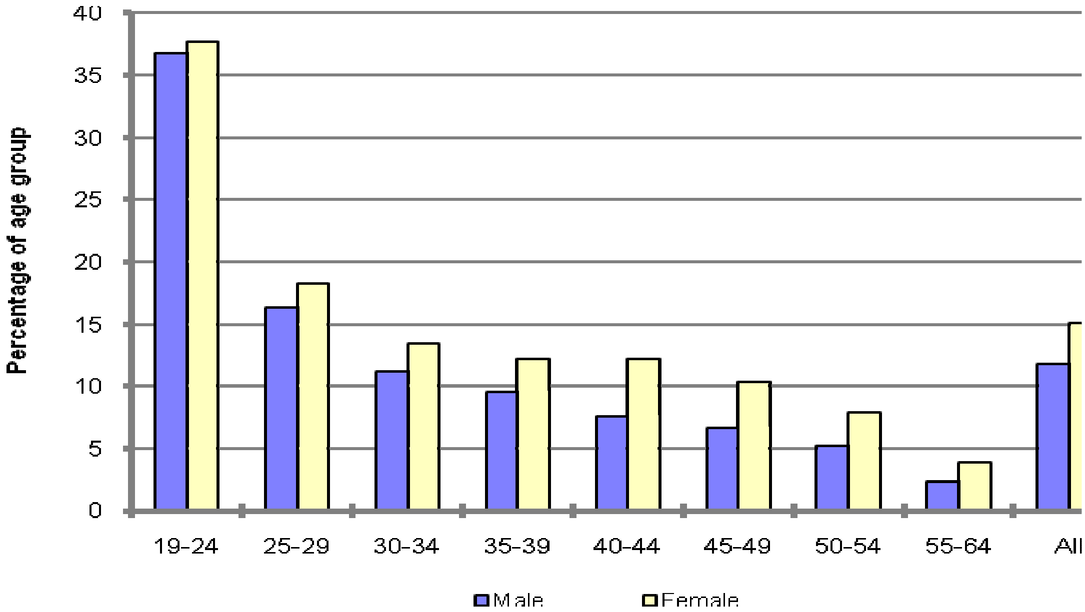


Figure Seven: Percentage of people aged 19-59/64 studying for a qualification by age and gender, England, Quarter 2 2008



Source: Department for Children, Schools and Families; Trends in Education and Skills

Although this differential in attainment is clear, less attention has been paid to the factors that actually cause or explain this gap. It may be that psychological and biological traits differ between males and females and it is these factors that cause the gap in achievement. McNabb et al. (2002) find that male university graduates are more likely to get a first-class degree than female graduates even though females are, on average, more likely to obtain upper-second class degrees. They test many possible reasons for this difference in performance, namely subject area, institutional factors, academic ability and discrimination and find that none of these factors have enough influence to account for the gender gap in performance. This, it is argued, although evidence by elimination rather than through direct findings, is support for a difference in the way that biological and psychological differences impact upon performance. For example, when the mean characteristics of females are entered into the likelihood function for males obtaining firsts, the gender gap in achievement is significantly reduced. Therefore it is not the differences in characteristics of males and females that influence attainment, but the way these differences actually influence attainment that explains the gender gap. One possibility is that males are more risk-taking in examinations, and this may pay off for some males in terms of first-class degrees. This would explain the consistency of the gender gap in attainment across all levels of education and is consistent with other literature that suggests that males perform better in examinations than females.

Machin and McNally (2005) examine the gender gap in compulsory education, specifically at age 11 and 16 (end of primary and secondary school, respectively) and examine whether this has changed over time. Concerning primary education, Machin and McNally show evidence that the introduction of literacy and numeracy hours has led to an improvement in performance and a closing of the gender gap. However, the striking result is that even when controlling for performance at age 11, there has been an increase in the gender gap in attainment at age 16 over time. The increase in the gender gap over time, then, has its origins in secondary school education. Not only this, the authors find that the increasing gender differential in attainment coincided with a major change in policy in the UK – the move from O-Levels to GCSE's as the assessment method at age 16. The essential change was the move to more a coursework-based method of assessment which, it is argued, favours females as they perform better in coursework as opposed to examinations which tend to favour males. This offers some support for the suggestive evidence given by McNabb et al.

The next issue concerning gender is whether the returns to education differ for males and females. This is obviously an important issue and may help to uncover differences in productive capacity, or at least employers' perceptions of productive capacity and attitudes towards males and females in the workplace, discrimination, attitudes to work and differences by gender of what individuals actually gain from experiences in the labour market, in terms of wages and outcomes other than monetary returns to their investment.

As a brief preliminary, I will set the scene of the gender pay gap in the UK and how it has changed over time. One interesting study decomposes changes in the distribution of wages into characteristics, prices and residual effects. The inequality in full-time earnings has increased within both female and male wages over the period 1973-1991 (Blackaby et al. 1997). This is due in part to the distribution of characteristics of individuals changing over time (qualifications and experience being relevant characteristics here), and the value of these characteristics is reflected in the labour market through higher wages. Secondly, the gender wage gap has reduced somewhat over the same period. Blackaby et al. find that it is prices, particularly of qualifications, that have contributed to a fall in the gender-wage gap.

It has been consistently found (the literature to be discussed below are merely a few examples) that the raw gender wage gap favours males, with the gender wage gap in the UK found to be approximately 22% (Swaffield 2000) – i.e. females earn about four-fifths of male earnings – but the returns to education are higher for females. As discussed above, females generally obtain better – and more – human capital than males, so how does this differential arise?

Research has typically focused on the differing returns to education for males and females, differences in starting pay and why these gaps have persisted 30 years after the introduction of equal pay legislation. Particular interest has been paid to the case of graduates, as it has been found that the gender pay gap is somewhat reduced at higher qualification levels. The gender pay gap does still exist however, even very early on in the career, despite that observed individuals are, as such, a more homogenous population and experience and career breaks do not play a role in the observed wage differential.

One possible explanation is that discrimination still persists against females in the labour market but the level of discrimination is reduced at higher levels of education. Females with higher levels of education are less likely to do manual or physical jobs in which males have a distinct advantage and jobs which reward soft skills may be considered to be more ‘female’, and also females with higher levels of investment in education signal to employers that they are career-motivated hence face less discrimination. However, a study on lawyers by McNabb and Wass (2006) finds a large wage differential, with women earning only 56 percent of male earnings, even though the required level of education is rather high. The authors find that much of this differential comes from limited promotion opportunities to partnership level and lower wage growth once promoted, fewer hours worked and less experience.

Much of the research into the gender gap in wages and the returns to education has not focused on discrimination itself but on these other factors that may influence firstly, the gender gap in wages and, secondly, the closing gap at higher levels of education. This is not to say that discrimination does not occur or is not an important issue, but discrimination may only be a small part of the story (at least in terms of pure discrimination, although it may be in terms of other aspects such as promotion opportunity) and is not directly under investigation here, and so I will not discuss the issue in depth.

On the evidence presented above one can safely say that it is not differences in the amount of human capital, the quality of human capital (i.e. attainment) or the ability of females which tends to result in lower pay compared to males (Brown and Corcoran 1997). However, one major factor is the subject area that males and females typically choose when investing in human capital. Males are more likely to obtain qualifications in higher-paying subjects (for example, engineering and mathematics), whilst females typically are more concentrated in Arts/Languages subjects, that are historically associated with lower pay and a higher risk of over-education. In addition, females are more likely to be employed in the public sector. Chevalier (2002) estimates that if men and women with the same observable characteristics chose the same degree, the gender wage gap for graduates would be as small as 1.3 percent, even though the raw gap is between 11-15 percent.. This is some evidence that there is hardly any (pure) discrimination towards female graduates in the UK labour market.

Returning to the graduate labour market pay differential, males are also more likely to aim for careers in which expected earnings are high, and males are more likely to state financial rewards and career prospects as important long-term values whereas females tended more to state being in a socially valuable job as a long-term value (Montmarquette et al. 2002; Chevalier 2006). Also, Chevalier finds evidence of an asymmetry in the types of occupations and their associated returns; for example, it has been found that the pay penalty for working in female-dominated occupations (which are likely to be lower paid than male-dominated occupations) is greater for women than for men.

Another important factor is that women are significantly more likely to take career breaks than men. This has a negative effect on wages, according to human capital theory because the individual stops accumulating skills, and being out of the labour market results in depreciation in the stock of human capital. Interestingly, it is not only career breaks but also the expectation of future career breaks that is important, and this can have an effect on pay through a lower intensity of job search. Also regarding family effects, Napari (2006), using a Finnish dataset, finds that family type (i.e. whether an individual has children or not) is the single most important contributory factor to the gender pay gap, accounting for 40 percent of the average pay gap 11 years after graduation, and is considerably more important than gender differences in characteristics (explaining 27 percent of the gender pay gap). Family type affects men and women asymmetrically, with women penalised more for having children than men are, evident through a significant negative effect on starting pay. Napari finds that the reason for this pay penalty for females is because they are likely to work less than men in the immediate years after a period of childbirth, shown through a large increase in the gender pay gap in the years between childbirths, but remaining stable or even decreasing after the last child is born.

The fact that women know they will be penalised for taking career breaks, hence receive a lower return to their investment in human capital, may result in women setting a lower reservation wage and searching less intensely for a job than, in all other respects, a similar man. This would explain why the expectation of future career breaks has an associated negative effect on pay and why women may enter typically female jobs (i.e. a self-fulfilling prophecy emerges) rather than 'male' dominated jobs which offer substantially higher wages, given that women with higher education have characteristics and career aspirations closer to those of men, compared to women with less human capital (Vella 1994). Also, women may choose degree subjects and enter occupations where skill depreciation is less of a risk when they expect to have future career breaks.

In summary, then, there are many potential reasons why, even when controlling for characteristics and educational attainment, females may receive lower average wages than males. This then translates into a higher return to education for females because females with more career-motivated aspirations and 'male-like' characteristics, for example ambition, (Dougherty 2003), more intense job search and possibly higher ability to pay for childcare because of a higher potential return to their human capital, result in better educated females being more likely to fully utilise their skills. Recent research by Booth (2009) has broken new ground in this field; her experimental evidence shows that females educated in all-girl schools are closer in terms of desire for competition to men than females educated in coeducational schools. This implies that these females are more likely to compete with men for promotion in firms, but also that these characteristics are not necessarily innate, but can be shaped by one's environment.

2.7 Intergenerational (im)mobility

Education is regarded as a transmission mechanism through which intergenerational mobility can be achieved because of the increasing returns to education. It is not the only mechanism through which intergenerational mobility occurs, but it is likely to be the one of the most significant.[29] Bowles and Gintis (2002), in a detailed meta-analysis (mainly of US data) attempt to find the full intergenerational

[29] Other examples of transmission mechanisms could be race, health, inheritance of wealth, social networks and such like.

correlation coefficient (i.e. correlation between outcomes of parents and their siblings) by summing the direct and indirect effects of education. The authors find, as they hypothesise, that education is likely to influence mobility both directly and as a medium through which other factors operate. Their findings show that genetic and environmental (the political environment which affects attitudes to race and discrimination, for example) inheritance – but not, it must be said, the inheritance of IQ – have a significant effect on mobility over and above the direct effect that parents' status has on the status of their offspring, as does schooling, wealth and in a small part, personality.

Dearden et al. (1997), using the NCDS, find that there is limited social mobility in Britain, reporting a regression coefficient of around 0.5 (where a coefficient of one would mean complete immobility and all individuals have the same socio-economic status at their parents). Widening access to Higher Education for low socio-economic groups is one possible method to attempt to improve the opportunities available so that individuals are able reach their full economic potential, whatever their background, family wealth and attributes.

Contrary to expectations, the increase in participation in Higher Education actually reinforced and increased educational inequality throughout the period in which participation increased. This is a somewhat surprising result but the educational inequality could in part be due to the persistence of intergenerational immobility. Blanden and Gregg (2004) find that a pure income effect still significantly affects educational attainment; a reduction in income increases the likelihood of finishing schooling at the compulsory leaving age with poor qualifications and reduces the likelihood of completing Higher Education.

Machin and Vignoles (2005) found that between three cohorts born in 1958, 1970 and 1980[30], staying-on rates in Higher Education rose fastest for those from high-income backgrounds between the earliest and intermediate cohorts, and then fell for the latter, but not quite reverting to the distribution in participation rates found for the earliest cohort. In a separate paper using the same datasets, they (Machin and Vignoles 2004) also find that an individual's labour market success is more closely related to parents' income in the BCS compared to the NCDS, and ability became a weaker predictor of educational achievement over this time period.

[30] Using data from the National Child Development Survey (NCDS), the British Cohort Study (BCS) and the British Household Panel Survey (BHPS), respectively.

The evidence for the fall in intergenerational mobility, despite the increased enrolment in Higher Education, is strong. To examine how, or through what mechanisms, the low social mobility has persisted given the upwards trend in participation rates, one must go further. Blanden et al. (2007), decomposes the measure of intergenerational mobility to examine the effects that cognitive and non-cognitive skills have, both directly and indirectly through educational attainment. Using the NCDS and BCS, the results show that cognitive and non-cognitive skills (though their main effect is through educational attainment) do have an independent effect on intergenerational mobility for the 1970 (BCS) cohort. More strikingly, Blanden et al. find that the role of non-cognitive variables are strongly associated with parental variables in the BCS but not so in the NCDS. This indicates then, that non-cognitive skills are important traits for shaping the economic outcomes for the later cohort but not for the earlier cohort. This supports the claim made earlier that the value of skills in the labour market may have changed over time. Therefore one must consider the possibility that the combined effect of the changing demand for skills and educational reform has resulted in less social mobility. There has been a shift in employer needs due to the nature of the service economy that has prospered in the UK and the educational reform has meant soft skills are used more frequently to distinguish between potential employees, and so these characteristics have become an increasingly important factor in shaping economic outcomes over time. The soft skills now in demand by firms are more likely to be inherited than to have been developed in school.

Personality has been found to be another significant factor in determining social mobility. Osborne Groves (2005) uses a father-sons dataset in the United States (the National Longitudinal Surveys) and conclude that personality, measured by the Rotter score[31], is a significant mechanism. When controlling for traditional human capital variables (education, cognitive performance, and tenure) personality reduces the unexplained proportion of income persistence by four percentage points. Moreover, about 11% of the correlation between a father's and son's earnings is explained by personality traits. This constitutes about a quarter of the total explained correlation in income persistence. This shows that personality is indeed an important factor in explaining intergenerational mobility.

[31] The Rotter scoring system involves questioning participants about their opinions on their locus of control. It is one of the most widely used personality tests in sociological and economic research, and will be discussed in more detail later.

As already discussed, non-cognitive soft skills (and specific cognitive skills) are becoming increasingly more important in the labour market. Therefore if these skills are affected by parental income and the family environment, this has repercussions for the labour market prospects of those individuals from low socio-economic backgrounds. Not only do these skills affect educational attainment, which is a driving factor in intergenerational mobility and socio-economic success, but they also have a value per se in the labour market. As a consequence individuals from low socioeconomic backgrounds are disadvantaged further due to the (lack of) development of these skills in childhood, in and outside of education. I will argue that one of the reasons that non-cognitive skills in particular have become more important as a determinant of labour market outcomes, particularly for individuals whom have obtained Higher Education, is because of the increase in participation rates. This has resulted in an increased frequency of individuals with the same qualifications – particularly degree-level qualifications – and has increased the competition for jobs. Firms are, therefore, likely to use soft skills as a way of distinguishing between candidates, hence increasing their value in the labour market. One may then argue that the fall in intergenerational mobility has not only coincided with an increase in participation in post-compulsory schooling, particularly participation in Higher Education, but has in some part been *caused* by the increased number of students in post-compulsory education.

2.8 Have returns to education changed over time?

As already discussed, the issue of whether the return to particular qualifications has changed over time depends, to an extent, on the demand for those skills in the UK labour market. Therefore the increase in participation rates in Higher Education may have resulted in decreasing returns to degree-level qualifications *if* there has not been an accompanying increase in demand. Put in a more general context, there may have been a fall in the return to academic qualifications over recent decades because of the many reforms to the education system that have encouraged higher attainment.

It is also possible that the increased participation may have widened the distribution of ability in post-compulsory education and this may play an important role in determining the (average) rate of return. This may vary by subject area, socio-economic group and ability, and the role these characteristics play in determining the returns to education may also have changed over time. Furthermore, the fact that some graduates are employed in jobs for which they are over-educated may result in a lower average return to education across the population.

Increased participation in the education system may also have had knock-on effects on the returns to other qualifications. If a higher proportion of young people are now staying on in education compared to earlier cohorts, this must mean that a smaller proportion of people are entering the labour market at a younger age and learning their trade on-the-job. As reported above, there has been a skill shortage in some skilled trades and also a relatively low number of individuals obtaining vocational qualifications. Therefore if there has not been a significant fall in demand for these vocational qualifications and the skills they promote (or at least a fall in demand not as large as the fall in the flow of individuals with these skills into the labour market), then the returns to vocational qualifications may increase. The mixed evidence on returns to qualifications is now reviewed,

O'Leary and Sloane (2005) examine the returns to graduates in comparison with the returns to those whose highest qualification is two or more A-levels, using the LFS. The main finding is that median returns have fallen for female graduates (using those females whom obtained two or more A-levels as the control group) between 1993 and 2003 but have remained relatively stable for males, and when broken down by income quartile it seems that the most significant downward trend has been for those in the lowest income quartile. The other important finding is that the decline is concentrated in certain subject areas, particularly Arts-based degrees, whereas no such decline has been experienced by those with Science-based degrees. This is in line with work cited earlier which found a decline in the return to Language degrees (Powdthavee and Vignoles 2006) and the over-education literature.

Another issue that the authors attempt to establish is whether this decline has been due to supply or demand factors. Using the change in the number of graduates as a proportion of the total stock of graduates in each subject area as a measure of changes in supply, and the number of unemployed graduates in each subject area as a demand measure, the authors find that it is the increased supply that has resulted in the falling return to graduates; although demand has risen, it has not risen as sharply as supply.

McIntosh (2004) creates pseudo cohorts[32] to explore changes in returns over time, whether returns vary by the private or public sector, returns by age group and returns to the marginal student. Firstly, McIntosh finds that returns to academic

[32] Linking together successive cross-sectional data by age

qualifications are higher than comparative vocational qualifications, with returns differing by subject area by gender, and some (lower level) vocational qualifications yield no significant increase in returns. However in contrast to most research in the field, he finds that returns for males and females are similar. Of primary interest here is whether returns have changed over time. Although it is a relatively short time period used in the analysis, it is found that returns are generally within 1-2 percentage points in 2002 of the values in 1996[33]. This result is the same whether qualifications are academic or vocational in nature. One interesting finding is that for females, low-level leaving-age school qualifications (GCSE's at grade D or below), whilst valued (albeit a relatively small, yet significant, return of 6.6 percent in 1996) in the labour market in the earlier years in the study, have declined to zero (i.e. no statistically significant returns) over the late 1990s.

One other finding of note is that returns to the marginal learner, here estimated as returns to a qualification for those who leave compulsory schooling with no qualifications, seem to be significantly positive for vocational routes (at least level 2 and 3 qualifications), and differ by subject for males and females. This, again, is in line with previous research. Also for individuals who obtain A-levels, the only extra qualification of worth is a degree. Vocational qualifications (at levels 2 and 3) do not yield a significant positive return to individuals who have also obtained A-Levels qualifications. Hence, these vocational qualifications are substitutes for, not complements to, A-Levels. The policy implication here is that although one is able to move between academic and vocational qualifications, this may not be of worth to learners whom have obtained post-compulsory qualifications.

The above evidence shows that there is conflicting evidence on how the returns to qualifications have changed over time. I will now discuss possible issues with the above evidence, which leads to an area of interest of this thesis.

Firstly, one must remember that any study of returns to education is inherently backward looking. Any evidence for the decline in returns, or indeed lack of it, can only be seen as suggestive for any other cohort. Any evidence that shows, for example, a return to degree level qualifications comparable to previous cohorts (so there is no evidence of a decline in returns) cannot be used as evidence of *ex ante* steady returns for current university participants. The full effect of education on the most recent cohort's

[33] McIntosh does go back to 1993, however for the years 1993-1995 only highest qualifications are reported in the LFS. Although these earlier years do not seem to affect the results when included in the analysis in terms of the there being no change in the conclusion that returns have not declined, I only report results from 1996 for consistency.

earnings, employment and other socioeconomic outcomes will not be fully identified until those individuals are well into their careers. Also, what is important for measuring the supply of graduates is not the total stock of individuals with these qualifications in the labour force, but the flow of individuals with these qualifications into the labour market and their associated socio-economic outcomes. For the very recent graduates, then, one could not determine the value of their Higher Education until those individuals are ten or more years into their careers. Of course, given the increased participation in Higher Education, any suggestion of falling returns to Higher Education from these earlier cohorts must be taken seriously.

Those individuals tracked by the 1958 National Child Development Study are much less likely to be over-educated than more recent cohorts as they completed their education before the increased participation and attainment of qualifications (and as discussed above, over-education brings about a pay penalty compared to those who are in a job that fully utilises their education), and also will have gained experience and completed training that increases their human capital stock – and may be seen as a substitute for education – and therefore these factors will become more important in determining earnings as individuals progress through their careers. This cohort may now be too advanced in their careers, and the nature of participation and attainment in the education system vastly different, to hold much value for recent cohorts. At the same time, due to the nature of age-earnings profiles increasing as individuals develop their careers and gain more experience, one could not use a young cohort of individuals (or a pseudo-cohort or cross-section) to compare the full effects of their education on earnings and life outcomes. This means that one could not accurately claim any change in the returns to education that may be found is due to the changes experienced in the UK education system or the increased attainment at higher levels of education.

I would argue that the 1970 British Cohort Study provides the most recent cohort of individuals (for which such data is available) that may accurately provide any evidence of changes in the returns to education in the UK. These individuals would have left the education system in the mid-1980s (if individuals left at compulsory school leaving age) through to the early 1990s (if continuing to further education and university). Although this cohort may form part of the increased participation in higher education, the sharp increase in the flow of graduates did not occur until the 1990s. Therefore, it may be that the full effect of the reforms to the education system and increased attainment and participation has not yet been felt[34]; it is likely that that the cohorts who have recently left or are presently leaving further education will be most affected by the changes and trends previously discussed. Therefore any evidence of changes in the returns to education for the 1970 cohort may only be the beginning of a decline in the returns to education and would have implications for policy and for those individuals participating in further education.

There may however be another effect pulling in the opposite direction. Skill-biased technological change may have decreased the risk of over-education and been one possible reason for the increases in demand for more skilled individuals. Skill-biased technological change favours those individuals with more skills (or potential for skill development). It has been found by Gottschalk and Hansen (2003), using the U.S. Current Population Survey, that skill-biased technological change has actually resulted in a *decline* in the proportion of college-educated workers (equivalent to a university-educated worker in the U.K.) in non-college jobs. Skill-biased technological change has also been offered as one explanation for the rising wage inequality, particularly in the U.S., during the 1980s and 1990s, and as mentioned above it is claimed to be pervasive, with other economies taking up similar technology. This also, then, has an effect on wages of skilled workers, preventing a decline in the returns to education. Skill-biased technological change may particularly affect technical, managerial and professional occupations due to the development and progress of computing technologies, and so it is likely to affect individuals who have participated in further education due to the nature of the types of jobs highly educated individuals typically enter.

A related issue is the possibility that over-education and qualification inflation may lead to crowding out (also termed ‘bumping down’ in the literature) which may mask any decline in the returns to qualifications, particularly higher-level qualifications. With a given number of vacancies and an over-supply of individuals with high-level qualifications, for example degrees, firms are likely to want to employ the individual with the highest level of human capital for a given wage rate. Some individuals will accept jobs for which they are over-qualified – perhaps to ensure transition from education into the labour market. In such circumstances, there is a job match for a vacancy in which the resulting stock of the individual is higher than required. Aggregating this across the labour market, then, those individuals with just sufficient stock of human capital are likely to be crowded out by these higher skilled workers,

[34] Indeed, some of the reforms previously discussed were not implemented until sometime after the 1970 cohort had finished their education.

forcing them into jobs for which they are over-qualified and so on, until the lowest skilled workers are possibly forced into unemployment. As shown in the literature, over-educated workers experience a pay penalty compared to those adequately educated for the job requirements at a given level of education. Therefore, the bumping down of workers given their level of education will lead to a pay penalty for them also. This may obscure some of the decline in returns to education in recent times because the comparison group (i.e. in a specification stating all levels of qualifications, the next level down in the NCVQ framework) may also have experienced bumping down and are over-educated. An apparent decline in returns to education across the board may actually reflect a vicious cycle of over-education.

Battu and Sloane (2000) do not test directly for the bumping down hypothesis, but they do find that the median level of occupational prestige (measured by the Goldthorpe Scale) has fallen for most education levels. Further support for the bumping down hypothesis is given by Nicaise (2000) who finds that, when allowing wages and employment status to be simultaneously determined, selection into employment has a negative effect on observed wages. This, argues the author, lends support for bumping down as these observed wages are below potential wages with full employment given their level of education and so this may be due to over-educated individuals escaping unemployment, hence bumping down lower-qualified individuals. However, neither Battu and Sloane or Nicaise find evidence of the lowest qualified workers being forced into unemployment.

In summary, then, there are many key factors in determining the returns to education, however the role of skills and personal attributes as yet are not fully understood. Given their increasing importance, they should be considered when analysing the variation in wages in the UK. The focus of this research is the extent to which the skills an individual has obtained are in demand by firms, once the individual completes their education. To what extent do individuals use the skills they have acquired in their employment, once they have finished their education? The demand for labour obviously depends on the state of the economy, its point in the business cycle, the relative performance of that particular sector and so on. However, it also depends on the flow of skills into and out of the firm/sector at the time the individual is engaging in labour search. However, the increase in participation rates in Higher Education must surely be a particular point of stress on the supply for skills and this may be reflected in a falling return to higher education. There has been considerable research into the utilisation of skills, over-education and its effects, particularly on university graduates, in the UK labour market. The increased numbers of graduates, particularly graduates from low socio-economic groups, may have affected the flow of skills into other occupations too, particularly vocationally-oriented trades through vocational qualifications and training programmes.

Until recently, individuals with low educational attainment, low socio-economic status or low incomes – which are all connected – would be likely to switch from education to employment at a relatively young age and acquire specific skills on-the-job, as low ability and income is always seen to be a constraint. This need not be the case now, with financial incentives such as the Education Maintenance Allowance, the recent restructuring of student loans for university education and the increased access to universities through the upgrading of technical colleges to university status, which typically have lower entry requirements than traditional universities. One aim of this research is to assess whether the returns to academic qualifications have fallen over time, particularly to qualifications obtained through Higher Education, and whether the returns to vocational qualifications have increased.

As well as the possibility that returns to education has changed over time, there may also have been changes in the value of particular skills in the labour market. I will review the evidence suggesting that cognitive and non-cognitive skills affect economic outcomes for more recent cohorts.

The expansion of research on the determinants of income persistence across generations, earnings and other socio-economic outcomes to take account of behavioural traits (as ‘skill’) is an attempt to explain more of the variance in outcomes across individuals. The literature on the economics of education finds that the long-established econometric specifications do not hold much power in the sense that, typically, only one-fifth to one-third of the variation in earnings is explained by education and the usual control variables (family background, ability, experience/age, firm size, occupational status and so on). It is therefore crucial that more research is undertaken to determine what other major factors drive the variation in earnings between individuals, and as a result potentially assist in shaping policy to improve the opportunity for social mobility for all individuals.

2.9 Behavioural traits and personality

Behavioural traits are a likely influence upon socioeconomic outcomes and recent research has attempted to bridge the gap between economic, sociological and psychological literature in order to give a more rounded picture of earnings and life outcomes. The theoretical modelling of behavioural traits as determinants of earnings is still in its infancy but important contributions have already been made. At its heart, one early study suggests, should be the differences in workers' ability to capture disequilibrium rents in the labour market due to personality differences (Bowles et al. 2001).

There has been some research on behavioural traits as a determinant of socio-economic outcomes, although it is limited due to the relatively small number of datasets that provide a reliable and varied set of personality measures. The most frequently collected data on personality are the Rotter score which measures the locus of control individuals feel they have in their life, and the 'Big Five' personality measure. The Rotter scale asks a number of questions and higher scores reflect that the individual is externalistic and feels that luck or fate or impact on life outcomes and success and achievement, as opposed to skill, hard work and effort (Rotter 1966). This personal efficacy measure has been found frequently to impact on earnings.

Nyhus and Pons (2005) use Extraversion, Agreeableness, Conscientiousness, Emotional stability and Autonomy as their five personality measures, and hypothesise the effect that each may have on job performance and labour market rewards. This research aims to measure the effect of psychological capital on earnings, and find that, as mentioned earlier, the effect of these personality traits varies by occupation, gender (possibly because of the occupational segregation by gender as discussed, p64) and also found interaction effects between education and personality.

Personality may be endogenous to wages, and to deal with this Osborne Groves (2005) uses personality measured at age 11 as an instrument (i.e. a measure unaffected by labour market experience) and child Rotter score as an instrument for adult Rotter score to control for this, in the National Longitudinal Survey for Young Women (NLSYW) and NCDS for the US and UK respectively, and find that personality traits (and locus of control) have a significant impact on wage determination in female-only samples.

The literature has found other determinants of socioeconomic outcomes but as there are not of direct interest here they will be only very briefly mentioned. Such determinants include birth order on schooling and wages (Behrman and Taubman 1986; Black et al. 2005) which poses that preferences for children and hence the financing of their education depends on the order of birth, social networks on paid employment for women (Stoloff et al. 1999), child mobility – although this is much contested (see Machin et al. 2006) – and regional variations in skills (Jenkins and Wolf 2004). Important from the perspective of this thesis, Jenkins and Wolf find that skill levels do vary by region, however which regions prosper and the extent of this variation depends on the definition of skills used[35]. This variation in regional skill levels impact on economic performance and so on training provided by firms and human capital accumulation from the perspective of individuals. This may then influence the educational choices of individuals given the state of the labour market and the opportunities available for employment and the potential returns to their education.

2.10 Education and non-market outcomes

Measuring returns to education purely in terms of wages, one is implicitly assuming that there are no non-pecuniary returns or social returns to education for those individuals investing in human capital. Some passing evidence has been given on social returns, but it is non-pecuniary returns that are of interest in this research. Such returns could be the likelihood of employment or a shorter duration of unemployment, individual health, some kind of social capital and well-being effects because of job satisfaction. The literature on non-monetary returns is discussed in Chapter Five, which attempts to examine a wide range of non-monetary returns for one cohort of individuals, exploiting the time dimension of the survey to control for individual differences in personality and efficacy, which as discussed above, may be very important in determining outcomes.

[35] Jenkins and Wolf use two datasets, the National Child Development Survey and the 1998 Workplace Employee Relations Survey (WERS); in relation to the NCDS, the authors warn that the results must be taken with caution given the sample sizes and the extent of the variation in regional skill levels that remained unexplained. The WERS provides a larger sample size and more robust results, with participation in training highest in the North East, London and East and lowest in the West Midlands and Yorkshire/Humberside.

2.11 Data considerations

There are various types of datasets used to analyse returns to education in the economics literature, namely cross-section, pseudo-cohorts and longitudinal panel data. There are advantages and disadvantages in using each of the various datasets, and the estimation strategy one is able to adopt will depend on the type of dataset used. Cross-section datasets typically contain information on a large number of individuals, hence giving a large sample size, and are representative national surveys. The disadvantage with such a survey is that it does not follow individuals over any substantial time period (for example, the Labour Force Survey follows individuals for just 5 successive quarters, and even then in only one quarter is information on income given). The 1970 British Cohort Study provides the most recent longitudinal data for this type of study, which might be used to explore returns to education. In regards to vocational training, the British Cohort Study provides information on the first cohort to experience the changes to the vocational qualifications system, namely the organisation of vocational qualifications under the National Council for Vocational Qualifications (NCVQ), which was established in 1986. However, one must consider other types of dataset to ensure a reliable and accurate set of results.

Longitudinal surveys follow one cohort of individuals born in one week of a particular year throughout their lifetime, and so allow the researcher the opportunity to use far greater detail on individuals, for example ability test scores, characteristics and family background – which have already been discussed as being important in accurately measuring returns to education – as well as attitudes, beliefs and values and the development of social capital and family life as individuals get older. This means that such a dataset can be used to examine both monetary and non-monetary returns at the same point in time, which is not possible with other types of data.

However, longitudinal survey data has its associated problems. Firstly, datasets are much smaller than cross-sections (the Labour Force Survey has a sample size of approximately 60,000 compared to a typical sample size of an initial longitudinal survey of around 15-20,000), and this typically declines over time because of difficulties in tracking individuals as they relocate and also the effort required by individuals may be off-putting when repeated over time. Also, due to the extensive effort required when designing and implementing new sweeps of a longitudinal survey, the full sweeps are not completed annually but over a rather longer period of time (although a random sub-sample may be surveyed more frequently). The sweeps of these surveys are, however, designed to be carried out at important points in the life-course. For example, the full sweeps of the 1970 British Cohort Study have thus far been undertaken at birth and then 5, 10, 16, 26, 29/30 and 34 years of age[36], ensuring coverage of individuals' transitions from birth through childhood, schooling, through adulthood and education to work and, most recently, relationships and health.

Pseudo-cohorts use successive sweeps of nationally representative cross-section surveys and are created by extracting individuals with increasing ages across successive samples and then pooling the subsamples together. The resulting data may be treated as one longitudinal survey. As longitudinal surveys generally are not conducted on an annual basis, this method of creating pseudo cohorts is one possible way of eliminating recall error (which is roughly equal to ability bias) whilst observing a (representative) cross-section across time. However, caution must be taken when inferring that the distribution of characteristics, family background, ability, and so on are the same across each cross-section. A longitudinal survey may provide a more reliable dataset for analysing whether returns to education have changed over time; simply by comparing a recent cohort with results from a previous cohort one can eliminate any change in returns due to the changing distribution of ability, socio-economic status and family background.

[36] Along with four sub-samples, for which surveys were carried out at 22 months, 42 months (which both consisted of all twins, small babies, post-mature babies and a 10% random sample), 7 years (consisting of traced non-respondents from the 5-year survey) and 21 years of age (a 10% random sample).

Bibliography

Association of Graduate Recruiters Survey Report, “Class of 2010 Face Uphill Struggle for Jobs”, http://www.agr.org.uk/content/Class-of-2010-Faces-Uphill-Struggle-for-Jobs, first accessed 10th October 2010

"Department for Education and Skills." from www.dfes.gov.uk. Key Stages.

(2008), "Education and Skills Act", Department for Education and Skills, http://www.dcsf.gov.uk/educationandskills.

(2003), "I Ditched the City for Plumbing". BBC News, http://news.bbc.co.uk/1/hi/uk/3011439.stm first accessed 10/09/2006.

(2004), "Schools in England". Statistics of Education, Department for Education and Skills.

(2005), "Participation Rates in Higher Education: Academic Years 1999/2000-2003/04". D. f. E. a. Skills.

(2006), "Life beyond pay - Work-life balance." Economist **379**(8482): 73-74.

(2006), "National Employers Skills Survey 2005: Main Report", Learning and Skills Council.

(2006) NGSA News Release.

(2006), "Why Skills Are the New Education". BBC News, 9th December, http://news.bbc.co.uk/1/hi/education/6162299.stm first accessed 10/09/2006.

(2006), "Work Dries up for City Boys Lured to Plumbing", The Times January 23rd 2006, http://www.timesonline.co.uk/tol/news/uk/article717727.ece, first accessed 20/09/2010.

(2007), "Can We Fix the Skills Shortage?" BBC News.

(2007), "Why are Plumbers Always in Demand?" BBC News Magazine, http://news.bbc.co.uk/1/hi/magazine/6951188.stm, first accessed 20/09/2010.

(2002), "Education: Degrees Down the Pan". The Sunday Times. London, published 17th November 2002.

Angrist, J. and A. Krueger (1991), "Does Compulsory School Attendance Affect Schooling and Earnings?", *The Quarterly Journal of Economics*, vol. 106 no. 4, 979-1014.

Ashenfelter, O., C. Harmon & H. Oosterbeek (1999), "A Review of Estimates of the Schooling/Earnings Relationship, with Tests for Publication Bias." *Labour Economics*, 6 4: 453-70.

Ball, S., C. Eckel, P. Grossman & W. Zane (2001), "Status in Markets." *The Quarterly Journal of Economics* 116(1): 161-188.

Barro, R. J. and X. Sala-i-Martin (2004), "Macroeconomic Growth", MIT Press.

Battu, H. and P. J. Sloane (2000), "Overeducation and Crowding Out in Britain. The Overeducated Worker? The Economics of Skill Utilization". L. Borghans and A. De Grip, Edward Elgar**:** 157-174.

Becker, G. (1975), "Human Capital: A Theoretical Analysis, With Special Reference to Education". New York, National Bureau of Economic Research.

Behrman, J. R. and P. Taubman (1986), "Birth Order, Schooling and Earnings." *Journal of Labour Economics* 4(3): S121-S145.

Bekhradnia, B. (2006), "Demand for Higher Education to 2020", Higher Education Policy Institute.

Ben-Porath, Y. (1967), "The Production of Human Capital and the Life Cycle of Earnings." *The Journal of Political Economy* 75(4): 352-365.

Berman, E., J. Bound & S. Machin (1998), "Implications of Skill-Biased Technological Change: International Evidence." *The Quarterly Journal of Economics* 113(4): 1245-1279.

Bjorklund, A. and C. Kjellstrom (2002), "Estimating the Return to Investments in Education: How Useful is the Standard Mincer Equation?" *Economics of Education Review* 21: 195-210.

Black, S., P. Devereux and K. Salvanes (2005), "The More the Merrier? The Effect of Family Size and Birth Order on Children's Education", *The Quarterly Journal of Economics*, vol. 120 no. 2, 669-700.

Blackaby, D. H., K. Clark, D. Leslie & P. Murphy (1997), "The Distribution of Male and Female Earnings 1973-91: Evidence for Britain." *Oxford Economic Papers* 49(2): 256-272.

Blanchflower, D. and P. Elias (1999). "Ability, Schooling and Earnings: Are Twins Different?", Warwick University.

Blanden, J. and P. Gregg (2004), "Family Income and Educational Attainment: A Review of Approaches and Evidence for Britain", *Oxford Review of Economic Policy* Special Issue on Education, Volume 20 pp. 245-263.

Blanden, J., P. Gregg & L. Macmillan (2007), "Accounting for Intergenerational Income Persistence: Noncognitive Skills, Ability and Education," *Economic Journal*, vol. 117 (519), pp. C43-C60, 03.

Blundell, R. (2000), "The Returns to Higher Education in Britain: Evidence from a British Cohort." *Economic Journal* 110 461: F82-99.

Blundell, R., L. Dearden and A. Vignoles (2005), "Evaluating the Effect of Education on Earnings: Models, Methods and Results from the National Child Development Survey", *Journal of Royal Statistical Society*, 168:3, pp.473-512.

Bonjour, D., L. F. Cherkas, J. Haskell, D. Hawkes & T. Spector (2003), "Returns to Education: Evidence from U.K. Twins." *The American Economic Review* 93(5): 1799-1812.

Bowles, S. and H. Gintis (2002), "The Inheritance of Inequality." *The Journal of Economic Perspectives* 16(3): 3-30.

Bowles, S., H. Gintis & M. Osbourne (2001), "The Determinants of Earnings: A Behavioral Approach." *Journal of Economic Literature* 39(4): 1137-1176.

Bowles, S., H. Gintis & M. Osbourne (2001), "Incentive-Enhancing Preferences: Personality, Behavior, and Earnings." *The American Economic Review* 91(2): 155-158.

Braverman, H. (1974), "Labor and Monopoly Capital; The Degradation of Work in the Twentieth Century". New York, Monthly Review Press.

Brennan, Z. (2002), "How To Seduce A Plumber". Times Online
http://property.timesonline.co.uk/tol/life_and_style/property/article1181037.ece,
first accessed 09/10/2006.

Brown, C. and M. Corcoran (1997), "Sex-Based Differences in School Content and the Male-Female Wage Gap." *Journal of Labor Economics* 15(3): 431-465.

Card, D. (1995), "Earnings, Schooling, and Ability Revisited", in: S. Polachek, ed. *Research in Labor Economics*, 14, 23-48.

Card, D. and J. DiNardo (2002), "Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles." *Journal of Labor Economics* 20(4): 733-783.

Carter, K. (2002), "Education: Degrees Down the Pan" The Sunday Times. London.

Chevalier, A. (2002), "Education, Motivation and Pay of UK Graduates: Are They Different for Women?" *European Journal of Education* 37(4): 347-369.

Chevalier, A. (2004), "Parental Education and Child's Education: A Natural Experiment", IZA Discussion Papers, no. 1153

Chevalier, A. (2006), "Education, Occupation and Career Expectations: Determinants of the Gender Pay Gap for UK Graduates", *Oxford Bulletin of Economics and Statistics*, vol. 69(6), 819-842,

Chevalier, A. and L. Feinstein (2006), "Sheepskin or Prozac? The Causal Effect of Education on Mental Health", IZA Discussion Papers, no. 2231.

Clark, A. E. (1997), "Job satisfaction and gender: Why are women so happy at work?" *Labour Economics* 4(4): 341-372.

Clark, A. E., A. Oswald & P. Warr (1996), "Is job satisfaction U-shaped in age?" *Journal of Occupational & Organizational Psychology* 69: 57-81.

Clark, A. E. and A. J. Oswald (1996), "Satisfaction and comparison income." *Journal of Public Economics* 61(3): 359-381.

Conlon, G. (2001), "The Differential in Earnings Premia Between Academically and Vocationally Trained Males in the United Kingdom", Centre for the Economics of Education, Discussion Paper no.11.

Conlon, G. (2002), "The Deteminants of Undertaking Academic and Vocational Qualifications in the United Kingdom", Centre for the Economics of Education, Discussion Paper no.20.

Dearden, L., S. Machin & H. Reed (1997), "Intergenerational Mobility in Britain." *The Economic Journal,* 107(440): 47-66.

Dearden, L., S. McIntosh, M. Myck, A. Vignoles (2002). "The Returns to Academic and Vocational Qualifications in Britain." *Bulletin of Economic Research* 54 3: 249-74.

Dearden, L., L. McGranahan & B. Sianesi (2004), "An In-Depth Analysis of the Returns to National Vocational Qualifications Obtained at Level 2", Centre for the Economics of Education, Discussion Paper no.46.

Dearden, L., L. McGranahan, & B. Sianesi (2004), "The Role of Credit Constraints in Educational Choices: Evidence From the NCDS and the BCS70", Centre for the Economics of Education, Discussion Paper no.48.

Del Bono, E. and F. Galindo-Rueda (2007). "The Long Term Impacts of Compulsory Schooling: Evidence from a Natural Experiment in School Leaving Dates", Centre for the Economics of Education, Discussion Paper no.74.

Dolton, P., G. Makepeace & B. Gannon (2001). "The Earnings and Employment Effects of Young People's Vocational Training in Britain." *Manchester School* 69 4: 387-417.

Dolton, P., G. Makepeace & J. Treble (1994). "The Youth Training Scheme and the School-To-Work Transition." *Oxford Economic Papers* 46: 629-657.

Dolton, P. and M. Silles (2003), "The Determinants and Consequences of Graduate Over-Education", in F. Büchel, A. de Grip and A. Mertens (eds), *Overeducation in Europe, Current Issues in Theory and Policy*, Edward Elgar.

Dolton, P. and A. Vignoles (2000), "The Incidence and Effects of Overeducation in the U.K. Graduate Labour Market." *Economics of Education Review* 19 2: 179-98.

Dougherty, C. (2005), "Why is the Rate of Return to Schooling Higher for Women than for Men?", *The Journal of Human Resources*, 40(4): 969-988.

Doyle, C. and M. Weale (1994), "Education, Externalities, Fertility and Economic Growth." *Education Economics* 2(2): 129-167.

Feinstein, L. (2002), "Quantitative Estimates of the Social Benefits of Learning, 1: Crime", Centre for Research on the Wider Benefits of Learning, Institute of Education.

Feinstein, L. (2002), "Quantitative Estimates of the Wider Benefits of Learning, 2: Health (Depression and Obesity)", Centre for Research on the Wider Benefits of Learning, Institute of Education.

Felstead, A., D. Gallie & F. Green (2004), "Job Complexity and Task Discretion: Tracking the Direction of Skills at Work in Britain". in C. Warhurst, I. Grugulis and E. Keep (eds) *The Skills That Matter*, Palgrave MacMillan.

Finegold, D. and D. Soskice (1988), "The Failure of Training in Britain: Analysis and Prescription." *Oxford Review of Economic Policy* 4(3): 21-53.

Frogner, M. (2002), "Skills Shortages". Labour Market Trends, Office of National Statistics.

Galindo-Rueda, F. and A. Vignoles (2005), "The Declining Relative Importance of Ability in Predicting Educational Attainment." *Journal of Human Resources* 40(2): 335-353.

Gallie, D. (1994), "Patterns of Skill Change: Upskilling, Deskilling or Polarization?", in R. Penn, M. Rose and J. Rubery (eds.), *Skill and Occupational Change*. Oxford University Press.

Gottschalk, P. and M. Hansen (2003), "Is the Proportion of College Workers in Noncollege Jobs Increasing?" *Journal of Labor Economics* 21(2): 449.

Greenhalgh, C. (1999), "Adult Vocational Training and Government Policy in France and Britain." *Oxford Review of Economic Policy* 15 1: 97-113.

Griliches, Z. (1977), "Estimating the Returns to Schooling: Some Econometric Problems." *Econometrica* 45(1): 1-22.

Grossman, M. (2006), "Education and Nonmarket Outcomes", in E. Hanusheck and F. Welch (eds.), *Handbook of the Economics of Education*., Elsevier B.V. 1**:** 577-633.

Grugulis, I., C. Warhurst & E. Keep (2004), "What's Happening to 'Skill'?", in C. Warhurst, I. Grugulis and E. Keep (eds.), *The Skills That Matter*, Basingstoke, Palgrave Macmillan.

Harmon, C., H. Oosterbeek & I. Walker (2003), “The Returns to Education – A Review of Evidence, Issues and Deficiencies in the Literature.”, *Journal of Economic Surveys*, March.

Harmon, C. and I. Walker (1995), "Estimates of the Economic Return to Schooling in the United Kingdom", *American Economic Review*, vol. 85 no. 5, 1278-1286.

Jenkins, A. (2001), "Companies' Use of Psychometric Testing and the Changing Demand for Skills: A Review of the Literature", Centre for the Economics of Education, Discussion Paper no.12.

Jenkins, A. and A. Wolf (2002), "Why Do Employers Use Selection Tests? Evidence from British Workplace", Centre for the Economics of Education, Discussion Paper no.27.

Jenkins, A. and A. Wolf (2004), "Regional Variations in Adult Learning and Vocational Training: Evidence from NCDS and WERS 98", Centre for the Economics of Education, Discussion Paper no.37

Layard, R., S. McIntosh, A. Vignoles (2002), "Britain's Record On Skills", Centre for the Economics of Education, Discussion Paper no.23.

Layard, R., P. Robinson & H. Steedman (1995), "Lifelong Learning", Centre for Economic Performance, Discussion Paper no.9.

Machin, S. and S. McNally (2008), "The Literacy Hour", *Journal of Public Economics*, vol. 92(5-6), 1441-1462.

Machin, S. and S. McNally (2005), "Gender and Student Achievement in Schools", *Oxford Review of Economic Policy*, vol. 21(3), 357-372.

Machin, S., S. Telhaj & J. Wilson (2006), "The Mobility of English School Children", *Fiscal Studies*, vol. 27(3), 253-280.

Machin, S. and A. Vignoles (2004), "Educational Inequality: The Widening Socio-economic Gap." *Fiscal Studies* 25 2: 107-28.

Machin, S. and A. Vignoles (2005), "Education Policy in the UK", CESifo DICE Report, Ifo Institute for Economic Research at the University of Munich, vol. 3(4), pages 64-74, 01.

Manacorda, M. and A. Manning (1999), "Just Can't Get Enough: More On Skill-Biased Change and Labour Market Performance", Centre for Economic Performance. Discussion Paper no.412.

Manning, A. and J.-S. Pischke (2006), "Comprehensive Versus Selective Schooling in England and Wales: What Do We Know?", NBER Working Papers, no.12176.

Mavromaras, K., S. McGuiness, N. O' Leary, P. Sloane and Y. Fok, (2010), "The Problem of Overskilling in Australia and Britain", *Manchester School*, vol. 78(3), pages 219-241, 06.

McGuiness, S., and J. Bennett (2007), "Overeducation in the Graduate Labour Market: A Quantile Regression Approach", *Economics of Education Review*, 26: 521-531.

McIntosh, S. (2006), "Further Analysis of the Returns to Academic and Vocational Qualifications", *Oxford Bulletin of Economics and Statistics*, vol. 68(2), pages 225-251, 04.

McIntosh, S. (2004). "The Impact of Vocational Qualifications on the Labour Market Outcomes of Low-Achieving School Leavers", Centre for Economic Performance, Discussion Paper no.621.

McIntosh, S. and A. Vignoles (2001), "Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes", *Oxford Economic Papers*, 3, 453-481.

McNabb, R., Sarmistha & P. Sloane (2002), "Gender Differences in Educational Attainment: The Case of University Students in England and Wales." *Economica* 69: 481-503.

McNabb, R. and V. Wass (2006), "Male-female earnings differentials among lawyers in Britain: a legacy of the law or a current practice?" *Labour Economics* 13(2): 219-235.

Mincer, J. (1974), "Schooling, Experience and Earnings". New York, National Bureau of Economic Research.

Montmarquette, C., K. Cannings & S. Mahseredjian (2002), "How do young people choose college majors?" *Economics of Education Review* 21(6): 543-556.

Moser, C. (1999), "Improving Literacy and Numeracy; A Fresh Start", DfEE.

Napari, S. (2006), "The Early Career Gender Wage Gap", Centre for Economic Performance, Discussion Paper no.738.

Nicaise, I. (2000), "The Effect of Bumping Down on Wages: an Empirical Test", in L. Borghans and A. De Grip (eds.), *The Overeducated Worker? The Economics of Skill Utilization.*, Edward Elgar**:** 175-187.

Nyhus, E. K. and E. Pons (2005), "The effects of personality on earnings." *Journal of Economic Psychology* 26(3): 363-384.

O'Leary, N. C. and P. J. Sloane (2005), "The Changing Wage Return to an Undergraduate Education". The Graduate Labour Market: Rates Of Return And Overeducation Conference Centre for the Economics of Education.

Osborne Groves, M. (2005), "How important is your personality? Labor market returns to personality for women in the US and UK." *Journal of Economic Psychology* 26(6): 827-841.

Osborne Groves, M. (2005), "Personality and the Intergenerational Transmission of Economic Status", in S. Bowles, H. Gintis and M. Osborne Groves (eds.) *Unequal Chances: Family Background and Economic Success.*. Princeton, Princeton University Press.

Payne, J. (2000), "National Skills Task Force issues final report." from http://www.eurofound.europa.eu/eiro/2000/10/feature/uk0010196f.html#contentpage.

Powdthavee, N. and A. Vignoles (2006), "Using Rates of Returns Analysis to Understand Sector Skill Needs", Centre for the Economics of Education, Discussion Paper no.70.

Prais, S. J. (1993), "Economic Performance and Education: The Nature of Britain's Skill Deficiencies", National Institute for Economic and Social Research, Discussion Paper no.52.

Price, J. (2003), "For What It's Worth". The Times. London.

Roan, D. (2002), "Time for a Change of Career?" BBC News

Rotter, J. B. (1966), "Generalized Expectancies for Internal Versus External Control of Reinforcement." *Psychological Monographs: General and Applied* 80(1): 1-28.

Ruiz, Y. (2004), "Skills Shortages in Skilled Construction and Metal Trade Occupations" *Labour Market Trends*, Office for National Statistics**:** 103-112.

Schultz, T. W. (1961), "Investment in Human Capital." *The American Economic Review* 51(1): 1-17.

Sharp, C. (2002), "School Starting Age: European Policy and Recent Research". LGA Seminar ‘When Should Our Children Start School?’ LGA Conference Centre, London.

Sianesi, B. and J. Van Reenen (2003), "The Returns to Education: Macroeconomics", *Journal of Economic Surveys*, vol. 17(2), 157-200.

Sloane, P.J., N. O'Leary and D. Watson (2005), "The Long Tail of Low Skills in Wales and the UK - A Review of the Evidence", Report to the Economic Research Unit, Welsh Assembly Government, No. 99/2005.

Sloane, P. J., H. Battu & P. Seaman (1999), "Overeducation, Undereducation and the British Labour Market." *Applied Economics* 31 11: 1437-53.

Smith, A. (1776), "The Wealth of Nations", Penguin Classics reprint.

Spence, M. (1973), "Job Market Signaling." *The Quarterly Journal of Economics* 87(3): 355-374.

Stoloff, J., J. Glanville & E. Bienenstock (1999), "Women's participation in the labor force: the role of social networks." *Social Networks* 21(1): 91-108.

Swaffield, J. (2000), "Gender, Motivation, Experience and Wages", Centre for Economic Performance, Discussion Paper no.457.

Taubman, P. and T. Wales (1974), "Higher Education and Earnings", National Bureau of Economic Research.

Thompson, J. (2010), "Male and Female Participation and Progression in Higher Education: Further Analysis Part 1, Employment Outcomes", Higher Education Policy Institute Report

Vella, F. (1994), "Gender Roles and Human Capital Investment: The Relationship between Traditional Attitudes and Female Labour Market Performance." *Economica* 61(242): 191-211.

Verdugo, R. R. and N. T. Verdugo (1989), "The Impact of Surplus Schooling on Earnings." *Journal of Human Resources* 24(4): 629-643.

Vignoles, A., A. De Coulon & O. Marcenaro-Gutierrez (2011), "The value of basic skills in the British labour market", *Oxford Economic Papers*, 63(1) 27-48.

Westwood, A. (2004), "Skills That Matter and Shortages That Don't", in C. Warhurst, I. Grugulis and E. Keep (eds.), *The Skills That Matter*.. Basingstoke, Palgrave MacMillan.

Wheeler, C. H. (2005), "Evidence on Wage Inequality, Worker Education, and Technology." *Federal Reserve Bank of St. Louis Review*, *87*(3), pp. 375-93*)* 87(3): 375-393.

Willis, R. J. (1986), "Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions", in O. Ashenfelter and R. Layard (eds.), *Handbook of Labor Economics,* Elsevier Science.

Appendix A

A1: Key Stages

Age	Stage	Year	Test/Qualifications
3-4 4-5	Foundation	 Reception	
5-6 6-7	Key Stage 1	Year 1 Year 2	National tests and tasks in English and mathematics
7-8 8-9 9-10 10-11	Key Stage 2	Year 3 Year 4 Year 5 Year 6	National tests in English, mathematics and science
11-12 12-13 13-14	Key Stage 3	Year 7 Year 8 Year 9	National tests in English, mathematics and science
14-15 15-16	Key Stage 4	Year 10 Year 11	Some children take GCSEs Most children take GCSEs or other national qualifications
16-17 17-18 18-19	Post-compulsory education and/or training	Year 12 (College Year 1) Year 13 (College Year 2)	Learning programmes leading to general, vocationally-related and occupational qualifications for example, A level, vocational A level, NVQ, modern apprenticeship

Source: Qualifications and Curriculum Authority (QCA) Key Stages.

A2: National Qualifications Framework

<table>
<tr><td></td><td></td><td colspan="2">National Qualifications Framework</td><td></td></tr>
<tr><td>Key Skills</td><td>NVQs</td><td>Original Levels</td><td>Revised Levels</td><td>Framework for Higher Education Qualifications</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Level 5
NVQs</td><td rowspan="2">Level 5
BTEC Advanced Professional Diplomas, Certificates and Awards</td><td>Level 8
BTEC Advanced Professional Diplomas, Certificates and Awards</td><td rowspan="2">D (doctoral)

Doctorates</td></tr>
<tr><td>Level 7
BTEC Advanced Professional Diplomas, Certificates and Awards</td></tr>
<tr><td rowspan="3">Level 4
Key Skills</td><td rowspan="3">Level 4
NVQs</td><td rowspan="3">Level 4
BTEC HNDs and HNCs

BTEC Professional Diplomas, Certificates and Awards</td><td>Level 6
BTEC Professional Diplomas, Certificates and Awards</td><td>M (Masters)

Masters degrees, postgraduate certificates and diplomas</td></tr>
<tr><td>Level 5
BTEC HNDs and HNCs

BTEC Professional Diplomas, Certificates and Awards</td><td>I (Intermediate)

Diplomas of Higher Education and further education, foundation degrees, higher national diplomas</td></tr>
<tr><td>Level 4
BTEC Professional Diplomas, Certificates and Awards</td><td>C (Certificate)

Certificates of Higher Education</td></tr>
<tr><td>Level 3
Key Skills</td><td>Level 3
NVQs</td><td colspan="2">Level 3
BTEC National Diplomas, Certificates and Awards

BTEC Diplomas, Certificates and Awards

A-Levels</td><td></td></tr>
<tr><td>Level 2
Key Skills
Literacy
Numeracy</td><td>Level 2
NVQs</td><td colspan="2">Level 2
BTEC First Diplomas and Certificates

BTEC Diplomas, Certificates and Awards

GCSE Grades A*-C</td><td></td></tr>
<tr><td>Level 1
Key Skills
Literacy
Numeracy</td><td>Level 1
NVQs</td><td colspan="2">Level 1
BTEC Introducory Diplomas and Certificates

BTEC Diplomas, Certificates and Awards

GCSEs Grades D-G</td><td></td></tr>
<tr><td>Entry Level
Literacy
Numeracy</td><td></td><td colspan="2">Entry Level
BTEC Certificates in Life Skills

BTEC Certificates in Skills for Working Life</td><td></td></tr>
</table>

Source: Qualifications and Curriculum Authority

A3: Trends in Vocational Attainment

Level	1987-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97
Entry										
1	902	1456	12033	32645	47792	47761	47761	52296	60374	76545
2	0	4193	18791	45158	86065	117097	144198	164317	213454	267144
3	777	2157	4043	6311	11753	16236	25114	48681	63790	90346
4	0	0	3123	5382	6644	7846	10777	7222	7796	8619
5					118	544	659	902	1058	1172
6										
7										
TOTAL	1679	7806	37990	89496	152372	189484	228509	273418	346472	443826

Level	97-98	98-99	99-2000	00-01	01-02	02-03	03-04	04-05	05-06
Entry			46305	119595	133544	157268	196443	246802	307534
1	70663	59882	65417	106740	753158	1020510	1305601	1361919	1380781
2	262991	252974	252518	324214	438323	586366	824642	1162865	1394119
3	100216	101079	109399	147494	205465	238460	422251	551432	623057
4	10956	13468	13770	14395	16926	24537	50872	49633	58017
5	1083	858	876	957	985	2558	4082	6534	14833
6						86	4740	4593	6010
7						936	1551	2045	3140
TOTAL	445909	428261	488285	713395	1548401	2030721	2810182	3385823	3787491

Source: Department for Children, Schools and Families; Trends in Education and Skills

Chapter Three:

Returns to Education in the British Cohort Study 1970

3.1 Introduction

The purpose of this chapter is to assess whether there is any evidence that the returns to education have changed over time. Given the trends in education participation and attainment in the UK, the consequent impact upon supply of skills may have resulted in changing returns to some of these qualifications. In particular, one might expect that returns to degree-level qualifications have fallen. Although evidence on whether this has happened is mixed, the presence of over-education is certain (see Chapter Two, p53), and this results in a pay penalty compared to those employed in jobs that fully utilise their skill level. As well as this, there is a well-reported skill-shortage in the UK in certain industries that require vocational qualifications, for example construction and plumbing. Therefore, returns to these types of qualifications may have risen.

This chapter will focus on the returns to education in the UK, using data from the 1970 British Cohort Study. It will employ various estimation methods in order to allow a comparison of results obtained using the main econometric techniques that have been applied to returns to education analysis. This will be in the form of the standard techniques of Ordinary Least Squares and Instrumental Variables. One innovation will be the use of a quantile regression analysis to examine how returns differ across the pay distribution. Each of these techniques and the results of each analysis will be discussed in turn, along with a comparison of the returns estimated by each of the methodologies used. I begin with an overview of this research, followed by a discussion of the dataset to be used in this analysis, the British Cohort Study 1970 (BCS70).

This research is original in a number of ways; firstly, this is the only source of panel data for which educational decisions were taken under the original National Framework of Qualifications[37], and at a point where the cohort members are at an age suitable for analysing returns to education (by age 34, individuals should have had sufficient labour market participation such that returns to education can be accurately estimated). Secondly, as information on pay is collected in 2000 and 2004, one can examine how returns to qualifications, employment and background characteristics affect individuals over time. Thirdly, employing quantile regression techniques allows

[37]The system was first introduced as a way of structuring vocational qualifications under one umbrella organisation, the National Council for Vocational Qualifications, and ranks them alongside academic qualifications in the NVQ framework.

one to examine the returns to education (and the effects of other variables in the specification) at different points in the pay distribution. Income and pay are not normally distributed, which raises the question of why is there so much focus on measuring the returns to education at the mean of the pay distribution. This analysis will examine returns at different percentiles, and show that the impact of some factors varies across the pay distribution.

3.2 Data

The BCS70 follows all individuals born in Britain during the week 5th-11th April 1970. The initial sweep covered obstetric and neonatal care, and was followed by subsequent full-sample sweeps[38] at age 5 (1975), 10 (1980), 16 (1986), 26 (1996), 30 (2000) and most age 34 (2004)[39]. Each sweep of the BCS70 was designed to cover the most important factors and events in an individual's life at that age, although some overlap between consecutive sweeps ensures consistency and continuity throughout the survey. Given the social and economic climate at the time, the BCS70 is not an exact replica of its predecessor, the 1958 National Child Development Study (NCDS). Also, the early life surveys were not conducted at the same ages as in the NCDS. This is important, as comparisons with the NCDS (which has been used often in the literature to measure returns to education) allows us to examine *if*, and if so, *how* returns to education have changed over time, in the context of the changes in the education structure and trends in educational attainment over time. However, the type of ability tests used is similar, and the NCDS is still the most comparable dataset to the BCS in terms of the information included, and the timing of surveys within the panel.

The surveys at ages 5 and 10 include a range of ability test scores. The ability tests completed by the cohort members were: at age 5 copying designs, human figure drawing, a picture vocabulary test, a human profile test, a reading test , and at age 10 a reading test, a vocabulary and sentences test and a maths test. The way in which the test scores will be used will be discussed during the analysis.

The age 16 sweep covers educational and social development, aspirations and attitudes towards a variety of important aspects of personal and economic development.

---

[38] Sub-sample sweeps were also carried out, however as these will not be used in this analysis they are not mentioned here.

[39] 2008 survey data, conducted via a telephone interview, was released in September 2010.

The age 30 and 34 sweeps cover social roles and values, family life, attitudes towards employment, training and qualifications and future employment/promotion prospects, children (the 2004 sweep includes a one-off survey of the cohort members' children themselves) and health. A dataset detailing work histories of cohort members has also been constructed from the 26, 30 and 34 year sweeps.

As with any panel, there is some attrition but it seems to be relatively limited. The first sweep of the survey in 1970 covered 17,287 babies. By sweep 5 (in 2000), the target sample had only slightly decreased to 17,050 cohort members. The observed sample sizes (with the observed sample as a percentage of the target sample stated in brackets) are 16571 (95.9%) in sweep 0, 13071 (79.8%) in sweep 1, 14874 (89.7%) in sweep 2, 11621 (69.4%) in sweep 3, 9003 (55.3%) in sweep 4, and 11261 (70.1%) in sweep 5. The target sample for 2004/5 (sweep 6) comprised all individuals who had participated in at least one survey since 1996 and had confirmed their contact details. The sweep 6 target sample comprised a total of 13,107 individuals, with an observed sample of 9,665 cohort members (73.7% of the target sample).

3.2.1 Pay data

In the British Cohort Study 1970, pay is reported as the last received amount of pay (gross and net) and respondents are asked the length of the period this covers. As the reported earned income of individuals differs according to different pay periods, one must calculate an equivalence measure to account for this. Using this, and information on hours worked, it has been possible to calculate hourly pay for each cohort member in both the 2000 and 2004 sweeps of the BCS70. In both sweeps the interviewer is instructed to ask to see a payslip to confirm the reported pay, with the intention that reported pay in the BCS70 is accurate.

However, one of the issues in calculating hourly pay from reported hours worked is how to deal with overtime hours. Overtime may be paid or unpaid, and therefore a calculated hourly pay variable based on total hours worked may not accurately reflect cohort members' earned income. Even within those who are paid for overtime, some cohort members may receive an overtime premium and others may not. Therefore, to ensure that the chosen measure of pay is as comparable as possible for the whole cohort, I use pay and hours worked excluding overtime (see Appendix B2, p133, for details), i.e., hourly pay based on contracted usual hours of work.

There may also be issues over the accuracy of reported pay. A descriptive analysis of the data reveals a problem with extreme values, and in some cases the periods reported for net and gross pay are not consistent. These two problems may well be linked. It was obvious that some of the extreme values for hourly pay reported in the BCS70 were implausible, so I have used the Annual Survey of Hours and Earnings (ASHE) to compare and clean the BCS70 pay data. The ASHE is an annual survey carried out by the Office for National Statistics and Inland Revenue, with data taken from employees' Pay as You Earn (PAYE) information. The fact that this data is collected from employers means that it is likely to be more accurate, and was used as a benchmark for the BCS70 data.

To identify any extreme values for hourly pay calculated in the BCS70, the ASHE was used as a benchmarking source to which to compare the data. I wished to maximise the sample size of the BCS70, so I replaced extreme hourly pay values with the median hourly pay by occupational group reported in the ASHE for this age group (see p133 for details).

3.3 Analysis of the returns to education for the British Cohort Study 1970

The richness of the data collected in the BCS70 provides a good opportunity to compare various econometric methodologies and to illustrate the methodological issues involved in each technique in a practical way. I firstly present a basic Ordinary Least Squares model to examine the 'raw' returns to qualifications in the UK for the 1970 cohort, before including more controls, and then running the regression separately for men and women to assess how returns to qualifications differ by gender.

As we have already seen, one problem with using OLS is that it does not account for the fact that ability may not only affect income, but also the schooling choice itself. There are a number of ways this has been dealt with in the literature, for example experiments (Ball et al. 2001), twins analysis (Blanchflower and Elias 1999) and proxy measures for (productive) ability[40]. The Instrumental Variables methodology will be used as an attempt to consistently estimate the returns to education when there is an endogenous variable on the right-hand side of the regression equation. In order to do this, the instrument must be correlated with the endogenous variable (schooling) but not

[40] See p21 (Chapter Two) for discussion.

correlated with the error term in the first equation (if this was the case, the estimated returns would be biased). Following this, I will use quantile regression methods to investigate whether returns differ across the pay distribution, and compare the results obtained across the three methodologies.

3.3.1 Ordinary least squares

The Ordinary Least Squares (OLS) regression takes the form

$$ln(\omega_i) = \sum_{k=0}^{n} \beta_k^{'} QUAL_{ki} + \delta^{'} OTH_i + \varepsilon_i ,$$

where $ln(\omega_i)$ is the natural log of hourly earnings for individual *i*, $QUAL_{ki}$ are all qualifications obtained by individual *i* for *k*=1,2,…n qualifications and OTH_i reflects other characteristics, family background or events specific to individual *i*, depending on the specification in question. Sometimes highest qualifications are used in estimating returns to education, however this is usually due to a lack of available data. Using all qualifications has two distinct advantages over including only highest qualification in the earnings equation. Firstly, highest qualification specifications do not control for the prior qualifications that the individual has obtained. Individuals can take many paths of achievement through the education system and if returns to prior qualifications differ, or the characteristics of individuals differ by path of achievement, then highest qualification would not give an accurate estimate of the value of the qualification gained. Secondly, if an individual has achieved two qualifications at the same level, it may be difficult to ascertain which is the highest. Using all qualifications obtained, the total earnings premium due to an individual's educational attainment is given by the sum of the earnings premia for each qualification obtained.

The advantage of using returns to specific qualifications rather than years of schooling is that it allows for non-linearity in the returns to qualifications; it is likely that qualifications at different levels, *and* different qualifications at the same (NVQ) level, are associated with differing magnitudes of returns. Using years of schooling would only estimate an average marginal return to schooling, and although it would allow one to examine the returns to years of schooling where a qualification wasn't obtained, for example returns to one year of degree-level education for a drop-out, it would not be useful for an analysis of whether the returns to academic and vocational qualifications have changed over time. Some qualifications almost always lead to public sector work (namely, nursing and teaching qualifications) and so have not been included in the analysis. Entry into these occupations is conditional upon attainment of these qualifications, and they are almost certainly occupation-specific.

One of the issues regarding returns to education analysis is the upward bias in estimates caused by the omission of some measure of ability due to the correlation between ability (which in the absence of some measure will be recorded as an unobserved part of the residual error term) and earnings. To show this, as a first step I have analysed returns to education excluding any measure of ability for both the 2000 and 2004 sweeps of the BCS70. There has also been debate in the literature about the intergenerational transmission of ability; recent research shows that about half of a person's IQ is explained by family background, using Swedish military conscription tests administered at 18 years of age (Björklund et al. 2010). Therefore, it will be interesting to compare results with and without ability controls to examine how closely related the results are.

Aside from qualifications, the other variables included in this simple OLS regression are controls for ethnicity, father's social class at age 16 and a variable reflecting any financial difficulty within the household at age 16.

Table 1

	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*
5+ GCSE's Grade A-C (or equivalent)	0.118	*0.000*	0.121	*0.000*
<5 GCSE's Grade A-C (or equivalent)	0.004	*0.686*	-0.008	*0.459*
A/S Level Grade A-C	0.081	*0.000*	0.062	*0.008*
A-Level/S-Level Grade A-C	0.131	*0.000*	0.104	*0.000*
SCE Standard Grade 4-5	-0.013	*0.832*	-0.072	*0.317*
SCE Standard Grade 1-3	0.018	*0.574*	-0.009	*0.821*
SLC Lower or Ordinary Grade	-0.048	*0.544*	0.165	*0.120*
SLC Higher Grade	0.115	*0.000*	0.101	*0.004*
Scottish Certificate of Sixth Year Studies	0.050	*0.440*	0.039	*0.614*
Other Scottish qualification	-0.017	*0.875*	0.155	*0.292*
Degree	0.217	*0.000*	0.268	*0.000*
Higher Degree	0.053	*0.035*	0.049	*0.104*
BTEC Level 2	0.002	*0.916*	0.032	*0.150*
BTEC Level 3	0.102	*0.000*	0.082	*0.000*
BTEC Level 4	0.029	*0.437*	0.051	*0.257*
Other BTEC qualification	0.115	*0.002*	0.023	*0.595*
City and Guilds Level 2	-0.013	*0.418*	-0.018	*0.354*
City and Guilds Level 3	0.004	*0.773*	0.006	*0.730*
City and Guilds Level 4	0.035	*0.400*	0.007	*0.885*
Other City and Guilds qualification	0.006	*0.852*	0.023	*0.557*
RSA Stage 1	-0.043	*0.002*	-0.054	*0.001*
RSA Stage 2	0.014	*0.728*	0.059	*0.226*
RSA Stage 3	0.018	*0.874*	0.140	*0.249*
NVQ Level 1	-0.097	*0.001*	-0.042	*0.264*
NVQ Level 2	-0.082	*0.000*	-0.069	*0.016*
NVQ Level 3	0.044	*0.096*	0.036	*0.259*
NVQ Level 4	0.207	*0.000*	0.157	*0.015*
NVQ Level 5	0.152	*0.377*	-0.027	*0.856*
NVQ Level 6	0.234	*0.095*	0.089	*0.550*
Other NVQ or Trusts towards NVQ	0.009	*0.881*	0.010	*0.883*
GNVQ Level 1	0.169	*0.256*	-0.067	*0.674*
GNVQ Level 2	0.061	*0.512*	-0.041	*0.761*
GNVQ Level 3	-0.004	*0.967*	0.057	*0.699*
Other GNVQ qualification	0.121	*0.608*	0.320	*0.206*
ONC/OND	0.104	*0.000*	0.085	*0.006*
HNC/HND	0.070	*0.001*	0.094	*0.000*
Recognised trade apprenticeship	0.109	*0.000*	0.110	*0.000*
Irish	0.009	*0.893*	-0.075	*0.364*
White other	0.005	*0.879*	0.025	*0.567*
White & Black Caribbean	-0.140	*0.167*	0.205	*0.204*
White & Black African	-0.258	*0.440*	(dropped)	
White & Asian	0.024	*0.838*	0.031	*0.850*
Other mixed race	-0.061	*0.582*	-0.196	*0.220*
Indian	0.001	*0.977*	0.038	*0.535*
Pakistani	-0.043	*0.643*	-0.043	*0.676*
Bangladeshi	-0.229	*0.234*	-0.057	*0.749*
Other Asian	0.103	*0.334*	0.015	*0.918*
Caribbean	0.049	*0.615*	-0.049	*0.669*
African	-0.353	*0.135*	(dropped)	
Other Black	-0.102	*0.420*	-0.101	*0.779*
Chinese	-0.105	*0.485*	-0.202	*0.258*
Other ethnic group	0.046	*0.489*	0.000	*0.997*
Father Social Class I 1986	0.077	*0.000*	0.114	*0.000*
Father Social Class II 1986	0.064	*0.000*	0.095	*0.000*
Father Social Class III non-manual 1986	0.019	*0.309*	0.053	*0.013*
Father Social Class III manual 1986	-0.012	*0.297*	-0.002	*0.852*
Father Social Class IV 1986	-0.033	*0.096*	-0.015	*0.538*
Father is a student 1986	-0.086	*0.056*	0.040	*0.459*
Father is dead	0.007	*0.835*	0.055	*0.138*
Financial hardship 1986	-0.053	*0.001*	-0.068	*0.000*
(Constant)	1.998	*0.000*	2.236	*0.000*
	Number of obs:	5792	Number of obs:	4934
	Adj R-squared:	0.2633	Adj R-squared:	0.2569

We can immediately see the non-linearity in returns, highlighting the importance of using measures of qualifications obtained rather than years of schooling. All coefficients are interpreted as the return to that particular qualification holding all other qualifications constant. Five or more GCSE's at grade A-C, A/S levels, A-levels, Scottish Highers, a degree, Higher degree, a BTEC Level 3, other BTEC, NVQ Levels 3, 4 and 6, ONC/OND, HNC/HND and a recognised trade apprenticeship all have associated significantly positive returns, with NVQ Levels 1 and 2, and RSA Level 1 giving significantly negative returns in 2000. The same significant relationships are apparent for 2004, apart from higher degree, other BTEC (both no longer significant in 2004), NVQ Levels 3 and 4, and the negative returns associated with NVQ Level 1 are no longer significant.

Low income at age 16 has been found to hinder an individual's academic progress, resulting in an increased likelihood of leaving school at this age; therefore not benefiting from post-16 investment in further or higher education (Dearden et al. 2004). To capture this we utilise the variable 'financial hardship', which is a self-reported variable which can be interpreted as reflecting financial constraints in the household. A financial 'shock', i.e. an unexpected downturn in the household's finances whatever the income level, could have a detrimental effect on the child's education. This could be, for example, due to financial planning of the family to support their child through A-Levels and onto university education, not coming to fruition due to the financial shock. 1986 is particularly important for individuals as it is the point at which the key decision of whether to leave or stay on in full-time education. The significant detrimental impact of financial hardship in 1986 seems to worsen as the individual progresses into their career (from a 5.3% hourly pay penalty to 6.8% penalty).

Financial hardship at age 16 could result in children leaving school and moving into the labour market. Other dimensions of family financial and social capital are captured by social class. Unsurprisingly, father's social class in 1986, measured by the Registrar General's Social Scale (now termed Social Class based on Occupation) is associated with a significantly positive increase in hourly pay for those with fathers in social class 1 (i.e. managers and professionals) compared to social class 4 (partly-skilled occupations). The coefficient declines as one moves down the scale, becoming negative for class 3 manual (although class 3 occupations are not significantly different to class 4) and continuing to fall as one moves down to class 5 (unskilled workers). Father's social class at the lower end of the scale has more effect in 2000 than further on in an individual's career.

There are two major types of bias that may be present when estimating returns to qualifications; ability bias and recall error. It has been found that the bias caused by omitting ability test scores is counteracted by the downwards bias caused by recall error (Dearden 2002), giving an overall unbiased estimate of the returns to schooling. Dearden instruments qualifications provided at age 33 through qualifications detailed in the 1981 (age 23) survey. However, because the 26-year sweep (the first opportunity in the survey to question most individuals on all completed qualifications) of the BCS70 is conducted as postal survey, no attempt is made to control for measurement error here for two reasons. Firstly the sample size is much smaller than age 30 and 34 samples (with a response rate of only 55.3% of the target sample). Secondly, most respondents would have still finished their education some years before, whereas in the NCDS the survey is carried out much closer in time to completion of education for most individuals. Information on qualifications obtained in this analysis is based on responses from the 30 year sweep (2000) of the BCS70. Some individuals would have completed schooling as much as 16 years beforehand (the earliest a cohort member leaves continuous full-time education in the survey is age 14[41], and so some recall error is likely to exist.

The ability tests used in the BCS70 are recognition and drawing of a human figure and human face profile, copying designs and a vocabulary test (all administered at age 5) and a maths test, reading test and words test (administered at age 10)[42]. The specification now includes the ability test scores (measured as quintile dummy variables, with the omitted dummy the middle quintile, to allow for non-linearity), and produces the following results.

[41] This individual may either have been expelled, or was born outside of the UK and subsequently became part of the survey at one of the later sweeps.

[42] The age 5 tests are labelled Drawing test One, Drawing test Two, Vocabulary test, Profile test and Copying test in Table 2. Those administered at age ten are labelled Maths test, Reading test and Word score.

Table 2	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*
5+ GCSE's Grade A-C (or equivalent	0.092	*0.000*	0.087	*0.000*
<5 GCSE's Grade A-C (or equivalent)	-0.004	*0.643*	-0.015	*0.184*
A/S Level Grade A-C	0.065	*0.001*	0.046	*0.057*
A-Level/S-Level Grade A-C	0.113	*0.000*	0.084	*0.000*
SCE Standard Grade 4-5	0.002	*0.973*	-0.066	*0.357*
SCE Standard Grade 1-3	0.019	*0.558*	-0.005	*0.893*
SLC Lower or Ordinary Grade	-0.120	*0.162*	0.151	*0.185*
SLC Higher Grade	0.086	*0.006*	0.078	*0.029*
Scottish Certificate of Sixth Year Studies	0.037	*0.571*	0.012	*0.882*
Other Scottish qualification	-0.014	*0.909*	0.133	*0.403*
Degree	0.199	*0.000*	0.247	*0.000*
Higher Degree	0.034	*0.181*	0.027	*0.377*
BTEC Level 2	0.012	*0.521*	0.047	*0.040*
BTEC Level 3	0.097	*0.000*	0.068	*0.002*
BTEC Level 4	0.023	*0.541*	0.038	*0.422*
Other BTEC qualification	0.107	*0.008*	0.012	*0.797*
City and Guilds Level 2	-0.008	*0.627*	-0.002	*0.939*
City and Guilds Level 3	-0.004	*0.798*	-0.009	*0.618*
City and Guilds Level 4	0.023	*0.611*	0.003	*0.950*
Other City and Guilds qualification	0.002	*0.964*	0.019	*0.642*
RSA Stage 1	-0.043	*0.003*	-0.056	*0.001*
RSA Stage 2	0.018	*0.670*	0.058	*0.254*
RSA Stage 3	0.082	*0.518*	0.127	*0.312*
NVQ Level 1	-0.089	*0.003*	-0.033	*0.398*
NVQ Level 2	-0.081	*0.001*	-0.071	*0.018*
NVQ Level 3	0.041	*0.141*	0.025	*0.450*
NVQ Level 4	0.226	*0.000*	0.177	*0.008*
NVQ Level 5	0.131	*0.443*	-0.057	*0.699*
NVQ Level 6	0.237	*0.088*	0.075	*0.608*
Other NVQ or Trusts towards NVQ	0.031	*0.612*	0.046	*0.513*
GNVQ Level 1	0.340	*0.076*	-0.175	*0.322*
GNVQ Level 2	0.073	*0.463*	-0.036	*0.801*
GNVQ Level 3	-0.006	*0.954*	0.051	*0.728*
Other GNVQ qualification	0.171	*0.464*	0.258	*0.300*
ONC/OND	0.084	*0.002*	0.050	*0.116*
HNC/HND	0.061	*0.005*	0.076	*0.003*
Recognised trade apprenticeship	0.097	*0.000*	0.097	*0.001*
Irish	-0.013	*0.851*	-0.102	*0.207*
White other	0.005	*0.905*	0.019	*0.687*
White & Black Caribbean	-0.099	*0.325*	0.199	*0.211*
White & Black African	-0.343	*0.299*	(dropped)	
White & Asian	0.030	*0.798*	-0.010	*0.952*
Other mixed race	-0.044	*0.706*	-0.197	*0.265*
Indian	0.050	*0.371*	0.064	*0.364*
Pakistani	0.076	*0.490*	0.056	*0.658*
Bangladeshi	-0.214	*0.262*	-0.056	*0.751*
Other Asian	0.087	*0.429*	0.010	*0.951*
Caribbean	0.045	*0.653*	-0.004	*0.972*
African	-0.361	*0.123*	(dropped)	
Other Black	0.090	*0.586*	(dropped)	
Chinese	-0.153	*0.422*	-0.192	*0.346*
Other ethnic group	0.078	*0.261*	0.038	*0.637*
Father Social Class I 1986	0.055	*0.013*	0.088	*0.001*
Father Social Class II 1986	0.036	*0.009*	0.068	*0.000*
Father Social Class III non-manual 1986	0.001	*0.942*	0.036	*0.112*
Father Social Class III manual 1986	-0.020	*0.104*	0.000	*0.991*
Father Social Class IV 1986	-0.029	*0.171*	-0.014	*0.579*
Father is a student 1986	-0.079	*0.091*	0.081	*0.149*
Father is dead	0.010	*0.771*	0.056	*0.151*
Financial hardship 1986	-0.034	*0.034*	-0.061	*0.001*
Drawing test One 1st (lowest) quintile	-0.006	*0.793*	-0.004	*0.871*
Drawing test One 2nd quintile	0.011	*0.548*	-0.005	*0.804*

Drawing test One 4th quintile	0.001	*0.950*	-0.003	*0.878*
Drawing test One 5th quintile	0.005	*0.792*	-0.023	*0.319*
Drawing test Two 1st quintile	-0.005	*0.832*	-0.018	*0.493*
Drawing test Two 2nd quintile	0.001	*0.935*	0.001	*0.974*
Drawing test Two 4th quintile	-0.008	*0.655*	-0.028	*0.165*
Drawing test Two 5th quintile	-0.023	*0.260*	-0.002	*0.927*
Vocabulary test 1st (lowest) quintile	-0.031	*0.091*	-0.082	*0.000*
Vocabulary test 2nd quintile	0.007	*0.653*	-0.030	*0.112*
Vocabulary test 4th quintile	0.014	*0.353*	0.015	*0.402*
Vocabulary test 5th quintile	0.043	*0.005*	0.046	*0.008*
Profile test 1st (lowest) quintile	0.013	*0.433*	0.021	*0.267*
Profile test 2nd quintile	0.019	*0.209*	0.015	*0.370*
Profile test 4th quintile	0.005	*0.725*	0.022	*0.220*
Profile test 5th quintile	-0.005	*0.725*	0.006	*0.753*
Copying test 1st (lowest) quintile	-0.039	*0.062*	-0.034	*0.151*
Copying test 2nd quintile	0.001	*0.953*	-0.005	*0.791*
Copying test 4th quintile	0.021	*0.151*	0.018	*0.283*
Copying test 5th quintile	0.044	*0.005*	0.048	*0.009*
Maths test 1st (lowest) quintile	-0.092	*0.000*	-0.084	*0.000*

Maths test 2nd quintile	-0.056	*0.001*	-0.018	*0.357*
Maths test 4th quintile	-0.012	*0.408*	0.033	*0.052*
Maths test 5th quintile	0.033	*0.050*	0.051	*0.009*
Reading test 1st (lowest) score	-0.008	*0.724*	-0.030	*0.224*
Reading test 2nd score	0.019	*0.250*	0.008	*0.663*
Reading test 4th score	-0.004	*0.788*	-0.035	*0.045*
Reading test 5th score	0.000	*0.992*	-0.006	*0.735*
Word score 1st (lowest) quintile	-0.032	*0.105*	-0.094	*0.000*
Word score 2nd quintile	0.000	*0.995*	-0.050	*0.028*
Word score 4th quintile	0.026	*0.089*	0.003	*0.860*
Word score 5th quintile	0.058	*0.000*	0.020	*0.197*
(Constant)	2.000	*0.000*	2.272	*0.000*
	Number of obs:	5248	Number of obs:	4469
	Adj R-squared:	0.2877	Adj R-squared:	0.2915

N.B. Some of the ethnicity controls are dropped from the analysis due to lack of observations for that group.

Compared to the results in Table one, where ability measures were excluded from the analysis, for the 2000 sweep there is a fall in the returns associated with qualifications of between 0.31% and 22.67% and for 2004 between a 2.58% and 25.69% fall in returns when the specification includes ability measures at 5 and 10 years of age. These results are comparable with those reported by Dearden et al. (2002). In the NCDS, when introducing ability variables the returns fall between 0.7% and 31.4% for men (with returns to an RSA level 2 or 3 qualification actually increasing when ability measures are entered into the specification) and between 1.6% and 32.5% for women (with a 57% increase in returns to City and Guilds higher qualifications).

Obtaining a Higher degree no longer yields a significantly positive return in 2000; this is probably not surprising, given that income is measured very soon after graduation. BTEC Level 2 qualifications now reward significantly positive returns in 2004 after controlling for ability. These low-level qualifications do seem to give some positive signal to employers, when controlling for ability. Vocational Level 2 qualifications are particularly important for the low socio-economic status and low-achieving sub-groups of the population, even though it has been found that overall they reward poor returns (Dearden et al. 2004, Jenkins et al. 2007). Given the nature of BTEC qualifications, i.e. vocational training, it is likely that any reward may come after a significant amount of work experience; therefore it may explain the positive return in 2004 but not 2000. We return to this when variables measuring tenure are introduced to the specification (Table 3, p103). NVQ Level 3 qualifications are no longer significant, and ONC/OND only significant in 2000.

The pay penalty associated with experiencing financial hardship in the household at age 16 has become more severe; once ability controls are included, the associated penalty in 2004 is almost double that in 2000, once ability controls are included. Cohort members with fathers in higher socio-economic groups still have higher pay, but now that ability is taken into account the lower-end penalties for having a father in (loosely termed) middle-lower social classes (class 3 downwards) no longer has a significant effect in 2000. Other literature suggests that family background has become more important in predicting educational attainment between the NCDS and BCS70, at the expense of cognitive ability (Galindo-Rueda and Vignoles 2005). This is one of the reasons why increased educational attainment in recent times has been associated with an increase in inequality in the UK, and not the decrease one would expect (Dearden et al. 1997, Blanden and Gregg 2004, Machin and Vignoles 2005).

This is an important point to make, particularly in relation to government policy, since education is one of the most valuable transmission mechanisms (both directly and indirectly) through which one can influence their social status (Bowles and Gintis 2002), and given that social mobility is cited as one of the most important reasons for the provision of schooling as a publicly funded good.

This specification for ability uses dummy variables for measuring test performance, split into quintiles for each ability test that was administered at 5 and 10 years of age. The reference category for each test performance score is the 40^{th}-60^{th} percentiles of the distribution (the 'middle' quintile). At first glance, the overall change in hourly pay associated with the ability measures seems to be rather small. In general, there is a negative return associated with being in the lowest quintile and a positive return for achieving a test score in the top quintile. Being in the bottom quintile in maths at age 10 has the largest significant pay penalty (9.2% for 2000) whereas achieving a score in the highest quintile of the words test gives the largest positive significant increase in hourly pay (5.8% for 2000). The generally small coefficients for ability test quintiles are probably not surprising given the declining importance of ability in determining educational achievement, as already noted.

The regression with the full set of controls is shown below. This now includes gender, full-time/part-time status, region, firm size, tenure and its squared term and whether the individual has managerial or supervisory responsibilities[43]. The ethnicity measures (which are consistently insignificant in the OLS regressions) have now been dropped. Coefficients for father's social class, region and ability are not presented in this version of the table, although some of these measures do have a significant impact on earnings (see Appendix B2 Table 1 for the full results).

[43] A full specification excluding managerial/supervisory responsibilities is presented in table 3i (p112), as this variable may capture some of the returns to (particularly higher) qualifications.

Table 3	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.079	0.000	0.091	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.001	0.923	0.000	0.978
A/S Level Grade A-C	0.047	0.008	0.028	0.172
A-Level/S-Level Grade A-C	0.094	0.000	0.056	0.000
SCE Standard Grade 4-5	-0.003	0.953	-0.035	0.577
SCE Standard Grade 1-3	0.023	0.445	0.038	0.269
SLC Lower or Ordinary Grade	-0.078	0.313	0.165	0.095
SLC Higher Grade	0.065	0.026	0.096	0.003
Scottish 6th Year Certificate	0.034	0.558	-0.013	0.845
Other Scottish qualification	0.035	0.741	0.187	0.170
Degree	0.176	0.000	0.218	0.000
Higher Degree	0.041	0.075	0.014	0.595
BTEC Level 2	0.010	0.560	0.048	0.021
BTEC Level 3	0.077	0.000	0.065	0.001
BTEC Level 4	-0.005	0.879	0.005	0.903
Other BTEC qualification	0.114	0.001	0.000	0.997
City and Guilds Level 2	-0.017	0.252	0.001	0.964
City and Guilds Level 3	-0.032	0.023	-0.050	0.004
City and Guilds Level 4	-0.017	0.677	-0.026	0.583
Other City and Guilds qualification	0.009	0.767	0.017	0.646
RSA Stage 1	0.003	0.847	0.014	0.346
RSA Stage 2	0.067	0.069	0.078	0.076
RSA Stage 3	-0.029	0.802	0.105	0.331
NVQ Level 1	-0.047	0.088	0.011	0.742
NVQ Level 2	-0.091	0.000	-0.056	0.035
NVQ Level 3	0.024	0.342	0.011	0.707
NVQ Level 4	0.167	0.001	0.191	0.001
NVQ Level 5	0.152	0.320	-0.018	0.888
NVQ Level 6	0.229	0.065	-0.042	0.741
Other NVQ or Trusts towards NVQ	0.010	0.856	0.016	0.798
GNVQ Level 1	0.309	0.071	-0.104	0.494
GNVQ Level 2	0.057	0.525	-0.006	0.975
GNVQ Level 3	-0.004	0.970	0.098	0.431
Other GNVQ qualification	0.230	0.272	0.219	0.306
ONC/OND	0.048	0.050	0.000	0.991
HNC/HND	0.033	0.095	0.070	0.002
Recognised trade apprenticeship	0.041	0.053	0.031	0.263
Female	-0.082	0.000	-0.075	0.000
Part time	-0.218	0.000	-0.215	0.000
Small firm	-0.055	0.000	-0.046	0.000
Large firm	0.027	0.021	0.022	0.108
Very large firm	0.068	0.000	0.070	0.000
Tenure	0.011	0.005	0.004	0.255
Tenure squared	0.000	0.076	0.000	0.560
Managerial/supervisory responsibility	0.141	0.000	0.187	0.000
(Constant)	2.028	0.000	2.285	0.000
	Number of obs:	5229	Number of obs:	3901
	Adj R-squared:	0.4336	Adj R-squared:	0.4926

Ceteris paribus, females earn 8.2% and 7.5% less than males, in 2000 and 2004 respectively. Reasons for the gender pay gap have already been discussed in detail (pages 58-64), and include educational attainment, cognitive ability, biological and psychological differences, examination/coursework performance (McNabb et al. 2002), discrimination (McNabb and Wass 2006), subject of study (Chevalier 2002), motivation and career choice (Montmarquette et al. 2002), family factors (Napari 2006) and job type (Chevalier 2006). Of course, much of the 'raw' hourly wage differential between males and females is captured by the part-time pay penalty, which arises because women are more likely to be in part-time work than men. This is supported by a previous analysis that shows the female pay penalty when omitting the part-time variable is around double the penalty when part-time status is included (see Appendix B2 Table 2). Part-time workers earn 24.4% and 24.0% less per hour than their full-time counterparts. The part-time pay penalty worsens with career progression, due to the career earnings profiles being relatively steep for full-time workers at this age. Part-time work is particularly common amongst mothers, but also switching to part-time work is associated with downgrading of occupation, pay and, therefore, also results in underutilisation of skills (Connolly and Gregory 2007, 2009).

Compared to the previous results, the returns to qualifications have generally fallen. Interestingly, returns to A/S Levels, NVQ Level 6 and a trade apprenticeship are no longer significant for 2004, whilst SLC Lower/Ordinary and Standard Grades 1-3 no longer result in significant returns in either year. BTEC Level 2 qualifications only offer significant increases in hourly pay in 2004, at 4.5%. GNVQ Level 1 qualifications now give significantly positive returns in 2000.

The tenure term measures the number of years the individual has spent doing their current main activity. The upper bound of this variable for both sweeps is 1986 – i.e. from 16 years of age. Therefore this is the year from which tenure is measured. Some individuals did report starting their main activity before age 16, and these were coded as missing. Those individuals that did report beginning their main activity before age 16 would include those still in full-time education at the time that particular sweep was carried out. Tenure and its squared term are only significant in 2000, and both coefficients are rather small in magnitude.

Those working in a small firm with 1-24 employees (compared to working in a medium firm with 25-99 employees) are paid less, whereas those working in a large firm (100-499 employees) or very large firm (500+ employees) are paid more. Pay is significantly higher for those working in larger firms in both 2000 and 2004. This is consistent with other literature (Lallemand, Plasman and Rycx 2005, Wagner 1997, Brown and Medoff 1989). Having managerial/supervisory responsibilities has a significant effect on pay (15.1%) in 2000, and an even larger effect in 2004 (20.6%). By the age of 34/35, individuals who are in managerial roles are more likely to be in roles with more responsibility (higher-level managers, for example), as compared to those in managerial roles at the age of 29/30, due to natural career progression.

Rather than just looking at returns to qualifications in isolation, it is perhaps more meaningful to compare the returns to qualifications within qualification levels, and particularly comparing between academic and vocational qualifications within each NVQ Level. The results below are taken from the full controls analysis, controlling for all of the factors discussed above.

Table 4	**Academic**	**2000**	**2004**	**Vocational**	**2000**	**2004**
NVQ Level 1	Less than 5 GCSE's Grade A-C (or equivalent)	-0.001	0.000	RSA Stage 1	0.003	0.014
				NVQ Level 1	-0.047	0.011
				GNVQ Level 1	0.309	-0.104
NVQ Level 2	5 or more GCSE's Grade A-C (or equivalent)	0.079	0.091	BTEC Level 2		0.065
				City and Guilds Level 2	-0.017	0.001
				RSA Stage 2	0.067	0.078
				NVQ Level 2	-0.091	-0.056
				GNVQ Level 2	0.057	-0.006
NVQ Level 3	A/S Level Grade A-C	0.047	0.028	BTEC Level 3	0.077	0.065
	A-Level/S-Level Grade A-C	0.094	0.056	City and Guilds Level 3	-0.032	-0.050
				RSA Stage 3	-0.029	0.105
				NVQ Level 3	0.024	0.011
				GNVQ Level 3	-0.004	0.098
				ONC/OND	0.048	0.000
NVQ Level 4	Degree	0.176	0.218	BTEC Level 4	-0.005	0.005
				City and Guilds Level 4	-0.017	-0.026
				NVQ Level 4	0.167	0.191
				HNC/HND	0.033	0.070
NVQ Level 5	Higher Degree	0.041	0.014	NVQ Level 5	0.152	-0.018
NVQ Level 6				NVQ Level 6	0.229	-0.042

One can see from just a glance at the table above, that returns within (and indeed ranking of some qualifications between) levels are not consistent. This is in line with other literature. Jenkins et al. (2007) found that vocational qualifications are associated with varying magnitudes of returns, and Conlon (2001) analysed parity between academic and vocational qualifications aggregated by NVQ Level, and found that returns favoured academic qualifications at every NVQ level, by 8-10% at lower levels and 12-18% at higher levels. These results for a different data source appear to confirm this and calls into question the 'parity of esteem' that qualifications are intended to have within NVQ Levels[44], and also the value that employers put on the qualifications as a training tool and as a signal of an individual's ability in the workplace. It is worth remembering that these coefficients reflect the change in hourly pay compared to an individual without that qualification, holding all other qualifications constant. I will only discuss statistically significant returns to qualifications here.

NVQ Level 1 qualifications result in a negative return in 2000 (4.7%), whereas returns to GNVQ Level 1 qualifications are high, at 36.2% in 2000.

At NVQ Level 2, the returns to vocational qualifications are considerably lower than the 7.9% and 9.1% returns for academic qualifications in 2000 and 2004 respectively. A BTEC Level 2 qualification awards a 6.5% increase in hourly pay in 2004, RSA Level 2 awards a 7.8% increase in pay in 2004, and 6.7% increase in 2000. NVQ Level 2 qualifications penalise the individual to the tune of 9.1% and 5.6% in 2000 and 2004 respectively. Low-level qualifications may be a negative signal to employers of the ability of the individual. This may particularly be the case for vocational qualifications; if an individual obtains vocational qualifications as a substitute for more traditional academic qualifications, then an employer may question the individual's ability and productivity in the workplace.

A/S Levels (NVQ Level 3) award a significant 4.7% increase in hourly pay in 2000, and A-Levels a significant 9.4% increase, falling to 5.6% in 2004. BTEC Level 3 (a significant 7.7% in 2000 and 6.5% in 2004) and ONC/OND (significant 4.8% in 2000) all have positive, but comparably lower, returns than A-Levels (A/S Levels were introduced only recently and therefore will not have been part of an individual's continuous schooling attainment). Level 3 City and Guilds qualifications have an

[44] I have used the old version of the NVQ framework, as the latest framework has only just been introduced and therefore most of the cohort members in the survey obtained their qualifications under the old system. Not all qualifications were obtained via continuous schooling, of course; A/S Levels, for example, were not introduced until 1999, so these qualifications can only have been obtained well after the cohort member first left schooling. The new NVQ framework was changed partly because of the parity of esteem, so it may (or may not) hold for recent and future cohorts.

associated negative return in 2000, relative to zero qualifications. Therefore some qualifications still give a negative signal to employers.

At NVQ Level 4, a degree awards a large increase in pay, at 19.2% in 2000 and 24.4% in 2004. An NVQ Level 4 qualification rewards an increase in pay that is comparable to a degree qualification – an increase of 18.2% in 2000 and 21.0% in 2004. HNC/HND qualifications award a relatively small but significant increase in pay (3.3% and 7.0% for 2000 and 2004 respectively). Higher degrees offer a small but significant 4.1% return in 2000. The small return to higher degrees is probably due to the nature of work that individuals with these qualifications enter, for example individuals with PhD's are likely to go into public sector work. Also, individuals in this cohort would have only had limited time in the labour market since obtaining these qualifications, and is also likely to be a factor in the low estimated returns. NVQ Level 6 qualifications offer a large and significant 25.7% increase in hourly pay in 2000.

One can see then, that there is certainly not parity of esteem, measured by labour market returns, within qualification levels, particularly between academic and vocational qualifications. At almost every NVQ level, academic qualifications reward higher returns that their vocational counterparts.

As mentioned earlier, to really get a feel for the returns to qualifications for females due to the different nature of their employment and the likelihood that they will have rather different work histories to males, and the fact that some careers and, therefore, some qualifications may be gendered, in that they are more valuable in certain jobs (i.e. male- and female-'type' jobs) the regressions ought to be looked at separately. It can also be used to explore sources of the gender wage gap. Below are the results for male and females for both 2000 and 2004. Coefficients for father's social class, region, ability and employment variables are not presented in this table (see Appendix B2 Table 3 for details).

Table 5	Females		Males		Females		Males	
	Log hourly pay 2000		Log hourly pay 2000		Log hourly pay 2004		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*
5+ GCSE's A-C	0.100	*0.000*	0.056	*0.001*	0.094	*0.000*	0.083	*0.000*
<5 GCSE's A-C	-0.015	*0.222*	0.015	*0.233*	0.014	*0.333*	-0.013	*0.370*
A/S Level A-C	0.057	*0.024*	0.039	*0.124*	0.011	*0.707*	0.048	*0.109*
A-Level/S-Level	0.064	*0.001*	0.123	*0.000*	0.059	*0.010*	0.049	*0.034*
SCE Std. 4-5	-0.017	*0.829*	-0.004	*0.953*	-0.031	*0.737*	-0.016	*0.854*
SCE Std. 1-3	0.053	*0.206*	0.001	*0.989*	0.041	*0.401*	0.036	*0.490*
SLC Lower/	-0.060	*0.625*	-0.068	*0.502*	0.118	*0.456*	0.201	*0.119*
SLC Higher	0.078	*0.061*	0.068	*0.097*	0.051	*0.265*	0.144	*0.003*
Scottish 6th Cert	0.003	*0.970*	0.047	*0.554*	0.001	*0.990*	-0.073	*0.419*
Other Scottish	0.072	*0.590*	-0.047	*0.791*	0.210	*0.339*	0.144	*0.414*
Degree	0.197	*0.000*	0.160	*0.000*	0.232	*0.000*	0.216	*0.000*
Higher Degree	0.061	*0.067*	0.034	*0.285*	0.061	*0.125*	-0.022	*0.537*
BTEC Level 2	0.025	*0.312*	-0.005	*0.828*	0.043	*0.149*	0.057	*0.059*
BTEC Level 3	0.050	*0.043*	0.102	*0.000*	0.056	*0.056*	0.069	*0.009*
BTEC Level 4	0.025	*0.675*	-0.024	*0.575*	0.101	*0.163*	-0.024	*0.644*
Other BTEC	0.112	*0.032*	0.137	*0.006*	0.040	*0.534*	-0.040	*0.481*
C&G Level 2	-0.032	*0.180*	-0.013	*0.503*	-0.010	*0.751*	0.008	*0.730*
C&G Level 3	-0.092	*0.000*	-0.015	*0.404*	-0.037	*0.236*	-0.059	*0.007*
C&G Level 4	-0.088	*0.354*	-0.021	*0.645*	-0.166	*0.118*	0.007	*0.895*
Other C&G	0.023	*0.617*	0.011	*0.790*	0.034	*0.538*	-0.001	*0.988*
RSA Stage 1	0.010	*0.478*	-0.016	*0.622*	0.022	*0.206*	0.008	*0.830*
RSA Stage 2	0.060	*0.109*	0.134	*0.382*	0.099	*0.035*	-0.103	*0.502*
RSA Stage 3	0.020	*0.861*	(dropped)		0.102	*0.357*	(dropped)	
NVQ Level 1	-0.019	*0.586*	-0.081	*0.058*	0.019	*0.666*	-0.001	*0.983*
NVQ Level 2	-0.075	*0.013*	-0.100	*0.002*	-0.029	*0.451*	-0.079	*0.041*
NVQ Level 3	0.027	*0.436*	0.033	*0.367*	0.033	*0.433*	-0.009	*0.847*
NVQ Level 4	0.160	*0.008*	0.220	*0.012*	0.263	*0.001*	0.053	*0.581*
NVQ Level 5	0.239	*0.159*	-0.220	*0.542*	-0.020	*0.887*	0.118	*0.747*
NVQ Level 6	0.379	*0.074*	0.252	*0.153*	-0.117	*0.605*	0.033	*0.852*
Other NVQ	0.011	*0.865*	0.013	*0.895*	-0.036	*0.635*	0.150	*0.205*
GNVQ Level 1	0.345	*0.252*	0.308	*0.149*	0.201	*0.366*	-0.406	*0.056*
GNVQ Level 2	0.004	*0.984*	0.059	*0.557*	0.030	*0.891*	0.053	*0.862*
GNVQ Level 3	-0.012	*0.944*	-0.009	*0.938*	(dropped)		0.089	*0.478*
Other GNVQ	0.234	*0.257*	(dropped)		0.039	*0.899*	0.416	*0.169*
ONC/OND	0.070	*0.228*	0.041	*0.144*	0.097	*0.145*	-0.030	*0.367*
HNC/HND	-0.013	*0.695*	0.062	*0.013*	-0.020	*0.611*	0.124	*0.000*
Trade	-0.027	*0.723*	0.035	*0.136*	0.047	*0.622*	0.026	*0.383*
Part time	-0.199	*0.000*	-0.374	*0.000*	-0.205	*0.000*	-0.342	*0.000*
(Constant)	1.935	*0.000*	2.023	*0.000*	2.174	*0.000*	2.322	*0.000*
	No. of obs:	*2594*	No of obs:	*2633*	No of obs:	*2020*	No obs:	*1879*
	Adj. R-squared	*0.476*	Adj. R-squared	*0.334*	Adj. R-squared	*0.494*	Adj. R-squared	*0.419*

One can clearly see that returns to qualifications do vary by gender. For those qualifications that are associated with significant increases in pay (up to the 10% level) for both men and women, returns to A-Levels, BTEC Level 3, Other BTEC, NVQ

Level 4 are lower for women than for men in 2000. However, returns to 5 or more GCSE's, SLC Highers and NVQ Level 2 (a less negative pay penalty) are higher in 2000 for women, and returns to a degree are higher in both 2000 and 2004. As well as these, females earn a significant increase in pay from AS-Level (2000), RSA Level 3, and NVQ Level 4 (2004), and a significant decrease from a City and Guilds Level 3 qualification in 2000. Qualifications that reward men with a significant increase in pay but not women are HNC/HND qualifications, but NVQ Levels 1 (in 2000) and 2 (2004) are associated with a significant fall in hourly pay.

NVQ Levels 4 (30.1%) and 6 (46.1%) both offer rather high returns to women in 2004 and 2000 respectively, and is probably due to these being highly specialised and high-level qualifications. NVQ Level 4 is also high for men (24.6% in 2000), but not as high as for women.

Some of these differences are rather interesting; I will highlight a few of them here and suggest some explanations. For 5 or more GCSE's, females enjoyed higher returns in 2000, by about double that of men, but by 2004 this gap had reduced to 1.1 percentage points. Indeed, returns for females fell between 2000 and 2004. It is well-known that females tend to achieve better grades than males, and this may be showing through for GCSE's in 2000 – even though both men and women may have achieved these qualifications, females may do so at a higher level of attainment. The fall in returns to GCSE qualifications by 2004 may be due to the type of jobs or sectors that females typically enter, or due to interrupted career histories.

For degree-level qualifications, returns for females are higher than for males in 2000, and remain so in 2004, increasing by 3.5 percentage points (although the gap between returns for males and females reduced over this period). It may be that females with degree-level qualifications are much more career-minded than females with lower-level qualifications, and so see their career as a priority due to the high investment required for university education. They delay family formation and are less likely to have interruptions during their careers. Dougherty (2005) finds that education has a 'double effect' on women: firstly, education increases their human capital and skills (as it does men); however, increased attainment also reduces the differential attributable to factors such as tastes, for example career-mindedness, and discrimination.

The part-time pay penalty increases slightly for women but decreases for men between 2000 and 2004. The penalty for being a part-time worker is much higher for men than women. There may be a number of contributing factors. Firstly, men may be expected to be full-time workers, so the penalty for not being so may be higher. Secondly, those in career jobs may need to switch occupation to obtain part-time work due to the nature of their full time employment, and this may well be typically into occupations with lower pay, and so capturing the downgrade in the part-time dummy; although this is true for all, it may affect males more than females. Thirdly, the pay differential between women in part-time jobs and full time jobs is likely to be much smaller than it is for men, because women are more likely to be employed in jobs where part-time and full-time pay rates aren't very different (e.g. service sector jobs with a specified hourly rate of pay, which may not vary between full-time and part-time workers). Lastly, women are generally paid less on average than men anyway, and so because there is a 'hard floor' (i.e. the minimum wage), the wage decrease associated with part-time work is likely to be compressed more for women than for men, as women are more likely to work part-time.

It is likely that the managerial/supervisory responsibilities variable may capture some of the return to higher qualifications as higher attainment may result in an increased likelihood of managerial positions. Therefore, table 3i below reports the full controls specification for 2000 and 2004, without controlling for managerial/supervisory responsibilities. The full results are presented in Appendix B Table 4. One can see that the coefficients on qualifications are generally slightly higher than those on the full specification (Table 3, 104). The coefficient on tenure has, unsurprisingly, increased, and is now has a significantly positive effect in 2004.

Table 3i	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.090	0.000	0.101	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.001	0.874	-0.001	0.947
A/S Level Grade A-C	0.048	0.008	0.038	0.076
A-Level/S-Level Grade A-C	0.096	0.000	0.069	0.000
SCE Standard Grade 4-5	0.001	0.982	-0.041	0.523
SCE Standard Grade 1-3	0.032	0.298	0.057	0.115
SLC Lower or Ordinary Grade	-0.107	0.175	0.177	0.086
SLC Higher Grade	0.073	0.014	0.104	0.002
Scottish 6th Year Certificate	0.026	0.663	-0.020	0.779
Other Scottish qualification	0.042	0.700	0.150	0.291
Degree	0.188	0.000	0.236	0.000
Higher Degree	0.031	0.189	0.012	0.662
BTEC Level 2	0.010	0.571	0.054	0.012
BTEC Level 3	0.083	0.000	0.072	0.000
BTEC Level 4	-0.004	0.915	0.014	0.756
Other BTEC qualification	0.101	0.006	0.008	0.860
City and Guilds Level 2	-0.010	0.493	-0.006	0.771
City and Guilds Level 3	-0.033	0.023	-0.047	0.011
City and Guilds Level 4	-0.010	0.813	-0.013	0.796
Other City and Guilds qualification	0.007	0.814	0.025	0.509
RSA Stage 1	-0.005	0.718	0.008	0.619
RSA Stage 2	0.067	0.078	0.082	0.075
RSA Stage 3	-0.022	0.849	0.149	0.187
NVQ Level 1	-0.049	0.083	0.022	0.527
NVQ Level 2	-0.091	0.000	-0.070	0.011
NVQ Level 3	0.032	0.208	0.011	0.723
NVQ Level 4	0.201	0.000	0.184	0.002
NVQ Level 5	0.175	0.265	0.032	0.808
NVQ Level 6	0.227	0.074	0.055	0.675
Other NVQ or Trusts towards NVQ	0.038	0.491	0.037	0.570
GNVQ Level 1	0.342	0.051	-0.133	0.399
GNVQ Level 2	0.085	0.355	-0.003	0.988
GNVQ Level 3	0.038	0.695	0.034	0.793
Other GNVQ qualification	0.261	0.225	0.211	0.345
ONC/OND	0.039	0.115	0.002	0.938
HNC/HND	0.047	0.020	0.077	0.001
Recognised trade apprenticeship	0.045	0.037	0.044	0.121
Female	-0.088	0.000	-0.077	0.000
Part time	-0.246	0.000	-0.254	0.000
Small firm	-0.050	0.000	-0.040	0.004
Large firm	0.024	0.049	0.021	0.148
Very large firm	0.069	0.000	0.076	0.000
Tenure	0.016	0.000	0.009	0.028
Tenure squared	-0.001	0.013	0.000	0.235
(Constant)	2.081	0.000	2.355	0.000
	Number of obs:	5229	Number of obs:	3902
	Adj R-squared:	0.4047	Adj R-squared:	0.4500

3.3.2 Instrumental variables

Previous results focus on returns to qualifications with controls for ability, background and labour market characteristics. This part of the analysis now attempts to control for ability by Instrumental Variables on schooling. The Instrumental Variables methodology is a way of taking account of unobserved factors in the earnings equation that may affect the schooling decision, such as unobserved ability. This is dependent on finding a good instrument – i.e. one that is correlated with the true measure of schooling but uncorrelated with unobservable factors such as ability, measurement error and heterogeneity (Blundell et al. 2005) and is correctly excluded from the earnings equation. In this case a consistent estimator of returns to schooling can be found. Following Conlon (2001), family background is used as the instrument, and so here the analysis requires the estimation of a Two-Stage Least Squares estimation of

$$ln(\omega_i) = \alpha SCHOOL_i + \sum_{k=0}^{n} \beta_k{}' QUAL_{ki} + \delta' OTH_i + \varepsilon_i,$$

$$SCHOOL_i = \gamma' FAM_i + v_i,$$

where SCHOOL measures the years of full-time continuous education, FAM lists some family background variables (Father's social class at age 16, and whether the household experienced a financial difficulty at age 16), and OTH represents the other variables used in OLS analysis not specified in FAM. This differs to the previous specification, in that it includes a years of schooling variable as well as specific qualifications gained. Therefore, the total return to a qualification will be the sum of the returns to the qualification and the number of years of schooling required to complete it. With the inclusion of years of schooling in the earnings equation, the coefficients on qualifications represent the 'sheepskin effect' associated with completing that particular qualification. That is, the value associated with *completing* that qualification compared with those who do not, *given* the years of schooling obtained. Numerous studies have found that the return to a year of schooling that involves the completion and achievement of a particular qualification is larger than the return to previous years of schooling for the same qualification (see, for example, Hungerford and Solon 1987, Jaeger and Page 1996) but this argument is also refuted, particularly for the UK (Silles 2008, Chevalier et al. 2004). Due to data restrictions, this analysis only contains those cohort members who had completed continuous full-time education by the 29-year sweep. This is because although both the 2000 and 2004 sweeps ask whether the individual returned to full-time education, neither asks how long this period lasted.

This does not affect the sample size too much; 274 respondents were still in full-time education in 2000, and only 8 by 2004. Therefore it is unlikely that there will be any bias in terms of years of continuous schooling. The mean number of years of schooling was 12.41 years (implying an average school leaving age of approximately 17). There is however a problem with some of the qualifications. Due to the rather extensive reform of the UK education system over the last few decades, some qualifications could not have been achieved as part of a cohort member's continuous full-time education. These (namely A/S Levels, introduced in 1999 and NVQ Level 6, which came about in the reclassification of qualifications in the most recent reform to the NVQ Framework in 2007) have been dropped from the Instrumental Variables analysis.

The instruments used for this analysis are a vector of family characteristics. Usually, policy rules are used and are generally better instruments – family background characteristics are likely to be weak instruments at best. Due to this being a cohort survey, there is no way of using a policy rule to compare 'before and after' cohorts. Again, the coefficients for the controls (same set of controls as the full OLS specification) are omitted from this version of the table[45].

[45] The full results are presented in Appendix B2 Table 5

Table 6	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
Years of continuous schooling	0.114	0.000	0.118	0.001
5+ GCSE's Grade A-C (or equivalent	0.006	0.812	0.019	0.505
<5 GCSE's Grade A-C (or equivalent)	0.002	0.827	0.000	0.980
A-Level/S-Level Grade A-C	-0.023	0.504	-0.065	0.115
SCE Standard Grade 4-5	0.006	0.922	0.005	0.952
SCE Standard Grade 1-3	-0.024	0.506	-0.015	0.730
SLC Lower or Ordinary Grade	-0.118	0.188	0.077	0.524
SLC Higher Grade	-0.054	0.232	-0.037	0.513
Scottish Certificate of 6th Year Studies	-0.030	0.674	-0.113	0.178
Other Scottish qualification	-0.127	0.320	-0.019	0.912
Degree	-0.131	0.128	-0.094	0.353
Higher Degree	-0.103	0.022	-0.114	0.021
BTEC Level 2	-0.001	0.972	0.032	0.188
BTEC Level 3	0.014	0.567	0.017	0.522
BTEC Level 4	-0.005	0.909	0.030	0.552
Other BTEC qualification	0.046	0.300	-0.085	0.106
City and Guilds Level 2	-0.020	0.228	0.000	0.997
City and Guilds Level 3	-0.014	0.406	-0.030	0.157
City and Guilds Level 4	0.002	0.965	0.001	0.990
Other City and Guilds qualification	0.022	0.521	0.027	0.517
RSA Stage 1	0.007	0.655	0.018	0.317
RSA Stage 2	0.017	0.701	0.054	0.301
RSA Stage 3	0.029	0.819	0.169	0.178
NVQ Level 1	-0.018	0.577	0.032	0.426
NVQ Level 2	-0.086	0.001	-0.044	0.162
NVQ Level 3	0.029	0.299	0.000	0.994
NVQ Level 4	0.197	0.001	0.155	0.023
NVQ Level 5	0.292	0.087	0.253	0.115
Other NVQ or Trusts towards NVQ	0.057	0.359	0.090	0.234
GNVQ Level 1	0.334	0.082	-0.077	0.656
GNVQ Level 2	0.035	0.730	0.071	0.724
GNVQ Level 3	0.129	0.254	0.236	0.114
Other GNVQ qualification	0.117	0.621	0.097	0.697
ONC/OND	0.051	0.066	0.002	0.945
HNC/HND	0.030	0.185	0.065	0.019
Recognised trade apprenticeship	0.107	0.000	0.107	0.007
	N	5089	N	3776
	Adj. R-sq	0.2775	Adj. R-sq	0.3213

Compared to the full controls OLS specification, the coefficients on qualifications have fallen and most of the total return is captured by the high return to years of schooling. However one must remember that this measures the average marginal return to a year of schooling and so some of the returns to particular qualifications may be hidden in this average returns measure. To assess the returns to particular qualifications, one must aggregate the coefficient on years of schooling multiplied by the number of years required to obtain that qualification, plus the coefficient on the qualification in question. For example, a degree takes typically three years to complete, and so the overall returns to a degree qualification in 2000 in this Instrumental Variables (IV) analysis is (0.121*3)-0.140=0.223. Therefore ceteris paribus, a degree rewards a 22.3% increase in hourly pay. The full specification of the OLS regression estimated returns of 19.2% for 2000. Conlon (2001) also finds IV estimates to be larger than OLS estimates for the NCDS, however the marginal returns to a year of schooling is much larger here (12.1% per year as opposed to 3.7% for the NCDS). Conlon uses an aggregated measure of academic qualifications; specifically, dummies are used for each NVQ Level to analyse whether, on average, academic qualifications reward more than vocational qualifications.

A vocational equivalent to a degree is an NVQ Level 4 qualification. However, the time it takes to obtain a vocational qualification crucially depends on the time it takes for an individual to gain the necessary skills. There is also usually work experience involved, and participants may decide to do the qualification part-time and take on some extra days of work. One full-time equivalent year of studying for this qualification would give returns of 33.9%, and rises if it is obtained over more years. This is higher than the returns to a degree qualification. There are many reasons why this may be the case. Firstly, there has been a large increase in the number of people obtaining a degree qualification, and the labour market may have become over-supplied with these skills, forcing some individuals into jobs for which they are over-qualified. There is evidence that those who are over-qualified earn less than those who use all of their skills in employment. At the same time, the number of higher-level vocational qualifications has been declining and these skills are becoming rarer, increasing the returns to these qualifications. The evidence on declining returns to qualifications, particularly degree-level qualifications, is mixed. Some studies have found no evidence of decreasing returns, whereas others have found stable or slightly decreasing returns. However it must be said that the pay penalty for being over-qualified, and the incidence of over-education, is incontrovertible.

Another factor that may influence the results is that vocational qualifications typically have a work-experience component set up by the government through local employers. Therefore, the high returns to NVQ Level 4 may be in part due to work experience and on-the-job training, and secondly it may be that because these individuals are tied to an employer throughout their training, the employer has better and more information on the individual's quality. Thirdly, the higher return may be due to the job-specific skills gained in vocational qualifications, whereas degree-level qualifications offer more generic skills.

A final explanation for the large increase in returns to vocational, rather than academic, qualifications is that the years of schooling variable, representing an average return to continuous schooling across all qualifications, actually overstates the marginal returns to a year of NVQ Level 4 'schooling'.

One can see that returns (all excluding returns to extra schooling) to a Higher degree (less negative at -9.8%), NVQ Level 2 (less negative, at -8.6%), NVQ Level 5 (33.9%), GNVQ Level 1 (39.7%), ONC/OND (5.1%) and a recognised apprenticeship (11.3%), as well as the aforementioned NVQ Level 4 qualifications, all offer larger returns than a degree level qualification in 2000. Some of these qualifications will naturally take less time to obtain than a degree qualification and overall may offer a smaller increase in hourly pay. For 2004, NVQ Level 4 and trade apprenticeships again offer large and significant returns, at 16.8% and 11.3% respectively (plus the increase in returns from extra years of schooling). Some of the very general academic qualifications, such as 5 or more GCSE's, which have been significantly positive throughout the analysis in this chapter, are now insignificant. This is probably due to the generic nature of these qualifications and the large number of individuals that gain them, resulting in the returns showing up through years of schooling rather than the qualifications themselves. This lends some support to previous work that refutes the existence of sheepskin effects in the UK (Silles 2008, Chevalier et al. 2004).

It must be said here that some of these results do not seem plausible, for example the very high returns to some qualifications (and particularly when aggregated with the effect of marginal return to schooling). These results may be suspect for two reasons. Firstly, as mentioned above, the estimate of an average marginal return to schooling may over estimate the true marginal return to a year of vocational schooling (or training)[46], and underestimate the true marginal return to a year of academic schooling. Secondly, family background measures may only be a weak instrument, at best, for taking account of the unobservable factors. A better instrument would be some exogenous reform to the education system (for example a change in a policy rule, such as a change in the compulsory school leaving age) and then analysing returns to two adjacent cohorts (assuming the distributions of other factors, such as ability, are equal across the two cohorts). Because of these issues, the IV results must be interpreted with some caution, and OLS may be the preferred specification in this analysis.

3.3.3 Quantile regression

The Ordinary Least Squares method estimates the returns to qualifications at the mean; however, the returns to qualifications may vary across the distribution. It is known that the distribution of earnings tends to have a negatively skewed distribution, with median pay less than the mean pay. Therefore, it is interesting to estimate returns at the median, but also at other percentiles of the distribution. Secondly, returns to some qualifications may vary substantially, as could some of the demographic variables in the regression equation. For example, individuals with low educational attainment (or no academic qualifications) generally use lower-level vocational qualifications to distinguish themselves from those who have no qualifications at all. Therefore returns to low-level vocational qualifications may be relatively high amongst those at the lower end of the pay distribution. Also, due to the widely-used practice of cognitive tests for job-interview assessments (mostly used for distinguishing between degree-level job candidates), it may be that (high-ability) individuals with high academic qualifications (in terms of class of degree or quality of institution) experience higher returns to degrees than those with degrees further down the pay distribution. This may also be influenced by graduate 'fast-track' schemes which train the most suitable individuals specifically for quick promotion within the firm.

Quantile regression has been used to analyse the relationship between ability and education, but evidence is mixed. Martins and Pereira (2004) find that returns are higher for more skilled individuals, but Denny and O'Sullivan find the opposite (those with higher ability experience a lower return to education). It has also been used to estimate

[46] This may in part be due to the fact that typically vocational qualifications combine both on the job experience and formal schooling, hence the student spending less time in the classroom, if you like, than for an academic qualification.

the incidence of over-education and ability (McGuiness and Bennett 2007), who find that returns to education are lower for low-ability males, but are equal across the ability distribution for females. Ability is not the focus of this analysis, but is included as a set of detailed control variables.

It may also be the case that demographic characteristics have varying degrees of influence across the pay distribution. For example, fathers' social class may be important for the returns to high academic achievement (those fathers at the top-end of social class) and low academic achievement (those at the lower end of social class) through parents' expectations and the individual's ambition in their career, and perhaps even networks and contacts available to the individual.

One way to investigate whether returns do vary across the pay distribution is to estimate returns to qualifications using a Quantile Regression method. This method essentially estimates the regression equation by minimising the weighted sum of absolute residuals (as opposed to minimising the sum of squared residuals in OLS), with the median regression having the same number of positive and negative residuals. Comparing a Quantile regression method to the Ordinary Least Squares method tests the validity of using OLS, in the sense that one can see whether estimating a mean return to all individuals is an accurate estimation of the true return across the whole pay distribution. Also, evidence of varying returns across the pay distribution may reflect the presence of heterosedasticity; therefore testing for a significant difference in returns between percentiles can also be used as evidence for this. A regression, using the same variables as the full specification above, was computed, using 5%, 20%, 25%, 40%, 50% (median regression) 60%, 75%, 80% and 95% quantiles, with bootstrapped standard errors.

The results show that there is much variation in the coefficients and their significance in explaining pay, across the pay distribution. This is the same specification as the OLS regression with full controls, presented in tables 3 and 4, but here ethnicity is included as it may be that its effect varies across the pay distribution. I will briefly explain some of the findings, and elaborate on those that are more interesting.

Table 7	Q 5		Q 20		Q 25		Q 40		Q 50		Q60		Q 75		Q 80		Q 95	
	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	P>t
5+ GCSE's Grade A-C	0.094	*0.000*	0.084	*0.000*	0.075	*0.000*	0.068	*0.000*	0.095	*0.000*	0.103	*0.000*	0.126	*0.000*	0.120	*0.000*	0.107	*0.001*
<5 GCSE's Grade A-C	-0.007	*0.715*	0.019	*0.195*	0.017	*0.215*	0.002	*0.871*	-0.009	*0.531*	-0.002	*0.885*	0.002	*0.905*	-0.004	*0.827*	-0.032	*0.244*
A/S Level Grade A-C	0.060	*0.262*	0.071	*0.012*	0.046	*0.081*	0.019	*0.429*	0.003	*0.895*	0.001	*0.970*	0.027	*0.345*	0.016	*0.574*	0.038	*0.374*
A-Level/S-Level A-C	0.030	*0.376*	0.085	*0.004*	0.074	*0.004*	0.069	*0.001*	0.065	*0.003*	0.046	*0.018*	0.042	*0.093*	0.020	*0.421*	0.039	*0.286*
SCE Standard 4-5	0.092	*0.235*	-0.041	*0.642*	0.011	*0.908*	0.050	*0.538*	0.007	*0.925*	-0.043	*0.610*	-0.083	*0.234*	-0.116	*0.119*	-0.268	*0.005*
SCE Standard 1-3	-0.016	*0.758*	0.045	*0.363*	0.020	*0.670*	0.015	*0.735*	0.060	*0.269*	0.082	*0.132*	0.082	*0.072*	0.054	*0.345*	0.041	*0.550*
SLC Lower/ Ordinary	0.301	*0.002*	0.321	*0.002*	0.176	*0.096*	0.207	*0.026*	0.185	*0.074*	0.154	*0.130*	0.091	*0.514*	0.012	*0.946*	0.246	*0.357*
SLC Higher Grade	0.134	*0.012*	0.059	*0.199*	0.080	*0.064*	0.031	*0.418*	0.040	*0.437*	0.069	*0.280*	0.153	*0.003*	0.137	*0.028*	0.085	*0.248*
Scottish 6th Year Studies	-0.331	*0.152*	0.045	*0.716*	0.128	*0.245*	0.130	*0.077*	0.089	*0.252*	0.030	*0.708*	-0.092	*0.207*	-0.132	*0.136*	-0.217	*0.093*
Other Scottish	0.493	*0.000*	0.347	*0.000*	0.335	*0.000*	0.282	*0.000*	0.240	*0.000*	0.179	*0.003*	0.064	*0.300*	-0.001	*0.984*	-0.248	*0.020*
Degree	0.223	*0.000*	0.269	*0.000*	0.260	*0.000*	0.233	*0.000*	0.209	*0.000*	0.217	*0.000*	0.212	*0.000*	0.230	*0.000*	0.214	*0.000*
Higher Degree	-0.061	*0.587*	-0.008	*0.876*	0.005	*0.914*	0.030	*0.421*	0.014	*0.713*	0.033	*0.397*	0.034	*0.405*	0.018	*0.667*	0.038	*0.462*
BTEC Level 2	0.086	*0.008*	0.052	*0.058*	0.055	*0.030*	0.043	*0.075*	0.036	*0.123*	0.022	*0.386*	0.055	*0.093*	0.054	*0.111*	0.024	*0.667*
BTEC Level 3	0.074	*0.037*	0.039	*0.229*	0.042	*0.179*	0.053	*0.027*	0.062	*0.031*	0.067	*0.013*	0.060	*0.067*	0.082	*0.033*	0.073	*0.043*
BTEC Level 4	-0.108	*0.371*	0.057	*0.465*	0.033	*0.620*	0.094	*0.098*	0.068	*0.117*	0.037	*0.398*	-0.045	*0.289*	-0.051	*0.336*	-0.013	*0.879*
Other BTEC	0.043	*0.596*	0.045	*0.432*	0.040	*0.456*	-0.003	*0.958*	-0.004	*0.928*	-0.049	*0.372*	-0.024	*0.720*	-0.046	*0.599*	0.068	*0.593*
City and Guilds Level 2	0.005	*0.868*	-0.003	*0.883*	-0.013	*0.614*	-0.011	*0.611*	-0.012	*0.584*	-0.014	*0.555*	0.000	*0.991*	0.011	*0.726*	0.024	*0.575*
City and Guilds Level 3	0.015	*0.559*	-0.019	*0.384*	-0.014	*0.496*	-0.029	*0.137*	-0.027	*0.135*	-0.040	*0.057*	-0.077	*0.001*	-0.096	*0.000*	-0.080	*0.035*
City and Guilds Level 4	-0.057	*0.359*	-0.056	*0.243*	-0.065	*0.256*	-0.048	*0.521*	-0.048	*0.497*	-0.032	*0.720*	0.067	*0.558*	0.150	*0.089*	0.017	*0.791*
Other City and Guilds	-0.031	*0.629*	0.049	*0.414*	0.049	*0.327*	0.080	*0.106*	0.080	*0.077*	0.062	*0.142*	0.007	*0.883*	-0.027	*0.632*	-0.058	*0.412*
RSA Stage 1	0.013	*0.626*	0.002	*0.941*	0.029	*0.199*	0.024	*0.223*	0.016	*0.437*	0.014	*0.553*	-0.013	*0.576*	-0.009	*0.730*	0.020	*0.644*
RSA Stage 2	0.054	*0.413*	0.062	*0.277*	0.061	*0.273*	0.004	*0.936*	0.005	*0.923*	0.025	*0.690*	0.050	*0.564*	0.118	*0.188*	0.231	*0.252*
RSA Stage 3	-0.048	*0.851*	0.108	*0.641*	0.174	*0.396*	0.225	*0.228*	0.222	*0.200*	0.178	*0.258*	0.013	*0.942*	0.080	*0.670*	-0.079	*0.670*
NVQ Level 1	0.033	*0.393*	0.013	*0.765*	0.014	*0.720*	0.019	*0.537*	0.003	*0.938*	0.009	*0.831*	0.008	*0.874*	0.011	*0.866*	0.095	*0.505*
NVQ Level 2	-0.079	*0.096*	-0.026	*0.551*	-0.017	*0.663*	-0.064	*0.018*	-0.077	*0.009*	-0.081	*0.007*	-0.043	*0.294*	-0.044	*0.275*	-0.069	*0.257*
NVQ Level 3	0.068	*0.340*	0.037	*0.434*	0.024	*0.632*	0.036	*0.276*	0.023	*0.431*	-0.004	*0.896*	-0.065	*0.093*	-0.058	*0.233*	0.011	*0.869*
NVQ Level 4	0.358	*0.008*	0.250	*0.000*	0.221	*0.000*	0.163	*0.007*	0.187	*0.008*	0.154	*0.038*	0.130	*0.029*	0.138	*0.032*	0.013	*0.931*
NVQ Level 5	-0.236	*0.477*	0.086	*0.820*	0.079	*0.827*	0.011	*0.971*	-0.056	*0.846*	0.074	*0.803*	0.103	*0.748*	0.033	*0.919*	0.311	*0.391*
NVQ Level 6	-0.155	*0.601*	0.115	*0.664*	0.059	*0.818*	0.036	*0.888*	0.016	*0.941*	-0.145	*0.518*	0.080	*0.730*	0.037	*0.869*	-0.209	*0.342*
Other NVQ	0.137	*0.066*	0.032	*0.558*	-0.002	*0.969*	0.031	*0.628*	0.008	*0.890*	0.019	*0.709*	-0.016	*0.808*	-0.034	*0.688*	-0.077	*0.584*
GNVQ Level 1	0.089	*0.572*	-0.202	*0.309*	-0.084	*0.690*	-0.228	*0.355*	0.094	*0.725*	0.042	*0.880*	0.007	*0.980*	0.078	*0.741*	-0.210	*0.348*
GNVQ Level 2	0.337	*0.026*	0.197	*0.040*	0.077	*0.386*	0.105	*0.087*	0.004	*0.935*	-0.055	*0.265*	-0.152	*0.035*	-0.187	*0.034*	-0.440	*0.006*
GNVQ Level 3	-0.101	*0.699*	0.166	*0.497*	0.142	*0.538*	0.271	*0.164*	0.220	*0.195*	0.170	*0.322*	0.076	*0.532*	0.067	*0.579*	0.092	*0.652*

Other GNVQ	0.439	*0.120*	0.215	*0.311*	0.197	*0.345*	0.070	*0.762*	-0.002	*0.994*	0.375	*0.089*	0.276	*0.166*	0.239	*0.184*	0.031	*0.820*
ONC/OND	0.042	*0.408*	0.039	*0.272*	0.038	*0.285*	0.025	*0.455*	-0.001	*0.968*	-0.032	*0.415*	-0.056	*0.226*	-0.085	*0.045*	-0.098	*0.143*
HNC/HND	0.080	*0.057*	0.045	*0.132*	0.035	*0.315*	0.053	*0.064*	0.059	*0.079*	0.093	*0.008*	0.137	*0.001*	0.140	*0.000*	0.102	*0.045*
Trade apprenticeship	0.028	*0.603*	0.050	*0.222*	0.034	*0.455*	0.057	*0.201*	0.074	*0.070*	0.054	*0.198*	0.020	*0.574*	0.007	*0.840*	0.026	*0.703*
Female	-0.064	*0.008*	-0.060	*0.001*	-0.065	*0.000*	-0.055	*0.000*	-0.059	*0.000*	-0.077	*0.000*	-0.099	*0.000*	-0.102	*0.000*	-0.105	*0.000*
Part time	-0.201	*0.000*	-0.230	*0.000*	-0.251	*0.000*	-0.263	*0.000*	-0.255	*0.000*	-0.246	*0.000*	-0.193	*0.000*	-0.174	*0.000*	-0.142	*0.000*
Irish	-0.069	*0.373*	-0.170	*0.181*	-0.080	*0.532*	-0.050	*0.594*	-0.106	*0.311*	-0.022	*0.842*	-0.061	*0.585*	0.002	*0.984*	-0.102	*0.405*
White other	0.036	*0.584*	0.037	*0.585*	0.041	*0.556*	0.047	*0.353*	0.050	*0.421*	0.109	*0.039*	0.084	*0.095*	0.088	*0.107*	-0.038	*0.574*
White & Black Caribbean	0.277	*0.104*	0.275	*0.071*	0.256	*0.107*	0.332	*0.027*	0.349	*0.021*	0.289	*0.034*	0.254	*0.061*	0.211	*0.122*	0.079	*0.704*
White & Asian	0.072	*0.564*	-0.199	*0.117*	-0.094	*0.455*	-0.188	*0.099*	-0.239	*0.029*	-0.253	*0.026*	-0.368	*0.003*	-0.402	*0.001*	-0.733	*0.000*
Other mixed race	0.156	*0.266*	-0.080	*0.454*	-0.052	*0.613*	-0.118	*0.235*	-0.190	*0.067*	-0.231	*0.040*	-0.331	*0.005*	-0.204	*0.096*	-0.367	*0.036*
Indian	-0.045	*0.701*	0.076	*0.388*	0.058	*0.511*	0.096	*0.157*	0.094	*0.125*	0.074	*0.166*	-0.039	*0.478*	-0.067	*0.260*	-0.085	*0.646*
Pakistani	0.129	*0.279*	0.152	*0.227*	0.111	*0.419*	0.124	*0.346*	0.082	*0.489*	0.049	*0.700*	-0.022	*0.881*	-0.014	*0.939*	-0.043	*0.830*
Bangladeshi	-0.096	*0.715*	-0.222	*0.362*	-0.135	*0.590*	-0.267	*0.388*	0.173	*0.599*	0.090	*0.793*	-0.079	*0.812*	0.153	*0.626*	-0.178	*0.543*
Other Asian	0.262	*0.013*	0.114	*0.328*	0.073	*0.567*	0.111	*0.438*	0.080	*0.590*	0.037	*0.822*	-0.042	*0.791*	-0.099	*0.550*	-0.164	*0.344*
Caribbean	0.056	*0.629*	0.144	*0.140*	0.151	*0.074*	0.138	*0.052*	0.073	*0.259*	0.009	*0.913*	0.042	*0.680*	0.027	*0.813*	-0.171	*0.207*
Chinese	-0.251	*0.494*	-0.527	*0.151*	-0.510	*0.152*	0.003	*0.993*	-0.084	*0.789*	-0.196	*0.552*	-0.011	*0.973*	-0.056	*0.860*	-0.324	*0.319*
Other ethnic group	0.141	*0.088*	0.040	*0.506*	-0.003	*0.965*	-0.026	*0.791*	-0.032	*0.750*	0.039	*0.694*	-0.041	*0.595*	-0.080	*0.287*	-0.256	*0.001*
Father Social Class I	0.046	*0.392*	0.084	*0.016*	0.082	*0.007*	0.062	*0.021*	0.062	*0.027*	0.055	*0.056*	0.041	*0.201*	0.059	*0.096*	0.037	*0.453*
Father Social Class II	-0.019	*0.456*	0.039	*0.093*	0.041	*0.036*	0.059	*0.001*	0.074	*0.000*	0.052	*0.002*	0.031	*0.093*	0.032	*0.146*	0.061	*0.023*
Father Social Class III nm	-0.014	*0.635*	-0.006	*0.854*	0.008	*0.801*	0.028	*0.244*	0.032	*0.248*	0.024	*0.395*	0.000	*0.998*	0.003	*0.911*	0.004	*0.930*
Father Social Class III m	0.013	*0.487*	0.009	*0.654*	0.017	*0.365*	0.005	*0.736*	0.016	*0.326*	0.009	*0.643*	-0.002	*0.932*	0.013	*0.570*	0.044	*0.129*
Father Social Class IV	-0.051	*0.278*	0.011	*0.714*	-0.012	*0.677*	-0.019	*0.492*	0.016	*0.576*	-0.015	*0.638*	-0.042	*0.164*	-0.042	*0.193*	0.002	*0.968*
Father is a student	-0.053	*0.475*	-0.028	*0.724*	-0.039	*0.643*	-0.008	*0.925*	0.072	*0.264*	0.007	*0.923*	-0.042	*0.672*	0.021	*0.834*	0.062	*0.454*
Father is dead	-0.022	*0.767*	0.016	*0.760*	0.032	*0.538*	0.053	*0.310*	0.056	*0.307*	0.092	*0.127*	0.070	*0.281*	0.094	*0.236*	0.134	*0.170*
Financial hardship 1986	-0.004	*0.866*	0.001	*0.968*	-0.009	*0.592*	-0.025	*0.112*	-0.038	*0.034*	-0.052	*0.010*	-0.041	*0.095*	-0.038	*0.105*	-0.082	*0.034*
North	-0.116	*0.019*	-0.114	*0.000*	-0.126	*0.000*	-0.143	*0.000*	-0.149	*0.000*	-0.168	*0.000*	-0.203	*0.000*	-0.214	*0.000*	-0.269	*0.000*
Yorkshire and Humberside	-0.039	*0.260*	-0.029	*0.336*	-0.029	*0.278*	-0.046	*0.032*	-0.057	*0.008*	-0.066	*0.009*	-0.071	*0.014*	-0.079	*0.003*	-0.158	*0.000*
East Midlands	-0.029	*0.437*	-0.048	*0.089*	-0.041	*0.110*	-0.046	*0.061*	-0.041	*0.121*	-0.056	*0.067*	-0.051	*0.106*	-0.072	*0.032*	-0.140	*0.005*
East Anglia	-0.006	*0.899*	-0.058	*0.081*	-0.064	*0.045*	-0.075	*0.010*	-0.084	*0.005*	-0.092	*0.006*	-0.140	*0.002*	-0.120	*0.011*	-0.208	*0.000*
South West	-0.041	*0.256*	-0.044	*0.086*	-0.041	*0.123*	-0.045	*0.116*	-0.038	*0.111*	-0.049	*0.055*	-0.041	*0.185*	-0.047	*0.138*	-0.163	*0.000*
West Midlands	-0.014	*0.673*	-0.033	*0.198*	-0.044	*0.042*	-0.050	*0.017*	-0.044	*0.040*	-0.061	*0.003*	-0.073	*0.007*	-0.069	*0.028*	-0.075	*0.109*
North West	-0.057	*0.058*	-0.060	*0.013*	-0.072	*0.004*	-0.082	*0.000*	-0.088	*0.000*	-0.111	*0.000*	-0.123	*0.000*	-0.130	*0.000*	-0.147	*0.000*
Wales	-0.069	*0.149*	-0.087	*0.026*	-0.081	*0.022*	-0.099	*0.000*	-0.114	*0.000*	-0.138	*0.000*	-0.162	*0.000*	-0.189	*0.000*	-0.207	*0.000*
Scotland	-0.108	*0.006*	-0.091	*0.007*	-0.096	*0.002*	-0.120	*0.000*	-0.131	*0.000*	-0.127	*0.000*	-0.135	*0.000*	-0.122	*0.010*	-0.091	*0.036*
Drawing test One 1st quintile	-0.033	*0.513*	-0.070	*0.019*	-0.047	*0.081*	-0.026	*0.307*	-0.051	*0.078*	-0.088	*0.012*	-0.041	*0.276*	-0.048	*0.229*	-0.021	*0.705*
Drawing test One 2nd quintile	-0.013	*0.693*	-0.043	*0.086*	-0.029	*0.185*	0.002	*0.916*	-0.020	*0.425*	-0.039	*0.089*	-0.035	*0.165*	-0.045	*0.127*	-0.066	*0.119*
Drawing test One 4th quintile	-0.056	*0.035*	-0.055	*0.069*	-0.042	*0.108*	-0.026	*0.243*	-0.032	*0.213*	-0.033	*0.249*	-0.019	*0.583*	-0.021	*0.535*	-0.040	*0.365*

Drawing test One 5th quintile	-0.039	*0.252*	-0.052	*0.150*	-0.036	*0.198*	-0.027	*0.315*	-0.035	*0.233*	-0.039	*0.226*	-0.010	*0.779*	-0.016	*0.648*	0.024	*0.605*
Drawing test Two 1st quintile	-0.029	*0.568*	0.035	*0.239*	0.007	*0.815*	-0.030	*0.293*	-0.007	*0.833*	0.003	*0.922*	-0.025	*0.475*	0.001	*0.978*	-0.026	*0.630*
Drawing test Two 2nd quintile	0.028	*0.449*	0.034	*0.159*	0.022	*0.340*	-0.005	*0.844*	0.010	*0.706*	0.013	*0.618*	-0.005	*0.876*	0.017	*0.624*	0.039	*0.355*
Drawing test Two 4th quintile	0.003	*0.928*	0.013	*0.657*	0.013	*0.627*	-0.010	*0.681*	-0.018	*0.492*	-0.040	*0.210*	-0.057	*0.098*	-0.029	*0.425*	0.007	*0.856*
Drawing test Two 5th quintile	0.040	*0.265*	0.036	*0.281*	0.032	*0.270*	0.026	*0.338*	0.021	*0.446*	0.012	*0.704*	-0.029	*0.452*	-0.005	*0.900*	-0.008	*0.868*
Vocabulary test 1st quintile	-0.005	*0.867*	-0.018	*0.514*	-0.031	*0.215*	-0.039	*0.101*	-0.017	*0.499*	-0.020	*0.411*	-0.046	*0.127*	-0.065	*0.048*	-0.083	*0.064*
Vocabulary test 2nd quintile	0.000	*0.999*	-0.009	*0.702*	-0.008	*0.714*	-0.018	*0.416*	-0.031	*0.149*	-0.027	*0.226*	-0.010	*0.702*	-0.018	*0.548*	0.009	*0.856*
Vocabulary test 4th quintile	0.010	*0.764*	0.020	*0.459*	0.032	*0.173*	0.013	*0.557*	0.015	*0.563*	0.010	*0.607*	0.006	*0.776*	-0.004	*0.860*	-0.046	*0.222*
Vocabulary test 5th quintile	0.056	*0.070*	0.032	*0.225*	0.029	*0.226*	0.013	*0.538*	0.011	*0.623*	-0.003	*0.871*	-0.012	*0.648*	-0.013	*0.632*	-0.072	*0.068*
Profile test 1st quintile	-0.005	*0.862*	0.023	*0.357*	0.005	*0.842*	0.027	*0.160*	0.042	*0.032*	0.057	*0.007*	0.041	*0.130*	0.044	*0.116*	0.003	*0.917*
Profile test 2nd quintile	0.004	*0.878*	0.013	*0.524*	0.009	*0.652*	0.030	*0.117*	0.041	*0.027*	0.059	*0.004*	0.025	*0.317*	0.026	*0.294*	0.000	*0.998*
Profile test 4th quintile	0.013	*0.647*	0.016	*0.467*	0.004	*0.838*	0.013	*0.405*	0.038	*0.038*	0.055	*0.005*	0.021	*0.346*	0.027	*0.263*	0.032	*0.395*
Profile test 5th quintile	-0.033	*0.205*	-0.004	*0.850*	-0.007	*0.715*	-0.006	*0.734*	0.013	*0.483*	0.020	*0.264*	-0.003	*0.876*	0.004	*0.883*	0.050	*0.154*
Copying test 1st quintile	-0.067	*0.055*	0.004	*0.873*	-0.003	*0.904*	-0.045	*0.051*	-0.044	*0.097*	-0.036	*0.215*	-0.049	*0.152*	-0.072	*0.049*	-0.026	*0.495*
Copying test 2nd quintile	-0.005	*0.859*	-0.004	*0.864*	0.002	*0.931*	0.006	*0.781*	0.001	*0.953*	0.003	*0.899*	0.036	*0.148*	-0.002	*0.951*	0.036	*0.381*
Copying test 4th quintile	0.002	*0.943*	0.050	*0.024*	0.041	*0.063*	0.035	*0.039*	0.028	*0.139*	0.036	*0.046*	0.047	*0.032*	0.020	*0.444*	0.041	*0.196*
Copying test 5th quintile	0.013	*0.671*	0.039	*0.100*	0.042	*0.053*	0.059	*0.003*	0.047	*0.016*	0.038	*0.031*	0.049	*0.023*	0.040	*0.120*	0.043	*0.164*
Maths test 1st quintile	-0.043	*0.197*	-0.055	*0.032*	-0.060	*0.014*	-0.046	*0.060*	-0.075	*0.002*	-0.093	*0.002*	-0.050	*0.198*	-0.029	*0.487*	-0.047	*0.318*
Maths test 2nd quintile	0.019	*0.500*	-0.012	*0.562*	-0.001	*0.948*	0.005	*0.791*	0.005	*0.809*	-0.001	*0.961*	0.017	*0.527*	0.010	*0.737*	0.015	*0.740*
Maths test 4th quintile	-0.028	*0.372*	0.007	*0.752*	0.006	*0.760*	0.014	*0.490*	0.012	*0.580*	0.026	*0.229*	0.030	*0.216*	0.043	*0.093*	0.062	*0.091*
Maths test 5th quintile	-0.018	*0.602*	0.015	*0.581*	0.017	*0.496*	0.025	*0.327*	0.006	*0.807*	0.006	*0.840*	-0.003	*0.902*	0.003	*0.925*	0.001	*0.984*
Reading test 1st quintile	0.002	*0.962*	-0.008	*0.792*	-0.011	*0.714*	-0.007	*0.770*	-0.006	*0.812*	0.001	*0.966*	-0.079	*0.024*	-0.098	*0.007*	-0.166	*0.000*
Reading test 2nd quintile	0.014	*0.653*	0.028	*0.251*	0.023	*0.351*	0.013	*0.521*	0.004	*0.854*	0.009	*0.669*	-0.002	*0.918*	-0.014	*0.610*	-0.001	*0.980*
Reading test 4th quintile	0.011	*0.696*	-0.016	*0.506*	-0.015	*0.504*	-0.010	*0.649*	-0.011	*0.616*	0.002	*0.937*	-0.001	*0.960*	-0.012	*0.659*	-0.028	*0.397*
Reading test 5th quintile	0.040	*0.226*	-0.007	*0.789*	0.013	*0.601*	0.014	*0.505*	0.022	*0.346*	0.019	*0.406*	0.004	*0.876*	0.003	*0.909*	0.009	*0.807*
Word score 1st quintile	0.012	*0.676*	-0.038	*0.135*	-0.039	*0.118*	-0.061	*0.004*	-0.061	*0.011*	-0.077	*0.000*	-0.068	*0.012*	-0.073	*0.014*	-0.053	*0.215*
Word score 2nd quintile	-0.018	*0.597*	-0.077	*0.005*	-0.060	*0.042*	-0.035	*0.166*	-0.035	*0.216*	-0.015	*0.658*	0.016	*0.627*	0.008	*0.808*	-0.044	*0.341*
Word score 4th quintile	0.012	*0.664*	0.003	*0.918*	0.010	*0.658*	-0.013	*0.492*	-0.016	*0.371*	-0.013	*0.575*	0.005	*0.845*	0.011	*0.712*	0.031	*0.417*
Word score 5th quintile	0.021	*0.448*	0.020	*0.371*	0.016	*0.424*	0.025	*0.178*	0.026	*0.179*	0.032	*0.141*	0.029	*0.180*	0.027	*0.268*	0.029	*0.376*
Small firm	-0.053	*0.031*	-0.023	*0.193*	-0.028	*0.076*	-0.044	*0.003*	-0.050	*0.002*	-0.064	*0.001*	-0.056	*0.007*	-0.046	*0.048*	-0.012	*0.672*
Large firm	0.009	*0.731*	0.007	*0.717*	0.006	*0.737*	0.014	*0.400*	0.024	*0.184*	0.014	*0.399*	0.026	*0.207*	0.040	*0.097*	0.038	*0.198*
Very large firm	0.053	*0.060*	0.074	*0.000*	0.070	*0.000*	0.068	*0.000*	0.065	*0.001*	0.064	*0.001*	0.060	*0.006*	0.083	*0.001*	0.077	*0.005*
Tenure	0.008	*0.317*	0.007	*0.263*	0.006	*0.212*	0.009	*0.046*	0.008	*0.077*	0.005	*0.345*	0.005	*0.316*	0.004	*0.514*	-0.012	*0.208*
Tenure squared	0.000	*0.745*	0.000	*0.832*	0.000	*0.616*	0.000	*0.166*	0.000	*0.210*	0.000	*0.498*	0.000	*0.377*	0.000	*0.584*	0.000	*0.422*
Managerial responsibilities	0.105	*0.000*	0.148	*0.000*	0.147	*0.000*	0.179	*0.000*	0.192	*0.000*	0.203	*0.000*	0.220	*0.000*	0.212	*0.000*	0.213	*0.000*
(Constant)	1.846	*0.000*	1.972	*0.000*	2.039	*0.000*	2.163	*0.000*	2.244	*0.000*	2.360	*0.000*	2.512	*0.000*	2.570	*0.000*	2.907	*0.000*

The 'Other' Scottish qualification category really shows the advantage of analysing returns by various percentiles of the pay distribution. In the OLS regression, the return to this qualification was not significant (with a p-value of 0.158) however the Quantile regression shows that returns are significant at seven of the nine specified percentiles of the pay distribution. Even more importantly, the returns are rather large; 49.3% at the 5th percentile and then decreasing until the 60th percentile of the distribution, but still large at 19.6%. However, at the 95th percentile of the distribution returns are significantly negative, with a 22.0% pay penalty. This is why for the average individual (in the OLS regression) returns are not significantly different from zero. It may be that at the lower end of the distribution of wage offers by employers to prospective employees, the distribution of the quality of individuals (assumably proxied by employers by their qualifications) is likely to be rather low. Therefore, the benefit to an individual of having any type of qualification over an individual with no qualifications is likely to be quite high. This shows how using a simple OLS regression may mask some of the true returns to qualifications at different points in the pay distribution.

Having 5 GCSE's or equivalent offers a significant return across the pay distribution in 2004, ranging between 6.8% and 13.4% increases in hourly pay. A/S Level qualifications are significant for those in the 20th and 25th percentiles of the pay distribution and quite large at 7.1% and 4.6% - these qualifications were not significant for the average individual in the full (aggregated) specification for 2004. SCE Standard Grades 4-5 are also not significant (but negative) in the full OLS specification, but the Quantile regression highlights that for those at the 95th percentile, there is a 23.5% pay penalty for holding this qualification. SLC Lower/Ordinary Grades are very high for those at the bottom end, but generally decreasing as one moves up the distribution. These are only significant up to the 60th percentile, and were not significant at the mean in the OLS regression. The Scottish Certificate of Sixth Year Studies is similar, being relatively large at the 40th and 50th percentiles (13.9% and 8.9% respectively), but are negative and large at the 95th percentile. Again, these were not significant for the average individual in 2004.

Returns to degree-level qualifications are significant at every point in the pay distribution specified in the Quantile regression, starting at around 25.0% then decreasing as one moves up the pay distribution, then increasing again at the 95th percentile.

Looking at vocational qualifications, there is a significant pay penalty for those at the top end of the pay distribution for City and Guilds Level 3. NVQ Level 4 is significantly positive (starting high and decreasing) for all but the 95th percentile, and GNVQ Level 2 qualifications are associated with large and significant increases in pay at the lower end of the pay distribution, which as mentioned above is probably due to their attainment acting as a signal of some quality as compared to those with no qualifications, even in low-paying jobs. GNVQ Level 2 and City and Guilds Level 4 qualifications are however associated with significantly negative returns at the upper-end of the distribution. HNC/HND qualifications offer significant increases in pay across most of the pay distribution.

An F-test for significance of means finds that 5 or more GCSE's, Scottish certificate of 6th year studies, other Scottish qualifications, City and Guilds Level 3, NVQ Level 3, GNVQ Level 2, ONC/OND and HNC/HND qualifications all offer significantly different returns at the 25th percentile than the 75th percentile. Scottish standard grade 4-5, other Scottish, City and Guilds Level 3, NVQ Level 4 and other NVQ, GNVQ Level 2 and ONC/OND qualifications are associated with significantly different returns at the 5th and 95th percentiles. This again shows that assessing returns at the mean will not necessarily accurately reflect the returns to qualifications across the pay distribution, at least for some qualifications.

The female pay penalty increases as one moves up the pay distribution (6.4% at the 5th percentile and 10.0% at the 95th), and is significant at every point in the distribution. This is consistent with the literature on glass ceilings (Arulampalam et al. 2007, Booth 2006, Booth 2009). The pay penalty to being employed part-time is convex – 18.2% at the 5th percentile, becoming larger as one moves up the pay distribution (30.0% at the 40th percentile), before falling to the (relatively) small penalty of 15.3% at the 95th percentile. This supports the claim made earlier that the 'hard floor' of the minimum wage prevents low-paid full-and part-time jobs from differing much (compared to other points in the distribution) in terms of hourly wage, although only by a small degree.

The impact of ethnicity does indeed vary across the distribution and by the ethnic group itself. White and Black Caribbean, White Other and Caribbean offer significant increases in pay in the middle of the distribution, but White and Asian and Other Mixed race offer large and significantly negative returns, particularly at the upper end of the pay distribution.

The regions used in the analysis (pay is typically lower outside London and the South East at the (OLS) mean) shows that most of the pay penalty for being outside London is at the higher end of the pay distribution (and sometimes not even significant at the lower end of the distribution for the other regions). Therefore at the lower end of the pay distribution, possibly because of the National Minimum Wage, for some of the regions individuals do not earn less than those working in London, ceteris paribus. As well as the minimum wage effect, the difference between the OLS and Quantile regressions may reflect the wide range in pay in London, highlighting the pay inequality in the capital city, due in part because of the large financial sector based there.

The pay premia for those working in very large firms generally increases as one moves up the pay distribution, and is significant at each percentile, but is only significant at 80th percentile in a large firm, at 4.0%. As one would expect, the premium associated with having managerial/supervisory responsibilities generally increases as one moves up the pay distribution because firstly there are varying degrees of managerial responsibility that are not captured by this variable (i.e. those at the lower end of the distribution are more likely to be in managerial jobs with lower rank or status) and secondly, those that do have a high level of responsibility are likely to be paid a considerable amount more than those of lower managerial rank.

In general, one can clearly see the varying returns to qualifications, personal characteristics and demographic variables across the pay distribution, implying that econometric methods which simply analyse the returns to the mean individual will not reveal the true returns to education. This is not to say that OLS does not provide a meaningful interpretation for academic researchers, policy makers and the students considering which educational path to follow, for it still provides very important information on the state of the education system and how it may be adapted to suit the changing needs of the labour market. However for the individuals themselves, information on the returns to qualifications across the pay distribution may influence decisions on career paths, and this is increasingly important with the new funding arrangements for Higher Education in particular. Therefore, like other academic researchers in this area, I believe that estimated returns to qualifications should be made public by policy makers to inform educational choices. Although much of the literature on returns to education focuses on degree-level qualifications, I feel that, if anything, this is more important for low earners and low achievers. The evidence of high returns to some – particularly vocational – qualifications may encourage educational participation amongst this sub-group, thus improving not only individuals' skills and employment prospects, but also the skills base in the economy as a whole and the associated macroeconomic benefits.

3.4 Have returns changed over time?

It is very difficult, given the nature of the problem, to definitively state what the trends in returns to qualifications are. There are various methodologies employed, different controls and instruments used depending on the nature of the data and the issue in question, and different types of datasets can be analysed. The estimated coefficients vary considerably by the methodology used to analyse the returns to education. To a large extent, this is why the debate over whether returns to qualifications have or have not changed over the recent past has not conclusively been settled.

One source of evidence that is comparable to this study is that undertaken by Dearden et al. (2002), which uses the NCDS to estimate the returns to academic and vocational qualifications in 1991 (when the cohort was 33 years old). Dearden et al.'s analysis using the full OLS specification includes controls for ability, ethnicity, family background, parental education and parental interest in the child's schooling, school type, and region and employer characteristics, estimating returns for males and females separately. Here, Dearden et al.'s specification is replicated, as much as it is possible, using the BCS, at a similar age (33 in the NCDS and 34 in the 2004 survey of the BCS70). Table 6 in Appendix B2 compares the specification used by Dearden et al. to the one used here, with an explanation of differences between the two. Table 8 below presents a comparison of the results of the two studies.

Table 8	Males		Females	
	NCDS 1991	BCS 2004	NCDS 1991	BCS 2004
CSEs	0.024	-0.021	0.000	-0.009
	(0.09)	(0.019)	(0.018)	(0.021)
O Levels	0.122	0.064	0.104	0.076
	(0.017)	(0.021)	(0.020)	(0.022)
A Levels	0.154	0.071	0.175	0.090
	(0.018)	(0.026)	(0.027)	(0.026)
HE Diploma	0.140	0.067	0.177	0.086
	(0.027)	(0.029)	(0.048)	(0.029)
First Degree	0.100	0.174	0.262	0.280
	(0.046)	(0.025)	(0.033)	(0.027)
Higher Degree	-0.052	0.008	0.049	0.059
	(0.040)	(0.043)	(0.048)	(0.053)
Other academic		0.050		0.027
		(0.035)		(0.037)
RSA Low	-0.005	0.007	0.015	-0.005
	(0.107)	(0.038)	(0.033)	(0.021)
RSA High	-0.206	-0.143	0.021	0.087
	(0.094)	(0.160)	(0.029)	(0.055)
C&G Low	0.006	0.000	-0.046	0.007
	(0.018)	(0.020)	(0.042)	(0.023)
C&G Higher	0.041	-0.033	-0.011	-0.023
	(0.020)	(0.023)	(0.064)	(0.038)
ONC	0.070	0.048	0.079	0.058
	(0.026)	(0.023)	(0.037)	(0.029)
HNC	0.057	0.080	0.028	0.077
	(0.031)	(0.028)	(0.067)	(0.038)
Professional	0.152	0.164	0.198	0.211
	(0.025)	(0.030)	(0.032)	(0.034)
Nursing	0.119	0.060	0.158	0.110
	(0.094)	(0.108)	(0.028)	(0.038)
Other Business	0.044	-0.057	0.064	0.088
	(0.029)	(0.042)	(0.051)	(0.168)
Other vocational	0.015	-0.019	0.003	-0.029
	(0.017)	(0.017)	(0.025)	(0.019)
Apprenticeship no quals	0.011	0.035	-0.009	-0.041
	(0.040)	(0.030)	(0.101)	(0.130)
Adj. R-squared	0.3304	0.3259	0.4345	0.3867
No. of obs.	2597	1561	2363	1524

Dearden et al. found that returns to O-Levels (equivalent to GCSE's) resulted in a 13.0% increase in wages, 16.6% for A-Levels, and 10.0% a first degree for men, and 11.0%, 19.1% and 30.0% for women, respectively. These are the main academic qualifications undertaken in the UK, and this is the typical route taken to higher education. Therefore I will focus on comparing these academic qualifications to the results found in this study, particularly in 2004.

In this study, using the BCS70, the equivalent returns for men (with qualifications given in the same order above for 2004 are 6.4%, 7.1% and 19.0%. For women, the returns to respective qualifications are 7.6%, 9.0% and 32.3%.

One can see that returns have fallen between cohorts for GCSE's and A-levels, but not for degree-level qualifications. There is increasing concern and debate over the quality of Level 2 and Level 3 academic qualifications, and increasing attainment of high grades, and so this may be reflected in the fall in returns. Returns to a degree for men are higher in the BCS70 than for the NCDS, however Dearden et al.'s estimate is relatively low compared to other literature. For example, Blundell et al. (2001) estimate returns to a degree for men (using the NCDS data, and crucially also using wage data from the 1991 survey) to be 24.9%. Returns to degree qualifications for females have risen slightly, compared to the NCDS.

Returns to vocational qualifications for males, estimated by Dearden et al. are as follows: RSA Low 0.5% (and insignificant), RSA High 22.9%, City and Guilds Low 0.6% (and insignificant), City and Guilds High 4.1%, ONC 7.0% and HNC 5.7%.

From the BCS70, the estimated returns to these qualifications are: RSA Low 0.7%, RSA High -13.3% (both insignificant), City and Guilds Low 0.0%, City and Guilds High -3.3% (both insignificant), ONC/OND 4.8% and HNC/ HND 8.0%[47]

For females, the only significant return in Dearden et al.'s analysis is to ONC qualifications, to the order of 7.9%, professional qualifications and nursing qualifications. They hold a significant value in the BCS also;, the return to an ONC is 5.8%, professional qualifications 23.5%, nursing 11.6%, and HNC qualifications also offer a significant positive return.

Comparing between the two cohort surveys, it is difficult to say whether returns to females have changed in line with those for males, but also it is difficult to really see whether returns to vocational qualifications have changed, as the change in classification system may have changed the value of these qualifications – and the

[47] Many of the coefficients for the vocational qualifications variables are not significant. This may because of the change in the NVQ classification.

relative value of qualifications between levels – between the NCDS and the BCS. Using Dearden et al's specification, one can see that the returns to most qualifications have fallen for both males and females. Noted exceptions to this are HNC and Professional qualifications, where returns have risen across cohorts for both males and females.

As mentioned above, it is difficult to compare directly between cohorts, even when replicating the NCDS study, as there may be many exogenous factors affecting returns to education and the labour market conditions in general, as well as changes in the distributions of factors that may affect earnings[48]. However, there is some evidence that the returns to academic qualifications, at least at lower NVQ levels, have started to decline. This is not surprising given the increased attainment, and participation in further and higher education in the UK. This is important not only for this cohort, but also for more recent cohorts, as the increased participation has continued (and up until the beginning of the millennium was increasing at an even faster rate[49]) and, therefore, returns for these cohorts may have declined even more. One cannot say for sure whether this is the case, as this is an ex post analysis, and only predictions can be made about more recent cohorts. With respect to vocational qualifications, it is more difficult to assess the trend in returns to qualifications, but one can conclude firstly that some vocational qualifications are rewarded more than others in the labour market, particularly at lower-level qualifications, and except for some higher-level vocational qualifications, the returns to these are lower than the returns to academic qualifications.

Turning our attention to the methodological issues, one can see that returns differ between OLS and IV estimates, and consistent with other literature, IV estimates – taking account of the endogeneity of schooling choices – are lower. However caution must be taken when interpreting these results, given that the instrument used may be rather weak. Quantile regression analysis does show that returns to qualifications, and demographic and personal characteristics, do differ across the pay distribution, and provides some important results on returns, particularly for low achievers at the lower end of the pay distribution.

[48] For this reason, particularly due to the compromises in the qualifications classifications required for a comparison to Dearden et al., the preferred specification is given by the full controls BCS specifications given in Tables 3, 4 and 5.

[49] See Literature Review Figure 3 for enrolment statistics

Bibliography

Arulampalam, W., A. Booth and M. Bryan (2007), “Is There a Glass Ceiling over Europe? Exploring the Gender Pay Gap across the Wage Distribution”, *Industrial and Labor Relations Review*, Vol. 60, No. 2 (Jan., 2007), pp. 163-186.

Ball, S., C. Eckel, P. Grossman & W. Zane (2001), "Status in Markets." *The Quarterly Journal of Economics* 116(1): 161-188.

Björklund, A., K. Hederos Eriksson, M. Jäntii, 2010, “IQ and Family Background: Are Associations Strong or Weak?”, *The B.E. Journal of Economic Analysis and Policy*, Vol. 10, Issue 1 (Contributions), Article 2.

Blanchflower, D. and P. Elias (1999). “Ability, Schooling and Earnings: Are Twins Different?”, Warwick University.

Blanden, J. and P. Gregg (2004), “Family Income and Educational Attainment: A Review of Approaches and Evidence for Britain”, *Oxford Review of Economic Policy* Special Issue on Education, Volume 20 pp. 245-263.

Blundell, R., L. Dearden and A. Vignoles (2005), “Evaluating the Effect of Education on Earnings: Models, Methods and Results from the National Child Development Survey”, *Journal of Royal Statistical Society*, 168:3, pp.473-512, (and working paper version, Centre for the Economics of Education, 2001).

Booth, A. (2009), “Gender and competition”, *Labour Economics*, 16(6), pp. 599-606.

Booth, A. (2006), “The Glass Ceiling in Europe: Why are women doing badly in the labour market?”, Centre for Economic Policy Research, Discussion Paper no.542.

Bowles, S. and H. Gintis (2002), "The Inheritance of Inequality." *The Journal of Economic Perspectives* 16(3): 3-30.

Brown, C., and J. Medoff (1989), "The Employer Size-Wage Effect," *Journal of Political Economy*, University of Chicago Press, vol. 97(5), pp. 1027-59.

Chevalier, A. (2002), "Education, Motivation and Pay of UK Graduates: Are They Different for Women?" *European Journal of Education* 37(4): 347-369.

Chevalier, A. (2006), “Education, Occupation and Career Expectations: Determinants of the Gender Pay Gap for UK Graduates”, *Oxford Bulletin of Economics and Statistics*, vol. 69(6), 819-842,

Chevalier, A., C. Harmon, I. Walker and Y. Zhu (2004), “Does Education Raise Productivity, or Just Reflect it?”, *The Economic Journal*, 114, F499-517.

Conlon, G. (2001), “The Differential in Earnings Premia Between Academically and Vocationally Trained Males in the United Kingdom”, Centre for the Economics of Education, Discussion Paper no.20.

Connolly, S. and Gregory, M. (2009), "The part-time pay penalty: earnings trajectories of British Women", *Oxford Economic Papers*, 61, Supplement 1, i76-i97.

Connolly, S. and M. Gregory, (2007), “Women and Work”, in N. F. R. Crafts, Ian Gazeley, and Andrew Newell (eds.) *Work and Pay in 20th Century Britain*, Oxford University Press.

Dougherty, C. (2005), “Why is the Rate of Return to Schooling Higher for Women than for Men?”, *The Journal of Human Resources*, 40(4): 969-988.

Dearden, L., S. Machin & H. Reed (1997), "Intergenerational Mobility in Britain." *The Economic Journal* 107(440): 47-66.

Dearden, L., S. McIntosh, M. Myck, A. Vignoles (2002), "The Returns to Academic and Vocational Qualifications in Britain." *Bulletin of Economic Research* 54 3: 249-74.

Dearden, L., L. McGranahan & B. Sianesi (2004), “An In-Depth Analysis of the Returns to National Vocational Qualifications Obtained at Level 2”, Centre for the Economics of Education, Discussion Paper no.46.

Dearden, L., L. McGranahan, & B. Sianesi (2004), The Role of Credit Constraints in Educational Choices: Evidence From the NCDS and the BCS70, Centre for the Economics of Education, Discussion Paper no.48.

Denny, K., and V. O’Sullivan (2004), “Can education compensate for low ability? Evidence from British data”, *Applied Economics Letters*, 14: 9, 657-660.

Galindo-Rueda, F. and A. Vignoles (2005), "The Declining Relative Importance of Ability in Predicting Educational Attainment." *Journal of Human Resources* 40(2): 335-353.

Hungerford, T. and G. Solon (1987), “Sheepskin effects in the returns to education”, *The Review of Economics and Statistics*, 69:1, pp. 175-177.

Jaeger, D. and M. Page (1996), “New evidence on sheepskin effects in the returns to education, *The Review of Economics and Statistics*, 78:4, pp. 733-740.

Jenkins, A., C. Greenwood & A. Vignoles (2007), “The returns to qualifications in England: updating the evidence base on level 2 and level 3 vocational qualifications”. Centre for the Economics of Education, Discussion Paper no.89.

Lallemand, T., R. Plasman and F. Rycx, (2005), "Why do large firms pay higher wages? Evidence from matched worker-firm data", *International Journal of Manpower*, Vol. 26 Iss: 7/8, pp.705 – 723.

Machin, S. and A. Vignoles (2005), “Education Policy in the UK”, CESifo DICE Report, Ifo Institute for Economic Research at the University of Munich, vol. 3(4), pages 64-74, 01.

Martins, P. and P. Pereira (2004), “Does education reduce wage inequality? Quantile regression evidence from 16 countries”, *Labour Economics*, 11(3): 355-371.

McGuiness, S., and J. Bennett (2007), “Overeducation in the Graduate Labour Market: A Quantile Regression Approach”, *Economics of Education Review*, 26: 521-531.

McNabb, R., P. Sarmistha & P. Sloane (2002), "Gender Differences in Educational Attainment: The Case of University Students in England and Wales." *Economica* 69: 481-503.

McNabb, R. and V. Wass (2006), "Male-female earnings differentials among lawyers in Britain: a legacy of the law or a current practice?" *Labour Economics* 13(2): 219-235.

Montmarquette, C., K. Cannings & S. Mahseredjian (2002), "How do young people choose college majors?" *Economics of Education Review* 21(6): 543-556.

Napari, S. (2006), “The Early Career Gender Wage Gap”, Centre for Economic Performance, Discussion Paper no.738.

Silles, M. (2008), “Sheepskin effects in the returns to education”, *Applied Economics Letters*, 15: 217-219.

Wagner, J. (1997), “Firm Size and Job Quality, A Survey of the Evidence from Germany”, *Small Business Economics* 9: 411–425.

Appendix B1 – Measurement issues

Calculating equivalence measures of hourly pay:

From the BCS70, I used two categories of hours worked: reported hours per week for those who work overtime (but overtime excluded from reported hours), and reported hours worked per week for those who do not work overtime. One problem is that there may be misreporting in basic hours worked, particularly for those who work overtime. An individual who consistently works overtime may overstate basic hours worked per week. To check whether this may be the case, I firstly ran a t-test for equality of mean hours worked between those who do work overtime (excluding overtime from reported hours) and mean hours of those who do not. It was found that those who do work overtime (be it paid or unpaid) do work statistically more hours than those who do not. This may, however, not mean that there is a systematic misreporting of hours worked for those individuals concerned, as there is also likely to be a positive correlation between those who do work overtime and their basic (contracted) hours, especially in the occupations which regularly implement overtime hours.

To check which of these cases is more likely, I also tested for equality of means between hourly pay of individuals who do and do not work overtime. Individuals who do work overtime are paid statistically more per hour than those who do not work overtime. Comparing the mean and median pay between the two groups by occupation using SOC code, for the majority of SOC groups the hourly pay of those who do work overtime is higher than for those who do not. Assuming that SOC codes do accurately group similar occupations there is no evidence to suggest systematic misreporting of basic hours worked. Those who do overtime, be it paid or unpaid, may be compensated with a higher hourly wage for the inconvenience, for example, of sometimes working overtime, or they are compensated for the flexibility of remaining in their workplace and working longer hours at short notice.

Dealing with extreme values in the BCS70:

As mentioned in the main body of text, a descriptive analysis of the data reveals a problem with extreme values, and in some cases the periods reported for net and gross pay are not consistent. These two problems may well be linked. I replaced extreme hourly pay values with the median hourly pay reported in the ASHE using the following method:

- I calculated the ASHE average median wage for 22-29 year-old workers and 30-39 year-old workers, to provide suitable benchmarks for the 2000 sweep where individuals are 29/30 years of age at the time of interview.

  The 10^{th} and 90^{th} percentile values from the ASHE were used as upper and lower bounds of plausible values for hourly pay. When the estimated hourly pay from the BCS70 2000 sweep fell outside these bounds, the median wage of each Standard Occupational Classification (SOC) minor is assigned to these individuals.

  - For the 2004 sweep, the cut-offs were calculated in the same way, however the median wage assigned to extreme cases was simply the median wage of the 30-39 year-old group for each SOC sub-major grouping in the ASHE.
- The SOC 1990 minor groups were used for classifying occupation type for the 2000 pay data, and the SOC 2000 sub-major groups were used for the 2004 data. These group classifications are given in the ASHE pay data. The SOC 2000 updated the classification system, particularly in classifying managerial jobs more accurately, and improving the sub-major groupings.

Appendix B2 – Regression results

Table 1	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C	0.079	0.000	0.091	0.000
<5 GCSE's Grade A-C	-0.001	0.923	0.000	0.978
A/S Level Grade A-C	0.047	0.008	0.028	0.172
A-Level/S-Level Grade A-C	0.094	0.000	0.056	0.000
SCE Standard Grade 4-5	-0.003	0.953	-0.035	0.577
SCE Standard Grade 1-3	0.023	0.445	0.038	0.269
SLC Lower or Ordinary Grade	-0.078	0.313	0.165	0.095
SLC Higher Grade	0.065	0.026	0.096	0.003
Scottish 6th Year Certificate	0.034	0.558	-0.013	0.845
Other Scottish qualification	0.035	0.741	0.187	0.170
Degree	0.176	0.000	0.218	0.000
Higher Degree	0.041	0.075	0.014	0.595
BTEC Level 2	0.010	0.560	0.048	0.021
BTEC Level 3	0.077	0.000	0.065	0.001
BTEC Level 4	-0.005	0.879	0.005	0.903
Other BTEC qualification	0.114	0.001	0.000	0.997
City and Guilds Level 2	-0.017	0.252	0.001	0.964
City and Guilds Level 3	-0.032	0.023	-0.050	0.004
City and Guilds Level 4	-0.017	0.677	-0.026	0.583
Other City and Guilds	0.009	0.767	0.017	0.646
RSA Stage 1	0.003	0.847	0.014	0.346
RSA Stage 2	0.067	0.069	0.078	0.076
RSA Stage 3	-0.029	0.802	0.105	0.331
NVQ Level 1	-0.047	0.088	0.011	0.742
NVQ Level 2	-0.091	0.000	-0.056	0.035
NVQ Level 3	0.024	0.342	0.011	0.707
NVQ Level 4	0.167	0.001	0.191	0.001
NVQ Level 5	0.152	0.320	-0.018	0.888
NVQ Level 6	0.229	0.065	-0.042	0.741
Other NVQ	0.010	0.856	0.016	0.798
GNVQ Level 1	0.309	0.071	-0.104	0.494
GNVQ Level 2	0.057	0.525	-0.006	0.975
GNVQ Level 3	-0.004	0.970	0.098	0.431
Other GNVQ qualification	0.230	0.272	0.219	0.306
ONC/OND	0.048	0.050	0.000	0.991
HNC/HND	0.033	0.095	0.070	0.002
Recognised trade apprenticeship	0.041	0.053	0.031	0.263
Female	-0.082	0.000	-0.075	0.000
Part time	-0.218	0.000	-0.215	0.000
Father Social Class I 1986	0.042	0.034	0.064	0.006
Father Social Class II 1986	0.024	0.045	0.044	0.002
Father Social Class III non-manual	0.000	0.982	0.015	0.477
Father Social Class III manual 1986	-0.010	0.348	0.016	0.208
Father Social Class IV 1986	-0.030	0.119	-0.021	0.378
Father is a student 1986	-0.059	0.158	0.001	0.986
Father is dead	0.010	0.736	0.063	0.077
Financial hardship 1986	-0.023	0.119	-0.035	0.040
North	-0.101	0.000	-0.166	0.000
Yorkshire and Humberside	-0.079	0.000	-0.065	0.001
East Midlands	-0.047	0.007	-0.052	0.010
East Anglia	-0.049	0.022	-0.092	0.000
South West	-0.077	0.000	-0.055	0.004
West Midlands	-0.037	0.022	-0.046	0.013
North West	-0.050	0.001	-0.089	0.000
Wales	-0.079	0.000	-0.122	0.000
Scotland	-0.059	0.001	-0.103	0.000
Drawing test One 1st (lowest) quintile	-0.038	0.064	-0.034	0.155
Drawing test One 2nd quintile	-0.007	0.641	-0.016	0.384
Drawing test One 4th quintile	-0.001	0.934	-0.024	0.188
Drawing test One 5th quintile	0.001	0.951	-0.020	0.338
Drawing test Two 1st quintile	0.011	0.602	-0.013	0.575
Drawing test Two 2nd quintile	0.020	0.209	0.011	0.545

Drawing test Two 4th quintile	0.006	0.711	-0.016	0.393
Drawing test Two 5th quintile	0.001	0.964	0.016	0.434
Vocabulary test 1st (lowest) quintile	0.004	0.815	-0.048	0.013
Vocabulary test 2nd quintile	0.015	0.296	-0.015	0.396
Vocabulary test 4th quintile	0.014	0.303	0.006	0.706
Vocabulary test 5th quintile	0.018	0.187	0.005	0.779
Profile test 1st (lowest) quintile	-0.001	0.926	0.033	0.058
Profile test 2nd quintile	0.010	0.448	0.025	0.110
Profile test 4th quintile	0.004	0.793	0.030	0.066
Profile test 5th quintile	-0.015	0.264	0.007	0.665
Copying test 1st (lowest) quintile	-0.029	0.116	-0.032	0.142
Copying test 2nd quintile	0.006	0.686	0.010	0.581
Copying test 4th quintile	0.022	0.095	0.026	0.100
Copying test 5th quintile	0.042	0.003	0.037	0.026
Maths test 1st (lowest) quintile	-0.073	0.000	-0.057	0.011
Maths test 2nd quintile	-0.037	0.014	-0.002	0.923
Maths test 4th quintile	-0.008	0.559	0.016	0.294
Maths test 5th quintile	0.008	0.586	0.012	0.497
Reading test 1st (lowest) quintile	-0.017	0.386	-0.043	0.065
Reading test 2nd quintile	0.017	0.259	0.003	0.858
Reading test 4th quintile	0.005	0.720	-0.012	0.447
Reading test 5th quintile	0.019	0.190	0.007	0.699
Word score 1st (lowest) quintile	-0.020	0.258	-0.055	0.008
Word score 2nd quintile	-0.003	0.873	-0.037	0.086
Word score 4th quintile	0.010	0.485	0.004	0.788
Word score 5th quintile	0.046	0.000	0.022	0.134
Small firm	-0.055	0.000	-0.046	0.000
Large firm	0.027	0.021	0.022	0.108
Very large firm	0.068	0.000	0.070	0.000
Tenure	0.011	0.005	0.004	0.255
Tenure squared	0.000	0.076	0.000	0.560
Managerial/supervisory responsibility	0.141	0.000	0.187	0.000
(Constant)	2.028	0.000	2.285	0.000
	Number of obs:	5229	Number of obs:	3901
	Adj R-squared:	0.4336	Adj R-squared:	0.4926

Table 2	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*
5+ GCSE's Grade A-C	0.101	*0.000*	0.115	*0.000*
<5 GCSE's Grade A-C	-0.003	*0.750*	0.009	*0.435*
A/S Level Grade A-C	0.057	*0.003*	0.052	*0.023*
A-Level/S-Level Grade A-C	0.118	*0.000*	0.096	*0.000*
SCE Standard Grade 4-5	-0.010	*0.867*	-0.074	*0.284*
SCE Standard Grade 1-3	0.037	*0.251*	0.037	*0.310*
SLC Lower or Ordinary Grade	-0.107	*0.199*	0.189	*0.084*
SLC Higher Grade	0.083	*0.006*	0.097	*0.005*
Scottish 6th Certificate	0.024	*0.701*	-0.012	*0.869*
Other Scottish qualification	0.006	*0.958*	0.135	*0.375*
Degree	0.194	*0.000*	0.252	*0.000*
Higher Degree	0.027	*0.275*	0.026	*0.366*
BTEC Level 2	0.014	*0.441*	0.064	*0.004*
BTEC Level 3	0.089	*0.000*	0.073	*0.001*
BTEC Level 4	0.005	*0.894*	0.015	*0.741*
Other BTEC qualification	0.116	*0.003*	0.015	*0.742*
City and Guilds Level 2	-0.023	*0.162*	-0.008	*0.670*
City and Guilds Level 3	-0.033	*0.036*	-0.033	*0.072*
City and Guilds Level 4	-0.007	*0.870*	-0.012	*0.799*
Other City and Guilds	0.006	*0.848*	0.021	*0.587*
RSA Stage 1	0.012	*0.407*	0.016	*0.337*
RSA Stage 2	0.060	*0.138*	0.111	*0.022*
RSA Stage 3	0.094	*0.448*	0.193	*0.109*
NVQ Level 1	-0.078	*0.009*	-0.007	*0.844*
NVQ Level 2	-0.084	*0.000*	-0.065	*0.023*
NVQ Level 3	0.052	*0.055*	0.043	*0.172*
NVQ Level 4	0.239	*0.000*	0.188	*0.003*
NVQ Level 5	0.149	*0.371*	0.002	*0.991*
NVQ Level 6	0.225	*0.096*	0.048	*0.734*
Other NVQ	0.049	*0.405*	0.079	*0.238*
GNVQ Level 1	0.325	*0.081*	-0.160	*0.344*
GNVQ Level 2	0.044	*0.651*	-0.016	*0.907*
GNVQ Level 3	-0.031	*0.766*	-0.010	*0.944*
Other GNVQ qualification	0.281	*0.217*	0.296	*0.214*
ONC/OND	0.051	*0.056*	0.015	*0.626*
HNC/HND	0.051	*0.016*	0.077	*0.002*
Recognised trade apprenticeship	0.051	*0.026*	0.048	*0.086*
Female	-0.170	*0.000*	-0.193	*0.000*
Irish	-0.019	*0.788*	-0.087	*0.259*
White other	-0.014	*0.693*	0.009	*0.846*
White & Black Caribbean	-0.063	*0.517*	0.252	*0.098*
White & Black African	-0.250	*0.437*	(dropped)	
White & Asian	0.008	*0.944*	0.001	*0.997*
Other mixed race	-0.013	*0.910*	-0.143	*0.398*
Indian	0.037	*0.495*	0.054	*0.418*
Pakistani	0.036	*0.741*	0.013	*0.915*
Bangladeshi	-0.229	*0.217*	-0.034	*0.841*
Other Asian	0.147	*0.172*	0.061	*0.684*
Caribbean	0.044	*0.654*	0.016	*0.888*
African	-0.304	*0.181*	(dropped)	
Other Black	0.100	*0.537*	(dropped)	
Chinese	-0.236	*0.204*	-0.299	*0.125*
Other ethnic group	0.058	*0.395*	-0.007	*0.924*
Father Social Class I 1986	0.060	*0.005*	0.083	*0.001*
Father Social Class II 1986	0.045	*0.001*	0.063	*0.000*
Father Social Class III non-manual	0.004	*0.827*	0.029	*0.182*
Father Social Class III manual 1986	-0.011	*0.366*	0.011	*0.415*
Father Social Class IV 1986	-0.027	*0.202*	-0.021	*0.404*
Father is a student 1986	-0.066	*0.149*	0.068	*0.215*
Father is dead	0.027	*0.407*	0.057	*0.146*

Financial hardship 1986	-0.032	*0.043*	-0.052	*0.005*
Drawing test One 1st (lowest) quintile	-0.023	*0.303*	-0.025	*0.338*
Drawing test One 2nd quintile	0.009	*0.607*	-0.003	*0.869*
Drawing test One 4th quintile	0.013	*0.424*	-0.003	*0.878*
Drawing test One 5th quintile	0.020	*0.300*	-0.004	*0.846*
Drawing test Two 1st quintile	-0.012	*0.572*	-0.030	*0.256*
Drawing test Two 2nd quintile	0.003	*0.844*	0.001	*0.959*
Drawing test Two 4th quintile	-0.005	*0.777*	-0.018	*0.369*
Drawing test Two 5th quintile	-0.017	*0.396*	0.002	*0.930*
Vocabulary test 1st (lowest) quintile	-0.014	*0.414*	-0.054	*0.010*
Vocabulary test 2nd quintile	0.013	*0.403*	-0.009	*0.623*
Vocabulary test 4th quintile	0.011	*0.461*	0.020	*0.253*
Vocabulary test 5th quintile	0.026	*0.083*	0.028	*0.109*
Profile test 1st (lowest) quintile	0.007	*0.677*	0.015	*0.414*
Profile test 2nd quintile	0.015	*0.290*	0.012	*0.490*
Profile test 4th quintile	0.004	*0.770*	0.022	*0.216*
Profile test 5th quintile	-0.016	*0.274*	-0.009	*0.624*
Copying test 1st (lowest) quintile	-0.041	*0.040*	-0.037	*0.116*
Copying test 2nd quintile	0.004	*0.800*	-0.001	*0.972*
Copying test 4th quintile	0.021	*0.139*	0.016	*0.334*
Copying test 5th quintile	0.036	*0.017*	0.040	*0.027*
Maths test 1st (lowest) quintile	-0.088	*0.000*	-0.082	*0.001*
Maths test 2nd quintile	-0.053	*0.001*	-0.008	*0.666*
Maths test 4th quintile	-0.017	*0.250*	0.024	*0.161*
Maths test 5th quintile	0.011	*0.493*	0.018	*0.350*
Reading test 1st (lowest) quintile	-0.030	*0.153*	-0.044	*0.079*
Reading test 2nd quintile	0.014	*0.390*	0.004	*0.840*
Reading test 4th quintile	0.007	*0.646*	-0.019	*0.272*
Reading test 5th quintile	0.016	*0.306*	0.007	*0.718*
Word score 1st (lowest) quintile	-0.021	*0.272*	-0.082	*0.000*
Word score 2nd quintile	0.002	*0.900*	-0.041	*0.072*
Word score 4th quintile	0.022	*0.133*	0.004	*0.819*
Word score 5th quintile	0.049	*0.000*	0.013	*0.408*
(Constant)	2.083	*0.000*	2.329	*0.000*
	Number of obs	5248	Number of obs	4137
	Adj R-squared	0.3262	Adj R-squared	0.3566

Table 3	Females		Males		Females		Males	
	Log hourly pay 2000		Log hourly pay 2000		Log hourly pay 2004		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*
5+ GCSE's Grade A-C	0.100	*0.000*	0.056	*0.001*	0.094	*0.000*	0.083	*0.000*
<5 GCSE's Grade A-C	-0.015	*0.222*	0.015	*0.233*	0.014	*0.333*	-0.013	*0.370*
A/S Level Grade A-C	0.057	*0.024*	0.039	*0.124*	0.011	*0.707*	0.048	*0.109*
A-Level/S-Level Grade A-C	0.064	*0.001*	0.123	*0.000*	0.059	*0.010*	0.049	*0.034*
SCE Standard Grade 4-5	-0.017	*0.829*	-0.004	*0.953*	-0.031	*0.737*	-0.016	*0.854*
SCE Standard Grade 1-3	0.053	*0.206*	0.001	*0.989*	0.041	*0.401*	0.036	*0.490*
SLC Lower or Ordinary Grade	-0.060	*0.625*	-0.068	*0.502*	0.118	*0.456*	0.201	*0.119*
SLC Higher Grade	0.078	*0.061*	0.068	*0.097*	0.051	*0.265*	0.144	*0.003*
Scottish 6th Year Certificate	0.003	*0.970*	0.047	*0.554*	0.001	*0.990*	-0.073	*0.419*
Other Scottish qualification	0.072	*0.590*	-0.047	*0.791*	0.210	*0.339*	0.144	*0.414*
Degree	0.197	*0.000*	0.160	*0.000*	0.232	*0.000*	0.216	*0.000*
Higher Degree	0.061	*0.067*	0.034	*0.285*	0.061	*0.125*	-0.022	*0.537*
BTEC Level 2	0.025	*0.312*	-0.005	*0.828*	0.043	*0.149*	0.057	*0.059*
BTEC Level 3	0.050	*0.043*	0.102	*0.000*	0.056	*0.056*	0.069	*0.009*
BTEC Level 4	0.025	*0.675*	-0.024	*0.575*	0.101	*0.163*	-0.024	*0.644*
Other BTEC qualification	0.112	*0.032*	0.137	*0.006*	0.040	*0.534*	-0.040	*0.481*
City and Guilds Level 2	-0.032	*0.180*	-0.013	*0.503*	-0.010	*0.751*	0.008	*0.730*
City and Guilds Level 3	-0.092	*0.000*	-0.015	*0.404*	-0.037	*0.236*	-0.059	*0.007*
City and Guilds Level 4	-0.088	*0.354*	-0.021	*0.645*	-0.166	*0.118*	0.007	*0.895*
Other City and Guilds	0.023	*0.617*	0.011	*0.790*	0.034	*0.538*	-0.001	*0.988*
RSA Stage 1	0.010	*0.478*	-0.016	*0.622*	0.022	*0.206*	0.008	*0.830*
RSA Stage 2	0.060	*0.109*	0.134	*0.382*	0.099	*0.035*	-0.103	*0.502*
RSA Stage 3	0.020	*0.861*	(dropped)		0.102	*0.357*	(dropped)	
NVQ Level 1	-0.019	*0.586*	-0.081	*0.058*	0.019	*0.666*	-0.001	*0.983*
NVQ Level 2	-0.075	*0.013*	-0.100	*0.002*	-0.029	*0.451*	-0.079	*0.041*
NVQ Level 3	0.027	*0.436*	0.033	*0.367*	0.033	*0.433*	-0.009	*0.847*
NVQ Level 4	0.160	*0.008*	0.220	*0.012*	0.263	*0.001*	0.053	*0.581*
NVQ Level 5	0.239	*0.159*	-0.220	*0.542*	-0.020	*0.887*	0.118	*0.747*
NVQ Level 6	0.379	*0.074*	0.252	*0.153*	-0.117	*0.605*	0.033	*0.852*
Other NVQ	0.011	*0.865*	0.013	*0.895*	-0.036	*0.635*	0.150	*0.205*
GNVQ Level 1	0.345	*0.252*	0.308	*0.149*	0.201	*0.366*	-0.406	*0.056*
GNVQ Level 2	0.004	*0.984*	0.059	*0.557*	0.030	*0.891*	0.053	*0.862*
GNVQ Level 3	-0.012	*0.944*	-0.009	*0.938*	(dropped)		0.089	*0.478*
Other GNVQ qualification	0.234	*0.257*	(dropped)		0.039	*0.899*	0.416	*0.169*
ONC/OND	0.070	*0.228*	0.041	*0.144*	0.097	*0.145*	-0.030	*0.367*
HNC/HND	-0.013	*0.695*	0.062	*0.013*	-0.020	*0.611*	0.124	*0.000*
Trade apprenticeship	-0.027	*0.723*	0.035	*0.136*	0.047	*0.622*	0.026	*0.383*
Part time	-0.199	*0.000*	-0.374	*0.000*	-0.205	*0.000*	-0.342	*0.000*
Father Social Class I 1986	0.054	*0.055*	0.031	*0.280*	0.080	*0.016*	0.048	*0.146*
Father Social Class II 1986	0.010	*0.551*	0.042	*0.017*	0.041	*0.045*	0.050	*0.016*
Father Social Class III nm	0.046	*0.059*	-0.041	*0.094*	0.034	*0.264*	0.001	*0.977*
Father Social Class III m	0.007	*0.658*	-0.028	*0.078*	0.032	*0.076*	-0.005	*0.785*
Father Social Class IV 1986	-0.043	*0.108*	-0.008	*0.770*	0.014	*0.676*	-0.049	*0.145*
Father is a student 1986	-0.121	*0.031*	0.035	*0.575*	-0.004	*0.959*	0.017	*0.814*
Father is dead	0.022	*0.568*	0.000	*0.993*	0.112	*0.025*	0.014	*0.787*
Financial hardship 1986	-0.015	*0.437*	-0.031	*0.144*	-0.034	*0.153*	-0.040	*0.109*
North	-0.123	*0.000*	-0.082	*0.004*	-0.138	*0.000*	-0.213	*0.000*
Yorkshire and Humberside	-0.076	*0.001*	-0.087	*0.000*	-0.064	*0.015*	-0.068	*0.014*
East Midlands	-0.061	*0.013*	-0.031	*0.212*	-0.049	*0.092*	-0.052	*0.074*
East Anglia	-0.033	*0.298*	-0.069	*0.021*	-0.072	*0.062*	-0.103	*0.002*

South West	-0.077	*0.001*	-0.072	*0.004*	-0.054	*0.047*	-0.060	*0.033*
West Midlands	-0.081	*0.000*	0.011	*0.649*	-0.060	*0.024*	-0.032	*0.218*
North West	-0.040	*0.052*	-0.062	*0.006*	-0.082	*0.001*	-0.104	*0.000*
Wales	-0.096	*0.001*	-0.069	*0.025*	-0.098	*0.002*	-0.148	*0.000*
Scotland	-0.095	*0.000*	-0.029	*0.273*	-0.057	*0.065*	-0.144	*0.000*
Drawing test One 1st quintile	-0.035	*0.267*	-0.037	*0.181*	-0.030	*0.429*	-0.041	*0.203*
Drawing test One 2nd quintile	-0.010	*0.664*	-0.005	*0.802*	-0.006	*0.814*	-0.024	*0.350*
Drawing test One 4th quintile	-0.028	*0.188*	0.032	*0.156*	-0.010	*0.680*	-0.042	*0.115*
Drawing test One 5th quintile	-0.001	*0.981*	-0.001	*0.984*	-0.019	*0.501*	-0.018	*0.565*
Drawing test Two 1st quintile	0.011	*0.713*	0.009	*0.732*	-0.002	*0.967*	-0.015	*0.634*
Drawing test Two 2nd quintile	0.016	*0.488*	0.028	*0.206*	0.019	*0.495*	0.011	*0.675*
Drawing test Two 4th quintile	0.015	*0.476*	-0.002	*0.914*	-0.008	*0.766*	-0.025	*0.354*
Drawing test Two 5th quintile	0.001	*0.954*	0.003	*0.918*	0.013	*0.656*	0.020	*0.527*
Vocabulary test lowest quintile	0.016	*0.451*	-0.002	*0.928*	-0.039	*0.135*	-0.055	*0.073*
Vocabulary test 2nd quintile	0.003	*0.875*	0.031	*0.146*	-0.004	*0.854*	-0.026	*0.314*
Vocabulary test 4th quintile	0.007	*0.715*	0.022	*0.263*	0.010	*0.641*	-0.008	*0.742*
Vocabulary test 5th quintile	0.021	*0.272*	0.023	*0.229*	0.023	*0.328*	-0.017	*0.460*
Profile test lowest quintile	0.008	*0.689*	-0.012	*0.579*	0.024	*0.342*	0.046	*0.068*
Profile test 2nd quintile	0.022	*0.241*	-0.005	*0.797*	0.002	*0.910*	0.047	*0.041*
Profile test 4th quintile	0.020	*0.277*	-0.024	*0.232*	0.020	*0.374*	0.037	*0.124*
Profile test 5th quintile	-0.001	*0.971*	-0.028	*0.153*	-0.019	*0.422*	0.037	*0.108*
Copying test 1st lowest quintile	-0.022	*0.413*	-0.029	*0.274*	-0.012	*0.719*	-0.053	*0.084*
Copying test 2nd quintile	0.000	*0.999*	0.022	*0.343*	0.007	*0.776*	0.010	*0.716*
Copying test 4th quintile	0.026	*0.140*	0.011	*0.565*	0.015	*0.485*	0.039	*0.084*
Copying test 5th quintile	0.029	*0.132*	0.054	*0.009*	0.034	*0.149*	0.042	*0.074*
Maths test lowest quintile	-0.095	*0.000*	-0.053	*0.054*	-0.069	*0.026*	-0.035	*0.306*
Maths test 2nd quintile	-0.053	*0.009*	-0.027	*0.221*	-0.016	*0.492*	0.020	*0.462*
Maths test 4th quintile	-0.033	*0.070*	0.015	*0.430*	-0.005	*0.829*	0.043	*0.065*
Maths test 5th quintile	0.016	*0.440*	0.002	*0.926*	-0.006	*0.823*	0.030	*0.251*
Reading test lowest quintile	-0.071	*0.016*	0.016	*0.556*	-0.040	*0.234*	-0.057	*0.085*
Reading test 2nd quintile	0.004	*0.854*	0.028	*0.199*	-0.017	*0.493*	0.025	*0.339*
Reading test 4th quintile	-0.004	*0.852*	0.015	*0.460*	-0.009	*0.680*	-0.008	*0.751*
Reading test 5th quintile	0.020	*0.328*	0.017	*0.432*	0.015	*0.541*	0.006	*0.823*
Word score lowest quintile	-0.004	*0.883*	-0.032	*0.243*	-0.053	*0.057*	-0.055	*0.092*
Word score 2nd quintile	-0.006	*0.800*	0.009	*0.725*	-0.023	*0.417*	-0.060	*0.073*
Word score 4th quintile	0.017	*0.386*	-0.001	*0.952*	0.009	*0.687*	0.000	*0.987*
Word score 5th quintile	0.053	*0.003*	0.043	*0.015*	0.021	*0.313*	0.022	*0.278*
Small firm	-0.032	*0.040*	-0.069	*0.000*	-0.059	*0.001*	-0.032	*0.095*
Large firm	0.037	*0.026*	0.024	*0.154*	-0.015	*0.444*	0.060	*0.003*
Very large firm	0.092	*0.000*	0.054	*0.002*	0.080	*0.000*	0.061	*0.003*
Tenure	0.011	*0.034*	0.010	*0.070*	0.010	*0.063*	-0.004	*0.504*
Tenure squared	0.000	*0.237*	0.000	*0.198*	-0.001	*0.113*	0.000	*0.266*
Managerial responsibilities	0.142	*0.000*	0.144	*0.000*	0.201	*0.000*	0.176	*0.000*
(Constant)	1.935	*0.000*	2.023	*0.000*	2.174	*0.000*	2.322	*0.000*
	Number of obs:	2594	Number of obs:	2633	Number of obs:	2020	Number of obs:	1879
	Adj. R-squared	0.476	Adj. R-squared	0.334	Adj. R-squared	0.494	Adj. R-squared	0.419

Table 4	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.090	0.000	0.101	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.001	0.874	-0.001	0.947
A/S Level Grade A-C	0.048	0.008	0.038	0.076
A-Level/S-Level Grade A-C	0.096	0.000	0.069	0.000
SCE Standard Grade 4-5	0.001	0.982	-0.041	0.523
SCE Standard Grade 1-3	0.032	0.298	0.057	0.115
SLC Lower or Ordinary Grade	-0.107	0.175	0.177	0.086
SLC Higher Grade	0.073	0.014	0.104	0.002
Scottish 6th Year Certificate	0.026	0.663	-0.020	0.779
Other Scottish qualification	0.042	0.700	0.150	0.291
Degree	0.188	0.000	0.236	0.000
Higher Degree	0.031	0.189	0.012	0.662
BTEC Level 2	0.010	0.571	0.054	0.012
BTEC Level 3	0.083	0.000	0.072	0.000
BTEC Level 4	-0.004	0.915	0.014	0.756
Other BTEC qualification	0.101	0.006	0.008	0.860
City and Guilds Level 2	-0.010	0.493	-0.006	0.771
City and Guilds Level 3	-0.033	0.023	-0.047	0.011
City and Guilds Level 4	-0.010	0.813	-0.013	0.796
Other City and Guilds qualification	0.007	0.814	0.025	0.509
RSA Stage 1	-0.005	0.718	0.008	0.619
RSA Stage 2	0.067	0.078	0.082	0.075
RSA Stage 3	-0.022	0.849	0.149	0.187
NVQ Level 1	-0.049	0.083	0.022	0.527
NVQ Level 2	-0.091	0.000	-0.070	0.011
NVQ Level 3	0.032	0.208	0.011	0.723
NVQ Level 4	0.201	0.000	0.184	0.002
NVQ Level 5	0.175	0.265	0.032	0.808
NVQ Level 6	0.227	0.074	0.055	0.675
Other NVQ or Trusts towards NVQ	0.038	0.491	0.037	0.570
GNVQ Level 1	0.342	0.051	-0.133	0.399
GNVQ Level 2	0.085	0.355	-0.003	0.988
GNVQ Level 3	0.038	0.695	0.034	0.793
Other GNVQ qualification	0.261	0.225	0.211	0.345
ONC/OND	0.039	0.115	0.002	0.938
HNC/HND	0.047	0.020	0.077	0.001
Recognised trade apprenticeship	0.045	0.037	0.044	0.121
Female	-0.088	0.000	-0.077	0.000
Part time	-0.246	0.000	-0.254	0.000
Father Social Class I	0.047	0.021	0.065	0.007
Father Social Class II	0.031	0.014	0.048	0.001
Father Social Class III non-manual	-0.001	0.966	0.011	0.597
Father Social Class III manual	-0.015	0.186	0.012	0.381
Father Social Class IV	-0.032	0.105	-0.026	0.291
Father is a student	-0.072	0.091	0.011	0.833
Father is dead	0.020	0.512	0.070	0.059
Financial hardship 1986	-0.024	0.102	-0.045	0.010
North	-0.114	0.000	-0.181	0.000
Yorkshire and Humberside	-0.082	0.000	-0.071	0.000
East Midlands	-0.058	0.001	-0.063	0.003
East Anglia	-0.049	0.027	-0.092	0.000
South West	-0.080	0.000	-0.060	0.003
West Midlands	-0.048	0.004	-0.048	0.012
North West	-0.059	0.000	-0.099	0.000
Wales	-0.095	0.000	-0.129	0.000
Scotland	-0.069	0.000	-0.117	0.000
Drawing test One lowest quintile	-0.041	0.050	-0.046	0.070
Drawing test One 2nd quintile	-0.007	0.669	-0.020	0.315
Drawing test One 4th quintile	0.000	0.987	-0.020	0.298
Drawing test One 5th quintile	0.008	0.672	-0.015	0.501
Drawing test Two 1st quintile	0.005	0.814	-0.015	0.539
Drawing test Two 2nd quintile	0.019	0.238	0.012	0.538
Drawing test Two 4th quintile	0.006	0.725	-0.019	0.326
Drawing test Two 5th quintile	-0.004	0.838	0.012	0.578
Vocabulary test lowest quintile	-0.005	0.774	-0.057	0.005
Vocabulary test 2nd quintile	0.016	0.276	-0.021	0.250
Vocabulary test 4th quintile	0.014	0.320	0.009	0.608

Vocabulary test 5th quintile	0.022	0.106	0.016	0.335
Profile test lowest quintile	0.003	0.868	0.030	0.097
Profile test 2nd quintile	0.012	0.400	0.031	0.057
Profile test 4th quintile	0.000	0.972	0.028	0.100
Profile test 5th quintile	-0.022	0.117	0.000	0.982
Copying test lowest quintile	-0.028	0.148	-0.033	0.152
Copying test 2nd quintile	0.007	0.664	0.011	0.566
Copying test 4th quintile	0.024	0.072	0.026	0.107
Copying test 5th quintile	0.042	0.003	0.038	0.029
Maths test lowest quintile	-0.081	0.000	-0.060	0.011
Maths test 2nd quintile	-0.040	0.009	-0.004	0.829
Maths test 4th quintile	-0.008	0.565	0.024	0.142
Maths test 5th quintile	0.009	0.540	0.016	0.397
Reading test lowest quintile	-0.021	0.295	-0.047	0.053
Reading test 2nd quintile	0.016	0.301	0.003	0.866
Reading test 4th quintile	0.005	0.721	-0.017	0.315

Reading test 5th quintile	0.015	0.303	0.006	0.758
Word score lowest quintile	-0.021	0.241	-0.063	0.003
Word score 2nd quintile	-0.005	0.777	-0.029	0.188
Word score 4th quintile	0.013	0.350	0.011	0.520
Word score 5th quintile	0.047	0.000	0.025	0.098
Small firm	-0.050	0.000	-0.040	0.004
Large firm	0.024	0.049	0.021	0.148
Very large firm	0.069	0.000	0.076	0.000
Tenure	0.016	0.000	0.009	0.028
Tenure squared	-0.001	0.013	0.000	0.235
(Constant)	2.081	0.000	2.355	0.000
	Number of obs:	5229	Number of obs:	3902
	Adj R-squared	0.4047	Adj R-squared	0.4500

Table 5	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	*P>t*	Coef.	*P>t*
Years of schooling	0.114	*0.000*	0.118	*0.001*
5+ GCSE's Grade A-C	0.006	*0.812*	0.019	*0.505*
<5 GCSE's Grade A-C	0.002	*0.827*	0.000	*0.980*
A-Level/S-Level Grade A-C	-0.023	*0.504*	-0.065	*0.115*
SCE Standard Grade 4-5	0.006	*0.922*	0.005	*0.952*
SCE Standard Grade 1-3	-0.024	*0.506*	-0.015	*0.730*
SLC Lower or Ordinary Grade	-0.118	*0.188*	0.077	*0.524*
SLC Higher Grade	-0.054	*0.232*	-0.037	*0.513*
Scottish 6^{th} Year Certificate	-0.030	*0.674*	-0.113	*0.178*
Other Scottish qualification	-0.127	*0.320*	-0.019	*0.912*
Degree	-0.131	*0.128*	-0.094	*0.353*
Higher Degree	-0.103	*0.022*	-0.114	*0.021*
BTEC Level 2	-0.001	*0.972*	0.032	*0.188*
BTEC Level 3	0.014	*0.567*	0.017	*0.522*
BTEC Level 4	-0.005	*0.909*	0.030	*0.552*
Other BTEC qualification	0.046	*0.300*	-0.085	*0.106*
City and Guilds Level 2	-0.020	*0.228*	0.000	*0.997*
City and Guilds Level 3	-0.014	*0.406*	-0.030	*0.157*
City and Guilds Level 4	0.002	*0.965*	0.001	*0.990*
Other City and Guilds qualification	0.022	*0.521*	0.027	*0.517*
RSA Stage 1	0.007	*0.655*	0.018	*0.317*
RSA Stage 2	0.017	*0.701*	0.054	*0.301*
RSA Stage 3	0.029	*0.819*	0.169	*0.178*
NVQ Level 1	-0.018	*0.577*	0.032	*0.426*
NVQ Level 2	-0.086	*0.001*	-0.044	*0.162*
NVQ Level 3	0.029	*0.299*	0.000	*0.994*
NVQ Level 4	0.197	*0.001*	0.155	*0.023*
NVQ Level 5	0.292	*0.087*	0.253	*0.115*
Other NVQ or Trusts towards NVQ	0.057	*0.359*	0.090	*0.234*
GNVQ Level 1	0.334	*0.082*	-0.077	*0.656*
GNVQ Level 2	0.035	*0.730*	0.071	*0.724*
GNVQ Level 3	0.129	*0.254*	0.236	*0.114*
Other GNVQ qualification	0.117	*0.621*	0.097	*0.697*
ONC/OND	0.051	*0.066*	0.002	*0.945*
HNC/HND	0.030	*0.185*	0.065	*0.019*
Recognised trade apprenticeship	0.107	*0.000*	0.107	*0.007*
Sex	-0.098	*0.000*	-0.078	*0.000*
Part time	-0.098	*0.000*	-0.210	*0.000*
North	-0.193	*0.000*	-0.144	*0.000*
Yorkshire and Humberside	-0.080	*0.000*	-0.068	*0.002*
East Midlands	-0.071	*0.213*	-0.019	*0.459*
East Anglia	-0.027	*0.184*	-0.081	*0.008*
South West	-0.033	*0.010*	-0.037	*0.118*
West Midlands	-0.051	*0.171*	-0.029	*0.180*
North West	-0.025	*0.000*	-0.099	*0.000*
Wales	-0.069	*0.000*	-0.157	*0.000*
Scotland	-0.115	*0.100*	-0.077	*0.003*
Drawing test One 1st quintile	-0.036	*0.081*	-0.021	*0.454*
Drawing test One 2nd quintile	-0.041	*0.832*	0.002	*0.922*
Drawing test One 4th quintile	0.004	*0.251*	-0.014	*0.512*
Drawing test One 5th quintile	0.021	*0.716*	-0.005	*0.849*
Drawing test Two 1st quintile	0.007	*0.715*	-0.014	*0.625*
Drawing test Two 2nd quintile	0.008	*0.571*	0.001	*0.981*
Drawing test Two 4th quintile	0.010	*0.653*	-0.007	*0.732*
Drawing test Two 5th quintile	0.008	*0.400*	0.010	*0.683*
Vocabulary test lowest quintile	-0.017	*0.866*	-0.051	*0.026*
Vocabulary test 2nd quintile	-0.003	*0.324*	-0.013	*0.513*
Vocabulary test 4th quintile	0.016	*0.447*	-0.010	*0.587*
Vocabulary test 5th quintile	0.012	*0.609*	-0.010	*0.616*
Profile test lowest quintile	0.008	*0.370*	0.029	*0.150*
Profile test 2nd quintile	-0.015	*0.690*	0.019	*0.297*
Profile test 4th quintile	0.006	*0.685*	0.027	*0.153*
Profile test 5th quintile	-0.006	*0.218*	-0.001	*0.965*
Copying test lowest quintile	-0.019	*0.928*	0.000	*0.997*
Copying test 2nd quintile	0.002	*0.050*	0.034	*0.145*
Copying test 4th quintile	0.038	*0.020*	0.039	*0.032*
Copying test 5th quintile	0.035	*0.000*	0.058	*0.005*
Maths test lowest quintile	0.061	*0.001*	-0.057	*0.028*
Maths test 2nd quintile	-0.067	*0.036*	-0.009	*0.678*
Maths test 4th quintile	-0.035	*0.352*	0.012	*0.498*

Maths test 5th quintile	-0.014	*0.929*	-0.010	*0.645*
Reading test lowest quintile	-0.002	*0.952*	-0.022	*0.419*
Reading test 2nd quintile	-0.001	*0.239*	0.001	*0.973*
Reading test 4th quintile	0.020	*0.955*	-0.012	*0.520*
Reading test 5th quintile	-0.001	*0.213*	0.015	*0.450*
Word score lowest quintile	0.021	*0.802*	-0.032	*0.207*
Word score 2nd quintile	0.005	*0.726*	-0.019	*0.452*
Word score 4th quintile	0.007	*0.219*	0.023	*0.257*
Word score 5th quintile	0.020	*0.000*	0.032	*0.063*
Small firm	0.050	*0.000*	-0.041	*0.007*
Large firm	-0.052	*0.036*	0.028	*0.088*
Very large firm	0.028	*0.000*	0.060	*0.000*
Tenure	0.061	*0.789*	-0.001	*0.776*
Tenure squared	-0.001	*0.170*	0.000	*0.484*
Managerial responsibilities	0.001	*0.000*	0.181	*0.000*
(Constant)	0.142	*0.048*	0.917	*0.028*
	Number of obs:	5089	Number of obs:	3776
	Adj. R-squared	0.278	Adj. R-squared	0.321

Table 6	Dearden et al. NCDS	Aldrich BCS		
Academic qualifications			NVQ level	Comment (if applicable)
CSEs	CSE grade 2-5	CSE grade 2-5, O Levels grade D-E, GCSE's grade D-E	1	CSE's exams were offered to lower ability students as an alternative to O Levels. GCSE's were introduced in 1986 as a direct replacement for O-Levels under the NVQ framework. Scottish Standard grades 4-5 are equivalent to achieving GCSE's grade D-E. Scottish Standard grades 1-3 are equivalent to NVQ level 2 (GCSEs grade A-C).
		Scottish Standard grade 4-5	1	
O Levels	O Level A-C grade	O Level A-C grade, GCSE's grade A-C, CSE grade 1	2	
	CSE grade 1	Scottish Standard grade 1-3	2	
A Levels	A Level	A Level	3	A/S levels were not included in the NCDS, but are in the BCS. This is half an A-level (NVQ level 3), and is included in the 'other' qualification category in this specification.
	Scottish Certificate of 6th year studies	Scottish Certificate of 6th year studies	3	
	SCE Higher	SCE Higher	3	
HE Diploma	Diplomas in HE	Diplomas in HE	4	
First degree	Degree	Degree	4	
Higher Degree	Higher Degree	Higher Degree	5	
Other		A/S Levels SCE Lower		
Vocational Qualifications				
RSA Low	RSA Level 1	RSA Level 1 NVQ/GNVQ Level 1	1	Under the 1986 NVQ Framework, the system of vocational qualifications was simplified and the levels changed. For comparison, the qualifications have been merged to replicate the NCDS study. NVQs and GNVQs were not included in the NCDS, and have been included in existing qualification categories from the NCDS; NVQ Level 1 are included with RSA 1 qualifications, NVQ 2 and BTEC 2 with C&G Low, NVQ3 with ONC and NVQ 4,5 and 6 with HNC qualifications. A specification that included these qualifications separately (with categories specified in Deaden et al's analysis of Labour Force Survey data, which did include NVQ qualifications) resulted in very similar results (not presented) for all qualifications (for specified categories, see bottom of table). In the NCDS study, the
RSA High	RSA 2 &3	RSA 2 & 3	2	
C&G Low	C&G Craft/ Intermediate/ Ordinary	C&G Craft/ Intermediate/ Ordinary NVQ/GNVQ Level 2, BTEC 2	2	
C&G Higher	C&G Advanced, Final, Full	C&G Advanced, Final, Full Technological		

	Technological			qualifications included in C&G higher were only at NVQ level 3, however under the new system the same qualifications (full technological certificate) was classed as an NVQ level 4 qualification. Therefore, it is the NVQ levels that have changed, not what is included in the C&G categories.
ONC	ONC/OND, SNC/SND	ONC/OND	3	
	BTEC 3	BTEC 3	3	
	TEC/BEC 3	TEC/BEC 3	3	
	SCOTTEC/SCOTVEC 3	SCOTTEC/SCOTVEC 3 NVQ/GNVQ Level 3	3	
HNC	HNC/HND	HNC/HND	4	
	BTEC/SCOTVEC Higher	BTEC 4	4	
		TEC/BEC 4	4	
		SCOTTEC/SCOTVEC 4 NVQ Levels 4,5 & 6	4	
Nursing	Nursing	Nursing	4	
Professional qualifications	Member of a professional institute	Member of a professional institute	5	
Apprenticeship	Trade apprenticeship	Trade apprenticeship		
Other business	HGV, PSV, Other business qualifications	HGV		
Other	YT certificate	Other Scottish qualification	1	
	SCOTVEC National certificate	Other BTEC C&G Level 1	1	
	Any other qualifications	Other NVQ	1	
		YT/YTS	1	
		Any other qualifications	1	
(Alternative specification categories for qualifications not included in the NCDS)				
NVQ 1		NVQ/GNVQ Level 1	1	

NVQ 2		NVQ/GNVQ Level 2	2	
NVQ high		NVQ/GNVQ Level 3, NVQ 4,5 & 6		
BTEC Level 2		BTEC 2, TEC/BEC 2, SCOTTEC/SCOTVEC 2	2	

Table 6 cont.	Dearden et al. NCDS	Aldrich BCS	
Control variables			
Ethnicity	White Non-white	White Non-white	
Ability	Maths ability age 7 Reading ability age 7	Maths ability age 10 Reading ability age 10 Words test age 10 HFD age 5 PVT age 5 CDT age 5	In the NCDS, the earliest ability tests were used as they were less likely to be influenced by schooling. In the BCS, the comparable Maths and Reading tests were carried out age 10. Therefore, three specifications were estimated; one including only maths and reading tests at age 10, one with all available tests at age 10, and the other including only age 5 test scores. There is a slight difference between returns to GCSE's when using age 5 as opposed to age 10 tests, but differences are not significant. Therefore, only the specification controlling for maths and reading tests are presented here.
School type age 16	Comprehensive Secondary Modern Grammar Private Other	Local Education Authority school (base case) Independent school	The NCDS school type variables are no longer applicable in the BCS. Secondary modern schools, and grammar schools, were phased out in the 1970s, although grammar schools remain in some parts of England.
Parents' education	Father's years of education Father's education missing Mother's years of education	Father's years of education Father's education missing Mother's years of education	

	Mother's education missing	Mother's education missing	
Family background	Father's social class age 16 Bad finances age 11 or 16, or free school meals age 11 or 16	Father's social class age 16 Bad finances age 10, or free school meals age 10 or 16	Free school meal status is reported in the BCS at age 10 (the difference is only due to timing of the survey) and 16. Bad finances are reported at age 16 but not age 10.
Father's interest in education	Expects too much	Very interested	
Mother's interest in education	Very interested	Moderate interest	
	Some interest	Very little interest Uninterested (base case)	
Employer characteristics	Large employer (500+)	Large employer (500+)	
	Union membership	Trade union activity since last interview	Union membership is not asked for in the 2004 sweep of the BCS. Union membership declined considerable over this period, and only information regarding an individual's activity within a trade union is available.
	Private sector firm	Private firm or company	

Table 7	Log hourly pay 2004			
	Males		Females	
	Coef.	P>t	Coef.	P>t
CSEs	-0.021	0.283	-0.009	0.672
O Levels	0.064	0.002	0.076	0.001
A Levels	0.071	0.006	0.090	0.001
HE Diploma	0.067	0.020	0.086	0.003
First Degree	0.174	0.000	0.280	0.000
Higher Degree	0.008	0.855	0.059	0.266
Other academic	0.050	0.157	0.027	0.461
RSA Low	0.007	0.861	-0.005	0.820
RSA High	-0.143	0.370	0.087	0.114
C&G Low	0.000	0.984	0.007	0.763
C&G Higher	-0.033	0.138	-0.023	0.541
ONC	0.048	0.039	0.058	0.044
HNC	0.080	0.005	0.077	0.045
Professional	0.164	0.000	0.211	0.000
Nursing	0.060	0.582	0.110	0.004
Other Business	-0.057	0.175	0.088	0.600
Other vocational	-0.019	0.276	-0.029	0.130
Apprencticeship no quals	0.035	0.248	-0.041	0.753
Independent School	0.038	0.739	0.112	0.224
School type missing	-0.004	0.808	0.017	0.355
Non-white	-0.030	0.624	0.046	0.437
Financial hardship	-0.032	0.189	-0.050	0.052
Financial hardship missing	0.005	0.893	0.010	0.772
Father's years of education	0.004	0.397	-0.007	0.146
Mother's years of education	0.000	0.928	0.012	0.057
Father's education missing	-0.063	0.471	0.008	0.921
Mother's education missing	0.043	0.621	0.064	0.439
Father very interested in schooling	0.106	0.157	0.119	0.200
Father moderately interested in schooling	0.065	0.381	0.062	0.499
Father little interest in schooling	0.060	0.487	0.011	0.919
Father's interest missing	0.074	0.315	0.072	0.424
Mother very interested in schooling	-0.028	0.740	-0.027	0.814
Mother moderately interested in schooling	-0.041	0.627	-0.014	0.902
Mother little interest in schooling	-0.043	0.635	-0.005	0.964
Mother's interest missing	-0.033	0.705	0.036	0.756
Very large firm (500+ employees)	0.041	0.036	0.112	0.000
Firm size missing	0.349	0.057	0.259	0.443
Private firm	0.040	0.038	-0.022	0.222
Firm type missing	0.036	0.739	-0.157	0.141
Trade Union activity since last interview	-0.129	0.002	-0.073	0.291

Maths test lowest quintile	-0.134	0.000	-0.126	0.000
Maths test 2nd quintile	-0.011	0.694	-0.041	0.151
Maths test 4th quintile	0.041	0.103	0.034	0.185
Maths test highest quintile	0.039	0.152	0.057	0.057
Reading test lowest quintile	-0.082	0.014	-0.044	0.254
Reading test 2nd quintile	-0.015	0.564	-0.001	0.970
Reading test 4th quintile]	-0.011	0.665	0.010	0.695
Reading test highest quintile	0.001	0.970	0.028	0.311
North	-0.209	0.000	-0.152	0.000
Yorkshire and Humberside	-0.092	0.003	-0.108	0.001
East Midlands	-0.040	0.208	-0.089	0.012
East Anglia	-0.094	0.016	-0.126	0.011
South West	-0.032	0.345	-0.109	0.001
West Midlands	-0.031	0.302	-0.040	0.232
North West	-0.079	0.007	-0.084	0.006
Wales	-0.127	0.001	-0.140	0.001
Scotland	-0.134	0.000	-0.093	0.007
Father Social Class I	-0.023	0.685	0.038	0.472
Father Social Class II	-0.029	0.494	0.046	0.226
Father Social Class III non-manual	-0.082	0.086	0.036	0.425
Father Social Class III manual	-0.104	0.012	0.047	0.189
Father Social Class IV	-0.113	0.023	0.012	0.794
Father is a student	-0.042	0.625	0.082	0.407
Father is dead	-0.042	0.600	0.118	0.106
(Constant)	2.390	0.000	2.020	0.000
	Number of obs:	1561	Number of obs:	1524
	Adj. R-squared	0.3259	Adj. R-squared	0.3867

<u>Chapter Four:</u>

The Value of Soft Skills

4.1 Introduction

Chapter Three and other literature show that, even though there has been a recent increase in participation in post-compulsory schooling, particularly in higher education over the past 30 years, returns to these qualifications have not changed all that much. The usual conclusion from this is that demand for these qualifications has increased in line with supply; however this is not entirely consistent with the over-education literature, which finds a significant pay penalty for those not in jobs requiring their qualifications. Indeed, there is some evidence that the incidence of over-education has increased over time, particularly for graduates (Felstead et al. 2007). I propose an alternative explanation for the recent trends. It may be that some of the changes in returns to qualifications are clouded by the presence of an increased demand for 'soft' skills. These are more generic characteristics of individuals, rather than skills per se, which are not directly measured by qualifications obtained. Felstead et al. also find that, between 1997 and 2001, generic skills have become more important in the workplace. Blanden et al. (2007) add further support to this hypothesis, showing that skills are a determinant of social mobility for the 1970 Cohort, but this was not the case for the 1958 cohort. Other arguments suggest that the incidence of over-education is improving, through more jobs being defined as graduate-level (Grazier et al. 2008).

I will argue that employers increasingly require that new employees have not only 'hard', technical skills learnt in education, but also personal characteristics which help improve the match between the individual and the firm and its other employees. Therefore, it may be that firms find it increasingly hard to distinguish by qualification level[50] and are utilising the levels of soft skills to distinguish between potential employees. Ultimately, soft skills determine whether the individual is successful in applying for a job appropriate for his/her skills, or whether s/he is over-educated and therefore experiences a lower return to her qualifications, ceteris paribus.

Soft skills are becoming increasingly important in the UK labour market. With the expansion of the service sector (although not solely because of this reason), teamwork, effective communication, problem solving, leadership, and motivation are no longer seen as personal characteristics or attributes, but as skills in themselves. Firstly, I

[50] See Section 2.5, p.53 for a discussion of competition for graduate jobs.

will explain why this has occurred, and then I will discuss how soft skills are assessed by employers as part of the job application and assessment process.

Tasks in low-skilled service sector jobs are routine, whereas constantly improving technology has given frequent opportunity for those in higher-skilled jobs to increase their human capital (Gallie 1994). The increased automation of production tasks has lead to many low-skilled jobs, particularly part-time jobs, being concentrated in the service sector. A significant proportion of these occupations are ‘front-line’ jobs, where the employee interacts directly with a customer (for example in buying and selling goods). Therefore, the soft skills mentioned above are some of the most important competencies in these jobs. These same skills are used, although to a different extent or with a different emphasis, at the upper end of the occupational classification; for example, professional service and management positions rely on employees possessing these types of skills. Returns to management positions have been increasing, and is proposed as a major reason for increasing income inequality within firms, both within and between educational groups (Frederiksen and Poulsen 2008).

Therefore soft skills are now important across the skills spectrum at both the lower and upper levels of the occupational classification. As discussed previously (p45), skill-biased technological change has contributed to a polarisation of skills in the UK. The competent use of these skills does indeed increase the productive capacity of the employees concerned and, therefore, also of the firms themselves.

This chapter will address a number of questions concerning soft skills and their value in the labour market. One of the important issues I will discuss is whether the acquisition of soft skills are the responsibility of the individual concerned, or the responsibility of the education system, where training might be provided as part of the learning process in obtaining qualifications. This obviously has an effect on public policy, and has implications for the course content of both compulsory and post-compulsory education. This has been under scrutiny recently, with employers putting pressure on higher education institutions to revise the content of degree programmes to better suit the needs of business. This raises the question of where universities should be situated in the spectrum; as learning institutions for academic interest, or as a supplier of high-skill human capital to the labour market. There has been debate between business leaders and institutions; John Denham, the previous government Minister for the

Department of Innovation, Universities and Skills[51], called for closer links between universities and business to counter the concern over a lack of high-level skills, particularly personal and team-working skills, in graduates[52]. David Willetts, the new coalition Minister for universities, supports for the closer links also, but as a means of funding research, particularly in science fields[53]. The Confederation for British Industry (CBI) set up a higher education taskforce, with the makeup of the taskforce heavily weighted towards business, to assess what types of skills businesses require in graduate recruits. However, some university representatives have reacted cautiously to the proposals, claiming that it would counter academic freedom and suggests that if universities were to become more business oriented, then business should help fund the institutions[54]. I will attempt to define what soft skills are, examine the current state of the soft skills gap in the UK, and whether the assessment of soft skills held by individuals differs between employers and the individuals themselves.

4.2 Measuring, screening and valuing skills

Skill is not a one-dimensional concept; there is no linearly increasing single measure of ‘skill’. It covers many aspects of personal and educational development, and there is no over-arching gauge that employers can use to compare the complete skills sets of different individuals. Therefore, potential employees are assessed by the firm’s personnel on a one-to-one basis, by computer-assisted assessment or, frequently for managerial positions and for positions in large corporate organisations, both. The Workplace and Employee Relations Survey (WERS) 2004 shows the frequency of use of these assessments in filling vacancies increases with firm size.

[51] This is now the Department for Business, Innovation and Skills, having been renamed under the new government. This renaming itself hints to a continuation of this attitude by the new government.
[52] In a speech at the Wellcome Collection Conference Centre, 29th February 2008
[53] Scientists go on attack over reduced research spending, http://www.independent.co.uk/news/science/scientists-go-on-attack-over-reduced-research-spending-2075411.html 10th September 2010, The Independent
[54] Newman, M, ‘Million+ head says beware of concessions to business’, 2008, Times Higher Education, 25th September 2008 Issue 864

Table 9: Conduct of personality or attitude test by firm size

	Small firm	Medium firm	Large firm	Very large firm	Total
Yes	13.6%	23.2%	46.9%	63.4%	33.9%
No	86.4%	76.8%	53.1%	36.6%	66.1%
Total count	646	642	589	415	2292

Source: WERS 2004

Table 10: Conduct of performance or competency test by firm size

	Small firm	Medium firm	Large firm	Very large firm	Total
Yes	42.3%	55.0%	70.7%	84.1%	60.7%
No	57.7%	45.0%	29.3%	15.9%	39.3%
Total count	646	640	590	415	2291

Source: WERS 2004

The use of one-to-one assessment and interviews has long been a part of the interview process. Assessment centres and psychometric testing are more recent additions to the recruitment process and their use is still expanding (Jenkins 2001). Psychometric testing is used as part of the screening process (usually along with a traditional job application) before a formal face-to-face interview takes place, and is used to assess a candidate's maths, written communication and problem solving skills at an early stage of the recruitment process. The psychometric tests can be designed to assess some of the soft skills required for the particular vacancy the firm is seeking to fill. If the candidate performs well, s/he is invited to an interview and then, if successful at that stage of the process, to an assessment centre.

The purpose of the assessment centre is that it allows the firm to observe and scrutinise how the prospective employees (usually a number of candidates are invited to the assessment days) engage with each other and react to different situations and tasks. From the employer's point of view, it allows the prospective candidates to be assessed in a variety of contexts, tasks and activities which may use the skills involved in the vacancy. Indeed, the assessment centre tasks can be set up to reflect or even mirror the requirements of the vacancy. This way, the outcomes of the assessment centre are to show the candidate how the firm operates and the ethos behind the firm's day-to-day operations, along with providing the prospective employee with an opportunity to sample some of the tasks that, if successful, they would be required to carry out on the job. From the firm's standpoint, this allows the monitoring of candidates in a simulation of the business environment and can, therefore, assess how well the individual will cope with their responsibilities, and evaluate the individual's future potential. The most important aspect of this from the firm's point of view is that, because the day-to-day work environment can be simulated, the firm can ensure that the successful candidate is well-matched firstly with the firm, and secondly with any other successful candidates present at the assessment centre. The second aspect to this is that, of course, soft skills cannot be objectively measured on a CV or by qualifications obtained, and the assessment centre gives the employer a chance to critically assess these soft skills in person. Therefore, despite being a costly screening device, it is becoming increasingly popular, particularly amongst larger, corporate firms.

Having been assessed for ability, a sufficient level of human capital, training and experience during the screening and interview process, successful candidates undergo further screening at assessment centres. This provides that firm with an opportunity to examine the candidate in how s/he applies these skills to the typical tasks s/he will be asked to do, whilst also assessing the candidate's soft skills *within the context of the tasks to be performed on the job*. This typically includes team-working, communicating with authority, team-members and clients, problem solving, giving presentations, attending meetings and writing reports[55]. This of course cannot be done in a traditional interview, and interview competency may not be a good signal of competency in the typical on-the-job tasks the successful candidate will have to perform.

The successful matching between firm and employee in this way, both in terms of the match between the ethos of the firm and the individual's work ethics, and that of competencies and soft skills with the tasks s/he will be asked to perform in the role, may result in a value-added productivity of the worker and therefore for the firm, particularly when the firm invests in providing further training. This could have long lasting effects, in terms of tenure, promotion, job satisfaction for the employee, and lower employee turnover and training costs, and higher production for the firm. Therefore it may be that a significant part of the explanation of the increased utilisation of these tests in the recruitment process is due to the increased focus of firms on the soft skills requirements of the job, thus ensuring a good match with the abilities and characteristics of the potential employee. This may also allow a good match to form between employees,

[55] CIPD fact-sheet: Assessment centres for recruitment and selection

improving the collective productivity of new workers and the initial sunk costs incurred by the running of these assessment centres and the lengthy recruitment process can be recouped over a period of time.

One can see then, that these soft skills are an important part of an individual's human capital, but one also needs to consider the employers' views regarding the state of these skills in the workforce.

4.3 The demand for skills

The National Employers' Skills Survey (NESS) carries out a detailed analysis of the perceived state of skills in the existing workforce and in the potential pool of applicants for any vacancies within firms. The survey asks representative managers or human resource employees about the state of skills gaps and skill shortages within businesses of all sizes and across all sectors. Crucially for this analysis, the NESS asks employers about their perceptions of the state of a number of skills, both 'hard' and 'soft'. This series of surveys, then, can be used to compare how employers perceive the state of skills in the UK to how individuals perceive their own skills (using the BCS70). Given that soft skills are hard to define and even harder to directly measure one might expect there to be a difference between the two. This raises an important dimension of soft skills. Firstly, perceptions of job content between managers and employees may differ. Burchell et al. (1994), as part of the Social Change and Economic Life Initiative, surveyed managers and employees across various types of organisation in one town in the UK in 1987. The authors found that perceptions of job content differ; both within occupational roles, but also that the perception gap differs according to the type of occupation in question. Managers typically seemed to underestimate the levels of organisational and social skills, and the use of discretion in tasks, compared to the workers themselves, particularly for lower skilled jobs (for example, between a hairdresser and a manager). Perceptions were closer when the tasks of the employee were more comparable to that of the managers themselves (i.e. typically in higher skilled jobs).

Secondly, perceptions may differ given the context in which the questions in the BCS70 and NESS are asked. The NESS asks managers for their perceived state of skills regarding both their existing workforce and applicants for vacancies in the past year;

these questions are answered in the context of the typical day-to-day operations of the business. The BCS70 simply asks how the respondent rates a number of soft skills from a choice of 'not having the skill' to 'good'. This may cause a disparity in responses between the BCS70 and the NESS for two reasons. Respondents may struggle to give an accurate response because it is difficult to critically assess something that is not a tangible asset. Also, the individual has no immediate reference point to which s/he can assess the skill in question, although an individual's occupation may have some effect on the rating of their skills. Therefore, one possibility is that the individual uses his/her education level as a proxy reference point, believing the higher her education, the better his/her soft skills. In reality of course, this may not always be the case, although some correlation is likely. Also, one might expect soft skills to develop with experience, so age is likely to matter. Unfortunately, a direct comparison of experience and age cannot be made, as the NESS asks employers about the general state of skills in their workforce, not about specific individuals. I will now discuss the state of skills in the UK, with particular reference to the skills mentioned above that are important for this Thesis, using evidence from the NESS survey series.

The National Employers Skills Survey 2004 (NESS04) is used as a direct comparison to the 2004 sweep of the BCS70. It covers responses from over 27,000 employers which, although considerably smaller than other surveys (the NESS07, for example, covers over 79,000 employers), gives a comprehensive picture of the state of skills in the UK labour market across firms of all sizes and all occupational groups. This survey will be used to outline the state of skills in the UK, and also to compare the employers' responses to those of individuals in the BCS70. The NESS07 will then be used to highlight any changes in the UK, particularly with reference to soft skills, which will have implications for future returns to soft skills. Not only does the NESS07 have a larger sample size, it is also more detailed than the NESS04 and includes information on employers' ratings of those individuals employed straight from education. Therefore the later sweep of the survey will be used to supplement the evidence presented for 2004[56].

Overall, the NESS04 found that 20% of employers experienced skills gaps (defined as a scenario where existing staff were not fully proficient in the skills required

[56] See McIntosh (2005) for a discussion of skills shortages from earlier skills surveys

to carry out the tasks their jobs required), and these are more commonly found in lower skill occupations. Interestingly, employers tended to report deficiencies in soft skills more commonly than in other skills. The most frequently cited gaps were in communication, customer handling, team-working and problem solving skills, comprising between 40-50% of skills gaps where these gaps were present. ‘Hard’ skills, i.e. technical and practical skills, were also frequently cited as missing (45% of employers reporting skills gaps reported these skills to be lacking) and in about 25% of cases, IT and management skills were lacking. It is estimated that around 3% of managers across the whole workforce are lacking proficiency in their management skills.

Examining the breakdown of responses by occupation also makes for interesting reading. The table below extracts some of the skills lacking by occupation for skills gaps and skill shortages.

Table 11: A selection of skills gaps and shortages by major occupational group

Occupation	Skills gaps	Skill shortages[57]
Managers/senior officials	Management skills 75% Communication 57% Team-working 51%	Management skills 54% Communication 37% Customer handling 37%
Professional occupations	Technical and practical 48% Management skills 38% Customer handling 38%	Technical and practical 48% Management skills 24% Communication 20%
Associate professionals	Technical and practical 55% Communication 44% Team-working 40%	Technical and practical 49% Communication 31% Customer handling 30%
Administrative and secretarial occupations	Customer handling 54% IT skills 46% Office administration 48%	Communication 49% Customer handling 49% Literacy skills 42%
Skilled trades	Technical and practical 66% Communication 41% Team-working 39%	Technical and practical 56% Team-working skills 33% Problem solving skills 30%
Personal service occupations	Technical and practical 56% Communication 47% Customer handling 44%	Communication 52% Team-working 49% Customer handling 46%
Sales and customer service	Communication 59% Customer handling 69% Team-working 48%	Customer handling 64% Communication 63% Numeracy skills 33%
Process, plant and machine operatives	Technical and practical 68% Team-working 59% Communication 51%	Technical and practical 54% Communication 36% Customer handling 31%
Elementary occupations	Customer handling 60% Team-working 55% Communication 53%	Communication 52% Customer handling 45% Numeracy skills 40%

Source: NESS 2004 Main Report, Tables 3.4 and 4.4

Unsurprisingly, the skills gaps cited by employers are skills that are important to that occupation in question. This does show that firstly, soft skills are important for business, and employers do appreciate their value as part of the human capital of their workforce. Secondly, it shows that the lack of soft skills accounts for a considerable amount of skills gaps in the UK workforce.

How can the employer remedy the problem of skills gaps in its workforce? The NESS04 shows that often the explanation for the skills gaps is a lack of experience (75% of employers that experienced a skills gap cited this). This was followed by staff lacking motivation, failure by the employer to train staff (both cited 27% of the time), inability of the workforce to keep up with change (24%), high staff turnover and recruitment problems (both 20%). As much of the problem lies with lack of experience, it may be

[57] Skills shortages are distinct from skills gaps in that it measures the proportion of individuals in the potential pool of applicants that lack the skills required to do the job. This will be discussed on p150.

that employers feel that training would not be of much use in improving and filling the soft skills gaps. Unfortunately, NESS04 doesn't ask about the specific skills covered by the training activities provided. The survey does show, however, that the majority of employers (64%) do provide some kind of training to its employees (either on the job, off the job, or both), and the amount of training increases with firm size. Unsurprisingly, managers receive training from more employers than any other group. This is partly due to the fact that managers are one of the largest groups of employees. It may also be due to many management positions requiring specialist training, either in management skills if the employer is promoting in-house or in the structure of the business if recruiting from outside. Given that much of the skills gaps in management occupations concern soft skills, one would expect a significant amount of this training to involve management, communication and teamwork skills (the skills most often cited when skills gaps exist). The other occupations where training was most frequently provided include personal services (71% of employers providing training), associate professionals (61%) and professionals (60%). The table below shows responses from the BCS 2004 survey, again showing that management, professional, associate professional and personal service occupations are more likely to receive work-related training[58].

Table 12: Training rates by occupation

SOC 2000 major group	Whether has done any work-related training courses	
	Yes	No
Managers and senior officials	37.2%	62.8%
Professional occupations	35.5%	64.5%
Associate professional and technical	38.9%	61.1%
Administrative and secretarial	19.4%	80.6%
Skilled trades occupations	21.0%	79.0%
Personal service occupations	25.0%	75.0%
Sales and customer service	14.7%	85.3%
Process, plant and machine operatives	23.5%	76.5%
Elementary occupations	15.5%	84.5%

Source: British Cohort Study 2004

[58] These responses represent whether the individual has received work-related training course that lasted at least three days, since the last time the respondent took part in the survey (for the majority of cases this would have been 2000).

The other important aspect of the state of skills in the UK concerns skill shortages. Did employers find it difficult to fill some of their vacancies? If so, how often did the pool of potential labour not possess the skills required for the vacancies available? From the 18% of firms surveyed that had vacancies, 8% of these vacancies were hard to fill[59] and 6% of these establishments had skills shortage vacancies. 24% of all vacancies are described by employers as skills shortage vacancies (i.e. the percentage of those hard to fill vacancies that are due to a lack of skills in the pool of applicants). Interestingly, the numbers of hard to fill and skill shortage vacancies are found to be higher in smaller firms – 57% of all skills shortage vacancies are found in small (less than 25 employees) firms (although larger firms were more likely to have skills shortage vacancies as a proportion of all vacancies). This may be because, whilst larger firms may be more likely to experience skills shortage vacancies because they cover a higher proportion of employees and are also likely to demand a wider variety of skills across their occupations, they have better recruitment policies (as discussed above) than small firms and so have numerically fewer skill shortage vacancies. This is confirmed when looking at the density of skill shortage vacancies. As a proportion of all vacancies, the density is highest for the smallest firms (29% for firms with 5 or less employees) and decreases as firm size increases (only 16% of vacancies are hard-to-fill because of skill shortages for the largest firms (500 employees or more)). The density is also higher for smaller establishments when calculated as a proportion of skill shortage vacancies per 1000 employees. The existence of skill shortages is very likely to affect performance and productivity of the firm[60].

Looking at the results by occupation, skilled trades[61] (9% of employment, 9% of vacancies but 20% of skill shortage vacancies) and personal services (5% of employment, 9% of vacancies and 12% of skill shortage vacancies) account for a much higher proportion of skills shortage vacancies than they do for total employment share or proportion of vacancies. When asked about the reasons behind the hard-to-fill vacancies, the most frequently cited reason was that applicants lacked the required skills to do the job (this was cited 32% of the time). Interestingly, lack of qualifications was only cited 14% of the time (although this increased 6 percentage points since the 2003 survey). The

[59] Defined as vacancies that are hard to fill because of a lack of education, skills or experience in the pool of applicants

[60] This was not asked directly in the 2004 survey but has been asked in many other years, and this has been a consistent finding.

[61] A discussion of skilled trades shortages is given in Chapter Two.

difference between these results shows that employers accept that education does not provide individuals with all their required human capital, and it is generally skills and *not* the levels of education that are lacking in the UK labour market (at least with regards to these hard-to-fill vacancies).

The above table shows the majority of skills lacking in the pool of potential applicants concerns soft skills; although technical and practical skills are lacking most frequently, communication (40%) customer handling (36%) team working (32%), problem solving (29%), literacy and numeracy skills (28% and 25% respectively) and management skills (22%) are all frequently cited (and incidence has either stayed the same or increased for all of those skills mentioned since 2003).

How does this compare with the views on skills of the individuals themselves? The British Cohort Study asks the individual to rate six soft skills in the 2004 sweep of the survey, and nine in 2000. These are communication, team working, ability to learn new skills, problem solving, using tools properly, looking after people who need care, (and as well as these, in 2000) using finance/accounts, use of numbers and using computers/IT skills. Unfortunately not all the soft skills covered by the BCS70 are the same as those covered by the NESS, but there is some overlap between the skills covered by the surveys. The table below shows the ratings of each skill.

Table 13: British Cohort Study individual rating of soft skills (6 in 2004, 9 in 2000)

	Communication (%)		Teamwork (%)		Learning new skills (%)		Problem solving (%)		Using tools properly (%)		Caring for others (%)		Use of numbers (%)	Computing/ IT skills (%)	Finance/ Accounts (%)
	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2000	2000
Good	72.4	69.3	80.8	78.1	66.5	65.3	53.8	57.5	46.1	51	36.1	41.4	50.2	34.7	30.6
Fair	25.3	28.9	17.8	20.3	32.4	33.3	43.6	39.5	44.2	42	45.6	43.5	42.6	37.8	48.1
Poor	2.2	1.7	1	1.3	0.9	1.3	2.4	2.8	7.7	5.8	11	10.3	6.8	18.4	15.8
No skill	0.1	0.1	0.5	0.3	0.2	0.1	0.2	0.2	2.1	1.1	7.3	4.8	0.4	9.1	5.6

Firstly, one can see that, for those skills that are measured in both the BCS70 and the NESS04, there are differences in perceptions on the state of skills between employers and individuals themselves. The three skills that are identified in both surveys are communication, team-working and problem solving. In the NESS04, as discussed above, these skills are amongst the most frequently cited by employers as lacking in their staff, and are also cited as lacking in applicants for vacancies at the firm. However, when we look at individual responses in the BCS70, we can see that the majority of individuals rated their competence in these skills as good. Moreover, it is very rare for individuals to state that they had a poor grasp of that skill, or did not have the skill at all. In 2004, for example, only 1.7% of individuals rated their communication skills as poor, and 0.1% (just 13 individuals) stated they did not have the skill, even though 51% of employers who stated that staff lacked proficiency stated communication to be lacking, and 40% of applicants for skill shortage vacancies lacked the skill.

Of the remaining skills covered by the BCS70, it seems as though caring for others is the skill most lacking, with only 41.4% and 36.1% of individuals rating that skill as ‘good’ in 2004 and 2000 respectively. Other skills with a relatively low percentage rating of ‘good’ are using tools properly, computing/IT skills and finance/accounts. Interestingly, although basic maths skills are seen as severely lacking in Britain (in an international comparison) (Moser 1999), 92.8% of individuals rated their use of numbers as ‘good’ or ‘fair’.

This disparity may in part be psychological; nevertheless it has some important implications for the skills gap and public policy. If individuals believe that they have these skills, regardless of employers’ perceptions, then individuals will not have the motivation to improve their skills independently of education or workplace training. Therefore, the state of the skills gap will not improve significantly[62] without some sort of intervention.

Appendix C1 Table 1 shows that individuals’ perceptions of skills are gendered. Females are more likely than men to rate communication, team work, and looking after others as ‘good’, whereas men are more likely to rate themselves as ‘good’ at problem

[62] The 2007 National Employers’ Skills Survey shows that the soft skills gaps are still large.

solving, using tools and learning new skills. Females seem to rate their inter-personal skills higher than men do, and men their more practical skills.

One may expect individuals' perceptions of their soft skills to depend in some way on their employment and this is confirmed by Appendix C1 Table 2 which examines soft skills responses by main economic activity. The responses vary across the types of soft skills. For communication skills, the part-time self-employed are most likely to report their skill level as 'good' (77.6%), whilst 70.6% of full-time (working more than 30 hours per week) employees, but only 55% of unemployed, report their communication as 'good'. For team working skills, part-time workers (employed and self-employed) are more likely to rate their skills as 'good' relative to their full-time counterparts (but by less than one percentage point). The unemployed are only slightly less likely to report team working as good (0.3 percentage points). Full-time employees are more likely than any other group to report their ability to learn new skills as 'good', with part-time employees only just more likely than the unemployed (0.2 percentage points) to rate learning new skills as good. For problem solving skills, there is a clear difference between full-time employed and self-employed individuals, compared with part-time workers. For those working full-time, over 60% report problem solving as 'good' (for both employed and self-employed) but for part-time workers only 43.5% of employees reported problem solving as good, and 54.5% of the self-employed.

Unemployed workers are more likely than part-time workers to report their problem solving skills as 'good'. The full-time self-employed are most likely to report their use of tools as 'good'. One would expect this would be due to the nature of much of the self-employed work in the UK being skilled trades and such like. Full-time employees are next most likely, with 57% reporting their skill as 'good' and the unemployed are more likely than part-time workers to report use of tools as 'good' (50.8%). Part-time paid employees are most likely to report their skills as carers as good (59.8%). Part-time self-employed are next most likely. Only 28.2% of full-time self-employed and 33.5% employed report this skill as 'good'. Part-time workers may be more likely to report looking after others as 'good' simply because they have more time to devote to such an activity, outside the workplace, than full-time workers.

For some skills, namely learning new skills, problem solving and using tools properly, the responses highlight a difference between the soft skills of full-time and part-time workers. This may be due to a number of factors; part-time workers may work in occupations that do not require these types of skills, for example low-skill service occupations (but as explained earlier, still require other soft skills, such as interacting with customers). As well as this, working in low-skill occupations may reinforce any lack of skills (Gallie 1994) as individuals may not receive the training required to update and improve these types of skills. However, the direction of causality may be questioned here, as it may be that these individuals recognise that they lack some of the required skills and so self-select into low skilled jobs, with the lack of up-skilling opportunities reinforcing the divide between full-time and part-time workers.

As mentioned above, one of the difficulties in analysing and comparing responses to the results of the NESS is that, because individuals are not asked about their skills in a well-defined context, when considering their responses they may assign a proxy measure as a guide to their response. One obvious choice would be level of education. Although one may expect soft skills ratings to be correlated somewhat with an individual's level of education, it would not be possible to accurately analyse the returns to soft skills in the presence of perfect correlation.

Examining the responses by highest qualification (categorised by NVQ level)[63] for academic and vocational qualifications separately, one can see that responses do differ by education level and by type of qualification. For academic qualifications, the rating of communication skills does increase with NVQ level, with a large step between NVQ level 1 and level 2. For team working, the percentage of respondents rating the skill as 'good' is lower for those with degree (79.2%) and postgraduate level (77.5%) qualifications than GCSE's (82.1%) and A-levels (82.6%). For learning new skills and problem solving there is more than a ten percentage point difference between those with less than 5 GCSE's and higher qualifications. Using tools properly is rated as good by less than half of the respondents for each of the education levels, apart from those with less than 5 GCSE's (52.4%). For looking after others who need care, ratings are much lower than for other skills, and fall as education level increases.

For vocational qualifications, ratings of communication skills are highest for NVQ level 1 (73.4%) and lowest for level 3 (67.3%). Those with NVQ levels 5 and 4 (equivalent to postgraduate and degree-level qualifications respectively) rate their team

[63] Appendix C1 Tables 3 and 4.

working skills as highest. For learning new skills, there is a relatively large differential between ratings for those with NVQ level 4 and the rest. Problem solving skills show a similar trend, with a 13.5 percentage point difference between those with NVQ levels 3 and 4 rating the skill as ‘good’. Respondents with NVQ level 1 only rate their skills at using tools properly as ‘good’ 38.2% of the time, whereas at level 4 this was the case 66.2% of the time. Looking after others who need care is again rated better for those with lower qualifications.

Importantly, it seems from the responses that individual ratings differ by type of qualification across the different skills. Secondly, there is not a strictly increasing relationship between individuals’ self-rated responses and their education level.

Another indicator of reliability in soft skill responses is the correlation between responses in 2000 and 2004. Given that the sweeps of the survey are undertaken four years apart one could assume that these are independent observations, in the sense that the individuals probably cannot recall how they rated their skills in the previous survey. Therefore, some positive correlation between responses would be a good sign that these ratings are reliable, although of course one would expect that, for some individuals, their soft skills will have either improved or deteriorated depending on their experiences in the labour market between these two dates. A Spearman rank correlation test confirms that there is a strongly significant positive correlation between respective 2000 and 2004 soft-skill responses (for a one-tailed test).

Table 14: Spearman rank correlation between 2000 and 2004 soft skills responses

	Communicating with others	Working in a team	Learning new skills	Problem solving	Using tools properly	Looking after others who need care
Correlation	.478	.395	.433	.501	.514	.569
Significance	.000	.000	.000	.000	.000	.000

Source: British Cohort Study 2004

The table below shows responses within occupation, measured by SOC 2000 major group.

Table 15: Soft Skills ratings by Occupational Group

How good at communicating with others

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		80.30%	73.70%	77.60%	70.60%	58.30%	73.60%	70.90%	53.80%	55.70%	70.30%
Fair		19.10%	25.30%	21.80%	28.00%	38.80%	24.80%	27.80%	43.50%	41.30%	28.20%
Poor		0.50%	1.00%	0.60%	1.30%	2.90%	1.60%	1.30%	2.50%	2.40%	1.40%
Don't have skill		0.10%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.20%	0.70%	0.10%
Total	Count	1384	1071	1413	977	1004	561	399	559	591	7959
	% of Total	17.40%	13.50%	17.80%	12.30%	12.60%	7.00%	5.00%	7.00%	7.40%	100.00%

How good at working in a team

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		84.90%	79.10%	83.20%	83.30%	74.80%	82.50%	82.70%	73.50%	80.20%	80.90%
Fair		14.60%	20.10%	15.90%	16.20%	23.80%	16.80%	16.30%	25.20%	18.60%	18.20%
Poor		0.50%	0.80%	0.90%	0.30%	1.40%	0.50%	1.00%	1.10%	1.00%	0.80%
Don't have skill		0.00%	0.00%	0.10%	0.20%	0.00%	0.20%	0.00%	0.20%	0.20%	0.10%
Total	Count	1384	1071	1413	977	1004	561	399	559	591	7959
	% of Total	17.40%	13.50%	17.80%	12.30%	12.60%	7.00%	5.00%	7.00%	7.40%	100.00%

How good at learning new skills

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		74.20%	76.50%	71.80%	68.70%	65.60%	59.70%	62.70%	55.50%	53.50%	67.90%
Fair		25.40%	23.40%	27.90%	30.80%	33.40%	39.80%	36.10%	43.10%	43.80%	31.40%
Poor		0.40%	0.10%	0.40%	0.50%	0.90%	0.50%	1.30%	1.40%	2.40%	0.70%
Don't have skill		0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.30%	0.00%
Total	Count	1384	1071	1413	977	1004	561	399	559	591	7959
	% of Total	17.40%	13.50%	17.80%	12.30%	12.60%	7.00%	5.00%	7.00%	7.40%	100.00%

How good at problem solving

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		74.40%	74.80%	67.90%	53.10%	60.90%	43.10%	45.90%	42.80%	39.90%	60.60%
Fair		24.60%	24.20%	30.90%	44.70%	37.50%	52.00%	48.60%	54.60%	55.30%	37.30%
Poor		1.00%	1.00%	1.20%	2.10%	1.70%	4.80%	5.50%	2.50%	4.20%	2.10%
Don't have skill		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.50%	0.10%
Total	Count	1384	1071	1413	977	1004	561	399	559	591	7959

How good at using tools properly

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		54.90%	48.50%	51.80%	36.90%	86.60%	37.30%	39.80%	63.30%	53.60%	53.80%
Fair		39.90%	44.00%	41.50%	54.40%	12.70%	54.90%	51.40%	32.70%	40.80%	40.30%
Poor		4.70%	6.00%	5.40%	7.00%	0.60%	7.00%	7.00%	3.60%	4.70%	5.00%
Don't have skill		0.50%	1.60%	1.30%	1.70%	0.10%	0.90%	1.80%	0.40%	0.80%	1.00%
Total	Count	1384	1071	1413	977	1004	561	399	559	591	7959
	% of Total	17.40%	13.50%	17.80%	12.30%	12.60%	7.00%	5.00%	7.00%	7.40%	100.00%

How good at looking after people who need care

		SOC 2000 major group									
		1	2	3	4	5	6	7	8	9	Total
Good		31.00%	31.90%	48.20%	42.40%	21.20%	74.20%	43.90%	26.20%	40.10%	38.40%
Fair		48.60%	48.70%	37.70%	44.80%	55.20%	23.70%	47.60%	52.30%	47.60%	45.40%
Poor		15.20%	13.60%	10.30%	7.30%	16.70%	1.40%	5.00%	13.80%	6.80%	11.10%
Don't have skill		5.30%	5.70%	3.80%	5.50%	7.00%	0.70%	3.50%	7.70%	5.40%	5.10%
Total	Count	1384	1071	1413	975	1002	561	399	558	588	7951
	% of Total	17.40%	13.50%	17.80%	12.30%	12.60%	7.10%	5.00%	7.00%	7.40%	100.00%

Source: British Cohort Study 2004

One can clearly see that there are differences across major occupation group for each of the skills. The means plots and pair-wise comparisons show that there is no consistent pattern across each skill; there are significant differences in responses to self-rated competence of the soft skills, but this differs for each skill by the occupation group in which individuals are classed[64]. Here, I will only highlight a few of the most interesting cases.

Managers and senior officials (major group 1) on average report communication skills to be higher than each other SOC major group (this difference is significant for all groups but professional occupations). This contrasts somewhat with the NESS04 findings, in which only sales occupations lacked communications skills more than managers (in the view of the senior manager/human resource representative responding to the survey). For team-working skills, managers once again rated themselves higher, on average, than all other groups even though the NESS04 reports that 51% of managers that lacked skills did so in this specific area. Those in skilled trades (group 5) and process, plant and machine operatives (group 8), on average, rated themselves as least likely to have this skill; this would probably be expected given the nature of jobs that individuals in these occupations typically carry out, particularly the former SOC category. This group includes many occupations in which you would expect individuals to work alone (or even be self-employed), for example agricultural, electrical, and building trades. For learning new skills, the ratings generally get worse as one moves down SOC scale, with those in elementary occupations rating themselves the worst. If one assumes that the SOC scale reflects the jobs requiring the most 'skill' as group 1 and declines through to group 9, then this would be expected. The causality of this however, is not clear-cut. Either, individuals are in these high skilled jobs precisely because they are able to learn new skills easily and are constantly improving their stock of human capital, and so work in high skill, high paid jobs or, the reason is more due to factors of opportunity; these individuals are good at learning new skills because they are in occupations that are fast evolving, and so are *required* to learn new skills as part of their job, and also receive more training than workers in lower-classed (in terms of the SOC coding) occupations. This second proposition would be consistent with evidence of skill-biased technological change (Gallie 1994). The pattern is similar for problem

[64] The mean plots of 2004 responses by occupational major group are shown in the Appendix C1.

solving skills, with higher occupational groups rating themselves as better. For using tools properly, unsurprisingly those in skilled trade occupations rate themselves, on average, significantly better than all other groups. One would expect this given the nature of employment of these individuals. Those classified as working in a personal service occupation rate their ability to look after others significantly higher on average than any other group; this is again likely to be because of the nature of their job.

4.4 Returns to soft skills

Having evaluated individuals' soft skill responses in the BCS70, the regression results will now be presented. The regressions will be compared against the results from the previous chapter, and the inclusion of soft skills variables allows one to assess whether firstly, soft skills have any value in the labour market and, secondly, whether any of the returns to qualifications found in the previous chapter are capturing the value of soft skills. If the hypothesis presented at the beginning of this chapter is correct, one would see a positive return to soft skills and a fall in the returns to qualifications, vis á vis previous regressions.

The second part of the study considers whether particular soft skills are actually components of a 'higher dimension' of skill traits using Principal Components Analysis, and assess the returns to these traits. This will be discussed in more detail after the first set of regression results.

The first part of this analysis will provide some information on whether soft skills are valuable in the labour market in their own right, and how they affect returns to qualifications. Specifications 1-3 presented below contain the same control variables as in the previous chapter[65]. All specifications here include early-age ability test scores. This is important because this provides an objective measure of ability in the analysis. They include socio-economic background measures and dummy variables for the six soft skill variables discussed above. This gives consistency within and across chapters, and allows a direct comparison with the coefficients on the education variables between the regressions. As the survey follows the same individuals across time, it also allows an examination of the dynamics of the value of skills as the cohort progress through

[65] Specifications 1 and 2 do not include qualification controls; this allows an estimation of their 'raw' value.

their careers. Specification 4 includes major occupational grouping in order to examine whether soft skills are occupationally specific.

Given that the majority of individuals rate their soft skills as ‘good’, this has been used as the base category. The full regression results, including all control variables, are presented in the Appendix C1. This first model will show whether self-rated soft skills are valued in the labour market.

Table 16: Returns to soft skills 2004

	Log hourly pay 2004							
	Specification 1		Specification 2		Specification 3		Specification 4	
	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*
No communication skills	**-0.415**	***0.081***	-0.344	*0.131*	-0.343	*0.111*	-0.160	*0.311*
Poor communication skills	**-0.080**	***0.096***	-0.060	*0.194*	-0.048	*0.281*	0.016	*0.628*
Fair communication skills	**-0.072**	***0.000***	**-0.061**	***0.000***	**-0.045**	***0.000***	-0.005	*0.574*
No team-working skills	0.011	*0.975*	0.030	*0.924*	0.065	*0.831*	0.102	*0.644*
Poor team-working skills	0.067	*0.391*	0.088	*0.235*	0.097	*0.173*	-0.023	*0.663*
Fair team-working skills	-0.009	*0.587*	0.008	*0.634*	0.006	*0.696*	**-0.022**	***0.049***
Not able to learn new skills	-0.029	*0.946*	-0.113	*0.785*	0.054	*0.886*	0.077	*0.780*
Poor at learning new skills	-0.015	*0.832*	-0.002	*0.978*	0.046	*0.473*	0.058	*0.212*
Fair at learning new skills	-0.009	*0.505*	-0.009	*0.481*	0.004	*0.767*	-0.004	*0.655*
No problem solving skills	-0.393	*0.104*	-0.301	*0.193*	-0.151	*0.490*	0.077	*0.630*
Poor at problem solving	**-0.144**	***0.000***	**-0.100**	***0.011***	**-0.089**	***0.021***	-0.044	*0.121*
Fair at problem solving	**-0.111**	***0.000***	**-0.083**	***0.000***	**-0.061**	***0.000***	**-0.019**	***0.039***
Not able to use tools properly	**0.206**	***0.000***	**0.194**	***0.000***	**0.105**	***0.041***	0.048	*0.199*
Poor at using tools properly	**0.110**	***0.000***	**0.099**	***0.000***	**0.046**	***0.051***	**0.031**	***0.079***
Fair at using tools properly	**0.064**	***0.000***	**0.056**	***0.000***	**0.027**	***0.016***	0.007	*0.368*
Not able to look after others	-0.024	*0.355*	-0.014	*0.584*	-0.027	*0.252*	0.004	*0.803*
Poor at looking after others	**0.040**	***0.043***	0.027	*0.151*	0.013	*0.459*	0.018	*0.170*
Fair at looking after others	0.003	*0.776*	0.002	*0.861*	-0.008	*0.503*	0.011	*0.188*
N		4047		4046		3895		3886
Adj. R-squared		0.3769		0.4291		0.4977		0.7300
	Controls							
Family background	*		*		*		*	
Early-age ability measures	*		*		*		*	
Job characteristics	*		*		*		*	
Managerial/supervisory status			*		*		*	
Qualifications					*		*	
Occupational group							*	

Specification 1 includes just soft skills and measures for ability at age 5 and 10 and socio-economic background. The ability test scores are an important control in these analyses because the tests are objective measures of one’s ability. One can see that there are some interesting results here. The largest effect on pay is having no communication skills. There is a 34.0% pay penalty for those with no communication skills, compared to those with good communication skills. Having poor or fair communication skills also results in a negative effect on pay, compared to those with good communication skills. Somewhat surprisingly, an individual's (self-rated) competence in team-working has no effect on their pay, and neither does ability to learn new skills. A lack of problem solving skills does not significantly affect pay but having poor or fair problem solving skills both result in a strongly significant negative effect (13.4% and 10.5% respectively) compared to those with good problem solving skills. Interestingly, being less than good at using tools properly results in a strongly significant pay increase, and increases as self-rated competence falls, at 6.4%, 11.6% and 22.9% for fair, poor and not having the skill at all, respectively. This may be because of an occupational effect; those who are good at using tools are more likely to be found in manual or skilled trades occupations (either because those good at using tools enter these occupations, or because they are good at using tools because they are in these occupations – there is no assumption of causality here). This is confirmed by the descriptive statistics discussed above, and the occupations may not pay as well as others (this will be explained further with respect to the results of specification 4, which includes controls for occupational grouping). Those individuals who rate themselves as poor at caring for others experience slightly higher pay (significant at the 5% level), increasing by 4.3%.

As discussed above, those in managerial and professional occupations were much more likely to have good communication and team-working skills. Specification 2 presents regression results controlling for whether the individual has supervisory or managerial responsibilities in their place of work. This has resulted in 'fair' communication skills the only remaining rating of this skill type having a significant effect on pay, and the coefficient has increased slightly (i.e., is less negative) to a 6.1% pay penalty compared to those with good communication skills, ceteris paribus. This shows that, as one would expect, managers are compensated for having this skill as part of their management premium. The remaining skill ratings, that were significant in specification 1 are still significant and have the same directional effect, although 'poor at looking after others who need care' is no longer significant.

One of the key questions to be addressed concerns the role of education in the development of soft skills, and the employers' perception of the skills individuals have, by their education level. If qualifications reflect not only academic ability but also soft skills that are supposed to be developed alongside the academic content, and employers are confident that these qualifications do reflect the possession of these skills as part of an individual's human capital (as well as confidence in academic skills, for that matter), then one would expect that these skill ratings would no longer have a significant effect on pay once qualifications were included in the model specification. Therefore, one can examine whether soft skills do have a value in the labour market over and above qualifications themselves. The results are shown in specification 3. This regression has the same specification as the full controls regression in Chapter One[66] (aside the inclusion of soft skill ratings).

One can see that the skill ratings that had a significant effect on pay in the previous regression remain significant[67], although the magnitude of the effect of each skill rating has decreased with the inclusion of the qualification measures.

In summary, for the majority of academic qualifications, the inclusion of soft skill ratings has resulted in a slight fall (to the magnitude of 1%-2%) in the returns[68]. This is addressed in the next section 4.5 (p181), where a comparison of the results is presented. For the vocational qualifications, the effects are more mixed. Fourteen of the coefficients on education dummies have decreased and nine have increased, and again the majority of changes are relatively small[69]. There is evidence that some soft skills do have an effect on pay, over and above the effect of qualifications obtained. An individual still earns significantly higher pay if they are good at problem solving (those rated fair and poor experienced 6.1% and 8.9% lower pay), on top of having a degree-level qualification. Also, the coefficients on the firm size variables have fallen for 'big' (100-499 employees) and 'large' (500+ employees) firms with the inclusion of the soft skill ratings. This may reflect the fact that larger firms are more likely to use the soft-

---

[66] See p103.

[67] 'Not able' and 'fair' ratings of using tools properly are now significant at the 5% level, and 'poor' at the 10% level – all were significant at the 1% level in the previous regression. The other ratings remain significant at the same level.

[68] The two qualifications that experience a rise in pay are Scottish certificate of 6^{th} year studies and the SLC lower or Ordinary grade, the latter becoming significant at the 10% level.

[69] The vocational qualifications associated with an increase in pay are RSA level 3, NVQ Levels 1, 2 and 5, GNVQ 1, 2 and 3, ONC/OND and trade apprenticeship.

skill assessments, discussed earlier, as part of the employment process. Therefore, some of the positive effect on pay due to being in a larger firm is because they invest more in ascertaining the soft-skill proficiency of potential employees and pay them accordingly.

As discussed previously, one of the major factors that may affect an individual's rating of their own soft skills, aside from qualifications, is occupation. Any tasks that an individual performs on a day-to-day basis which involve soft skills in the workplace are likely to improve their competence through practice and experience. Specification 4 includes the same variables as before, along with SOC 2000 major grouping.

The full results are presented in the Appendix C1 Specification 4. Apart from sales and customer service occupations, each of the SOC major groupings have a strongly significant positive effect on pay compared to the base category, elementary occupations (SOC group 9). The occupational effects absorb much of the impact of soft skills; two of the soft skill ratings are still associated with significant effects on pay, these being fair at team working skills and poor at using tools properly. The latter is significant in each of the previous regressions (and consistently positive); however, this is the first time that any of the team working skills ratings have had a significant effect on pay. When controlling for occupational group, having 'fair' team working skills results in a 2.2% decrease in pay compared to those rating themselves as 'good'. Those poor at using tools have an associated 3.1% increase in pay, even when controlling for occupational group. This is much smaller than the coefficients in the previous regressions, so this does give evidence towards an occupational effect.

The table of results for the equivalent 2000 sweep regressions are shown below. As mentioned above, the soft skills covered here include ratings of use of numbers, computers and Information Technology, and finance and accounts in addition to those covered in 2004. I will compare results of the regressions to the results of the 2004 data, and also go into more detail in the coefficients for the new soft skills ratings.

Table 17: Returns to soft skills 2000

	Log hourly pay 2000							
	Specification 1		Specification 2		Specification 3		Specification 4	
	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*	Coef.	*P>t*
Skills covered in 2004								
No communication skills	-0.167	*0.398*	-0.186	*0.336*	-0.203	*0.268*	-0.059	*0.700*
Poor communication skills	**-0.109**	***0.001***	**-0.088**	***0.007***	**-0.083**	***0.009***	**-0.066**	***0.014***
Fair communication skills	**-0.048**	***0.000***	**-0.038**	***0.001***	**-0.033**	***0.002***	**-0.034**	***0.000***
No team-working skills	0.173	*0.369*	0.166	*0.378*	0.126	*0.479*	-0.012	*0.936*
Poor team-working skills	-0.047	*0.410*	-0.027	*0.629*	-0.019	*0.717*	-0.047	*0.290*
Fair team-working skills	0.005	*0.706*	0.017	*0.180*	0.000	*0.987*	-0.007	*0.515*
Not able to learn new skills	**0.367**	***0.099***	**0.394**	***0.070***	**0.504**	***0.085***	0.388	*0.113*
Poor at learning new skills	-0.010	*0.874*	-0.020	*0.754*	-0.044	*0.477*	0.026	*0.616*
Fair at learning new skills	0.011	*0.296*	0.011	*0.292*	0.015	*0.148*	0.007	*0.403*
No problem solving skills	-0.160	*0.414*	-0.166	*0.387*	-0.095	*0.602*	-0.077	*0.615*
Poor at problem solving	**-0.096**	***0.015***	**-0.076**	***0.047***	-0.053	*0.155*	-0.013	*0.682*
Fair at problem solving	**-0.062**	***0.000***	**-0.046**	***0.000***	**-0.032**	***0.001***	**-0.016**	***0.051***
Not able to use tools	0.052	*0.122*	0.058	*0.073*	0.014	*0.650*	0.015	*0.570*
Poor at using tools properly	**0.116**	***0.000***	**0.105**	***0.000***	**0.061**	***0.000***	**0.041**	***0.004***
Fair at using tools properly	**0.045**	***0.000***	**0.041**	***0.000***	**0.022**	***0.021***	0.004	*0.592*
Not able to look after others	0.016	*0.374*	0.017	*0.356*	0.022	*0.203*	**0.036**	***0.015***
Poor at looking after others	**0.034**	***0.034***	**0.033**	***0.034***	0.021	*0.168*	**0.035**	***0.006***
Fair at looking after others	0.002	*0.846*	0.002	*0.823*	-0.001	*0.924*	**0.014**	***0.084***
Additional skills reported in 2000								
No number skills	-0.057	*0.625*	-0.113	*0.318*	-0.032	*0.768*	-0.064	*0.478*
Poor number skills	0.028	*0.188*	0.033	*0.108*	**0.040**	***0.050***	0.020	*0.232*
Fair number skills	-0.012	*0.260*	-0.010	*0.337*	0.006	*0.556*	0.010	*0.231*
No computer and IT skills	**-0.199**	***0.000***	**-0.191**	***0.000***	**-0.151**	***0.000***	**-0.085**	***0.000***
Poor computer and IT skills	**-0.139**	***0.000***	**-0.134**	***0.000***	**-0.099**	***0.000***	**-0.077**	***0.000***
Fair computer and IT skills	**-0.058**	***0.000***	**-0.057**	***0.000***	**-0.040**	***0.000***	**-0.024**	***0.004***
Not able to work with finance/accounts	**-0.062**	***0.008***	**-0.041**	***0.076***	**-0.045**	***0.043***	-0.028	*0.131*
Poor at finance/accounts	**-0.039**	***0.014***	**-0.025**	***0.098***	**-0.036**	***0.015***	**-0.022**	***0.078***
Fair at finance/accounts	**-0.028**	***0.007***	**-0.024**	***0.017***	**-0.036**	***0.000***	**-0.031**	***0.000***
N		5442		5442		5226		5226
Adj. R-squared		0.3576		0.3886		0.4510		0.6157
Controls								
Family background	*		*		*		*	
Early-age ability measures	*		*		*		*	
Job characteristics	*		*		*		*	
Managerial status			*		*		*	
Qualifications					*		*	
Occupational group							*	

Specification 1 (which contains background measures, ability test scores and the soft-skill ratings) generally shows the same directional effects as in the 2004 regression, and are broadly similar in magnitude. As with the 2004 responses, very few individuals rated themselves as poor at or not having a particular skill, so it is unsurprising that a number of these ratings show no significant effects on pay. Having poor or fair communication skills has a significant negative effect on pay, at 10.3% and 4.8% respectively. Having poor or fair problem solving skills, as compared to good problem solving skills, again have significant negative effects on pay. Being poor (12.3%) or fair (4.5%) at using tools properly, and being poor at looking after others who need care (3.4%), again result in a higher pay. Those individuals who are not able to learn new skills experience a large and marginally significant increase in pay. Considering that this includes only 0.2% of respondents, this seems to be some kind of anomaly.

Interestingly, individuals rating themselves as less than good at use of finance and accounts have significantly negative effects on pay at 6.2%, 3.9% and 2.8% for no skill, poor and fair, respectively. As one can see, this negative effect gets smaller (i.e. the pay penalty decreases in magnitude) as their proficiency increases. Individuals rating themselves as less than good at using computers and IT also have strongly significant negative effects on their pay. The pay penalty is relatively large; 18.0% for those not able to use computers and IT, 14.9% for those rating their skills as poor and 5.8% for those rating themselves as fair, as compared to those with competent use of computers. Early research on the effects of computer use on pay proposed that this contributed significantly to the increased disparity in pay between the more skilled and more educated, and low skilled and lower qualified workers (Krueger 1993). There has been criticism that the value associated with computer use simply reflected that those individuals in higher paid jobs were more likely to use computers (particularly in the early years of computer adoption in the workplace), and there were other, unobserved, factors that were omitted from the true earnings equation. For example, DiNardo and Pischke (1997) found a similar value to the use of a pencil or to the proportion of the time spent sitting down at work. More recent research in the UK has found that the observed return to computer use remains even when utilising a rich set of variables and panel estimation techniques (Dolton and Makepeace 2004, Dolton Makepeace and Robinson 2007); however, they acknowledge the possibility of unobserved factors affecting the results. Each of the studies mentioned analyse computer use (or more specific uses of a computer for particular tasks, for example email or word processing), whereas in this study the value of an individual's competence in computer use is being estimated, but unobserved factors affecting the coefficients cannot be ruled out.

Given that other literature has found that the UK has one of the highest rates of innumeracy in the OECD, and poor numeracy results in a significant pay penalty (Layard et al. 2002), it may be surprising that less than competent use of numbers does not result in a significant pay penalty in these regressions. However, 'use of numbers' is a general measure, the returns of which could be clouded by returns to other soft skills which may also represent numeracy in the respondents' interpretation of the questions. For example, problem solving may be seen to mean numerical problems, and competence at computing and information technology may convey a logical mind. Also, a measure of competency at using finance/accounts is included, which is a much more specific measure of skill with numbers. Therefore, one would expect anyone who rates themselves as good (and possibly fair) at finance and accounts would also rate themselves as good at the use of numbers. Borghans and ter Weel (2004) offer a similar explanation; they show that, when controlling for the sophistication of maths tasks, basic maths use has no significant value in the labour market. The same is true for computer use. Their results imply that it is not these skills per se that hold value (typically found in the literature), but other characteristics of the job correlated with these skills.

Moreover, in this specification, maths competence is controlled for by the age 5 and 10 tests, which are included in the regression as controls for test performance at an early age. When the three soft skills mentioned above are excluded from the analysis, use of numbers does indeed have a significant negative effect on pay[70] (Specification 5 2000 in Appendix C1). When a control for managerial/supervisory responsibilities is introduced to the regression (specification 2) the coefficients for each of the significant soft skills ratings fall slightly, but each one retains significance as compared to specification 1.

Specification 3 shows the returns to soft skills with the inclusion of qualifications in the regression. Again, each of the coefficients have fallen (apart from the return to not being able to learn new skills), and all soft skill ratings remain significant apart from being poor at problem solving. Given that not able to learn new

[70] Both 'Fair' and 'poor' at use of numbers are significant. Poor use of numbers results in a 3.9% pay penalty, significant at the 10% level. Fair use of numbers results in a 5.7% pay penalty, significant at the 1% level. Not having the skill is not significant (but still negative) and this is likely to be because only 0.4% of respondents rated themselves as not able to use numbers.

skills shows a large increase compared to the previous regression, I feel that this confirms the anomaly. Interestingly, when controls for occupation are introduced (specification 4), most of the soft-skill ratings remain significant. Anything less than competence at using computers and IT has the largest effect on pay, even when controlling for education and occupation. Also, the pay penalty falls as one rates themselves as more competent, as one would expect. This may reflect the trends in skill-biased technological change, with jobs becoming more automated and computers becoming more prevalent in the workplace, *regardless* of the type of job in which the individual is employed. This is also the case for competence in finance and accounts, which one might expect to be an occupation-specific skill. It may be that, as mentioned above, this is an indication of a higher competency of numeracy more generally and, therefore, this is reflected in the return to competent use of finance/accounts. This is somewhat in contrast to Borghans and ter Weel, in that they argue that these skills may be correlated with the tasks done at work, thus holding value in the labour market.

In contrast to the 2004 regression results, not being able to look after others has a significantly positive effect on pay in 2000, even when controlling for occupation. Also, communication skills have a significant effect on pay in 2000 whereas this was not the case in the 2004 regressions.

4.5 The role of soft skills in the returns to education

I have outlined the current state of soft skills in the UK labour market; there has been an increased importance placed on soft skills because of the shift away from manufacturing as well as the change in job content due to the rapid introduction of technology to the workplace, combined with the shortage of soft skills shown by the review of the NESS. The argument stated here proposes that some of the returns to soft skills, which are increasingly in demand by employers, are captured by qualification measures. Therefore the true returns to qualifications are biased upwards if soft skills measures are not included in the specification. Therefore, the true model is:

$$ln(\omega_i) = \sum_{k=0}^{n} \beta_k{}' QUAL_{ki} + \gamma_l SS_{li}{}' + \delta' OTH_i + \varepsilon_i \,,$$

where SS_{li} are the l=1,2,..n, soft skills possessed by individual *i* included in the regression, and other variables are as defined in Chapter Three (page 103).

The crucial part of this analysis is to examine how soft skills affect the returns to qualifications. To do this, I will compare results from the equivalent regression in Chapter Three to that in Chapter Four (specification 3 in each chapter).

The analysis above shows that at least some soft skills have a significant value in the labour market as part of an individual's human capital stock. If the hypothesis that soft skills are used to distinguish between the ever-increasing proportion of individuals with higher educational achievement is correct, then the value of qualifications should decrease when soft skills measures are included in the regression. The table below shows the comparison for the 2000 sweep of the BCS70.

Table 18: A comparison of Chapter 3 and Chapter 4 results 2000

	Skills and qualifications (Chapter 4)		*Qualifications (Chapter 3)*			
	Log hourly pay 2000		Log hourly pay 2000		Difference (S-Q)	t-test for difference between means
	Coef.	P>t	Coef.	P>t		
5+ GCSE's Grade A-C	0.064	0.000	0.079	0.000	-0.015	-2.753
<5 GCSE's Grade A-C	-0.006	0.491	-0.001	0.923	-0.005	-0.892
A/S Level Grade A-C	0.041	0.019	0.047	0.008	-0.006	-0.963
A-Level/S-Level Grade A-C	0.087	0.000	0.094	0.000	-0.007	-1.188
SCE Standard Grade 4-5	0.003	0.954	-0.003	0.953	0.006	1.091
SCE Standard Grade 1-3	0.012	0.681	0.023	0.445	-0.011	-1.903
SLC Lower or Ordinary Grade	-0.096	0.209	-0.078	0.313	-0.018	-3.213
SLC Higher Grade	0.048	0.097	0.065	0.026	-0.017	-2.975
Scottish 6th Year Certificate	0.053	0.359	0.034	0.558	0.019	3.291
Other Scottish qualification	0.027	0.794	0.035	0.741	-0.008	-1.340
Degree	0.164	0.000	0.176	0.000	-0.012	-2.021
Higher Degree	0.032	0.161	0.041	0.075	-0.009	-1.573
BTEC Level 2	0.007	0.681	0.010	0.560	-0.003	-0.536
BTEC Level 3	0.066	0.000	0.077	0.000	-0.011	-1.926
BTEC Level 4	-0.021	0.538	-0.005	0.879	-0.016	-2.773
Other BTEC qualification	0.102	0.004	0.114	0.001	-0.012	-2.060
City and Guilds Level 2	-0.007	0.624	-0.017	0.252	0.010	1.724
City and Guilds Level 3	-0.020	0.160	-0.032	0.023	0.012	2.190
City and Guilds Level 4	-0.019	0.624	-0.017	0.677	-0.002	-0.468
Other City and Guilds	0.005	0.879	0.009	0.767	-0.004	-0.782
RSA Stage 1	-0.024	0.071	0.003	0.847	-0.027	-4.614
RSA Stage 2	0.041	0.265	0.067	0.069	-0.026	-4.630
RSA Stage 3	-0.050	0.657	-0.029	0.802	-0.021	-3.737
NVQ Level 1	-0.049	0.070	-0.047	0.088	-0.002	-0.408
NVQ Level 2	-0.091	0.000	-0.091	0.000	0.000	-0.026
NVQ Level 3	0.010	0.684	0.024	0.342	-0.014	-2.400
NVQ Level 4	0.147	0.003	0.167	0.001	-0.020	-3.553
NVQ Level 5	0.137	0.365	0.152	0.320	-0.015	-2.660
NVQ Level 6	0.210	0.085	0.229	0.065	-0.019	-3.170
Other NVQ	0.007	0.899	0.010	0.856	-0.003	-0.537
GNVQ Level 1	0.252	0.136	0.309	0.071	-0.057	-10.026
GNVQ Level 2	0.048	0.589	0.057	0.525	-0.009	-1.612
GNVQ Level 3	-0.023	0.807	-0.004	0.970	-0.019	-3.375
Other GNVQ qualification	0.182	0.383	0.230	0.272	-0.048	-8.515
ONC/OND	0.044	0.071	0.048	0.050	-0.004	-0.766
HNC/HND	0.015	0.452	0.033	0.095	-0.018	-3.194
Trade apprenticeship	0.049	0.020	0.041	0.053	0.008	1.389
Female	-0.083	0.000	-0.082	0.000	-0.001	

Part time	-0.208	0.000	-0.218	0.000	0.010	
Father social class I	0.038	0.048	0.042	0.034	-0.004	
Father social class II	0.022	0.069	0.024	0.045	-0.002	
Father social class III nm	-0.004	0.817	0.000	0.982	-0.004	
Father social class III m	-0.012	0.275	-0.010	0.348	-0.002	
Father social class IV	-0.029	0.131	-0.030	0.119	0.001	
Father is a student	-0.064	0.117	-0.059	0.158	-0.005	
Father is dead	0.012	0.681	0.010	0.736	0.002	
Financial hardship	-0.018	0.204	-0.023	0.119	0.005	
North	-0.097	0.000	-0.101	0.000	0.004	
Yorkshire & Humberside	-0.074	0.000	-0.079	0.000	0.005	
East Midlands	-0.047	0.007	-0.047	0.007	0.000	
East Anglia	-0.045	0.036	-0.049	0.022	0.004	
South West	-0.072	0.000	-0.077	0.000	0.005	
West Midlands	-0.035	0.028	-0.037	0.022	0.002	
North West	-0.050	0.001	-0.050	0.001	0.000	
Wales	-0.074	0.000	-0.079	0.000	0.005	
Scotland	-0.050	0.007	-0.059	0.001	0.009	
Drawing test One lowest quintile	-0.028	0.160	-0.038	0.064	0.010	
Drawing test One 2nd quintile	-0.004	0.818	-0.007	0.641	0.003	
Drawing test One 4th quintile	0.000	0.986	-0.001	0.934	0.001	
Drawing test One 5th quintile	0.000	0.995	0.001	0.951	-0.001	
Drawing test Two 1st quintile	0.010	0.630	0.011	0.602	-0.001	
Drawing test Two 2nd quintile	0.021	0.177	0.020	0.209	0.001	
Drawing test Two 4th quintile	0.007	0.652	0.006	0.711	0.001	
Drawing test Two 5th quintile	0.003	0.881	0.001	0.964	0.002	
Vocabulary test lowest quintile	0.007	0.680	0.004	0.815	0.003	
Vocabulary test 2nd quintile	0.016	0.267	0.015	0.296	0.001	
Vocabulary test 4th quintile	0.014	0.308	0.014	0.303	0.000	
Vocabulary test 5th quintile	0.014	0.288	0.018	0.187	-0.004	
Profile test lowest quintile	-0.005	0.753	-0.001	0.926	-0.004	
Profile test 2nd quintile	0.004	0.767	0.010	0.448	-0.006	
Profile test 4th quintile	0.000	0.983	0.004	0.793	-0.004	
Profile test 5th quintile	-0.015	0.258	-0.015	0.264	0.000	
Copying test lowest quintile	-0.022	0.225	-0.029	0.116	0.007	
Copying test 2nd quintile	0.008	0.596	0.006	0.686	0.002	
Copying test 4th quintile	0.020	0.132	0.022	0.095	-0.002	
Copying test 5th quintile	0.038	0.007	0.042	0.003	-0.004	
Maths test lowest quintile	-0.071	0.000	-0.073	0.000	0.002	
Maths test 2nd quintile	-0.039	0.008	-0.037	0.014	-0.002	
Maths test 4th quintile	-0.008	0.541	-0.008	0.559	0.000	
Maths test 5th quintile	0.003	0.822	0.008	0.586	-0.005	
Reading test lowest quintile	-0.003	0.897	-0.017	0.386	0.014	
Reading test 2nd quintile	0.018	0.218	0.017	0.259	0.001	
Reading test 4th quintile	0.000	0.974	0.005	0.720	-0.005	
Reading test 5th quintile	0.011	0.434	0.019	0.190	-0.008	

Word score lowest quintile	-0.017	0.324	-0.020	0.258	0.003	
Word score 2nd quintile	-0.001	0.960	-0.003	0.873	0.002	
Word score 4th quintile	0.010	0.442	0.010	0.485	0.000	
Word score 5th quintile	0.047	0.000	0.046	0.000	0.001	
Small firm	-0.049	0.000	-0.055	0.000	0.006	
Large firm	0.020	0.080	0.027	0.021	-0.007	
Very large firm	0.059	0.000	0.068	0.000	-0.009	
Tenure	0.011	0.002	0.011	0.005	0.000	
Tenure squared	-0.001	0.045	0.000	0.076	-0.001	
Managerial responsibilities	0.126	0.000	0.141	0.000	-0.015	
(Constant)	2.111	0.000	2.028	0.000	-2.231	
	Number of obs.	5225	Number of obs.	5229		
	Adj. R-squared	0.4510	Adj. R-squared:	0.4336		

For the majority of qualifications, the returns are smaller when soft skills are included in the regression. Taking the typical academic route through to higher education, the difference in returns is 1.5, 0.7 and 1.2 percentage points respectively (for GCSE's, A-Levels and a degree). The largest difference in returns (for those qualifications that had a significant effect on pay in both regressions) was for NVQ Level 4, the vocational equivalent to a degree, at 2 full percentage points. These differences do indeed show that returns to qualifications fall when soft skills competency are included in the regression specification, and t-tests comparing the coefficients between regressions shows that most of the differences are significant in a one-tailed test.[71]

Also, the part-time pay penalty has fallen slightly (by one percentage point) with the inclusion of soft skills, perhaps indicating that those working part-time generally do not have the same competence in soft skills as those in full-time work. This may be because those in part-time work are typically in jobs which do not require such skills, but may also reflect that training is less likely and skill updating is stagnated in lower-level jobs (which account for a lot of part-time work). However, as discussed previously,

[71] This is a standard comparison of means t-test, $t = \frac{x_1 - x_2}{\sqrt{s_p^2(\frac{1}{n_1} + \frac{1}{n_2})}}$, where x_1 and x_2 are the coefficients for regression 1 (soft skills regression) and regression 2 (qualifications only regression), and the pooled variance, $\frac{s_p^2 = (n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$, where s_1 and s_2 are the estimated variances of the residuals.

even low-skill front-line service jobs require some soft skill competence, for example use of computers, and so this is reflected in the fall in the part-time pay penalty when soft skills measures are included. An F-test shows that the soft skill variables are jointly significant, and should therefore be included in the regression (F=7.219, p-value =0.000).[72]

The table below shows the regression comparison for the 2004 sweep of the BCS70.

[72] A Hausman test was also used to test whether the differences in coefficients between the Chapter 3 and Chapter 4 regressions were systematic, For 2000 regressions, the differences are systematic (chi-squared(94)=210.70, prob>chi^2 = 0.0000).

Table 19: A comparison of Chapter 3 and Chapter 4 results 2004

	Skills and qualifications (Chapter 4)		*Qualifications (Chapter 3)*			
	Log hourly pay 2004		Log hourly pay 2004		Difference (S-Q)	t-test for difference between means
	Coef.	P>t	Coef.	P>t		
5+ GCSE's Grade A-C	0.085	0.000	0.091	0.000	-0.006	-1.000
<5 GCSE's Grade A-C	0.000	0.992	0.000	0.978	0.000	0.026
A/S Level Grade A-C	0.025	0.222	0.028	0.172	-0.003	-0.454
A-Level/S-Level Grade A-C	0.051	0.001	0.056	0.000	-0.005	-0.785
SCE Standard Grade 4-5	-0.028	0.646	-0.035	0.577	0.007	0.919
SCE Standard Grade 1-3	0.024	0.488	0.038	0.269	-0.014	-2.113
SLC Lower or Ordinary Grade	0.164	0.096	0.165	0.095	-0.001	-0.197
SLC Higher Grade	0.086	0.009	0.096	0.003	-0.010	-1.485
Scottish 6th Year Certificate	-0.001	0.984	-0.013	0.845	0.012	1.730
Other Scottish qualification	0.174	0.201	0.187	0.170	-0.013	-1.993
Degree	0.213	0.000	0.218	0.000	-0.005	-0.796
Higher Degree	0.011	0.665	0.014	0.595	-0.003	-0.380
BTEC Level 2	0.044	0.033	0.048	0.021	-0.004	-0.577
BTEC Level 3	0.060	0.002	0.065	0.001	-0.005	-0.694
BTEC Level 4	0.003	0.941	0.005	0.903	-0.002	-0.297
Other BTEC qualification	-0.009	0.837	0.000	0.997	-0.009	-1.276
City and Guilds Level 2	0.001	0.965	0.001	0.964	0.000	-0.006
City and Guilds Level 3	-0.049	0.005	-0.050	0.004	0.001	0.154
City and Guilds Level 4	-0.028	0.546	-0.026	0.583	-0.002	-0.354
Other City and Guilds	0.013	0.716	0.017	0.646	-0.004	-0.517
RSA Stage 1	0.013	0.407	0.014	0.346	-0.001	-0.260
RSA Stage 2	0.077	0.081	0.078	0.076	-0.001	-0.234
RSA Stage 3	0.108	0.315	0.105	0.331	0.003	0.478
NVQ Level 1	0.018	0.589	0.011	0.742	0.007	1.054
NVQ Level 2	-0.060	0.024	-0.056	0.035	-0.004	-0.545
NVQ Level 3	0.012	0.690	0.011	0.707	0.001	0.107
NVQ Level 4	0.181	0.002	0.191	0.001	-0.010	-1.381
NVQ Level 5	-0.010	0.940	-0.018	0.888	0.008	1.227
NVQ Level 6	-0.070	0.579	-0.042	0.741	-0.028	-4.134
Other NVQ	0.007	0.915	0.016	0.798	-0.009	-1.390
GNVQ Level 1	-0.114	0.450	-0.104	0.494	-0.010	-1.542
GNVQ Level 2	0.020	0.911	-0.006	0.975	0.026	3.717
GNVQ Level 3	0.103	0.407	0.098	0.431	0.005	0.723
Other GNVQ qualification	0.246	0.249	0.219	0.306	0.027	3.934
ONC/OND	-0.001	0.982	0.000	0.991	-0.001	-0.144
HNC/HND	0.067	0.004	0.070	0.002	-0.003	-0.464
Trade apprenticeship	0.038	0.164	0.031	0.263	0.007	1.096
Female	-0.081	0.000	-0.075	0.000	-0.006	

Part time	-0.213	0.000	-0.215	0.000	0.002	
Father social class I	0.062	0.007	0.064	0.006	-0.002	
Father social class II	0.045	0.002	0.044	0.002	0.001	
Father social class III nm	0.014	0.500	0.015	0.477	-0.001	
Father social class III m	0.016	0.208	0.016	0.208	0.000	
Father social class IV	-0.021	0.372	-0.021	0.378	0.000	
Father is a student	0.019	0.706	0.001	0.986	0.018	
Father is dead	0.059	0.100	0.063	0.077	-0.004	
Financial hardship	-0.039	0.023	-0.035	0.040	-0.004	
North	-0.167	0.000	-0.166	0.000	-0.001	
Yorkshire & Humberside	-0.064	0.001	-0.065	0.001	0.001	
East Midlands	-0.050	0.013	-0.052	0.010	0.002	
East Anglia	-0.085	0.001	-0.092	0.000	0.007	
South West	-0.052	0.007	-0.055	0.004	0.003	
West Midlands	-0.041	0.026	-0.046	0.013	0.005	
North West	-0.088	0.000	-0.089	0.000	0.001	
Wales	-0.119	0.000	-0.122	0.000	0.003	
Scotland	-0.094	0.000	-0.103	0.000	0.009	
Drawing test One lowest quintile	-0.035	0.145	-0.034	0.155	-0.001	
Drawing test One 2nd quintile	-0.016	0.387	-0.016	0.384	0.000	
Drawing test One 4th quintile	-0.023	0.201	-0.024	0.188	0.001	
Drawing test One 5th quintile	-0.022	0.298	-0.020	0.338	-0.002	
Drawing test Two 1st quintile	-0.011	0.656	-0.013	0.575	0.002	
Drawing test Two 2nd quintile	0.015	0.437	0.011	0.545	0.004	
Drawing test Two 4th quintile	-0.015	0.413	-0.016	0.393	0.001	
Drawing test Two 5th quintile	0.019	0.355	0.016	0.434	0.003	
Vocabulary test lowest quintile	-0.049	0.011	-0.048	0.013	-0.001	
Vocabulary test 2nd quintile	-0.016	0.339	-0.015	0.396	-0.001	
Vocabulary test 4th quintile	0.005	0.734	0.006	0.706	-0.001	
Vocabulary test 5th quintile	0.003	0.835	0.005	0.779	-0.002	
Profile test lowest quintile	0.034	0.051	0.033	0.058	0.001	
Profile test 2nd quintile	0.026	0.098	0.025	0.110	0.001	
Profile test 4th quintile	0.028	0.081	0.030	0.066	-0.002	
Profile test 5th quintile	0.008	0.624	0.007	0.665	0.001	
Copying test lowest quintile	-0.025	0.249	-0.032	0.142	0.007	
Copying test 2nd quintile	0.010	0.602	0.010	0.581	0.000	
Copying test 4th quintile	0.022	0.149	0.026	0.100	-0.004	
Copying test 5th quintile	0.034	0.042	0.037	0.026	-0.003	
Maths test lowest quintile	-0.050	0.027	-0.057	0.011	0.007	
Maths test 2nd quintile	0.003	0.882	-0.002	0.923	0.005	
Maths test 4th quintile	0.017	0.279	0.016	0.294	0.001	
Maths test 5th quintile	0.012	0.487	0.012	0.497	0.000	
Reading test lowest quintile	-0.043	0.064	-0.043	0.065	0.000	
Reading test 2nd quintile	0.001	0.948	0.003	0.858	-0.002	
Reading test 4th quintile	-0.016	0.305	-0.012	0.447	-0.004	
Reading test 5th quintile	0.003	0.882	0.007	0.699	-0.004	

Word score lowest quintile	-0.049	0.017	-0.055	0.008	0.006	
Word score 2nd quintile	-0.035	0.099	-0.037	0.086	0.002	
Word score 4th quintile	0.005	0.767	0.004	0.788	0.001	
Word score 5th quintile	0.020	0.169	0.022	0.134	-0.002	
Small firm	-0.046	0.001	-0.046	0.000	0.000	
Large firm	0.024	0.090	0.022	0.108	0.002	
Very large firm	0.068	0.000	0.070	0.000	-0.002	
Tenure	0.006	0.155	0.004	0.255	0.002	
Tenure squared	0.000	0.392	0.000	0.560	0.000	
Managerial/supervisory responsibilities	0.176	0.000	0.187	0.000	-0.011	
(Constant)	2.318	0.000	2.285	0.000	0.033	
	No. of obs.	3894	Number of obs.	3901		
	Adj. R-squared	0.4977	Adj. R-squared:	0.4926		

It is clear that the introduction of soft skills variables has resulted in a fall in returns to the majority of qualifications measures in the regression Again, an F-test shows that the soft skills variables are jointly significant (F=3.567, p-value =0.000).[73] In this regression, however, for most of the qualifications the differences in returns to particular qualifications when soft skills are included are not significantly lower than the coefficients in the original regression. The differences in returns to qualifications for the typical academic route to higher education are 0.6, 0.5 and 0.5 percentage point falls for GCSE's, A-Levels and a degree respectively, when soft skills are taken into account. Specifically, the return to a degree-level qualification has fallen to 23.7%, ceteris paribus. Blundell et al. (2005) found the returns to a degree to be 24.9% using the NCDS, when individuals were 31 years of age. Again using this as a comparison, one can see an increased difference between returns to the NCDS and the BCS70 when soft skills are included in the regression (3.6 log points). Of course a direct comparison cannot be made as Blundell et al. did not include soft skill measures in the regression specification, however it is evidence of a fall in returns over time, and these differences are accentuated when soft skills measures are taken into account. This is some evidence then, that falls in the returns to qualifications are being masked by the increasing value of soft skills in the labour market.

[73] A Hausman test, finds that differences in coefficients between the two regressions are not systematic (chi-squared(94)=77.15, prob>chi^2 = 0.8964.

4.6 Principal component analysis

Another dimension of this analysis is to investigate whether the soft skill variables are determined by underlying traits of individuals. Given the difficulties in measuring soft skills for employers, and in assessing one's own soft skills (as in the case of the BCS70), a summary measure may be more informative of the value of soft skills in the labour market.

Principal components analysis (PCA) uses the correlations between measured variables to find the variance shared by clusters of these variables. It can be said that these clusters of variables are driven by some underlying dimension (the directly immeasurable 'factor' or 'component'). Therefore, PCA can be used to decompose the original soft skill measures into the components underlying these soft skills. This process is frequently used for estimating (immeasurable traits such as) intelligence and personality – by the various aspects underlying these traits that are measurable. Using PCA to reduce these variables into its underlying components has the added bonus of increasing the variability in the soft skills measures. As the descriptive statistics show, the majority of individuals rate their skills as 'good'; however the linear combinations of a number of the soft skills will increase the variance in the (component) measures. It will be useful for the regressions to be run using the underlying components in the place of the soft skill measures. The hope here is that the PCA is reliable and finds underlying traits that make sense in terms of the variables that are loaded on them ('loading' is discussed later). If the components underlying these soft skill variables do make sense, then the standardised scores of these components will be used in further regression analysis.

Given that particular skills are very difficult to assess, it may be that employers assess potential employees through more general traits; therefore, using the components underlying these skills may give more indication about how these skills are valued in the labour market. In the future, it may be possible to use PCA to construct a credible set of questions or tasks that measure soft skills traits with some accuracy, in a similar manner to the 'Big 5' Personality Test (John and Srivastava 1999).

This is an exploratory (rather than confirmatory) analysis so there may be issues regarding the accuracy of the decomposition used. A more rigorous PCA would use confirmatory analysis to design a set of questions and produce a consistent and reliable set of factors across more than one sample (see, for example, Rahim's (1995) discussion of the design of his ROCI-II Scale of management style). Given that it is very difficult to replicate a study to the kind of depth of the British Cohort Study 1970, here I use the variables already included in the BCS70. To ensure transparency and rigour, I present the full set of output from the PCA, and explain a number of checks for consistency and stability of the solution along the way.

Felstead et al. (2007) use a Factor Analysis to decompose a number of specific questions regarding the importance of various items, typically job requirements, into generic skills in their detailed investigation on a wide range of issues regarding skills. Dickerson and Green (2004) use a full Factor Analysis to examine skills utilisation, their value in the labour market, and how this has changed over recent years. Here, PCA is used rather than Factor Analysis because this is of an exploratory nature; in the two studies cited above, the dataset (the Skills Survey series) is specifically designed to explore and question individual's use of skills on the job. The dataset used here is much more generic and doesn't ask specific questions concerning skills *on the job* and interpretation of these questions may take a wider meaning. Also, the Skills Survey series asks about the extent to which skills are used, whereas the BCS questions an individual's self-rated competency. Therefore, PCA is used as it decomposes the data into a reduced set of linear components, rather than directly estimating the underlying factors (Factor Analysis). A factor analysis is used as a check of the stability of the solution and produces similar results (see page 197 and Appendix C2 for details).

PCA is usually carried out on a large number of variables, however in this case there are only six and nine soft skill measures to be analysed for the 2004 and 2000 responses, respectively. This raises issues regarding the stability of the solution. This will be discussed further in the presentation of the analysis. I will give an explanation of the theory of principal component analysis and a detailed discussion of the theory applied to this particular data, followed by further regression analysis. Throughout PCA, the researcher must make a number of decisions about the direction the analysis should take. I have taken direction from Field (2005) and Tabachnick and Fidell (2006).

A large sample size is required for PCA because it uses correlation coefficients between variables, which are more reliable with larger samples. The soft skill variables contain almost 9600 cases in 2004 and over 11000 in 2000, so sample size is not a problem here. An alternative measure is the Kaiser-Meyer-Olkin measure of sampling adequacy. The measure for this sample is 0.710, which is rated as 'good' (the closer the measure is to one, the better).

4.6.1 2004 principal components analysis

The first thing to check is the correlation matrix (call this R); firstly, it must be non-singular. Secondly, multicollinearity must not affect any of the variables. As can be seen below, neither of these are a problem. It is also useful to check the significance of the correlations between variables. Although not shown here (see Appendix C2), the correlations are all significant.

Table 20: Correlation Matrix

	Communicating	Working in a team	Learning new skills	Problem solving	Using tools properly	Looking after people
Communicating	1.000	.456	.326	.286	.090	.198
Working in a team	.456	1.000	.365	.254	.150	.155
Learning new skills	.326	.365	1.000	.514	.306	.075
Problem solving	.286	.254	.514	1.000	.349	.018
Using tools properly	.090	.150	.306	.349	1.000	.037
Looking after people	.198	.155	.075	.018	.037	1.000

Det. =0.386

This is confirmed by Bartlett's test, which tests that the correlation matrix is not an identity matrix (see Appendix C2). Given that correlation amongst variables is adequate, the next step is to extract the factors.

The correlation matrix is diagonalised by post- and pre-multiplying it by the eigenvector matrix and its transpose, respectively, giving the eigenvalue matrix (L).

$$L=V'RV$$

This essentially decomposes the variance in the correlation matrix into eigenvalues. Given there are six variables being analysed in the 2004 data, this will give us 6 initial eigenvalues, with the largest associated with the component with the most variance. Because the variables under consideration are standardised, and eigenvalues represent the variance within variables, any component with an eigenvalue less than one can be considered as not as important as an observed variable. Therefore, these components can be dismissed from the analysis. The table below shows the eigenvalues, and their contribution towards total variance, for the 6 soft skill variables in the 2004 data. One can see that two components are kept for the analysis.

Table 21: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.303	38.378	38.378	2.303	38.378	38.378	1.866	31.100	31.100
2	1.153	19.224	57.602	1.153	19.224	57.602	1.590	26.502	57.602
3	.879	14.646	72.248						
4	.658	10.963	83.210						
5	.551	9.188	92.398						
6	.456	7.602	100.000						

A second check is the scree plot (see Appendix C2). This plots the eigenvalues (which are decreasing as they are ordered largest to smallest) and the cut-off point for retaining factors is the point of inflection on the graph. Thirdly, a rule of thumb check is that the number of components with eigenvalues greater than one is:

'…between the number of variables divided by 3 and the number of variables divided by 5. If this is a reasonable number of factors for the data, if the number of variables is 40 or fewer, and if sample size is large, the number of factors indicated by this criterion is probably about right.' (Tabachnick and Fidell, 2007, p 644).

Ensuring the correct number of components is of major importance firstly for the stability of the solution, but also to ensure that the process of the analysis is not misused to create interesting results. These checks all point towards retaining 2 components for analysis.

Rearranging the equation above,

$R=VL^{0.5}L^{0.5}V'$

If $VL^{0.5}=A$,

$R=AA'$

This equation shows that the correlation matrix is the product of the factor loading matrix (A) and its transpose. The factor loading matrix is a matrix of correlations between the two components and each of the six variables, showing how much each variable 'loads' onto each of the two factors. The table below shows this component matrix.

Table 22: Component Matrix

	Component	
	1	2
How good at learning new skills	.768	-.202
How good at problem solving	.717	-.373
How good at working in a team	.673	.345
How good at communicating with others	.658	.433
How good at looking after people who need care	.248	.642
How good at using tools properly	.503	-.505

The interpretation of each component is derived from the variables that are highly correlated with it. However, variables are generally correlated with all components which make interpretation difficult, so the solution is rotated to maximise high correlations between components and variables, and minimise the low ones. This can be thought of, in this case, as a two-axes plot (the two axes being the two components) with the loadings of the variables plotted as coordinates. The axes are then rotated to intersect the clusters that are closest to that component. There are two types of rotation, orthogonal and oblique rotation. Orthogonal rotation is used when the factors are unrelated (of course, given that eigenvectors are orthogonal the components are unrelated to start with) whereas oblique rotation is used when one might believe that the components are correlated. Given that there are no theoretical grounds to believe that the two components are related, and also as orthogonal rotation has greater simplicity and interpretability, I have used an orthogonal rotation (specifically, varimax, a variance maximising procedure). The rotated component matrix is shown below.

Table 23: Rotated Component Matrix

	Component	
	1	2
How good at problem solving	.794	.148
How good at learning new skills	.730	.314
How good at using tools properly	.707	
How good at communicating with others	.251	.746
How good at working in a team	.317	.687
How good at looking after people who need care	-.201	.659

For an easy interpretation, it is desirable that variables are 'meaningfully' loaded onto one factor. From a practical point of view, 'meaningful' in this sense is taken, as a rule of thumb, if loadings are higher than 0.32 (Tabachnick and Fidell 2007, p.649). One can see here that no variable has a loading of more than 0.32 on both components; therefore we have what is termed as 'simple structure'. Moreover, variables with higher loadings are a better measure of that component. This is because the higher the loading, the more overlapping variance there is between the component and the variable. For example, problem solving has 63% overlapping variance (this is simply the loading squared). According to Comrey and Lee (1992), loadings above 0.71 (giving 50% overlapping variance) are considered excellent, and even the lowest meaningful loading here of 0.659 (looking after others who need care) is considered to be very good.

If we look at which variables are highly loaded on the components, one can see that the variables can be classed into two distinct groups. The first component has problem solving, learning new skills and using tools properly highly loaded onto it. The other variables are not meaningfully correlated with this component. The opposite is true for the second component, with communication, teamwork and looking after others highly loaded onto the component. These two components might be called 'technical' and 'personal' skills traits respectively.

From this, communalities may be found. Communalities are the proportion of shared variance within each variable. In PCA, the initial communalities are all one, but through extraction some information is lost. Communalities after extraction are the sum of squared loadings across components, shown below.

Table 24: Communalities

	Initial	Extraction
How good at communicating with others	1.000	.620
How good at working in a team	1.000	.572
How good at learning new skills	1.000	.631
How good at problem solving	1.000	.653
How good at using tools properly	1.000	.507
How good at looking after people who need care	1.000	.474

Extraction Method: Principal Component Analysis.

Essentially, communalities after extraction show how much of the variance in the variables is common variance explained by the two remaining components. One can check how the extracted model fits with the original data by examining the reproduced correlation matrix, constructed by the multiple of the rotated component matrix and its transpose. To measure the model's fit against the original data, the main diagonal of the original correlation matrix is simply replaced with the communalities, and the differences between the two matrices are taken. The smaller the values in the matrix of residuals, the better the model. The table below shows the fitted correlations and the residual correlation matrix.

Table 25: Reproduced Correlations

		Communicating with others	working in a team	learning new skills	problem solving	using tools properly	looking after others
Reproduced Correlation	communicating with others	.620[a]	.592	.418	.310	.112	.441
	working in a team	.592	.572[a]	.447	.353	.164	.389
	learning new skills	.418	.447	.631[a]	.626	.488	.061
	problem solving	.310	.353	.626	.653[a]	.548	-.062
	using tools properly	.112	.164	.488	.548	.507[a]	-.199
	looking after people who need care	.441	.389	.061	-.062	-.199	.474[a]
Residual	communicating with others		-.135	-.092	-.024	-.022	-.243
	working in a team	-.135		-.082	-.099	-.014	-.234
	How good at learning new skills	-.092	-.082		-.112	-.182	.014
	problem solving	-.024	-.099	-.112		-.199	.079
	using tools properly	-.022	-.014	-.182	-.199		.237
	looking after others	-.243	-.234	.014	.079	.237	

Residuals are computed between observed and reproduced correlations. There are 11 (73.0%) non-redundant residuals with absolute values greater than 0.05.

Given that there are only a small number of variables in the analysis one may question the stability of the solution. As a check for consistency, I have also run a factor analysis (FA). Generally, FA and PCA give similar results; however, when there are less than 20 variables differences can occur. The main difference between PCA and FA is that, as explained above, PCA assumes to begin with that all variance is common variance (hence initial eigenvalues are all one), whereas in FA only common variance (i.e. shared with other variables) is used in the analysis. The estimated communalities are inserted into the main diagonal of the correlation matrix before the factors are extracted. The factor loadings from the factor analysis can be found in Appendix C2, and shows that at least the solution is stable in the sense that it too extracts two factors with the same variables loaded on them.

Therefore, although Table 25 shows that the model does not ideally represent the original data[74], the FA shows some consistency with regards to the decomposed components.

To find the component scores, which are weighted variable scores (weighted by the component loadings) the product of the inverse of the correlation matrix and the rotated component matrix is found:

$B=R^{-1}A$

Table 26: Component Score Coefficient Matrix

	Component	
	1	2
How good at communicating with others	-.006	.471
How good at working in a team	.046	.416
How good at learning new skills	.371	.068
How good at problem solving	.444	-.063
How good at using tools properly	.442	-.210
How good at looking after people who need care	-.258	.505

Factor scores (F), is then estimated by weighting standardised variable scores by B in a regression-like equation:

$F=ZB$,

where Z is the matrix of standardised soft skill ratings.

Given that the responses of males and females vary across skills – particularly across the distinction between 'personal' (females rating themselves to be more

[74] The majority of the residuals are larger than |0.05|. This is because the two extracted components only account for 57.6% of the variance amongst the original correlations.

proficient) and ‘technical’ (males rating themselves to be more proficient), the PCA was also carried out separately for males and females, as another check of stability of the solution. The analysis (which can be found in Appendix C2) shows that the same underlying components are found for both males and females, showing that the groups are not so distinct that they should be considered separately[75].

4.6.2 2000 principal components analysis

In the 2000 sweep, participants were asked about three further soft skills: use of numbers, use of finance and accounts and use of computers and information technology. This requires a fresh PCA of all of these skills. The analysis will not be presented in detail here; all of the equivalent tables shown in the above section are included in Appendix C2. Here, I will only present and outline some of the important issues regarding this particular analysis. Table 27 below shows that there are three eigenvalues greater than one in the 2000 soft skill ratings data, therefore there are three underlying components, explaining just over 56% of the variance in the nine soft skill ratings overall.

[75] For females, the second eigenvalue is exactly 1. Although the default in the analysis is to only extract the one component with an eigenvalue larger than one, it is entirely appropriate to specify the extraction of the second component when the eigenvalue is close to one.

Table 27: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.773	30.814	30.814	2.773	30.814	30.814	2.413
2	1.263	14.038	44.852	1.263	14.038	44.852	1.692
3	1.028	11.422	56.275	1.028	11.422	56.275	1.501
4	.906	10.062	66.336				
5	.723	8.033	74.369				
6	.653	7.250	81.619				
7	.619	6.879	88.498				
8	.521	5.791	94.288				
9	.514	5.712	100.000				

Extraction Method: Principal Component Analysis.
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Initially, the same analysis was run as with the 2004 data; however the varimax rotation procedure resulted in some skills being meaningfully loaded onto more than one component, as shown in the rotated component matrix below.

Table 28: Rotated Component Matrix

	Component		
	1	2	3
(SC)How good... at communicating with others	.262	.714	-.035
(SC)How good... at the use of numbers	.732	-.015	.138
(SC)How good... at the use of computers and IT	.732	.060	-.031
(SC) How good...at working in a team	.175	.676	.175
(SC) How good...at learning new skills	**.458**	.294	**.469**
(SC) How good...at problem solving	**.546**	.165	**.497**
(SC) How good... at using tools properly	-.049	.006	.899
(SC) How good... at looking after people	-.196	.652	.039
(SC) How good...at working with finance/accounts	.706	.095	.027

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

One can see that learning new skills and problem solving both meaningfully load onto components one and three. Therefore, these two components cannot be assumed to be independent, meaning that the orthogonal rotation is not appropriate in this case. Therefore, I have instead employed an oblique rotation method. Oblique rotation produces two different matrices; a pattern matrix and a structure matrix (in orthogonal rotation, these are the same thing). The pattern matrix is similar to the rotated component matrix found for the 2004 data, in that it shows the loadings of variables onto each factor. The structure matrix is the product of the pattern matrix and the correlation coefficients matrix, thus taking into account the relationship between factors (Field p660). Both of these matrices are shown below.

Table 29: Pattern Matrix

	Component		
	1	2	3
(SC)How good... at communicating with others	.206	.713	-.125
(SC)How good... at the use of numbers	.741	-.083	.065
(SC)How good... at the use of computers and IT	.749	.006	-.114
(SC) How good...at working in a team	.102	.665	.102
(SC) How good...at learning new skills	.403	.230	.406
(SC) How good...at problem solving	.502	.089	.437
(SC) How good... at using tools properly	-.130	-.058	.926
(SC) How good... at looking after people	-.265	.679	.005
(SC) How good...at working with finance/accounts	.714	.040	-.055

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Table 30: Structure Matrix

	Component		
	1	2	3
(SC)How good... at communicating with others	.315	.729	.047
(SC)How good... at the use of numbers	.739	.069	.203
(SC)How good... at the use of computers and IT	.726	.127	.042
(SC) How good...at working in a team	.249	.703	.244
(SC) How good...at learning new skills	.530	.380	.531
(SC) How good...at problem solving	.609	.263	.556
(SC) How good... at using tools properly	.050	.086	.889
(SC) How good... at looking after people	-.135	.630	.074
(SC) How good...at working with finance/accounts	.710	.165	.099

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

The pattern matrix shows that three factors do seem to underlie these soft skills variables. Those loading (uniquely) highly on factor one are use of numbers, use of computers and IT, and finance and accounts. Factor two includes communicating with others, working in a team and looking after others, while using tools loads onto factor three. Learning new skills and problem solving load onto both factor one and factor three. The structure matrix (which includes information on the relationship between factors) generally confirms the loadings, although learning new skills loads onto each factor in the structure matrix. This is unsurprising, given the general nature of the soft skill rating; learning new skills is a generic soft skill. The loadings are again very high, with the majority of variables having a loading greater than 0.7 (which is considered as an excellent fit). Only problem solving and learning new skills – arguably the most generic skills of those in this analysis – share less than 30% overlapping variance with one factor, and both share well over the required 10% overlapping variance with one factor.

Given these loadings, one might interpret the first component as numerical skill, the second as interpersonal skills and the third factor as a reflection of technical skills. This is entirely intuitive; one can clearly see that the self-reported skills loading onto each factor are related, and it is plausible that firms assess individuals for these broader traits rather than individual skills.

4.7 PCA regressions

We now return to the earnings equations and investigate the returns to the underlying skill traits. The tables below show the results of the 2000 and 2004 regressions comparable to the OLS regressions above, but this time using underlying components as soft-skill measures, rather than dummy variables. The first regression is comparable to specification 2 in the previous section.

Table 31: Returns to skills traits, specification 2

Specification 2	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
Female	-0.077	0.000	-0.057	0.000
Part time	-0.249	0.000	-0.256	0.000
Irish	-0.022	0.733	-0.120	0.105
White other	0.001	0.968	0.049	0.265
White & Black Caribbean	-0.037	0.691	0.235	0.104
White & Black African	-0.138	0.654	(dropped)	
White & Asian	-0.009	0.935	-0.217	0.181
Other mixed race	0.072	0.510	-0.076	0.638
Indian	0.067	0.190	0.089	0.143
Pakistani	0.157	0.127	0.064	0.573
Bangladeshi	-0.055	0.755	-0.011	0.947
Other Asian	0.058	0.569	0.107	0.456
Caribbean	-0.046	0.595	0.059	0.546
African	-0.350	0.107	(dropped)	
Other Black	0.259	0.060	(dropped)	
Chinese	0.025	0.870	0.006	0.969
Other ethnic group	0.115	0.061	-0.001	0.994
Father social class I	0.140	0.000	0.167	0.000
Father social class II	0.073	0.000	0.099	0.000
Father social class III non-manual	0.007	0.691	0.048	0.025
Father social class III manual	-0.007	0.517	0.023	0.093
Father social class IV	-0.029	0.139	-0.012	0.618
Father is a student	-0.050	0.241	0.036	0.501
Father is dead	0.021	0.491	0.075	0.043
Financial hardship	-0.031	0.033	-0.052	0.003
North	-0.104	0.000	-0.178	0.000
Yorkshire & Humberside	-0.091	0.000	-0.084	0.000
East Midlands	-0.059	0.001	-0.074	0.000
East Anglia	-0.065	0.003	-0.118	0.000
South West	-0.087	0.000	-0.074	0.000
West Midlands	-0.043	0.009	-0.065	0.001
North West	-0.058	0.000	-0.112	0.000
Wales	-0.078	0.000	-0.149	0.000
Scotland	-0.050	0.002	-0.081	0.000
Drawing test One lowest quintile	-0.028	0.182	-0.026	0.301
Drawing test One 2nd quintile	-0.002	0.918	-0.008	0.662
Drawing test One 4th quintile	-0.005	0.761	-0.033	0.085
Drawing test One 5th quintile	-0.003	0.853	-0.038	0.084
Drawing test Two 1st quintile	0.004	0.834	-0.035	0.160
Drawing test Two 2nd quintile	0.014	0.374	-0.002	0.902
Drawing test Two 4th quintile	0.000	0.999	-0.018	0.348
Drawing test Two 5th quintile	0.001	0.935	0.027	0.227
Vocabulary test lowest quintile	0.001	0.928	-0.039	0.056
Vocabulary test 2nd quintile	0.007	0.655	-0.023	0.194
Vocabulary test 4th quintile	0.013	0.348	0.006	0.729
Vocabulary test 5th quintile	0.028	0.042	0.012	0.484
Profile test lowest quintile	-0.022	0.140	0.028	0.129
Profile test 2nd quintile	-0.004	0.779	0.020	0.209
Profile test 4th quintile	-0.007	0.620	0.021	0.208
Profile test 5th quintile	-0.021	0.126	-0.001	0.972

Copying test lowest quintile	-0.024	0.202	-0.033	0.155
Copying test 2nd quintile	0.006	0.694	0.004	0.840
Copying test 4th quintile	0.025	0.066	0.024	0.146
Copying test 5th quintile	0.063	0.000	0.062	0.000
Maths test lowest quintile	-0.067	0.000	-0.081	0.001
Maths test 2nd quintile	-0.053	0.000	-0.035	0.055
Maths test 4th quintile	-0.015	0.276	0.024	0.141
Maths test 5th quintile	0.024	0.113	0.063	0.001
Reading test lowest quintile	-0.029	0.143	-0.067	0.006
Reading test 2nd quintile	0.002	0.899	-0.025	0.173
Reading test 4th quintile	0.003	0.816	-0.015	0.370
Reading test 5th quintile	0.059	0.000	0.045	0.011
Word score lowest quintile	-0.030	0.103	-0.064	0.003
Word score 2nd quintile	-0.016	0.388	-0.054	0.015
Word score 4th quintile	0.002	0.860	-0.009	0.588
Word score 5th quintile	0.058	0.000	0.031	0.041
Small firm	-0.065	0.000	-0.058	0.000
Large firm	0.016	0.183	0.028	0.053
Very large firm	0.074	0.000	0.079	0.000
Tenure	0.013	0.001	0.014	0.001
Tenure squared	-0.001	0.000	-0.001	0.001
Managerial responsibilities	0.148	0.000	0.218	0.000
(Constant)	2.112	0.000	2.353	0.000
FACTORS				
	Coef.	P>t	Coef.	P>t
	Numerical		Technical	
	0.071	0.000	0.016	0.005
	Personal		Personal	
	0.010	0.035	0.026	0.000
	Technical			
	-0.028	0.000		
No. of obs.		5408		4046
Adj. R-squared		0.3801		0.4179

For 2004, one can see that both technical and personal skill traits (component one and component two, respectively) both significantly and positively affect pay.

For the 2000 regression numerical and personal skills are significantly and positively associated with pay, although technical skills negatively affect pay. It is important to point out that numerical skill is significantly large and positive even though early-age maths scores are controlled for. This confirms other literature that finds that numerical skill in the UK commands a high value in the labour market because of its short supply. Also, given that this soft skill component includes computer and information technology skills, it is also an indicator of the importance of being able to use technology in the workplace. The negative effect of technical skills probably reflects the increased pay associated with being less than competent at using tools found in the previous set of regressions. This supports the hypothesis that employers do assess an individual's overall competency for particular skills traits, rather than attempting to assess particular traits individually. As discussed above, soft skills are difficult to measure objectively, and there are no qualifications that directly signal or measure the competence at any particular skill.

The next regression (equivalent to specification 3 in the previous section) includes qualification measures. For 2004, once again the two component scores have significant effects on pay; compared to the last regression, the returns to these traits have fallen slightly. For 2000, the directional effects are the same as the previous regression, and the coefficient for numerical skills has fallen with the inclusion of the qualification measures. However, the magnitude of the effect of personal skills on pay has increased, whilst the effect of technical skills has decreased in magnitude (i.e. the pay penalty to these skills has fallen). This shows that both the personal and more technical soft skills do have some effect in addition to qualifications.

Table 32: Specification 3

Specification 3	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.064	0.000	0.088	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.005	0.525	0.000	0.985
A/S Level Grade A-C	0.041	0.019	0.028	0.185
A-Level/S-Level Grade A-C	0.087	0.000	0.056	0.000
SCE Standard Grade 4-5	-0.002	0.970	-0.029	0.636
SCE Standard Grade 1-3	0.016	0.604	0.032	0.362
SLC Lower or Ordinary Grade	-0.085	0.261	0.160	0.104
SLC Higher Grade	0.057	0.050	0.094	0.004
Scottish 6th Year Certificate	0.038	0.508	-0.008	0.902
Other Scottish qualification	0.027	0.794	0.183	0.180
Degree	0.171	0.000	0.216	0.000
Higher Degree	0.036	0.112	0.016	0.551
BTEC Level 2	0.007	0.674	0.045	0.030
BTEC Level 3	0.069	0.000	0.063	0.001
BTEC Level 4	-0.024	0.491	0.003	0.951
Other BTEC qualification	0.105	0.003	-0.003	0.944
City and Guilds Level 2	-0.013	0.395	-0.001	0.975
City and Guilds Level 3	-0.024	0.098	-0.051	0.003
City and Guilds Level 4	-0.017	0.671	-0.029	0.537
Other City and Guilds qualification	0.001	0.974	0.016	0.652
RSA Stage 1	-0.015	0.265	0.014	0.346
RSA Stage 2	0.046	0.210	0.074	0.091
RSA Stage 3	-0.040	0.724	0.103	0.341
NVQ Level 1	-0.052	0.056	0.012	0.731
NVQ Level 2	-0.090	0.000	-0.058	0.028

NVQ Level 3	0.013	0.607	0.008	0.793
NVQ Level 4	0.149	0.002	0.191	0.001
NVQ Level 5	0.160	0.289	0.000	0.998
NVQ Level 6	0.212	0.084	-0.056	0.655
Other NVQ or Trusts towards NVQ	0.008	0.876	0.013	0.841
GNVQ Level 1	0.299	0.077	-0.106	0.484
GNVQ Level 2	0.062	0.485	0.010	0.954
GNVQ Level 3	-0.007	0.940	0.097	0.436
Other GNVQ qualification	0.243	0.241	0.232	0.278
ONC/OND	0.039	0.105	0.000	0.995
HNC/HND	0.024	0.213	0.071	0.002
Recognised trade apprenticeship	0.053	0.012	0.033	0.236
Female	-0.088	0.000	-0.082	0.000
Part time	-0.212	0.000	-0.212	0.000
Father social class I	0.039	0.046	0.064	0.005
Father social class II	0.022	0.074	0.046	0.001
Father social class III non-manual	-0.005	0.754	0.016	0.442
Father social class III manual	-0.016	0.151	0.017	0.191
Father social class IV	-0.031	0.099	-0.017	0.460
Father is a student	-0.066	0.111	0.008	0.880
Father is dead	0.006	0.830	0.062	0.081
Financial hardship	-0.020	0.169	-0.036	0.037
North	-0.097	0.000	-0.166	0.000
Yorkshire & Humberside	-0.078	0.000	-0.066	0.001
East Midlands	-0.047	0.007	-0.051	0.011
East Anglia	-0.047	0.028	-0.087	0.001
South West	-0.072	0.000	-0.053	0.006
West Midlands	-0.036	0.024	-0.044	0.016
North West	-0.052	0.001	-0.089	0.000
Wales	-0.077	0.000	-0.125	0.000
Scotland	-0.057	0.002	-0.102	0.000
Drawing test One 1st (lowest) quintile	-0.033	0.102	-0.035	0.143
Drawing test One 2nd quintile	-0.007	0.674	-0.019	0.310
Drawing test One 4th quintile	-0.001	0.949	-0.025	0.167
Drawing test One 5th quintile	-0.001	0.933	-0.024	0.249
Drawing test Two 1st quintile	0.013	0.528	-0.011	0.633
Drawing test Two 2nd quintile	0.022	0.150	0.014	0.444
Drawing test Two 4th quintile	0.007	0.641	-0.015	0.417
Drawing test Two 5th quintile	0.003	0.863	0.019	0.362
Vocabulary test 1st (lowest) quintile	0.004	0.808	-0.048	0.015
Vocabulary test 2nd quintile	0.013	0.355	-0.015	0.381
Vocabulary test 4th quintile	0.011	0.429	0.006	0.706
Vocabulary test 5th quintile	0.013	0.332	0.004	0.801
Profile test 1st (lowest) quintile	-0.007	0.626	0.034	0.050
Profile test 2nd quintile	0.005	0.681	0.026	0.092
Profile test 4th quintile	0.002	0.889	0.029	0.077
Profile test 5th quintile	-0.014	0.306	0.006	0.708
Copying test 1st (lowest) quintile	-0.023	0.205	-0.030	0.164
Copying test 2nd quintile	0.009	0.540	0.010	0.600
Copying test 4th quintile	0.024	0.072	0.025	0.110
Copying test 5th quintile	0.041	0.004	0.036	0.032
Maths test 1st (lowest) quintile	-0.063	0.001	-0.056	0.013
Maths test 2nd quintile	-0.037	0.014	-0.002	0.926
Maths test 4th quintile	-0.014	0.280	0.016	0.310
Maths test 5th quintile	-0.007	0.663	0.013	0.481

Reading test 1st (lowest) score	-0.009	0.650	-0.043	0.063
Reading test 2nd score	0.018	0.209	0.001	0.961
Reading test 4th score	0.004	0.748	-0.014	0.373
Reading test 5th score	0.018	0.214	0.006	0.713
Word score 1st (lowest) quintile	-0.019	0.273	-0.054	0.009
Word score 2nd quintile	-0.001	0.959	-0.037	0.085
Word score 4th quintile	0.013	0.351	0.003	0.845
Word score 5th quintile	0.050	0.000	0.021	0.140
Small firm	-0.050	0.000	-0.047	0.000
Large firm	0.021	0.066	0.022	0.117
Very large firm	0.062	0.000	0.068	0.000
Tenure	0.012	0.002	0.005	0.183
Tenure squared	-0.001	0.037	0.000	0.455
Managerial/supervisory responsibilities	0.125	0.000	0.181	0.000
(Constant)	2.044	0.000	2.290	0.000

FACTORS

Coef.	P>t		Coef.	P>t
Numerical			Technical	
0.051	0.000		0.014	0.013
Personal			Personal	
0.012	0.010		0.019	0.000
Technical				
-0.018	0.000			
No. of obs.	5195		No. of obs.	3895
Adj. R-squared	0.4468		Adj. R-squared	0.4940

The table below shows the equivalent to specification 4, including SOC major grouping in the regression.

Table 33: Specification 4

Specification 4	Log hourly pay 2000		Log hourly pay 2004	
	Coef.	P>t	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.039	0.000	0.031	0.001
<5 GCSE's Grade A-C (or equivalent)	-0.011	0.115	-0.009	0.217
A/S Level Grade A-C	0.009	0.533	-0.002	0.876
A-Level/S-Level Grade A-C	0.044	0.000	0.025	0.034
SCE Standard Grade 4-5	0.002	0.958	-0.033	0.461
SCE Standard Grade 1-3	-0.004	0.870	0.029	0.259
SLC Lower or Ordinary Grade	-0.073	0.253	0.011	0.880
SLC Higher Grade	0.035	0.150	0.046	0.053
Scottish 6th Year Certificate	0.019	0.694	-0.015	0.766
Other Scottish qualification	0.038	0.664	-0.021	0.832
Degree	0.048	0.000	0.063	0.000
Higher Degree	-0.014	0.454	-0.013	0.486
BTEC Level 2	-0.003	0.837	0.006	0.697
BTEC Level 3	0.045	0.001	0.008	0.571
BTEC Level 4	-0.073	0.011	-0.024	0.430
Other BTEC qualification	0.066	0.026	-0.053	0.080
City and Guilds Level 2	-0.015	0.235	0.009	0.508
City and Guilds Level 3	-0.015	0.199	-0.025	0.057
City and Guilds Level 4	-0.023	0.491	-0.034	0.309

Other City and Guilds qualification	-0.014	0.593	0.006	0.811
RSA Stage 1	0.000	0.972	0.001	0.907
RSA Stage 2	0.094	0.002	0.036	0.269
RSA Stage 3	-0.076	0.422	0.016	0.835
NVQ Level 1	-0.024	0.286	0.010	0.681
NVQ Level 2	-0.077	0.000	-0.021	0.280
NVQ Level 3	-0.015	0.485	-0.043	0.050
NVQ Level 4	0.085	0.039	0.126	0.003
NVQ Level 5	0.068	0.591	0.025	0.790
NVQ Level 6	0.249	0.015	-0.064	0.483
Other NVQ or Trusts towards NVQ	0.009	0.842	0.023	0.612
GNVQ Level 1	0.082	0.563	-0.083	0.455
GNVQ Level 2	0.020	0.784	-0.004	0.977
GNVQ Level 3	-0.109	0.163	-0.054	0.553
Other GNVQ qualification	0.301	0.082	0.129	0.411
ONC/OND	-0.008	0.688	0.018	0.393
HNC/HND	0.002	0.912	-0.001	0.950
Recognised trade apprenticeship	0.054	0.003	0.028	0.161
Female	-0.088	0.000	-0.064	0.000
Part time	-0.157	0.000	-0.126	0.000
Father social class I	0.021	0.201	0.040	0.017
Father social class II	0.011	0.289	0.023	0.026
Father social class III non-manual	-0.008	0.578	0.002	0.902
Father social class III manual	-0.011	0.240	0.010	0.295
Father social class IV	-0.023	0.152	-0.009	0.600
Father is a student	-0.062	0.072	-0.016	0.663
Father is dead	0.001	0.961	0.034	0.196
Financial hardship	-0.021	0.079	-0.008	0.542
North	-0.088	0.000	-0.098	0.000
Yorkshire & Humberside	-0.077	0.000	-0.052	0.000
East Midlands	-0.055	0.000	-0.036	0.014
East Anglia	-0.050	0.005	-0.050	0.007
South West	-0.068	0.000	-0.027	0.052
West Midlands	-0.038	0.005	-0.031	0.021
North West	-0.043	0.001	-0.057	0.000
Wales	-0.082	0.000	-0.077	0.000
Scotland	-0.055	0.000	-0.055	0.001
Drawing test One 1st (lowest) quintile	-0.014	0.410	-0.015	0.397
Drawing test One 2nd quintile	0.001	0.946	-0.009	0.517
Drawing test One 4th quintile	0.003	0.836	-0.039	0.003
Drawing test One 5th quintile	0.003	0.832	-0.020	0.187
Drawing test Two 1st quintile	0.008	0.648	-0.006	0.721
Drawing test Two 2nd quintile	0.014	0.294	0.008	0.554
Drawing test Two 4th quintile	0.016	0.208	-0.005	0.681
Drawing test Two 5th quintile	0.010	0.514	0.013	0.412
Vocabulary test 1st (lowest) quintile	0.004	0.786	-0.016	0.268
Vocabulary test 2nd quintile	0.006	0.624	-0.010	0.432
Vocabulary test 4th quintile	0.002	0.828	-0.004	0.725
Vocabulary test 5th quintile	0.009	0.413	-0.015	0.211
Profile test 1st (lowest) quintile	-0.003	0.798	0.029	0.024
Profile test 2nd quintile	0.005	0.622	0.018	0.113
Profile test 4th quintile	0.000	0.974	0.017	0.144
Profile test 5th quintile	-0.011	0.318	0.016	0.168
Copying test 1st (lowest) quintile	-0.009	0.545	0.000	0.980
Copying test 2nd quintile	0.015	0.231	-0.003	0.834

Copying test 4th quintile	0.017	0.122	0.014	0.210
Copying test 5th quintile	0.022	0.056	0.027	0.026
Maths test 1st (lowest) quintile	-0.043	0.006	-0.022	0.179
Maths test 2nd quintile	-0.023	0.063	0.006	0.670
Maths test 4th quintile	-0.008	0.479	0.006	0.624
Maths test 5th quintile	-0.016	0.196	-0.002	0.883
Reading test 1st (lowest) score	0.013	0.419	-0.005	0.790
Reading test 2nd score	0.025	0.038	-0.001	0.909
Reading test 4th score	0.010	0.370	-0.018	0.125
Reading test 5th score	0.018	0.144	-0.017	0.168
Word score 1st (lowest) quintile	-0.022	0.146	-0.021	0.162
Word score 2nd quintile	0.004	0.795	-0.019	0.234
Word score 4th quintile	0.018	0.114	0.014	0.225
Word score 5th quintile	0.031	0.002	0.020	0.059
Small firm	-0.048	0.000	-0.033	0.001
Large firm	0.026	0.008	0.027	0.010
Very large firm	0.056	0.000	0.056	0.000
Tenure	0.009	0.003	0.002	0.558
Tenure squared	0.000	0.072	0.000	0.926
Managers and senior officials	0.540	0.000	0.717	0.000
Professional occupations	0.653	0.000	0.784	0.000
Associate professional and technical	0.513	0.000	0.560	0.000
Administrative and secretarial	0.178	0.000	0.262	0.000
Skilled trades	0.267	0.000	0.284	0.000
Personal service	0.147	0.000	0.143	0.000
Sales and customer service	0.130	0.000	0.032	0.121
Process, plant and machine operatives	0.166	0.000	0.167	0.000
Managerial/supervisory responsibilities	0.019	0.024	0.041	0.000
(Constant)	1.815	0.000	1.977	0.000

FACTORS

Coef.	P>t		Coef	P>t
Numerical			Technical	
0.034	0.000		0.006	0.120
Personal			Personal	
0.009	0.022		0.006	0.149
Technical				
-0.012	0.003			
No. of obs.	3931		No. of obs.	3885
Adj. R-squared	0.5067		Adj. R-squared	0.7298

For the 2000 regressions, the significant effects of each of the components remain, even when both occupational group and qualifications are controlled for. Numerical skill has a strongly significant effect on pay. Personal skills results in a smaller increase in pay than in previous specifications. Whilst technical skills again have a significant negative effect on pay, the return to being in a skilled trades occupation (the occupational group that rates these skills the highest) is large and strongly significant. Technical and personal skills no longer have a significant effect on pay in 2004 when controlling for qualifications and SOC major grouping. Generally, the soft skills that individuals possess hold a higher value in 2000 than for the same individuals in 2004. This is consistent with the hypothesis that soft skills may be used by employers to distinguish between equally qualified individuals, and therefore command a high value earlier in an individual's career.

In specifications 3 and 4, tenure becomes less important as one gets older; at age 30 the returns to experience are significant and positive, but at a slightly decreasing rate, however by age 34, experience has an insignificant effect on pay.

4.8 Discussion

This analysis shows that soft skills are indeed important in the UK labour market. These types of skills are highly demanded by firms, but a significant proportion of workers and potential employees do not possess them to a sufficient level for the tasks required by employers. This analysis shows that soft skills do significantly affect pay at the start of the career, particularly when measured as traits rather than particular skills in themselves. As expected, given that some types of skills are more likely to be used in particular occupations, we find that occupational effects are present. It has been found that cognitive abilities may affect occupational choice – Govier and Feldman (1999) find that females in male-dominated occupations are as good as males at tests that are typically found to favour males. Likewise, males in female-dominated occupations are as good as females at tasks that typically favour males (in terms of performance). The most valued soft skill is use of computers and IT, and this is unsurprising given the evidence of technological change in the workplace, regardless of occupation.

A crucial part of this analysis was to investigate whether, given this shortage of soft skills, some of the returns to qualifications are actually hidden by the value of soft skills in the labour market. The stability in returns over time may be the result of two underlying trends; a fall in returns to qualifications, but an increase in the value of skills. It is well known that there has been an increase in educational attainment; however, there does not seem to be a fall in returns to qualifications. Most research has concluded from this that demand for these higher level qualifications must have increased in line with their supply, however this ignores other literature showing the prevalence of over-education in the UK. Also, shown in the previous chapter of this Thesis in the Quantile regression (p118), there is a large variance in returns to some qualifications across the pay distribution.

Given this evidence, I propose that employers are finding it increasingly difficult to distinguish between potential employees by qualifications alone and are using other traits in an attempt to do so. Improving technology and the use of computers, and the expansion of the service sector in the UK has resulted in soft skills having a more important role in the productivity of firms and in customer service and, therefore, the competent use of these skills could be one possible way that employers may distinguish between potential applicants. This is supported by the evidence for the increased use of psychometric testing and assessment centres as part of the recruitment process, which are used precisely to assess whether individuals have these skills. Moreover, these tests can be designed to test for the sorts of skills used on the job, thus ensuring a good match between the firm and its employees.

The evidence presented here, using the British Cohort Study 1970, shows that returns to qualifications generally fall when soft skills measures are introduced, and their significant effect on pay (for some of the variables, at least) remains. Moreover, the inclusion of soft skills in the regression equations shows that, if anything, it is early in an individual's career where soft skills are important and seem to mask returns to qualifications. This provides support for the argument that soft skills may be used by employers to distinguish between individuals in their employment decision, and so individuals that do possess these skills, ceteris paribus, are more successful in securing higher paid jobs.

The second aspect of this analysis concerns how soft skill competence is measured and assessed, particularly by firms. One of the key issues regarding soft skills is that they are difficult to measure for both employers and researchers, and are not accredited through specific qualifications. Soft skills are generic components of human capital that are assessed by firms through a long and expensive recruitment process, usually through psychometric testing and assessment days. However, it is unlikely that employers are able to separately identify soft skills given their inherently generic and personal nature, and are more likely to pick up on more general qualities, for example interpersonal, technical and numerical abilities, that individuals possess. This analysis suggests an alternative way of measuring skills that is more in line with recruitment practices. Rather than using information on specific soft skills, this analysis decomposes these responses into broader factors. To my knowledge, this is the first time a full principal components analysis has been used to measure self-rated skills to find underlying traits and estimate their value in the labour market. This analysis finds that, consistent with other literature, soft skills – particularly numerical skills - are valued in the labour market, and have significant effects on pay when controlling for qualification, and in some cases also for occupation. Soft skills are found to be more important earlier in an individual's career, and this is consistent with the hypothesis that they are used to differentiate between equally qualified individuals. Given that psychometric testing and assessment centres are used as part of the recruitment process to ensure a good match between firm and employee, as one moves further into their career firm-specific capital may become more important and outweigh the value of soft skills, which are used to identify high quality candidates from the applicant pool. Those individuals without these skills may be at more risk of over-education.

A comparison of employers and employees shows that individuals over-estimate their skill set as compared to employers. Given that employers recognise a gap and shortage with respect to these skills, this gives rise to two important considerations for policy makers; firstly, can policy intervention be an effective tool for improving these skills, and if so, how is this best achieved? One might argue that generic skills of this type are inherent qualities of individuals that are developed through their interaction with their environment, and are related to traits such as confidence. If this is the case, then it would be very difficult for any policy intervention to rectify the situation. However, if one believes that soft skills can be developed through some kind of training, learning and experience, then some policy intervention may help to close the skills gap. If the latter is true, this becomes an issue of how, and at what point, to intervene. As proposed earlier in this discussion, if soft skills are used to differentiate between the increasing numbers of graduates entering the labour market, one could argue that this intervention should come in the higher education sector as this is where the accumulation of these skills will be most important. However, if business has a direct influence on course content of degree programmes, this firstly counters the academic freedom that universities have traditionally enjoyed and secondly, it may be argued, that if the primary role of universities becomes as a supplier of a high-skilled workforce, then business should be liable for some of the costs of higher education.

This research raises two key issues. Firstly, although the methodology used in this research is internally consistent and sound conclusions can be drawn for the 1970 cohort, a confirmatory factor analysis is required to give external validity. That is, whether the principal components found and how they load onto each factor may differ across cohorts. Therefore, attention should be paid to survey design in order to create an accurate, externally valid scale of measurement that can be included in future surveys. There are two examples of surveys that have been specifically designed to explore the issues regarding soft skills. The Skills at Work Report (Felstead et al. 2007), by the Centre for Skills, Knowledge and Organisational Performance (SKOPE) surveyed the extent to which employees used a range of skills in the tasks they perform on the job (rather than the ratings of these skills). It also uses PCA to find groups of skills, but factor scores are not used in place of survey responses. The Programme for the International Assessment of Adult Competencies (PIAAC) aims to provide a detailed analysis of soft skill competencies, using an objective analysis of skills traits, and has carried out a pilot study across a number of countries. This shows that this is receiving attention in the field and the PIAAC survey may indeed provide an externally valid test for assessing traits in other surveys. Secondly, more research is required on exactly how policy can be used to increase the levels of soft skills of education-leavers to ensure that the soft skills gaps reported by employers can be closed over time, creating a better match between employers and employees.

Finally, given the evidence presented here, what are the implications for future trends in soft skills? The latest National Employers Skills Survey (2009) shows that the incidence of both skills shortages and skills gaps have decreased since 2004. The proportion of firms with hard to fill vacancies fell from 8% to 3% in 2009, although this was mainly because of a fall in the number of vacancies. In 2007, 7% of firms had hard to fill vacancies. The proportion of firms experiencing skills gaps fell from 20% in 2004 to 16% in 2009. However, soft skills continue to make up a significant proportion of the skills gaps for these firms, and the skills that are important within particular occupations still seem to be lacking (for example, 75% of managers lack management skills in 2007, when management skills are lacking in the firm's existing workforce. This falls to 63% in 2009). Also, the work readiness of individuals employed straight from education has increased since 2005[76], however a significant proportion of young workers remain poorly prepared for the labour market in terms of their skills. For example, 29% of those leaving at compulsory school leaving age, 21% of college leavers, and 11% of graduates are believed by firms to be poorly or very poorly prepared for work. This shows then, that although the situation seems to be improving, the supply of soft skills in the labour market has not yet matched its demand.

[76] This was not included in the 2004 survey.

Those individuals that do not have the soft skills to the levels required by firms could find their career chances hampered. This may be particularly important for those leaving higher education, given its high cost, as these skills may be used to distinguish between graduates. Those lacking these skills may find themselves over-educated, resulting in a pay penalty, and also increasing the probability of being over-educated later on in their career (Dolton and Silles 2003). However, given that it is difficult to measure these soft skills, more work should be carried out in this area to increase evidence on these types of skills and also on better ways to measure them, so the value of these traits can be assessed over time.

Bibliography

"Scientists go on attack over reduced research spending", http://www.independent.co.uk/news/science/scientists-go-on-attack-over-reduced-research-spending-2075411.html 10th September 2010, The Independent, first accessed 21/10/2010.

CIPD factsheet: Assessment centres for Recruitment and Selection http://www.cipd.co.uk/subjects/recruitmen/selectn/asscentre.htm?IsSrchRes=1, first accessed 13/10/2008.

Blanden, J., P. Gregg & L. Macmillan (2007), "Accounting for Intergenerational Income Persistence: Noncognitive Skills, Ability and Education," *Economic Journal*, vol. 117 (519), pp. C43-C60, 03.

Blundell, R., L. Dearden and A. Vignoles (2005), "Evaluating the Effect of Education on Earnings: Models, Methods and Results from the National Child Development Survey", *Journal of Royal Statistical Society*, 168:3, pp.473-512.

Borghans, L., and B. ter Weel (2004), "Are Computer Skills the New Basic Skills? The Returns to Computer, Writing and Math Skills in Britain", *Labour Economics* 11(1), pp. 85-98.

Burchell, B., J. Elliott, J. Rubery and F. Wilkinson (1994), "Management and Employee Perceptions of Skill", in Penn, R., M. Rose and J. Rubery (eds.), *Skill and Occupational Change*, Oxford University Press.

Comrey, A., and H. Lee (1992), "A first course in Factor Analysis", 2nd ed, New Jersey, L. Erlbaum Associates.

Denham, J. (2008), Department for Universities and Skills speech made at the Wellcome Collection Conference Centre, London - 29 February, http://tna.europarchive.org/20080305115950/http://www.dius.gov.uk/speeches/denham_hespeech_290208.html, first accessed 25/09/2008.

Dickerson, A. & F. Green (2004), "The growth and valuation of computing and other generic skills", *Oxford Economic Papers*, vol. 56, pp. 371-406.

DiNardo, J. and S. Pischke (1997), "The returns to computer use revisited: have pencils changed the wage structure too?" *Quarterly Journal of Economics*, Vol. 112, 291-303.

Dolton, P. and G. Makepeace (2004), "Computer use and earnings in Britain," *Economic Journal*, Vol. 114, C117-C129.

Dolton, P., G. Makepeace & H. Robinson (2007), "Use it or lose it? The impact of computers on earnings", *Manchester School*, Vol. 75, 673-694.

Dolton, P. and M. Silles (2003), "The Determinants and Consequences of Graduate Over-Education", in F. Büchel, A. de Grip and A. Mertens (eds), *Overeducation in Europe, Current Issues in Theory and Policy*, Edward Elgar.

Felstead, A., D. Gallie, F. Green, Y. Zhou (2007), "Skills at Work 1986-2006", Centre on Skills, Knowledge, and Economic Performance (SKOPE) Report, University of Oxford.

Field, A. (2005), Discovering Statistics using SPSS, 2nd ed., London, Sage.

Frederiksen, A. and O. Poulsen (2008), "Management Compensation and Firm-Level Income Inequality", IZA Discussion Paper no. 3676, September.

Gallie, D. (1994), "Patterns of Skill Change: Upskilling, Deskilling or Polarization?", in Penn, R., M. Rose and J. Rubery (eds.), *Skill and Occupational Change*, Oxford University Press.

Govier, E. and J. Feldman (1999), "Occupational choice and patterns of cognitive abilities", *British Journal of Psychology*; Feb99, Vol. 90 Issue 1, p99.

Grazier, S., N. O'Leary, P.J. Sloane (2008), "Graduate Employment in the UK: An Application of the Gottschalk-Hansen Model", IZA Discussion Paper, no. 3618, July.

Jenkins, A., 2001, "Companies' Use of Psychometric Testing and the Changing Demand for Skills: A Review of the Literature", Centre for the Economics of Education, Discussion Paper no.12.

John, O. P., & S. Srivastava (1999), "The Big Five trait taxonomy: History, measurement, and theoretical perspectives". in L. A. Pervin, & O. P. John (eds.), *Handbook of personality: Theory and research*, 2nd ed, New York: Guilford.

Krueger, A. (1993), "How computers have changed the wage structure: evidence from microdata, 1984-1989", *Quarterly Journal of Economics*, Vol. 108, Pages 33-60.

Layard, R., S. McIntosh, A. Vignoles (2002), "Britain's Record On Skills", Centre for the Economics of Education, Discussion Paper no.23.

McIntosh, S. (2005), "Evidence on the Balance of Supply and Demand for Qualified Workers", in S. Machin and A. Vignoles (eds.), *What's the Good of Education? The Economics of Education in the UK*, Princeton.

Moser, C. (1999), "Improving Literacy and Numeracy; A Fresh Start", DfEE.

Newman, M. (2008), "Million+ head says beware of concessions to business", Times Higher Education, 25th September 2008 Issue 864.

Rahim, M., and N. Magner (1995), "Confirmatory factor analysis of the styles of handling interpersonal conflict – first-order factor model and its invariance across groups", *Journal of Applied Psychology*, 80:1 pp122-132.

Tabachnick, B., and L. Fidell (2006), “Using Multivariate Statistics”, 5th ed., Boston, (Mass.): Allyn and Bacon.

Appendix C1 – Soft Skills Analysis

Table 1: Soft skills Responses by gender

How good at communicating with others

		Good	Fair	Poor	Don't have skill	Total
Male	Count	2976	1506	105	6	4593
	%	64.8%	32.8%	2.3%	.1%	100.0%
	% of Total	31.0%	15.7%	1.1%	.1%	47.9%
Female	Count	3673	1271	54	7	5005
	%	73.4%	25.4%	1.1%	.1%	100.0%
	% of Total	38.3%	13.2%	.6%	.1%	52.1%
Total	Count	6649	2777	159	13	9598
	% of Total	69.3%	28.9%	1.7%	.1%	100.0%

How good at working in a team

		Good	Fair	Poor	Don't have skill	Total
Male	Count	3512	1004	67	8	4591
	%	76.5%	21.9%	1.5%	.2%	100.0%
	% of Total	36.6%	10.5%	.7%	.1%	47.8%
Female	Count	3983	944	53	24	5004
	%	79.6%	18.9%	1.1%	.5%	100.0%
	% of Total	41.5%	9.8%	.6%	.3%	52.2%
Total	Count	7495	1948	120	32	9595
	% of Total	78.1%	20.3%	1.3%	.3%	100.0%

How good at learning new skills

		Good	Fair	Poor	Don't have skill	Total
Male	Count	3098	1437	56	2	4593
	%	67.5%	31.3%	1.2%	.0%	100.0%
	% of Total	32.3%	15.0%	.6%	.0%	47.9%
Female	Count	3173	1758	65	9	5005
	%	63.4%	35.1%	1.3%	.2%	100.0%
	% of Total	33.1%	18.3%	.7%	.1%	52.1%
Total	Count	6271	3195	121	11	9598
	% of Total	65.3%	33.3%	1.3%	.1%	100.0%

How good at problem solving

		Good	Fair	Poor	Don't have skill	Total
Male	Count	3027	1478	85	3	4593
	%	65.9%	32.2%	1.9%	.1%	100.0%
	% of Total	31.5%	15.4%	.9%	.0%	47.9%
Female	Count	2491	2315	185	14	5005
	%	49.8%	46.3%	3.7%	.3%	100.0%
	% of Total	26.0%	24.1%	1.9%	.1%	52.1%
Total	Count	5518	3793	270	17	9598
	% of Total	57.5%	39.5%	2.8%	.2%	100.0%

How good at using tools properly

		Good	Fair	Poor	Don't have skill	Total
Male	Count	3041	1349	185	18	4593
	%	66.2%	29.4%	4.0%	.4%	100.0%
	% of Total	31.7%	14.1%	1.9%	.2%	47.9%
Female	Count	1857	2684	375	89	5005
		37.1%	53.6%	7.5%	1.8%	100.0%

	% of Total	19.3%	28.0%	3.9%	.9%	52.1%
Total	Count	4898	4033	560	107	9598
	% of Total	51.0%	42.0%	5.8%	1.1%	100.0%

How good at looking after people who need care

		Good	Fair	Poor	Don't have skill	Total
Male	Count	1098	2379	758	349	4584
	%	24.0%	51.9%	16.5%	7.6%	100.0%
	% of Total	11.5%	24.8%	7.9%	3.6%	47.8%
Female	Count	2867	1789	232	115	5003
	%	57.3%	35.8%	4.6%	2.3%	100.0%
	% of Total	29.9%	18.7%	2.4%	1.2%	52.2%
Total	Count	3965	4168	990	464	9587
	% of Total	41.4%	43.5%	10.3%	4.8%	100.0%

Table 2: Soft skill responses by economic activity

How good at communicating with others								
		(Derived) Cohort Member's main activity						
		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other[77]	Total
Good	Count	3906	1044	540	128	105	924	6647
		70.6%	70.0%	68.4%	77.6%	55.0%	65.0%	69.3%
	% of Total	40.7%	10.9%	5.6%	1.3%	1.1%	9.6%	69.3%
Fair	Count	1553	428	231	36	80	449	2777
		28.1%	28.7%	29.2%	21.8%	41.9%	31.6%	28.9%
	% of Total	16.2%	4.5%	2.4%	.4%	.8%	4.7%	28.9%
Poor	Count	73	18	18	1	5	44	159
		1.3%	1.2%	2.3%	.6%	2.6%	3.1%	1.7%
	% of Total	.8%	.2%	.2%	.0%	.1%	.5%	1.7%
Don't have skill	Count	4	2	1	0	1	5	13
		.1%	.1%	.1%	.0%	.5%	.4%	.1%
	% of Total	.0%	.0%	.0%	.0%	.0%	.1%	.1%
Total	Count	5536	1492	790	165	191	1422	9596
	% of Total	57.7%	15.5%	8.2%	1.7%	2.0%	14.8%	100.0%

How good at working in a team								
		(Derived) Cohort Member's main activity						
		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other	Total
Good	Count	4555	1235	552	116	133	902	7493
		82.3%	82.8%	69.9%	70.3%	69.6%	63.6%	78.1%
	% of Total	47.5%	12.9%	5.8%	1.2%	1.4%	9.4%	78.1%
Fair	Count	945	250	212	47	50	444	1948
		17.1%	16.8%	26.8%	28.5%	26.2%	31.3%	20.3%
	% of Total	9.9%	2.6%	2.2%	.5%	.5%	4.6%	20.3%
Poor	Count	34	4	25	2	8	47	120
		.6%	.3%	3.2%	1.2%	4.2%	3.3%	1.3%
	% of Total	.4%	.0%	.3%	.0%	.1%	.5%	1.3%
Don't have skill	Count	2	3	1	0	0	26	32
		.0%	.2%	.1%	.0%	.0%	1.8%	.3%
	% of Total	.0%	.0%	.0%	.0%	.0%	.3%	.3%
Total	Count	5536	1492	790	165	191	1419	9593
	% of Total	57.7%	15.6%	8.2%	1.7%	2.0%	14.8%	100.0%

How good at learning new skills

[77] 'Other' consists of those in full time education, on a government scheme for employment training, those who are temporarily or permanently sick/disabled, those looking after the home/family, wholly retired individuals, and others not classed as belonging to any other category.

		(Derived) Cohort Member's main activity						
		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other	Total
Good	Count	3916	878	523	102	112	739	6270
		70.7%	58.8%	66.2%	61.8%	58.6%	52.0%	65.3%
	% of Total	40.8%	9.1%	5.5%	1.1%	1.2%	7.7%	65.3%
Fair	Count	1587	598	263	58	73	615	3194
		28.7%	40.1%	33.3%	35.2%	38.2%	43.2%	33.3%
	% of Total	16.5%	6.2%	2.7%	.6%	.8%	6.4%	33.3%
Poor	Count	32	14	4	5	6	60	121
		.6%	.9%	.5%	3.0%	3.1%	4.2%	1.3%
	% of Total	.3%	.1%	.0%	.1%	.1%	.6%	1.3%
Don't have skill	Count	1	2	0	0	0	8	11
		.0%	.1%	.0%	.0%	.0%	.6%	.1%
	% of Total	.0%	.0%	.0%	.0%	.0%	.1%	.1%
Total	Count	5536	1492	790	165	191	1422	9596
	% of Total	57.7%	15.5%	8.2%	1.7%	2.0%	14.8%	100.0%

How good at problem solving

		(Derived) Cohort Member's main activity						
		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other	Total
Good	Count	3605	649	494	90	96	583	5517
		65.1%	43.5%	62.5%	54.5%	50.3%	41.0%	57.5%
	% of Total	37.6%	6.8%	5.1%	.9%	1.0%	6.1%	57.5%
Fair	Count	1838	790	278	67	81	738	3792
		33.2%	52.9%	35.2%	40.6%	42.4%	51.9%	39.5%
	% of Total	19.2%	8.2%	2.9%	.7%	.8%	7.7%	39.5%
Poor	Count	89	53	18	8	14	88	270
		1.6%	3.6%	2.3%	4.8%	7.3%	6.2%	2.8%
	% of Total	.9%	.6%	.2%	.1%	.1%	.9%	2.8%
Don't have skill	Count	4	0	0	0	0	13	17
		.1%	.0%	.0%	.0%	.0%	.9%	.2%
	% of Total	.0%	.0%	.0%	.0%	.0%	.1%	.2%
Total	Count	5536	1492	790	165	191	1422	9596
	% of Total	57.7%	15.5%	8.2%	1.7%	2.0%	14.8%	100.0%

How good at using tools properly

		(Derived) Cohort Member's main activity

		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other	Total
Good	Count	3158	507	557	70	97	509	4898
		57.0%	34.0%	70.5%	42.4%	50.8%	35.8%	51.0%
	% of Total	32.9%	5.3%	5.8%	.7%	1.0%	5.3%	51.0%
Fair	Count	2066	857	207	85	82	734	4031
		37.3%	57.4%	26.2%	51.5%	42.9%	51.6%	42.0%
	% of Total	21.5%	8.9%	2.2%	.9%	.9%	7.6%	42.0%
Poor	Count	266	98	24	9	10	153	560
		4.8%	6.6%	3.0%	5.5%	5.2%	10.8%	5.8%
	% of Total	2.8%	1.0%	.3%	.1%	.1%	1.6%	5.8%
Don't have skill	Count	46	30	2	1	2	26	107
		.8%	2.0%	.3%	.6%	1.0%	1.8%	1.1%
	% of Total	.5%	.3%	.0%	.0%	.0%	.3%	1.1%
Total	Count	5536	1492	790	165	191	1422	9596
	% of Total	57.7%	15.5%	8.2%	1.7%	2.0%	14.8%	100.0%

How good at looking after people who need care

		(Derived) Cohort Member's main activity						
		Full-time paid employee	Part-time paid employee	Full-time self-employed	Part-time self-employed	Unemployed and seeking work	Other	Total
Good	Count	1854	892	223	90	72	833	3964
		33.5%	59.8%	28.2%	54.5%	37.7%	58.7%	41.4%
	% of Total	19.3%	9.3%	2.3%	.9%	.8%	8.7%	41.4%
Fair	Count	2634	526	399	63	83	463	4168
		47.6%	35.3%	50.5%	38.2%	43.5%	32.6%	43.5%
	% of Total	27.5%	5.5%	4.2%	.7%	.9%	4.8%	43.5%
Poor	Count	706	48	126	8	24	77	989
		12.8%	3.2%	15.9%	4.8%	12.6%	5.4%	10.3%
	% of Total	7.4%	.5%	1.3%	.1%	.3%	.8%	10.3%
Don't have skill	Count	334	26	42	4	12	46	464
		6.0%	1.7%	5.3%	2.4%	6.3%	3.2%	4.8%
	% of Total	3.5%	.3%	.4%	.0%	.1%	.5%	4.8%
Total	Count	5528	1492	790	165	191	1419	9585
	% of Total	57.7%	15.6%	8.2%	1.7%	2.0%	14.8%	100.0%

Table 3: Soft skills responses by highest academic qualification

Communicating with others	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	66.2%	75.0%	76.3%	77.4%	79.8%
Fair	31.9%	23.9%	22.0%	21.8%	19.1%
Poor	1.8%	1.1%	1.4%	.8%	1.1%
Don't have skill	.1%	.0%	.3%	.1%	.0%

Working in a team	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	77.8%	82.1%	82.6%	79.2%	77.5%
Fair	20.6%	16.9%	16.5%	19.8%	22.1%
Poor	1.3%	1.0%	.8%	1.0%	.4%
Don't have skill	.2%	.0%	.0%	.0%	.0%

Learning new skills	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	61.7%	71.8%	75.2%	74.1%	79.8%
Fair	37.2%	27.7%	24.4%	25.5%	20.2%
Poor	1.1%	.5%	.4%	.3%	.0%
Don't have skill	.0%	.0%	.0%	.0%	.0%

Problem solving	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	51.2%	63.3%	68.2%	72.3%	82.4%
Fair	45.9%	35.5%	30.5%	26.1%	17.6%
Poor	2.9%	1.2%	1.3%	1.5%	.0%
Don't have skill	.1%	.0%	.0%	.1%	.0%

Using tools properly	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	52.4%	49.4%	46.5%	45.2%	46.2%
Fair	41.3%	43.6%	46.4%	45.8%	44.7%
Poor	5.5%	6.0%	6.2%	7.5%	8.4%
Don't have skill	.8%	1.0%	1.0%	1.5%	.8%

Looking after others who need care	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	42.2%	41.6%	43.3%	35.8%	30.9%
Fair	43.9%	43.9%	39.4%	44.7%	52.7%
Poor	8.9%	10.6%	11.8%	13.8%	13.0%
Don't have skill	5.1%	3.9%	5.5%	5.7%	3.4%

Table 4: Soft skills responses by highest vocational qualification

Communicating with others					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	73.4%	67.4%	67.3%	71.5%	71.4%
Fair	25.0%	30.8%	30.8%	26.9%	28.6%
Poor	1.5%	1.6%	1.9%	1.4%	.0%
Don't have skill	.1%	.2%	.1%	.2%	.0%

Working in a team					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	80.9%	77.0%	77.6%	82.0%	85.7%
Fair	17.6%	20.8%	21.4%	16.5%	7.1%
Poor	1.2%	1.9%	.9%	1.5%	7.1%
Don't have skill	.2%	.2%	.1%	.0%	.0%

Learning new skills					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	65.9%	63.5%	66.5%	75.2%	71.4%
Fair	33.3%	35.0%	32.4%	24.5%	28.6%
Poor	.9%	1.4%	1.1%	.3%	.0%
Don't have skill	.0%	.2%	.1%	.0%	.0%

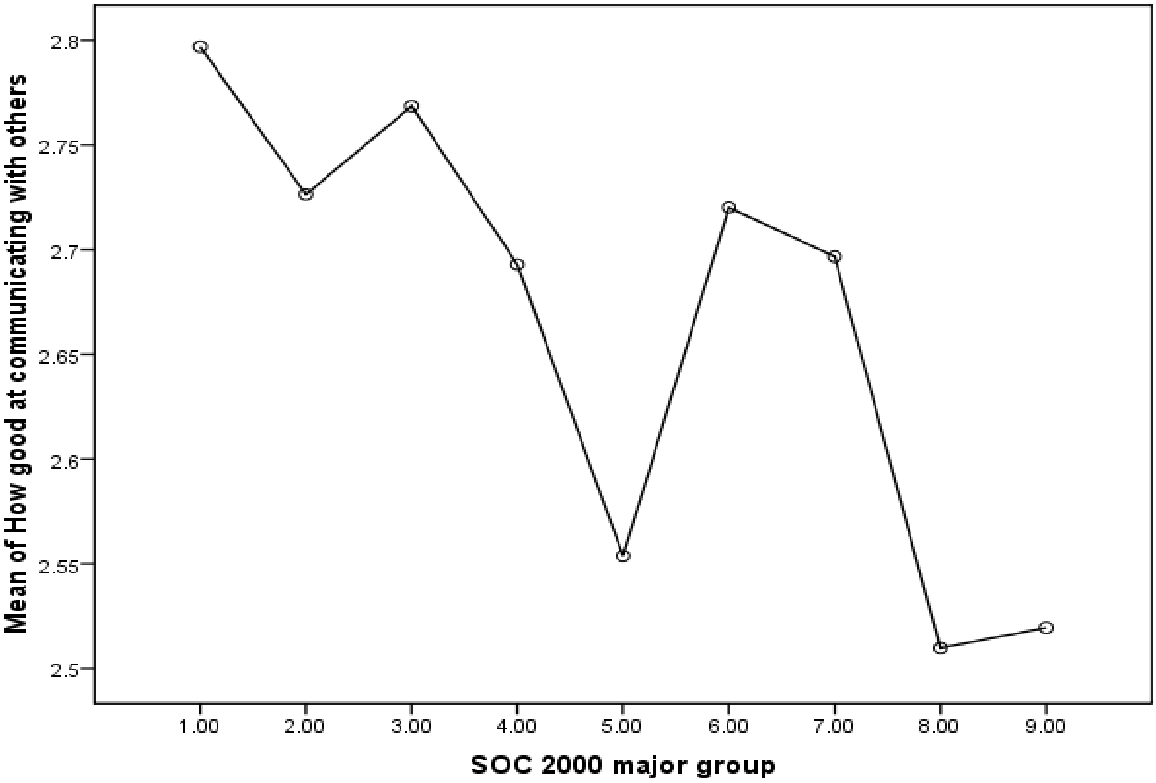
Problem solving					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	53.0%	52.3%	59.9%	73.4%	71.4%
Fair	43.9%	44.6%	37.8%	25.7%	28.6%
Poor	2.9%	3.0%	2.2%	.8%	.0%
Don't have skill	.1%	.1%	.1%	.2%	.0%

Using tools properly					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	38.2%	51.0%	63.4%	66.2%	64.3%
Fair	51.9%	43.0%	32.9%	28.8%	35.7%
Poor	8.2%	4.9%	3.4%	4.5%	.0%
Don't have skill	1.7%	1.0%	.3%	.6%	.0%

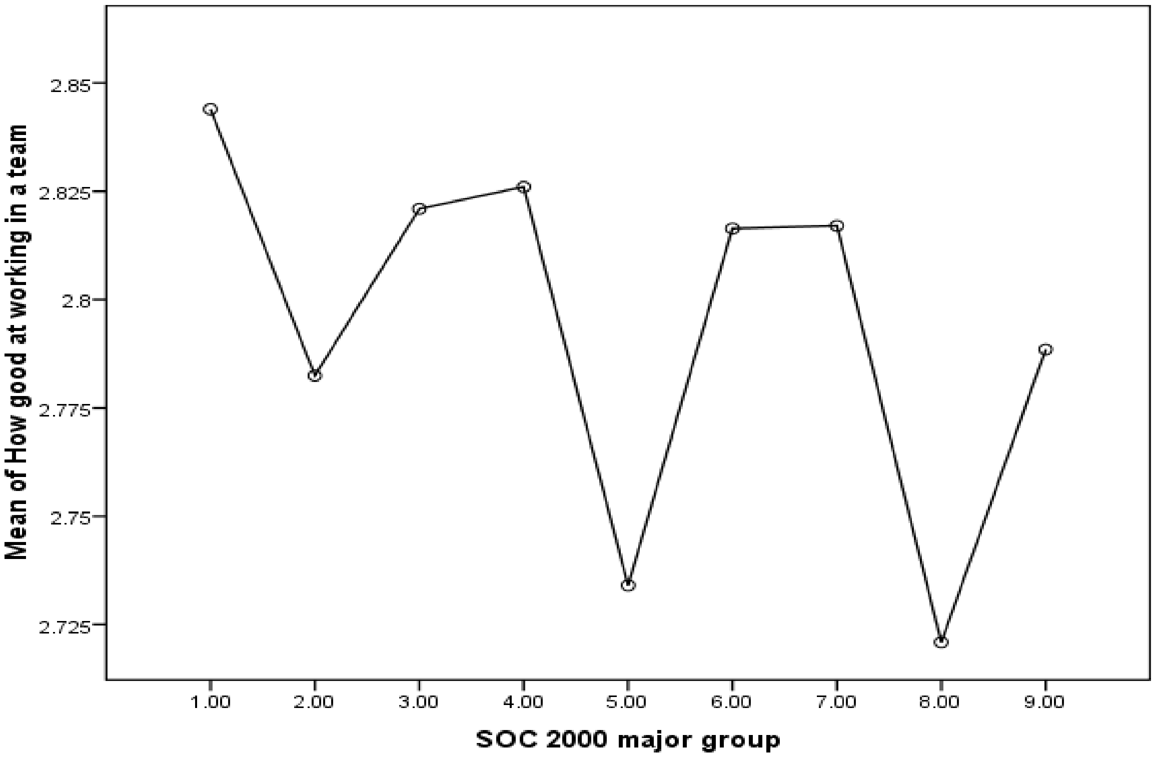
Looking after others who need care					
	NVQ Level 1	NVQ Level 2	NVQ Level 3	NVQ Level 4	NVQ Level 5
Good	49.9%	45.6%	35.4%	30.8%	35.7%
Fair	37.5%	40.4%	48.1%	48.5%	64.3%
Poor	8.2%	8.6%	12.1%	14.2%	.0%
Don't have skill	4.4%	5.4%	4.4%	6.6%	.0%

Mean plots of 2004 soft skill responses by major occupation group

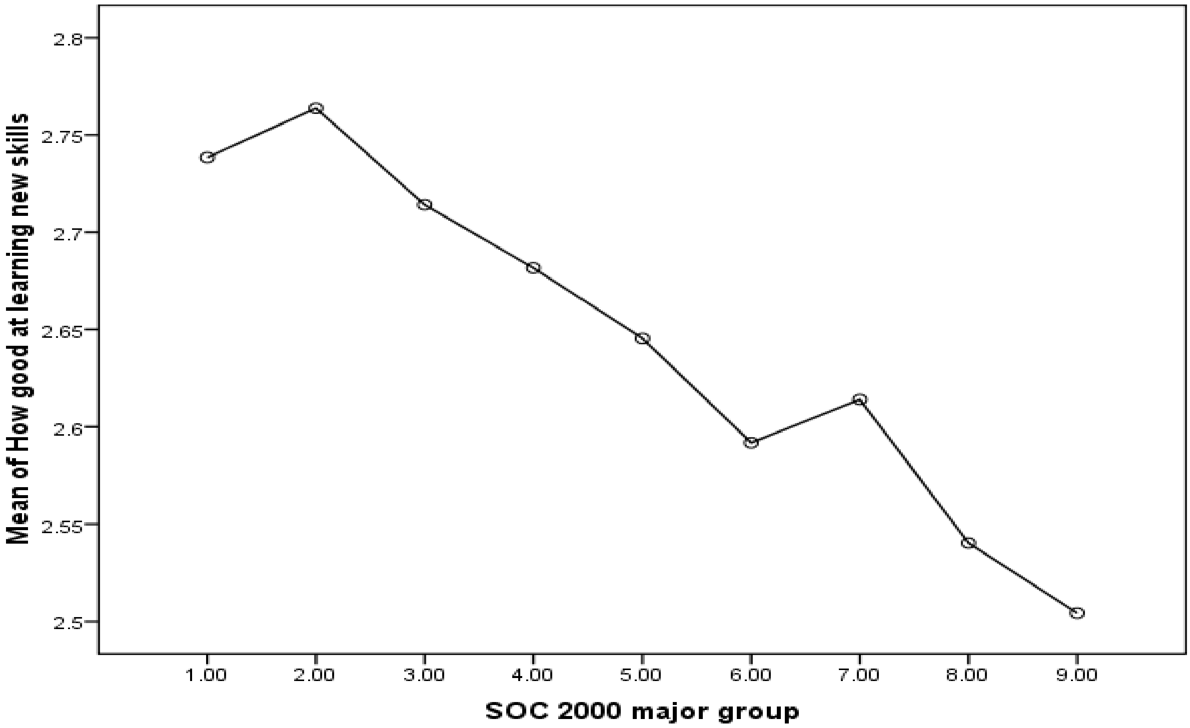
Communication



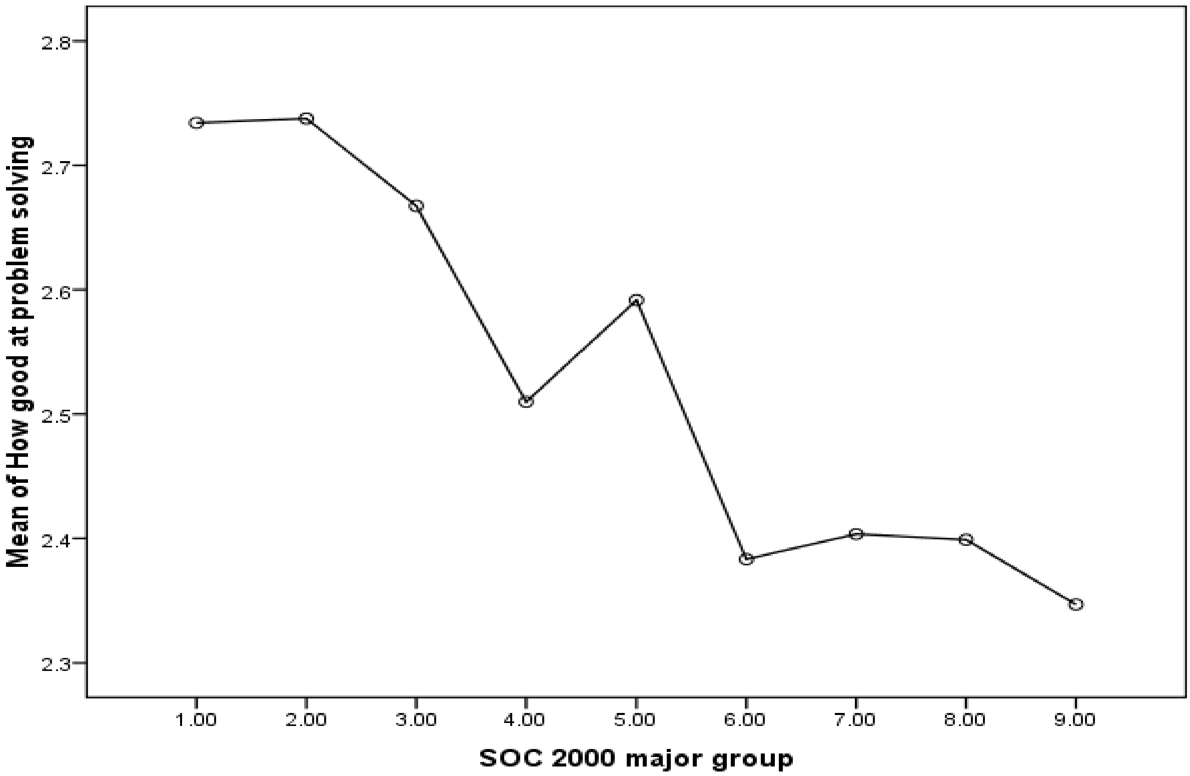
Working in a team



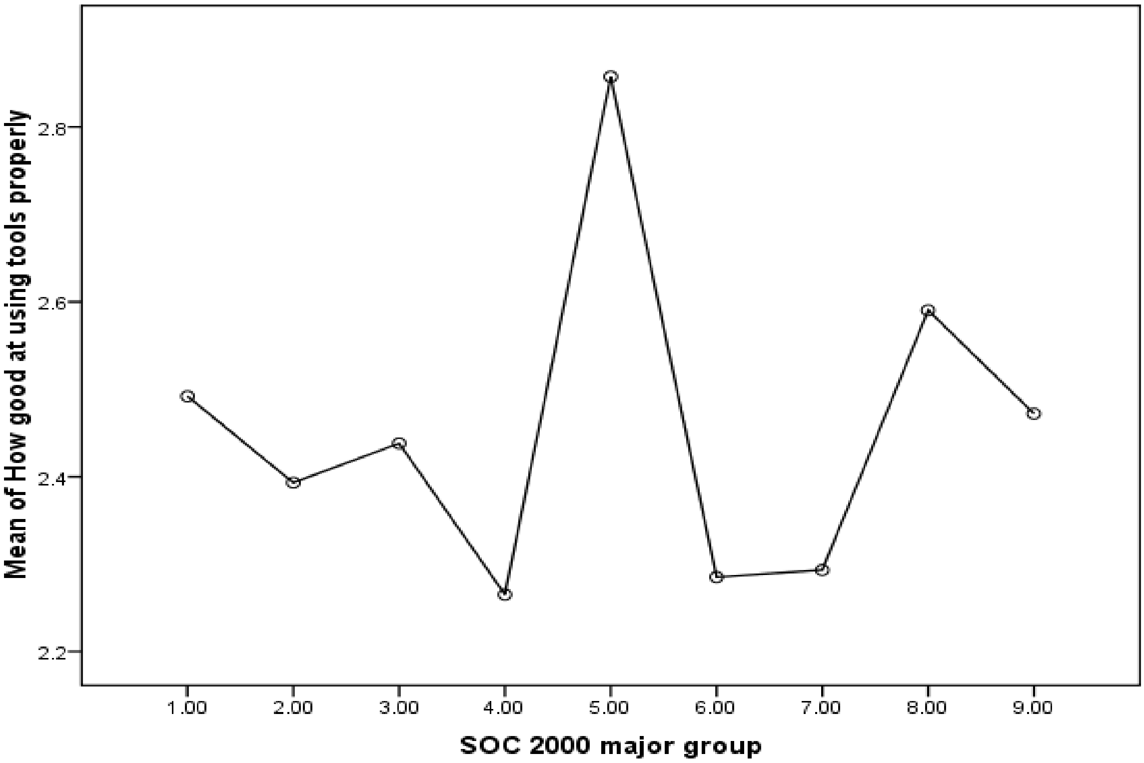
Learning new skills



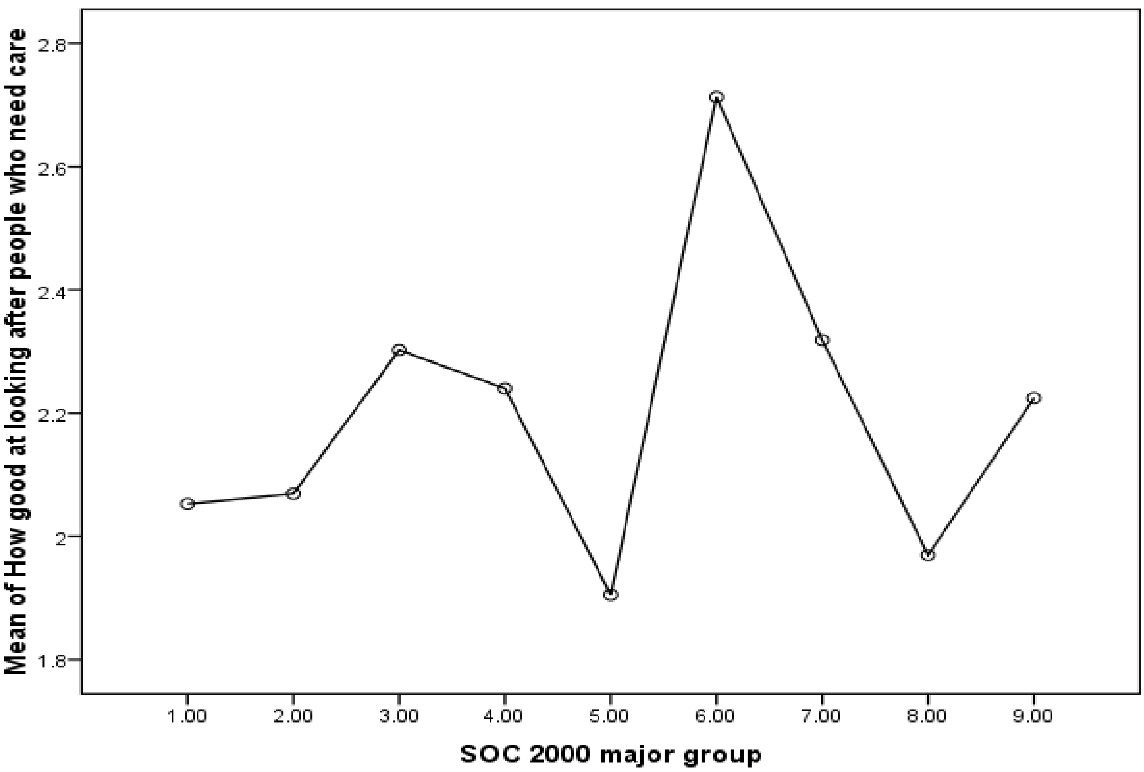
Problem solving



Using tools properly



Looking after others who need care



Specification 1 2004

	Log hourly pay 2004	
	Coef.	P>t
Female	-0.063	0.000
Part time	-0.298	0.000
Irish	-0.124	0.105
White other	0.047	0.307
White & Black Caribbean	0.218	0.144
White & Black African	(dropped)	
White & Asian	-0.164	0.327
Other mixed race	-0.114	0.494
Indian	0.044	0.483
Pakistani	0.088	0.488
Bangladeshi	0.007	0.966
Other Asian	0.118	0.428
Caribbean	0.027	0.792
African	(dropped)	
Other Black	(dropped)	
Chinese	-0.009	0.958
Other ethnic group	0.005	0.950
Father social class I	0.169	0.000
Father social class II	0.107	0.000
Father social class III non-manual	0.042	0.057
Father social class III manual	0.019	0.182
Father social class IV	-0.021	0.400
Father is a student	0.064	0.249
Father is dead	0.081	0.036
Financial hardship	-0.070	0.000
North	-0.198	0.000
Yorkshire & Humberside	-0.091	0.000
East Midlands	-0.084	0.000
East Anglia	-0.113	0.000
South West	-0.076	0.000
West Midlands	-0.065	0.001
North West	-0.123	0.000
Wales	-0.152	0.000
Scotland	-0.081	0.000
Drawing test One 1st (lowest) quintile	-0.038	0.152
Drawing test One 2nd quintile	-0.007	0.718
Drawing test One 4th quintile	-0.026	0.194
Drawing test One 5th quintile	-0.032	0.158
Drawing test Two 1st quintile	-0.036	0.167
Drawing test Two 2nd quintile	0.000	0.995
Drawing test Two 4th quintile	-0.022	0.274
Drawing test Two 5th quintile	0.027	0.245
Vocabulary test 1st (lowest) quintile	-0.052	0.014
Vocabulary test 2nd quintile	-0.031	0.100
Vocabulary test 4th quintile	0.007	0.675
Vocabulary test 5th quintile	0.025	0.147
Profile test 1st (lowest) quintile	0.024	0.205
Profile test 2nd quintile	0.023	0.173
Profile test 4th quintile	0.018	0.316
Profile test 5th quintile	-0.007	0.680
Copying test 1st (lowest) quintile	-0.024	0.314
Copying test 2nd quintile	0.001	0.941
Copying test 4th quintile	0.018	0.277
Copying test 5th quintile	0.058	0.001
Maths test 1st (lowest) quintile	-0.067	0.006
Maths test 2nd quintile	-0.029	0.128
Maths test 4th quintile	0.033	0.050

Maths test 5th quintile	0.066	0.001
Reading test 1st (lowest) score	-0.071	0.004
Reading test 2nd score	-0.026	0.180
Reading test 4th score	-0.025	0.155
Reading test 5th score	0.038	0.041
Word score 1st (lowest) quintile	-0.064	0.004
Word score 2nd quintile	-0.044	0.055
Word score 4th quintile	0.001	0.971
Word score 5th quintile	0.033	0.038
Small firm	-0.052	0.000
Large firm	0.026	0.086
Very large firm	0.082	0.000
Tenure	0.020	0.000
Tenure squared	-0.001	0.000
No communication skills	-0.415	0.081
Poor communication skills	-0.080	0.096
Fair communication skills	-0.072	0.000
No team-working skills	0.011	0.975
Poor team-working skills	0.067	0.391
Fair team-working skills	-0.009	0.587
Not able to learn new skills	-0.029	0.946
Poor at learning new skills	-0.015	0.832
Fair at learning new skills	-0.009	0.505
No problem solving skills	-0.393	0.104
Poor at problem solving	-0.144	0.000
Fair at problem solving	-0.111	0.000
Not able to use tools properly	0.206	0.000
Poor at using tools properly	0.110	0.000
Fair at using tools properly	0.064	0.000
Not able to look after people who need care	-0.024	0.355
Poor at looking after others who need care	0.040	0.043
Fair at looking after others that need care	0.003	0.776
(Constant)	2.475	0.000
	Number of obs.	4047
	Adj. R-squared	0.3769

Specification 2 2004

	Log hourly pay 2004	
	Coef.	P>t
Female	-0.060	0.000
Part time	-0.253	0.000
Irish	-0.107	0.146
White other	0.052	0.235
White & Black Caribbean	0.269	0.060
White & Black African	(dropped)	
White & Asian	-0.215	0.180
Other mixed race	-0.066	0.682
Indian	0.084	0.165
Pakistani	0.113	0.351
Bangladeshi	0.006	0.968
Other Asian	0.115	0.419
Caribbean	0.063	0.517
African	(dropped)	
Other Black	(dropped)	
Chinese	0.027	0.864
Other ethnic group	-0.007	0.928
Father social class I	0.158	0.000
Father social class II	0.096	0.000
Father social class III non-manual	0.044	0.037
Father social class III manual	0.022	0.097
Father social class IV	-0.017	0.474
Father is a student	0.049	0.362
Father is dead	0.072	0.050
Financial hardship	-0.056	0.002
North	-0.178	0.000
Yorkshire & Humberside	-0.081	0.000
East Midlands	-0.068	0.001
East Anglia	-0.109	0.000
South West	-0.070	0.000
West Midlands	-0.058	0.002
North West	-0.108	0.000
Wales	-0.140	0.000
Scotland	-0.071	0.000
Drawing test One 1st (lowest) quintile	-0.026	0.293
Drawing test One 2nd quintile	-0.005	0.805
Drawing test One 4th quintile	-0.030	0.113
Drawing test One 5th quintile	-0.033	0.130
Drawing test Two 1st quintile	-0.031	0.212
Drawing test Two 2nd quintile	-0.001	0.961
Drawing test Two 4th quintile	-0.019	0.311
Drawing test Two 5th quintile	0.026	0.240
Vocabulary test 1st (lowest) quintile	-0.042	0.039
Vocabulary test 2nd quintile	-0.024	0.181
Vocabulary test 4th quintile	0.005	0.752
Vocabulary test 5th quintile	0.012	0.466
Profile test 1st (lowest) quintile	0.026	0.153
Profile test 2nd quintile	0.019	0.246
Profile test 4th quintile	0.021	0.211
Profile test 5th quintile	0.001	0.953
Copying test 1st (lowest) quintile	-0.026	0.246
Copying test 2nd quintile	0.005	0.812
Copying test 4th quintile	0.020	0.209
Copying test 5th quintile	0.059	0.001
Maths test 1st (lowest) quintile	-0.069	0.003
Maths test 2nd quintile	-0.027	0.146
Maths test 4th quintile	0.024	0.137
Maths test 5th quintile	0.059	0.001
Reading test 1st (lowest) score	-0.062	0.009

Reading test 2nd score	-0.022	0.239
Reading test 4th score	-0.018	0.281
Reading test 5th score	0.036	0.045
Word score 1st (lowest) quintile	-0.056	0.009
Word score 2nd quintile	-0.050	0.025
Word score 4th quintile	-0.006	0.743
Word score 5th quintile	0.028	0.060
Small firm	-0.057	0.000
Large firm	0.028	0.050
Very large firm	0.078	0.000
Tenure	0.014	0.001
Tenure squared	-0.001	0.001
Managerial/supervisory responsibilities	0.208	0.000
No communication skills	-0.344	0.131
Poor communication skills	-0.060	0.194
Fair communication skills	-0.061	0.000
No team-working skills	0.030	0.924
Poor team-working skills	0.088	0.235
Fair team-working skills	0.008	0.634
Not able to learn new skills	-0.113	0.785
Poor at learning new skills	-0.002	0.978
Fair at learning new skills	-0.009	0.481
No problem solving skills	-0.301	0.193
Poor at problem solving	-0.100	0.011
Fair at problem solving	-0.083	0.000
Not able to use tools properly	0.194	0.000
Poor at using tools properly	0.099	0.000
Fair at using tools properly	0.056	0.000
Not able to look after people who need care	-0.014	0.584
Poor at looking after others who need care	0.027	0.151
Fair at looking after others that need care	0.002	0.861
(Constant)	2.374	0.000
	Number of obs.	4046
	Adj. R-squared	0.4291

Specification 3 2004

	Log hourly pay 2004	
	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.085	0.000
<5 GCSE's Grade A-C (or equivalent)	0.000	0.992
A/S Level Grade A-C	0.025	0.222
A-Level/S-Level Grade A-C	0.051	0.001
SCE Standard Grade 4-5	-0.028	0.646
SCE Standard Grade 1-3	0.024	0.488
SLC Lower or Ordinary Grade	0.164	0.096
SLC Higher Grade	0.086	0.009
Scottish 6th Year Certificate	-0.001	0.984
Other Scottish qualification	0.174	0.201
Degree	0.213	0.000
Higher Degree	0.011	0.665
BTEC Level 2	0.044	0.033
BTEC Level 3	0.060	0.002
BTEC Level 4	0.003	0.941
Other BTEC qualification	-0.009	0.837
City and Guilds Level 2	0.001	0.965
City and Guilds Level 3	-0.049	0.005
City and Guilds Level 4	-0.028	0.546
Other City and Guilds qualification	0.013	0.716
RSA Stage 1	0.013	0.407
RSA Stage 2	0.077	0.081
RSA Stage 3	0.108	0.315
NVQ Level 1	0.018	0.589
NVQ Level 2	-0.060	0.024
NVQ Level 3	0.012	0.690
NVQ Level 4	0.181	0.002
NVQ Level 5	-0.010	0.940
NVQ Level 6	-0.070	0.579
Other NVQ or Trusts towards NVQ	0.007	0.915
GNVQ Level 1	-0.114	0.450
GNVQ Level 2	0.020	0.911
GNVQ Level 3	0.103	0.407
Other GNVQ qualification	0.246	0.249
ONC/OND	-0.001	0.982
HNC/HND	0.067	0.004
Recognised trade apprenticeship	0.038	0.164
Female	-0.081	0.000
Part time	-0.213	0.000
Father social class I	0.062	0.007
Father social class II	0.045	0.002
Father social class III non-manual	0.014	0.500
Father social class III manual	0.016	0.208
Father social class IV	-0.021	0.372
Father is a student	0.019	0.706
Father is dead	0.059	0.100
Financial hardship	-0.039	0.023
North	-0.167	0.000
Yorkshire & Humberside	-0.064	0.001
East Midlands	-0.050	0.013
East Anglia	-0.085	0.001
South West	-0.052	0.007
West Midlands	-0.041	0.026
North West	-0.088	0.000
Wales	-0.119	0.000
Scotland	-0.094	0.000
Drawing test One 1st (lowest) quintile	-0.035	0.145
Drawing test One 2nd quintile	-0.016	0.387
Drawing test One 4th quintile	-0.023	0.201

Drawing test One 5th quintile	-0.022	0.298
Drawing test Two 1st quintile	-0.011	0.656
Drawing test Two 2nd quintile	0.015	0.437
Drawing test Two 4th quintile	-0.015	0.413
Drawing test Two 5th quintile	0.019	0.355
Vocabulary test 1st (lowest) quintile	-0.049	0.011
Vocabulary test 2nd quintile	-0.016	0.339
Vocabulary test 4th quintile	0.005	0.734
Vocabulary test 5th quintile	0.003	0.835
Profile test 1st (lowest) quintile	0.034	0.051
Profile test 2nd quintile	0.026	0.098
Profile test 4th quintile	0.028	0.081
Profile test 5th quintile	0.008	0.624
Copying test 1st (lowest) quintile	-0.025	0.249
Copying test 2nd quintile	0.010	0.602
Copying test 4th quintile	0.022	0.149
Copying test 5th quintile	0.034	0.042
Maths test 1st (lowest) quintile	-0.050	0.027
Maths test 2nd quintile	0.003	0.882
Maths test 4th quintile	0.017	0.279
Maths test 5th quintile	0.012	0.487
Reading test 1st (lowest) score	-0.043	0.064
Reading test 2nd score	0.001	0.948
Reading test 4th score	-0.016	0.305
Reading test 5th score	0.003	0.882
Word score 1st (lowest) quintile	-0.049	0.017
Word score 2nd quintile	-0.035	0.099
Word score 4th quintile	0.005	0.767
Word score 5th quintile	0.020	0.169

Small firm	-0.046	0.001
Large firm	0.024	0.090
Very large firm	0.068	0.000
Tenure	0.006	0.155
Tenure squared	0.000	0.392
Managerial/supervisory responsibilities	0.176	0.000
No communication skills	-0.343	0.111
Poor communication skills	-0.048	0.281
Fair communication skills	-0.045	0.000
No team-working skills	0.065	0.831
Poor team-working skills	0.097	0.173
Fair team-working skills	0.006	0.696
Not able to learn new skills	0.054	0.886
Poor at learning new skills	0.046	0.473
Fair at learning new skills	0.004	0.767
No problem solving skills	-0.151	0.490
Poor at problem solving	-0.089	0.021
Fair at problem solving	-0.061	0.000
Not able to use tools properly	0.105	0.041
Poor at using tools properly	0.046	0.051
Fair at using tools properly	0.027	0.016
Not able to look after people who need care	-0.027	0.252
Poor at looking after others who need care	0.013	0.459
Fair at looking after others that need care	-0.008	0.503
(Constant)	2.318	0.000
	Number of obs.	3895
	Adj. R-squared	0.4977

Specification 4 2004

	Log hourly pay 2004 Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.029	0.003
<5 GCSE's Grade A-C (or equivalent)	-0.009	0.225
A/S Level Grade A-C	-0.004	0.813
A-Level/S-Level Grade A-C	0.023	0.046
SCE Standard Grade 4-5	-0.029	0.520
SCE Standard Grade 1-3	0.025	0.326
SLC Lower or Ordinary Grade	0.017	0.816
SLC Higher Grade	0.044	0.068
Scottish 6th Year Certificate	-0.013	0.794
Other Scottish qualification	-0.027	0.790
Degree	0.062	0.000
Higher Degree	-0.014	0.463
BTEC Level 2	0.007	0.652
BTEC Level 3	0.007	0.611
BTEC Level 4	-0.026	0.404
Other BTEC qualification	-0.053	0.080
City and Guilds Level 2	0.009	0.490
City and Guilds Level 3	-0.024	0.071
City and Guilds Level 4	-0.034	0.322
Other City and Guilds qualification	0.007	0.803
RSA Stage 1	0.001	0.906
RSA Stage 2	0.035	0.276
RSA Stage 3	0.014	0.860
NVQ Level 1	0.009	0.712
NVQ Level 2	-0.021	0.277
NVQ Level 3	-0.041	0.066
NVQ Level 4	0.122	0.004
NVQ Level 5	0.031	0.736
NVQ Level 6	-0.070	0.446
Other NVQ or Trusts towards NVQ	0.025	0.590
GNVQ Level 1	-0.088	0.429
GNVQ Level 2	0.001	0.995
GNVQ Level 3	-0.059	0.520
Other GNVQ qualification	0.120	0.443
ONC/OND	0.017	0.422
HNC/HND	-0.002	0.912
Recognised trade apprenticeship	0.029	0.159
Female	-0.062	0.000
Part time	-0.125	0.000
Father social class I	0.041	0.015
Father social class II	0.023	0.026
Father social class III non-manual	0.001	0.971
Father social class III manual	0.010	0.291
Father social class IV	-0.010	0.564
Father is a student	-0.013	0.737
Father is dead	0.033	0.210
Financial hardship	-0.006	0.605
North	-0.099	0.000
Yorkshire & Humberside	-0.053	0.000
East Midlands	-0.036	0.014
East Anglia	-0.050	0.006
South West	-0.026	0.066
West Midlands	-0.029	0.032
North West	-0.056	0.000
Wales	-0.074	0.000

Scotland	-0.052	0.001	Word score 5th quintile	0.019	0.067
Drawing test One 1st (lowest) quintile	-0.016	0.356	Small firm	-0.033	0.001
Drawing test One 2nd quintile	-0.008	0.562	Large firm	0.027	0.009
Drawing test One 4th quintile	-0.039	0.004	Very large firm	0.056	0.000
Drawing test One 5th quintile	-0.019	0.217	Tenure	0.002	0.542
Drawing test Two 1st quintile	-0.005	0.769	Tenure squared	0.000	0.891
Drawing test Two 2nd quintile	0.008	0.541	Managerial/supervisory responsibilities	0.040	0.000
Drawing test Two 4th quintile	-0.006	0.663	No communication skills	-0.160	0.311
Drawing test Two 5th quintile	0.013	0.382	Poor communication skills	0.016	0.628
Vocabulary test 1st (lowest) quintile	-0.017	0.226	Fair communication skills	-0.005	0.574
Vocabulary test 2nd quintile	-0.011	0.384	No team-working skills	0.102	0.644
Vocabulary test 4th quintile	-0.005	0.685	Poor team-working skills	-0.023	0.663
Vocabulary test 5th quintile	-0.015	0.197	Fair team-working skills	-0.022	0.049
Profile test 1st (lowest) quintile	0.027	0.033	Not able to learn new skills	0.077	0.780
Profile test 2nd quintile	0.017	0.136	Poor at learning new skills	0.058	0.212
Profile test 4th quintile	0.017	0.148	Fair at learning new skills	-0.004	0.655
Profile test 5th quintile	0.016	0.169	No problem solving skills	0.077	0.630
Copying test 1st (lowest) quintile	0.002	0.899	Poor at problem solving	-0.044	0.121
Copying test 2nd quintile	-0.002	0.883	Fair at problem solving	-0.019	0.039
Copying test 4th quintile	0.013	0.245	Not able to use tools properly	0.048	0.199
Copying test 5th quintile	0.027	0.028	Poor at using tools properly	0.031	0.079
Maths test 1st (lowest) quintile	-0.021	0.205	Fair at using tools properly	0.007	0.368
Maths test 2nd quintile	0.007	0.605	Not able to look after people who need care	0.004	0.803
Maths test 4th quintile	0.007	0.568	Poor at looking after others who need care	0.018	0.170
Maths test 5th quintile	-0.002	0.877	Fair at looking after others that need care	0.011	0.188
Reading test 1st (lowest) score	-0.005	0.769	Managers and senior officials	0.715	0.000
Reading test 2nd score	-0.001	0.909	Professional occupations	0.784	0.000
Reading test 4th score	-0.019	0.104	Associate professional and technical	0.561	0.000
Reading test 5th score	-0.018	0.154	Administrative and secretarial	0.259	0.000
Word score 1st (lowest) quintile	-0.019	0.204	Skilled trades	0.285	0.000
Word score 2nd quintile	-0.017	0.267	Personal service	0.146	0.000
Word score 4th quintile	0.015	0.218	Sales and customer service	0.031	0.132

Process, plant and machine operatives	0.168	0.000
(Constant)	1.979	0.000
	Number of obs.	3886

	Adj. R-squared	0.7300

Specification 1 2000

	Log hourly pay 2000	
	Coef.	P>t
Female	-0.082	0.000
Part time	-0.274	0.000
Irish	-0.047	0.485
White other	0.006	0.869
White & Black Caribbean	-0.067	0.483
White & Black African	-0.029	0.926
White & Asian	0.005	0.964
Other mixed race	0.098	0.374
Indian	0.021	0.682
Pakistani	0.134	0.200
Bangladeshi	-0.005	0.978
Other Asian	0.047	0.652
Caribbean	-0.021	0.808
African	-0.417	0.060
Other Black	0.211	0.132
Chinese	-0.020	0.898
Other ethnic group	0.110	0.080
Father social class I	0.145	0.000
Father social class II	0.079	0.000
Father social class III non-manual	0.010	0.567
Father social class III manual	-0.008	0.485
Father social class IV	-0.025	0.212
Father is a student	-0.061	0.163
Father is dead	0.032	0.298
Financial hardship	-0.033	0.026
North	-0.116	0.000
Yorkshire & Humberside	-0.092	0.000
East Midlands	-0.070	0.000
East Anglia	-0.066	0.003
South West	-0.092	0.000
West Midlands	-0.055	0.001
North West	-0.065	0.000
Wales	-0.091	0.000
Scotland	-0.049	0.003
Drawing test One 1st (lowest) quintile	-0.023	0.286
Drawing test One 2nd quintile	0.003	0.850
Drawing test One 4th quintile	-0.001	0.939
Drawing test One 5th quintile	0.006	0.742
Drawing test Two 1st quintile	-0.006	0.775
Drawing test Two 2nd quintile	0.013	0.427
Drawing test Two 4th quintile	-0.002	0.883
Drawing test Two 5th quintile	-0.004	0.824
Vocabulary test 1st (lowest) quintile	-0.003	0.842
Vocabulary test 2nd quintile	0.008	0.568
Vocabulary test 4th quintile	0.015	0.284
Vocabulary test 5th quintile	0.031	0.026
Profile test 1st (lowest) quintile	-0.018	0.238
Profile test 2nd quintile	-0.004	0.762
Profile test 4th quintile	-0.013	0.346
Profile test 5th quintile	-0.030	0.034
Copying test 1st (lowest) quintile	-0.022	0.263
Copying test 2nd quintile	0.002	0.915
Copying test 4th quintile	0.020	0.137
Copying test 5th quintile	0.057	0.000
Maths test 1st (lowest) quintile	-0.078	0.000
Maths test 2nd quintile	-0.057	0.000
Maths test 4th quintile	-0.009	0.492
Maths test 5th quintile	0.036	0.023
Reading test 1st (lowest) score	-0.023	0.258

Reading test 2nd score	-0.002	0.916
Reading test 4th score	0.001	0.944
Reading test 5th score	0.049	0.001
Word score 1st (lowest) quintile	-0.029	0.117
Word score 2nd quintile	-0.015	0.430
Word score 4th quintile	0.006	0.688
Word score 5th quintile	0.056	0.000
Small firm	-0.057	0.000
Large firm	0.010	0.408
Very large firm	0.069	0.000
Tenure	0.018	0.000
Tenure squared	-0.001	0.000
No communication skills	-0.167	0.398
Poor communication skills	-0.109	0.001
Fair communication skills	-0.048	0.000
No number skills	-0.057	0.625
Poor number skills	0.028	0.188
Fair number skills	-0.012	0.260
No computer and IT skills	-0.199	0.000
Poor computer and IT skills	-0.139	0.000
Fair computer and IT skills	-0.058	0.000
No team-working skills	0.173	0.369

Poor team-working skills	-0.047	0.410
Fair team-working skills	0.005	0.706
Not able to learn new skills	0.367	0.099
Poor at learning new skills	-0.010	0.874
Fair at learning new skills	0.011	0.296
No problem solving skills	-0.160	0.414
Poor at problem solving	-0.096	0.015
Fair at problem solving	-0.062	0.000
Not able to use tools properly	0.052	0.122
Poor at using tools properly	0.116	0.000
Fair at using tools properly	0.045	0.000
Not able to look after people who need care	0.016	0.374
Poor at looking after others who need care	0.034	0.034
Fair at looking after others that need care	0.002	0.846
Not able to work with finance/accounts	-0.062	0.008
Poor at finance/accounts	-0.039	0.014
Fair at finance/accounts	-0.028	0.007
(Constant)	2.265	0.000
	Number of obs.	5442
	Adj. R-squared	0.3576

Specification 2 2000

	Log hourly pay 2000	
	Coef.	P>t
Female	-0.075	0.000
Part time	-0.243	0.000
Irish	-0.027	0.682
White other	0.004	0.920
White & Black Caribbean	-0.076	0.414
White & Black African	-0.144	0.638
White & Asian	0.007	0.946
Other mixed race	0.093	0.389
Indian	0.055	0.284
Pakistani	0.155	0.128
Bangladeshi	-0.009	0.960
Other Asian	0.058	0.573
Caribbean	-0.021	0.806
African	-0.358	0.097
Other Black	0.249	0.069
Chinese	0.005	0.973
Other ethnic group	0.109	0.077
Father social class I	0.136	0.000
Father social class II	0.071	0.000
Father social class III non-manual	0.010	0.560
Father social class III manual	-0.002	0.844
Father social class IV	-0.024	0.215
Father is a student	-0.046	0.276
Father is dead	0.023	0.449
Financial hardship	-0.030	0.039
North	-0.106	0.000
Yorkshire & Humberside	-0.088	0.000
East Midlands	-0.059	0.001
East Anglia	-0.064	0.003
South West	-0.088	0.000
West Midlands	-0.043	0.008
North West	-0.055	0.000
Wales	-0.077	0.000
Scotland	-0.044	0.006
Drawing test One 1st (lowest) quintile	-0.022	0.284
Drawing test One 2nd quintile	0.002	0.885
Drawing test One 4th quintile	-0.003	0.841
Drawing test One 5th quintile	0.000	0.987
Drawing test Two 1st quintile	0.000	1.000
Drawing test Two 2nd quintile	0.012	0.435
Drawing test Two 4th quintile	-0.001	0.925
Drawing test Two 5th quintile	0.001	0.975
Vocabulary test 1st (lowest) quintile	0.005	0.770
Vocabulary test 2nd quintile	0.010	0.509
Vocabulary test 4th quintile	0.016	0.233
Vocabulary test 5th quintile	0.028	0.041
Profile test 1st (lowest) quintile	-0.020	0.190
Profile test 2nd quintile	-0.005	0.736
Profile test 4th quintile	-0.008	0.567
Profile test 5th quintile	-0.023	0.087
Copying test 1st (lowest) quintile	-0.024	0.210
Copying test 2nd quintile	0.003	0.864
Copying test 4th quintile	0.020	0.142
Copying test 5th quintile	0.058	0.000
Maths test 1st (lowest) quintile	-0.075	0.000
Maths test 2nd quintile	-0.054	0.000
Maths test 4th quintile	-0.009	0.508
Maths test 5th quintile	0.034	0.027
Reading test 1st (lowest) score	-0.019	0.325

Reading test 2nd score	0.002	0.888
Reading test 4th score	0.000	0.998
Reading test 5th score	0.051	0.001
Word score 1st (lowest) quintile	-0.028	0.122
Word score 2nd quintile	-0.012	0.508
Word score 4th quintile	0.002	0.877
Word score 5th quintile	0.053	0.000
Small firm	-0.062	0.000
Large firm	0.015	0.215
Very large firm	0.070	0.000
Tenure	0.013	0.001
Tenure squared	-0.001	0.000
Managerial/supervisory responsibilities	0.147	0.000
No communication skills	-0.186	0.336
Poor communication skills	-0.088	0.007
Fair communication skills	-0.038	0.001
No number skills	-0.113	0.318
Poor number skills	0.033	0.108
Fair number skills	-0.010	0.337
No computer and IT skills	-0.191	0.000
Poor computer and IT skills	-0.134	0.000
Fair computer and IT skills	-0.057	0.000
No team-working skills	0.166	0.378

Poor team-working skills	-0.027	0.629
Fair team-working skills	0.017	0.180
Not able to learn new skills	0.394	0.070
Poor at learning new skills	-0.020	0.754
Fair at learning new skills	0.011	0.292
No problem solving skills	-0.166	0.387
Poor at problem solving	-0.076	0.047
Fair at problem solving	-0.046	0.000
Not able to use tools properly	0.058	0.073
Poor at using tools properly	0.105	0.000
Fair at using tools properly	0.041	0.000
Not able to look after people who need care	0.017	0.356
Poor at looking after others who need care	0.033	0.034
Fair at looking after others that need care	0.002	0.823
Not able to work with finance/accounts	-0.041	0.076
Poor at finance/accounts	-0.025	0.098
Fair at finance/accounts	-0.024	0.017
(Constant)	2.182	0.000
	Number of obs.	5442
	Adj. R-squared	0.3886

Specification 3 2000

	Log hourly pay 2000	
	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.064	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.006	0.491
A/S Level Grade A-C	0.041	0.019
A-Level/S-Level Grade A-C	0.087	0.000
SCE Standard Grade 4-5	0.003	0.954
SCE Standard Grade 1-3	0.012	0.681
SLC Lower or Ordinary Grade	-0.096	0.209
SLC Higher Grade	0.048	0.097
Scottish 6th Year Certificate	0.053	0.359
Other Scottish qualification	0.027	0.794
Degree	0.164	0.000
Higher Degree	0.032	0.161
BTEC Level 2	0.007	0.681
BTEC Level 3	0.066	0.000
BTEC Level 4	-0.021	0.538
Other BTEC qualification	0.102	0.004
City and Guilds Level 2	-0.007	0.624
City and Guilds Level 3	-0.020	0.160
City and Guilds Level 4	-0.019	0.624
Other City and Guilds qualification	0.005	0.879
RSA Stage 1	-0.024	0.071
RSA Stage 2	0.041	0.265
RSA Stage 3	-0.050	0.657
NVQ Level 1	-0.049	0.070
NVQ Level 2	-0.091	0.000
NVQ Level 3	0.010	0.684
NVQ Level 4	0.147	0.003
NVQ Level 5	0.137	0.365
NVQ Level 6	0.210	0.085
Other NVQ or Trusts towards NVQ	0.007	0.899
GNVQ Level 1	0.252	0.136
GNVQ Level 2	0.048	0.589
GNVQ Level 3	-0.023	0.807
Other GNVQ qualification	0.182	0.383
ONC/OND	0.044	0.071
HNC/HND	0.015	0.452
Recognised trade apprenticeship	0.049	0.020
Female	-0.083	0.000
Part time	-0.208	0.000
Father social class I	0.038	0.048
Father social class II	0.022	0.069
Father social class III non-manual	-0.004	0.817
Father social class III manual	-0.012	0.275
Father social class IV	-0.029	0.131
Father is a student	-0.064	0.117
Father is dead	0.012	0.681
Financial hardship	-0.018	0.204
North	-0.097	0.000
Yorkshire & Humberside	-0.074	0.000
East Midlands	-0.047	0.007
East Anglia	-0.045	0.036
South West	-0.072	0.000
West Midlands	-0.035	0.028
North West	-0.050	0.001
Wales	-0.074	0.000
Scotland	-0.050	0.007
Drawing test One 1st (lowest) quintile	-0.028	0.160

Drawing test One 2nd quintile	-0.004	0.818	Large firm	0.020	0.080
Drawing test One 4th quintile	0.000	0.986	Very large firm	0.059	0.000
Drawing test One 5th quintile	0.000	0.995	Tenure	0.011	0.002
Drawing test Two 1st quintile	0.010	0.630	Tenure squared	-0.001	0.045
Drawing test Two 2nd quintile	0.021	0.177	Managerial/supervisory responsibilities	0.126	0.000
Drawing test Two 4th quintile	0.007	0.652	No communication skills	-0.203	0.268
Drawing test Two 5th quintile	0.003	0.881	Poor communication skills	-0.083	0.009
Vocabulary test 1st (lowest) quintile	0.007	0.680	Fair communication skills	-0.033	0.002
Vocabulary test 2nd quintile	0.016	0.267	No number skills	-0.032	0.768
Vocabulary test 4th quintile	0.014	0.308	Poor number skills	0.040	0.050
Vocabulary test 5th quintile	0.014	0.288	Fair number skills	0.006	0.556
Profile test 1st (lowest) quintile	-0.005	0.753	No computer and IT skills	-0.151	0.000
Profile test 2nd quintile	0.004	0.767	Poor computer and IT skills	-0.099	0.000
Profile test 4th quintile	0.000	0.983	Fair computer and IT skills	-0.040	0.000
Profile test 5th quintile	-0.015	0.258	No team-working skills	0.126	0.479
Copying test 1st (lowest) quintile	-0.022	0.225	Poor team-working skills	-0.019	0.717
Copying test 2nd quintile	0.008	0.596	Fair team-working skills	0.000	0.987
Copying test 4th quintile	0.020	0.132	Not able to learn new skills	0.504	0.085
Copying test 5th quintile	0.038	0.007	Poor at learning new skills	-0.044	0.477
Maths test 1st (lowest) quintile	-0.071	0.000	Fair at learning new skills	0.015	0.148
Maths test 2nd quintile	-0.039	0.008	No problem solving skills	-0.095	0.602
Maths test 4th quintile	-0.008	0.541	Poor at problem solving	-0.053	0.155
Maths test 5th quintile	0.003	0.822	Fair at problem solving	-0.032	0.001
Reading test 1st (lowest) score	-0.003	0.897	Not able to use tools properly	0.014	0.650
Reading test 2nd score	0.018	0.218	Poor at using tools properly	0.061	0.000
Reading test 4th score	0.000	0.974	Fair at using tools properly	0.022	0.021
Reading test 5th score	0.011	0.434	Not able to look after people who need care	0.022	0.203
Word score 1st (lowest) quintile	-0.017	0.324	Poor at looking after others who need care	0.021	0.168
Word score 2nd quintile	-0.001	0.960	Fair at looking after others that need care	-0.001	0.924
Word score 4th quintile	0.010	0.442	Not able to work with finance/accounts	-0.045	0.043
Word score 5th quintile	0.047	0.000	Poor at finance/accounts	-0.036	0.015
Small firm	-0.049	0.000	Fair at finance/accounts	-0.036	0.000

(Constant)	2.111	0.000
	Number of obs.	5226

	Adj. R-squared	0.4510

Specification 4 2000

	Log hourly pay 2000	
	Coef.	P>t
5+ GCSE's Grade A-C (or equivalent)	0.039	0.000
<5 GCSE's Grade A-C (or equivalent)	-0.012	0.107
A/S Level Grade A-C	0.010	0.486
A-Level/S-Level Grade A-C	0.044	0.000
SCE Standard Grade 4-5	0.008	0.862
SCE Standard Grade 1-3	-0.008	0.735
SLC Lower or Ordinary Grade	-0.083	0.193
SLC Higher Grade	0.029	0.230
Scottish 6th Year Certificate	0.031	0.520
Other Scottish qualification	0.046	0.601
Degree	0.046	0.000
Higher Degree	-0.017	0.360
BTEC Level 2	-0.004	0.791
BTEC Level 3	0.043	0.002
BTEC Level 4	-0.072	0.012
Other BTEC qualification	0.065	0.027
City and Guilds Level 2	-0.014	0.274
City and Guilds Level 3	-0.015	0.214
City and Guilds Level 4	-0.025	0.447
Other City and Guilds qualification	-0.012	0.636
RSA Stage 1	-0.005	0.654
RSA Stage 2	0.090	0.003
RSA Stage 3	-0.090	0.337
NVQ Level 1	-0.024	0.292
NVQ Level 2	-0.077	0.000
NVQ Level 3	-0.016	0.447
NVQ Level 4	0.089	0.031
NVQ Level 5	0.054	0.673
NVQ Level 6	0.245	0.016
Other NVQ or Trusts towards NVQ	0.011	0.813
GNVQ Level 1	0.043	0.763
GNVQ Level 2	0.009	0.899
GNVQ Level 3	-0.117	0.133
Other GNVQ qualification	0.250	0.151
ONC/OND	-0.005	0.821
HNC/HND	-0.004	0.805
Recognised trade apprenticeship	0.046	0.009
Female	-0.079	0.000
Part time	-0.151	0.000
Father social class I	0.021	0.205
Father social class II	0.011	0.268
Father social class III non-manual	-0.007	0.598
Father social class III manual	-0.009	0.325
Father social class IV	-0.022	0.158
Father is a student	-0.065	0.060
Father is dead	0.002	0.926
Financial hardship	-0.019	0.112
North	-0.089	0.000
Yorkshire & Humberside	-0.073	0.000
East Midlands	-0.053	0.000
East Anglia	-0.047	0.008
South West	-0.066	0.000
West Midlands	-0.036	0.008
North West	-0.040	0.001
Wales	-0.078	0.000
Scotland	-0.049	0.001
Drawing test One 1st (lowest) quintile	-0.012	0.475
Drawing test One 2nd quintile	0.003	0.823
Drawing test One 4th quintile	0.002	0.879

Drawing test One 5th quintile	0.003	0.822	Tenure	0.009	0.004
Drawing test Two 1st quintile	0.006	0.715	Tenure squared	0.000	0.084
Drawing test Two 2nd quintile	0.015	0.236	Managerial/supervisory responsibilities	0.020	0.016
Drawing test Two 4th quintile	0.017	0.179	No communication skills	-0.059	0.700
Drawing test Two 5th quintile	0.012	0.406	Poor communication skills	-0.066	0.014
Vocabulary test 1st (lowest) quintile	0.006	0.674	Fair communication skills	-0.034	0.000
Vocabulary test 2nd quintile	0.007	0.545	No number skills	-0.064	0.478
Vocabulary test 4th quintile	0.004	0.725	Poor number skills	0.020	0.232
Vocabulary test 5th quintile	0.010	0.391	Fair number skills	0.010	0.231
Profile test 1st (lowest) quintile	-0.003	0.812	No computer and IT skills	-0.085	0.000
Profile test 2nd quintile	0.005	0.645	Poor computer and IT skills	-0.077	0.000
Profile test 4th quintile	-0.003	0.804	Fair computer and IT skills	-0.024	0.004
Profile test 5th quintile	-0.012	0.273	No team-working skills	-0.012	0.936
Copying test 1st (lowest) quintile	-0.009	0.548	Poor team-working skills	-0.047	0.290
Copying test 2nd quintile	0.014	0.265	Fair team-working skills	-0.007	0.515
Copying test 4th quintile	0.015	0.178	Not able to learn new skills	0.388	0.113
Copying test 5th quintile	0.020	0.083	Poor at learning new skills	0.026	0.616
Maths test 1st (lowest) quintile	-0.048	0.002	Fair at learning new skills	0.007	0.403
Maths test 2nd quintile	-0.026	0.038	No problem solving skills	-0.077	0.615
Maths test 4th quintile	-0.003	0.759	Poor at problem solving	-0.013	0.682
Maths test 5th quintile	-0.009	0.492	Fair at problem solving	-0.016	0.051
Reading test 1st (lowest) score	0.015	0.343	Not able to use tools properly	0.015	0.570
Reading test 2nd score	0.025	0.042	Poor at using tools properly	0.041	0.004
Reading test 4th score	0.006	0.593	Fair at using tools properly	0.004	0.592
Reading test 5th score	0.012	0.327	Not able to look after people who need care	0.036	0.015
Word score 1st (lowest) quintile	-0.021	0.150	Poor at looking after others who need care	0.035	0.006
Word score 2nd quintile	0.004	0.781	Fair at looking after others that need care	0.014	0.084
Word score 4th quintile	0.016	0.159	Not able to work with finance/accounts	-0.028	0.131
Word score 5th quintile	0.030	0.003	Poor at finance/accounts	-0.022	0.078
Small firm	-0.048	0.000	Fair at finance/accounts	-0.031	0.000
Large firm	0.025	0.010	Managers and senior officials	0.534	0.000
Very large firm	0.054	0.000	Professional occupations	0.648	0.000

Associate professional and technical	0.509	0.000
Administrative and secretarial	0.169	0.000
Skilled trades	0.267	0.000
Personal service	0.152	0.000
Sales and customer service	0.123	0.000
Process, plant and machine operatives	0.166	0.000

(Constant)	1.857	0.000
	Number of obs.	5226
	Adj. R-squared	0.6157

Specification 5 2000

	Log hourly pay 2000	
	Coef.	P>t
Female	-0.082	0.000
Part time	-0.292	0.000
Irish	-0.024	0.721
White other	0.007	0.842
White & Black Caribbean	-0.028	0.771
White & Black African	-0.098	0.760
White & Asian	0.002	0.986
Other mixed race	0.048	0.673
Indian	0.046	0.392
Pakistani	0.148	0.167
Bangladeshi	-0.012	0.948
Other Asian	0.086	0.424
Caribbean	-0.054	0.543
African	-0.390	0.084
Other Black	0.264	0.065
Chinese	0.017	0.918
Other ethnic group	0.116	0.072
Father social class I	0.156	0.000
Father social class II	0.091	0.000
Father social class III non-manual	0.016	0.372
Father social class III manual	-0.008	0.487
Father social class IV	-0.021	0.305
Father is a student	-0.056	0.213
Father is dead	0.036	0.256
Financial hardship	-0.039	0.011
North	-0.123	0.000
Yorkshire & Humberside	-0.097	0.000
East Midlands	-0.072	0.000
East Anglia	-0.073	0.001
South West	-0.095	0.000
West Midlands	-0.057	0.001
North West	-0.066	0.000
Wales	-0.100	0.000
Scotland	-0.056	0.001
Drawing test One 1st (lowest) quintile	-0.032	0.138
Drawing test One 2nd quintile	0.003	0.871
Drawing test One 4th quintile	-0.005	0.781
Drawing test One 5th quintile	0.006	0.740
Drawing test Two 1st quintile	-0.005	0.813
Drawing test Two 2nd quintile	0.013	0.443
Drawing test Two 4th quintile	-0.003	0.843
Drawing test Two 5th quintile	-0.006	0.766
Vocabulary test 1st (lowest) quintile	-0.007	0.671
Vocabulary test 2nd quintile	0.006	0.706
Vocabulary test 4th quintile	0.015	0.299
Vocabulary test 5th quintile	0.037	0.011
Profile test 1st (lowest) quintile	-0.017	0.273
Profile test 2nd quintile	0.002	0.907
Profile test 4th quintile	-0.008	0.571
Profile test 5th quintile	-0.027	0.059
Copying test 1st (lowest) quintile	-0.032	0.108
Copying test 2nd quintile	-0.001	0.936
Copying test 4th quintile	0.026	0.062
Copying test 5th quintile	0.065	0.000
Maths test 1st (lowest) quintile	-0.084	0.000
Maths test 2nd quintile	-0.054	0.001
Maths test 4th quintile	-0.010	0.486
Maths test 5th quintile	0.038	0.016
Reading test 1st (lowest) score	-0.038	0.064

Reading test 2nd score	-0.005	0.740
Reading test 4th score	0.006	0.671
Reading test 5th score	0.060	0.000
Word score 1st (lowest) quintile	-0.037	0.048
Word score 2nd quintile	-0.019	0.319
Word score 4th quintile	0.004	0.791
Word score 5th quintile	0.056	0.000
Small firm	-0.065	0.000
Large firm	0.015	0.226
Very large firm	0.084	0.000
Tenure	0.019	0.000
Tenure squared	-0.001	0.000
No communication skills	-0.156	0.439
Poor communication skills	-0.142	0.000
Fair communication skills	-0.064	0.000
No number skills	-0.141	0.226
Poor number skills	-0.039	0.057
Fair number skills	-0.057	0.000
No team-working skills	0.120	0.519
Poor team-working skills	-0.024	0.677
Fair team-working skills	-0.005	0.693
Not able to learn new skills	0.231	0.309
Poor at learning new skills	-0.080	0.207
Fair at learning new skills	-0.033	0.002
Not able to use tools properly	0.049	0.149
Poor at using tools properly	0.115	0.000
Fair at using tools properly	0.043	0.000
Not able to look after people who need care	0.007	0.711
Poor at looking after others who need care	0.038	0.020
Fair at looking after others that need care	0.007	0.499
(Constant)	2.196	0.000
	Number of obs.	5443
	Adj. R-squared	0.3299

Appendix C2 – Principal Components Analysis

PCA 2004

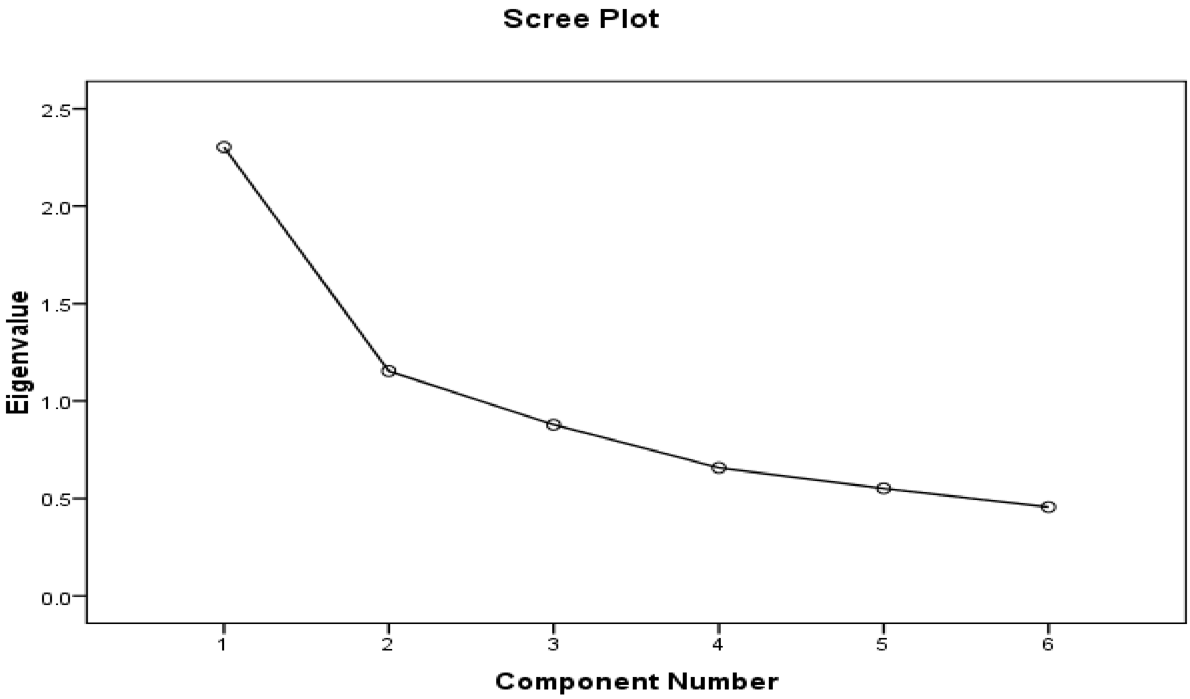
Correlation Matrix[a]

		Communication	Team work	Leaning new skills	Problem solving	Using tools	Looking after others
Correlation	Communication	1.000	.456	.326	.286	.090	.198
	Team work	.456	1.000	.365	.254	.150	.155
	Leaning new skills	.326	.365	1.000	.514	.306	.075
	Problem solving	.286	.254	.514	1.000	.349	.018
	Using tools	.090	.150	.306	.349	1.000	.037
	Looking after others	.198	.155	.075	.018	.037	1.000
Sig. (1-tailed)	Communication		.000	.000	.000	.000	.000
	Team work	.000		.000	.000	.000	.000
	Leaning new skills	.000	.000		.000	.000	.000
	Problem solving	.000	.000	.000		.000	.043
	Using tools	.000	.000	.000	.000		.000
	Looking after others	.000	.000	.000	.043	.000	

a. Determinant = .386

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.710
Bartlett's Test of Sphericity	Approx. Chi-Square	9120.264
	df	15
	Sig.	.000


Scree Plot
Eigenvalue
2.5
2.0
1.5
1.0
0.5
0.0
1
2
3
4
5
6
Component Number

2004 Factor Analysis

Rotated Factor Matrix[a]

	Factor	
	1	2
How good at problem solving	.733	.147
How good at learning new skills	.645	.298
How good at using tools properly	.466	
How good at communicating with others	.212	.686
How good at working in a team	.264	.587
How good at looking after people who need care		.276

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

2004 PCA Males only

Correlation Matrix[a]

		How good at communicating with others	How good at working in a team	How good at learning new skills	How good at problem solving	How good at using tools properly	How good at looking after people who need care
Correlation	How good at communicating with others	1.000	.447	.308	.282	.058	.184
	How good at working in a team	.447	1.000	.352	.224	.144	.166
	How good at learning new skills	.308	.352	1.000	.482	.254	.124
	How good at problem solving	.282	.224	.482	1.000	.262	.071

	How good at using tools properly	.058	.144	.254	.262	1.000	.152
	How good at looking after people who need care	.184	.166	.124	.071	.152	1.000
Sig. (1-tailed)	How good at communicating with others		.000	.000	.000	.000	.000
	How good at working in a team	.000		.000	.000	.000	.000
	How good at learning new skills	.000	.000		.000	.000	.000
	How good at problem solving	.000	.000	.000		.000	.000
	How good at using tools properly	.000	.000	.000	.000		.000
	How good at looking after people who need care	.000	.000	.000	.000	.000	

a. Determinant = .430

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	3540.743
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
How good at communicating with others	1.000	.679
How good at working in a team	1.000	.616
How good at learning new skills	1.000	.606
How good at problem solving	1.000	.602
How good at using tools properly	1.000	.580
How good at looking after people who need care	1.000	.197

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.238	37.303	37.303	2.238	37.303	37.303	1.669	27.812	27.812
2	1.042	17.373	54.676	1.042	17.373	54.676	1.612	26.864	54.676
3	.971	16.186	70.862						
4	.709	11.814	82.676						
5	.570	9.494	92.170						
6	.470	7.830	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
How good at learning new skills	.748	.216
How good at problem solving	.679	.375
How good at working in a team	.674	-.403
How good at communicating with others	.658	-.496
How good at looking after people who need care	.357	-.265
How good at using tools properly	.450	.614

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
How good at communicating with others	.819	
How good at working in a team	.766	.173
How good at looking after people who need care	.441	
How good at using tools properly		.755
How good at problem solving	.233	.740
How good at learning new skills	.392	.672

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

PCA 2004 Females only

Correlation Matrix[a]

		How good at communicating with others	How good at working in a team	How good at learning new skills	How good at problem solving	How good at using tools properly	How good at looking after people who need care
Correlation	How good at communicating with others	1.000	.462	.343	.329	.171	.163
	How good at working in a team	.462	1.000	.373	.293	.183	.146
	How good at learning new skills	.343	.373	1.000	.530	.341	.072
	How good at problem solving	.329	.293	.530	1.000	.359	.095
	How good at using tools properly	.171	.183	.341	.359	1.000	.143
	How good at looking after people who need care	.163	.146	.072	.095	.143	1.000
Sig. (1-tailed)	How good at communicating with others		.000	.000	.000	.000	.000
	How good at working in a team	.000		.000	.000	.000	.000
	How good at learning new skills	.000	.000		.000	.000	.000
	How good at problem solving	.000	.000	.000		.000	.000
	How good at using tools properly	.000	.000	.000	.000		.000
	How good at looking after people who need care	.000	.000	.000	.000	.000	

a. Determinant = .359

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.741
Bartlett's Test of Sphericity	Approx. Chi-Square	4840.632
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
How good at communicating with others	1.000	.451
How good at working in a team	1.000	.449
How good at learning new skills	1.000	.579
How good at problem solving	1.000	.543
How good at using tools properly	1.000	.318
How good at looking after people who need care	1.000	.084

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.425	40.410	40.410	2.425	40.410	40.410	2.029	33.819	33.819
2	1.000	16.661	57.071	1.000	16.661	57.071	1.395	23.252	57.071
3	.939	15.650	72.721						
4	.636	10.601	83.322						
5	.548	9.137	92.459						
6	.452	7.541	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
How good at learning new skills	.761	-.289
How good at problem solving	.737	-.316
How good at communicating with others	.672	.309
How good at working in a team	.670	.279
How good at using tools properly	.564	-.283
How good at looking after people who need care	.290	.750

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
How good at learning new skills	.799	.155
How good at problem solving	.793	.120
How good at using tools properly	.629	
How good at looking after people who need care	-.149	.790
How good at communicating with others	.408	.617
How good at working in a team	.423	.590

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

PCA 2000

Correlation Matrix[a]

		Communicating with others	The use of numbers	The use of computers and IT	Working in a team	Learning new skills	Problem solving	Using tools properly	Looking after people	Working with finance/ accounts
Correlation	Communicating with others	1.000	.186	.179	.356	.248	.246	.052	.170	.166
	The use of numbers	.186	1.000	.329	.146	.287	.367	.122	-.047	.442
	The use of computers and IT	.179	.329	1.000	.162	.318	.328	.031	-.041	.365
	Working in a team	.356	.146	.162	1.000	.302	.233	.130	.145	.143
	Learning new skills	.248	.287	.318	.302	1.000	.456	.221	.072	.257
	Problem solving	.246	.367	.328	.233	.456	1.000	.252	.027	.309
	Using tools properly	.052	.122	.031	.130	.221	.252	1.000	.072	.096
	Looking after people	.170	-.047	-.041	.145	.072	.027	.072	1.000	.086
	Working with finance/accounts	.166	.442	.365	.143	.257	.309	.096	.086	1.000
Sig. (1-tailed)	Communicating with others		.000	.000	.000	.000	.000	.000	.000	.000

	The use of numbers	.000		.000	.000	.000	.000	.000	.000	.000
	The use of computers and IT	.000	.000		.000	.000	.000	.001	.000	.000
	Working in a team	.000	.000	.000		.000	.000	.000	.000	.000
	Learning new skills	.000	.000	.000	.000		.000	.000	.000	.000
	Problem solving	.000	.000	.000	.000	.000		.000	.002	.000
	Using tools properly	.000	.000	.001	.000	.000	.000		.000	.000
	Looking after people	.000	.000	.000	.000	.000	.002	.000		.000
	Working with finance/accounts	.000	.000	.000	.000	.000	.000	.000	.000	

a. Determinant = .255

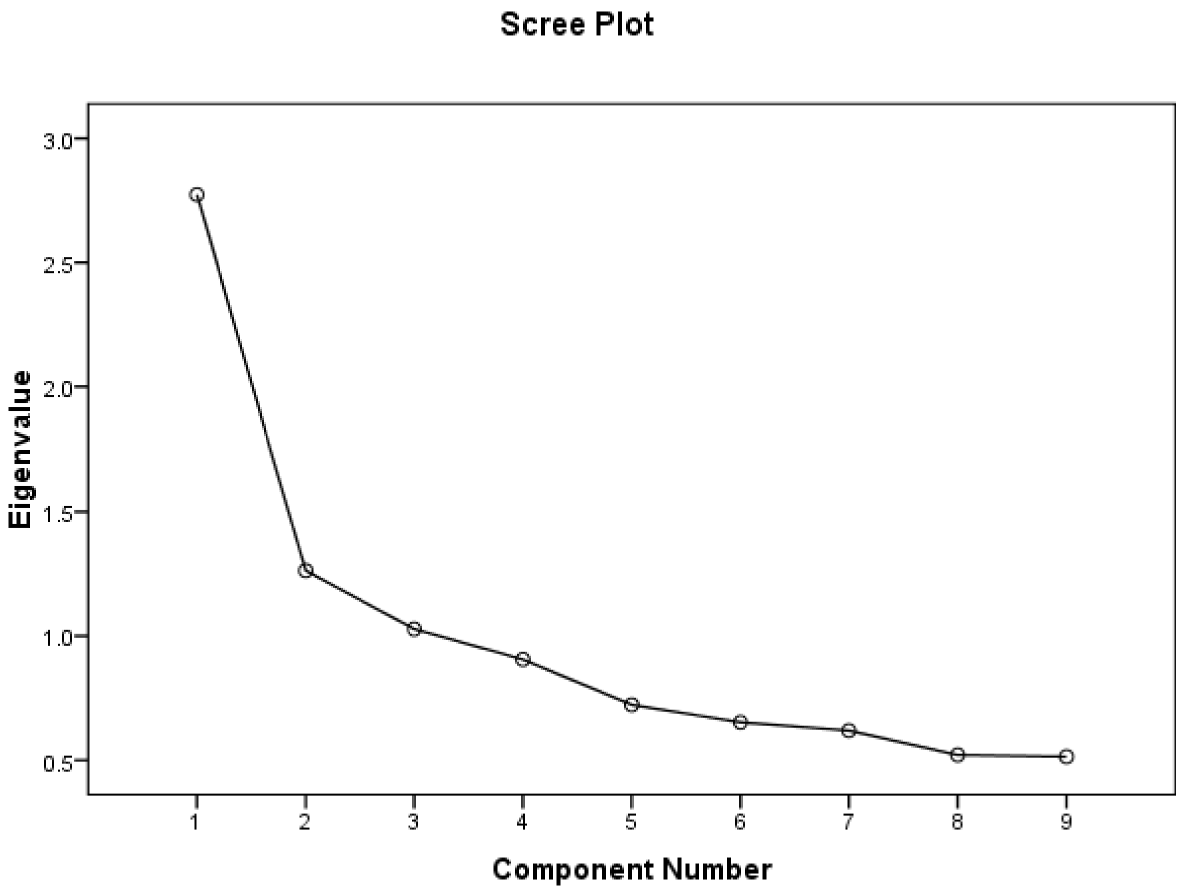
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.775
Bartlett's Test of Sphericity	Approx. Chi-Square	15157.353
	df	36
	Sig.	.000

Communalities

	Initial	Extraction
(SC)How good... at communicating with others	1.000	.579
(SC)How good... at the use of numbers	1.000	.556
(SC)How good... at the use of computers and IT	1.000	.540
(SC) How good...at working in a team	1.000	.518
(SC) How good...at learning new skills	1.000	.516
(SC) How good...at problem solving	1.000	.572
(SC) How good... at using tools properly	1.000	.811
(SC) How good... at looking after people	1.000	.464
(SC) How good...at working with finance/accounts	1.000	.509

Extraction Method: Principal Component Analysis.


Scree Plot
3.0
2.5
2.0
1.5
1.0
0.5
Eigenvalue
1
2
3
4
5
6
7
8
9
Component Number

Component Matrix[a]

	Component		
	1	2	3
(SC) How good...at problem solving	.714		.241
(SC) How good...at learning new skills	.688		.193
(SC)How good... at the use of numbers	.638	-.380	
(SC) How good...at working with finance/accounts	.619	-.294	-.198
(SC)How good... at the use of computers and IT	.600	-.347	-.243
(SC) How good...at working in a team	.505	.496	-.130
(SC)How good... at communicating with others	.505	.445	-.355
(SC) How good... at looking after people	.141	.651	-.145
(SC) How good... at using tools properly	.332	.185	.816

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Reproduced Correlations

		Communicating with others	The use of numbers	The use of computers and IT	Working in a team	Learning new skills	Problem solving	Using tools properly	Looking after people	Working with finance/ accounts
Reproduced Correlation	Communicating with others	.579[a]	.176	.235	.522	.314	.244	-.039	.412	.252
	The use of numbers	.176	.556[a]	.531	.143	.396	.466	.088	-.148	.520
	The use of computers and IT	.235	.531	.540[a]	.163	.339	.394	-.063	-.106	.522
	Working in a team	.522	.143	.163	.518[a]	.361	.294	.153	.413	.193
	Learning new skills	.314	.396	.339	.361	.516[a]	.532	.401	.120	.364
	Problem solving	.244	.466	.394	.294	.532	.572[a]	.421	.020	.415
	Using tools properly	-.039	.088	-.063	.153	.401	.421	.811[a]	.049	-.010
	Looking after people	.412	-.148	-.106	.413	.120	.020	.049	.464[a]	-.075
	Working with finance/accounts	.252	.520	.522	.193	.364	.415	-.010	-.075	.509[a]

Residual[b]	Communicating with others		.009	-.056	-.167	-.066	.003	.091	-.242	-.086
	The use of numbers	.009		-.202	.003	-.109	-.099	.034	.101	-.078
	The use of computers and IT	-.056	-.202		-.001	-.021	-.066	.094	.064	-.157
	Working in a team	-.167	.003	-.001		-.059	-.061	-.023	-.268	-.050
	Learning new skills	-.066	-.109	-.021	-.059		-.076	-.180	-.048	-.107
	Problem solving	.003	-.099	-.066	-.061	-.076		-.169	.007	-.106
	Using tools properly	.091	.034	.094	-.023	-.180	-.169		.023	.105
	Looking after people	-.242	.101	.064	-.268	-.048	.007	.023		.162
	Working with finance/accounts	-.086	-.078	-.157	-.050	-.107	-.106	.105	.162	

Extraction Method: Principal Component Analysis.

a. Reproduced communalities

b. Residuals are computed between observed and reproduced correlations. There are 26 (72.0%) nonredundant residuals with absolute values greater than 0.05.

Component Score Coefficient Matrix

	Component		
	1	2	3
(SC)How good... at communicating with others	.071	.478	-.129
(SC)How good... at the use of numbers	.347	-.091	.009
(SC)How good... at the use of computers and IT	.357	-.027	-.137
(SC) How good...at working in a team	.011	.444	.061
(SC) How good...at learning new skills	.153	.129	.297
(SC) How good...at problem solving	.204	.028	.318
(SC) How good... at using tools properly	-.115	-.054	.753
(SC) How good... at looking after people	-.155	.473	.005
(SC) How good...at working with finance/accounts	.336	-.004	-.089

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Component Scores.

<u>Chapter Five:</u>

Private Non-Monetary Returns to Education

5.1 Introduction

Education may have many benefits to personal and social well-being. The fifth chapter of this Thesis will investigate non-monetary returns to education using data from the 1970 cohort. This analysis exploits differences between observations between two sweeps of a cohort survey, at ages 30 and 34, and asks whether there are any fairly immediate non-monetary benefits to education. As such, this is likely to underestimate the full value of education as we typically expect non-monetary returns to be larger in the long run.

Many studies have explored the links between education and well-being and the literature, to be discussed in the next section, typically focuses on one category, or even a single outcome or aspect of well-being. The analysis here has two distinct advantages over these studies. Firstly, the BCS70 is rich in data and allows an analysis of the returns to a wide range of potential non-monetary benefits, in each of the categories to be discussed. Secondly, this analysis, combined with the previous two chapters, will give a complete picture of the private returns to education and skills for this cohort at a relatively early time in an individual's life and career. This is, however, a crucial period in their life due to career progression, relationships and family formation and so if any non-monetary benefits accrue by this age they could be particularly important in one's life course. Also, well-being is becoming increasingly important in the public domain, particularly with regards to public policy. It is expected that happiness measures will be included as part of the Office for National Statistics surveys from next year[78]. It must be noted that although there are also social (i.e. external) benefits to education these will not be considered here.

This analysis uses fixed and random effects models in an attempt to find a causal effect of education on many different aspects of life outcomes, giving a much more comprehensive examination of non-pecuniary returns than currently exists in much of the literature. Using fixed effects models enables us to control for differences among individuals that are constant across time, for example personality.

The rest of the chapter is set out as follows: section two will discuss theoretical concepts concerning these externalities and provides an overview of some of the

[78] BBC News, http://www.bbc.co.uk/news/uk-politics-11756049 accessed 19/11/2010

literature in this area. Section three examines a variety of non-pecuniary returns to education, and section four uses a fixed effects approach to analyse the effects of education on psychological and physical well-being. Section five examines three other components of outcomes concerning the labour market, social participation and household consumption. Section six concludes.

5.2 Literature

Non-monetary benefits to education were posited in the very earliest work on human capital (Schultz 1961, Becker 1964). However more recent literature has tended to focus upon the economic (monetary) returns to qualifications. This is for two reasons; firstly, data on education and pay is more widely available in surveys, it is easier to measure and possibly more reliably measured than non-monetary returns. Where surveys do include information on non-monetary outcomes they are typically self-reported, for example health status. Butler et al. (1987) compare two self-reported assessments of arthritis and find differences between these assessments for certain demographic groups – particularly the unemployed. They argue that the more detailed, more objective measure of the condition (by asking specifics concerning the area affected, amount of pain and such like) is more accurate than a simple binary health status question. For example, responses to the question ‘do you suffer from arthritis or not?’ may be biased, as some workless individuals may exaggerate or possible use poor health status as a justification for being unemployed, which the more detailed line of questioning prevents. The BCS70 health questions being used in this analysis are simple binary outcomes and therefore one must be aware of the risk of measurement error in such self-reporting.

The second reason why less attention has been paid to this area of research is because it is more difficult to establish a causal link between education and non-market outcomes. This is again partly due to available data; many surveys are one-off cross-sections. This is also because there are many contributing factors to life outcomes, some of which are difficult to identify and measure. Furthermore, the relationships between these factors are not always well understood, despite being consistently reported in the literature. One part of this study will utilise the panel nature of the BCS70 and apply differencing methods, thus controlling for some underlying time-invariant factors, in an attempt to establish a causal link between education and non-market outcomes.

It should be noted that education does not always generate benefits; while more education may well be associated with positive effects on some aspects of health, this may be counteracted somewhat by the increased pressure and stress caused by the expectations individuals may place on themselves, and have placed on them, in their line of work. For example, Gardner and Oswald (2002) find that stress is U-shaped in education using an OLS specification. Evidence of the influence of education on various life outcomes will now be considered.

The general consensus in academic literature and between policy makers is that, given the importance that the education-investment decision has on life outcomes, the estimated monetary returns, particularly to higher education, should be more widely available in the public domain, for example by subject of study and by university. Million+[79] and the Higher Education Statistics Agency[80] (HESA) are just two of the many organisations that publish such information. It is likely that this information is more accessible to prospective entrants than information on non-monetary returns would be, and as a consequence, the latter are not given due attention in the investment decision. From the perspective of education as a field of research for economists, it is important that research does not focus on monetary returns alone (Dearden et al. 2009). Yet it is more important that information on non-monetary returns is available to individuals when making the investment decision; given the imperfect supply of information on returns, individuals may not always be making the optimal choice. If, when based on monetary considerations alone, the decision is marginal, then having access to information on non-monetary returns would be particularly important in the decision-making process. This was first acknowledged by Haveman and Wolfe (1984): "A full accounting must consider all of schooling's effects, positive and negative, and not simply those recorded in a single market" (p379).

Of course, due to the nature of these benefits, as already discussed, it is much more difficult to accurately ascertain these returns. The question of how, and by whom (i.e. the policy maker or the individuals themselves), these returns should be valued, raises even more complexities. Given the consequences of choosing whether to continue in education for the individual, as well as on the economy and society as a whole, it

[79] http://www.millionplus.ac.uk/, first accessed 11/09/09
[80] http://www.hesa.ac.uk/, first accessed 11/09/09

seems important to obtain accurate and reliable returns which can be made available in the public domain.

As well as increased monetary returns to education, individuals receive some non-monetary private returns to the higher level of education attained. These non-monetary returns begin as soon as the individual enters employment (or possibly even as soon as the individual starts their higher education course), and continue even after retirement. On top of this, some of these non-monetary returns may feed back into post-retirement monetary benefits, for example a higher pension due to better pension schemes at work and better private investment opportunities. Also, more education leads to longer life; life expectancy has indeed been shown to increase with education (Meara et al. 2008), though this is not explored in this study.

This chapter will examine an extensive set of non-monetary outcomes that may or may not result from investment in education for this cohort. The choice of measures is informed by the existing literature, which is now discussed with reference to how these different outcomes have been categorised.

McMahon (1998), Wolfe and Zuvekas (1995) and Haveman and Wolfe (1984) have all classified non-market returns to education when reviewing the literature in this area. The table below shows a summary of these categories[81], with examples of each. I will refer to specific evidence on non-market returns when outlining the various outcomes to be examined in this study.

[81] Wolfe and Zuvekas and Haveman and Wolfe also list public non-market outcomes. These have been omitted as they are not considered in this study.

Table 34: Non-market outcomes of educational investment, by type

Non-market outcome	Examples	Nature of outcome
Health	Smoking/alcohol consumption, stress-related illness, physical and mental illnesses	Private/public
Labour market	Participation rates, job satisfaction, working conditions	Private/public
Household and family effects	Human capital produced in the home, fertility rates, saving and investments, health of one's family	Private/public
Social participation/cohesion	Political participation, voluntary work/charitable giving, crime rates	Private/public
Motivational attributes	Control over outcomes, life satisfaction, happiness	Private
Consumption effects	Better informed choices, time preferences	Private

Source: McMahon (1998), Wolfe and Zuvekas (1995) and Haveman and Wolfe (1984)

Whenever estimating non-market outcomes to education, it is important to ensure that income is controlled for. It is well established[82] that education increases labour market earnings and it may be through income that well-being is improved. For example, higher labour market earnings, may allow one to improve own health status through affording better care, or consumption of goods of higher quality and in higher quantity, or better provision for their family. Therefore one must separate any improvement or otherwise in these non-market outcomes with respect to income caused (in part) by education, and the effect of education itself. The same argument applies to all other mediating variables which have this characteristic; however, some of these relationships are not as well understood as the relationship between education, outcomes and income.

Haveman and Wolfe (1984) outline an estimation method to value non-market returns; one can use the value of one 'unit' of a non-market outcome traded in the private market as an estimate of its willingness to pay, using this to provide a value of education's role in producing that outcome. Assuming all of the outcomes are mutually

[82] See Chapter Two p13.

exclusive, then the total non-market returns to education are simply the sum of the returns to individual outcomes.

Using a (small) sample of existing literature which has valued some of these outcomes, Haveman and Wolfe estimate that non-market outcomes approximately equal the monetary returns to each extra year of schooling. They do, however, accept that it is a "giant leap" (ibid, p400) to assume that this sample of five non-market outcomes represent the "full set of nonmarketed inputs" (a selection of which are presented in the table above) from which the value of non-market outcomes can be imputed. This of course depends on a number of relatively strict theoretical and empirical assumptions, and on top of this the authors use a number of different studies and a midpoint year of the studies to estimate prices. As noted by Haveman and Wolfe "the estimates…of schooling's value in producing nonmarketed outputs fall far short of the ideal that these assumptions characterize" (ibid. p400). Using panel data removes some of the uncertainties by estimating the impact of education on a large number of non-market outcomes for one cohort.

The literature typically focuses on only one aspect of non-market outcomes. I will now discuss previous evidence of non-market returns which have relevance to this study by providing a brief overview of the types of outcomes examined in the literature (i.e. one row of the table above), the proposed theoretical mechanisms through which these outcomes occur (when appropriate) and methodological techniques used.

5.2.1 Health

Health outcomes accruing from education are possibly the most frequently reported non-market outcomes in the returns literature. Grossman (2006) gives an overview of the various mechanisms by which education may affect health. These generally fall into three categories; productive efficiency (education increases the efficiency of production of health, i.e. for a given set of inputs, better educated individuals are better at producing health outputs), allocative efficiency (more educated individuals are better at choosing the inputs in their health production function that are better for their health) and time preferences (better educated people have a more future-oriented view and so adjust their lifestyle accordingly). Grossman provides a review of the empirical literature supporting each of these. Other studies have found that education significantly affects one's lifespan in the Netherlands (van Kippersluis et al. 2009), self reported health and likelihood of experiencing chronic conditions in the U.S. (Lundborg 2008), and smoking behaviour in Spain (Oriol Escardibul 2005).

A substantial amount of previous research has found a significant relationship between health and non-market outcomes, however a *causal* impact has been more difficult to establish. I have highlighted two of the above studies because of their attempt to establish this link. van Kippersluis et al. exploit a change in the compulsory school leaving age in 1928 to examine the causal effect of schooling on mortality in old age, by linking a household survey in 1997-2005 with a Cause-of-Death register for the same period, and selecting those individuals affected by the change in compulsory schooling. The law change leads to an increase in schooling of 0.8 years for males. No statistical change in years of education was found for females and they were subsequently excluded from the analysis. They find that one additional year of schooling reduces the probability of dying between ages 81 and 88, conditional on being alive aged 80, by approximately 4-6% compared to the baseline mortality rate at this age. However, there are two issues with this methodology.

Firstly, the instrument used is not a full treatment effect; one could leave school once six years of education were completed, and therefore school leaving age was dependent on the age at which their education started. Only half of the individuals in the pre-law change cohort would have been affected had the law been introduced one year earlier. Also, the law change does not indicate a general effect of increased schooling on lifespan, but a local average treatment effect. This is because an exogenous increase in the compulsory school leaving age is only likely to affect those at the lower end of the distribution of years of schooling, because those higher in the distribution were likely to continue their schooling regardless of the change in school leaving age. van Kippersluis et al. do check for this, by excluding individuals who completed higher (academic or vocational) education, and find that the results are not biased by their inclusion. However, this is not a sure robustness test, as the schooling law change may have induced those who may have left education at the compulsory leaving age to continue their education further. This is likely to be the case, as the law change forced most children to begin secondary schooling[83].

[83] At this time, most primary schools in the Netherlands covered 6 years of schooling; prior to the 1928 law change, this is all that was required. The change in compulsory schooling resulted in those born after 1st January 1917 being forced to complete 7 years of compulsory schooling, and therefore

The second concern is that income is not controlled for in the study. Income is likely to be one of the key mediating variables through which education affects health outcomes. As Grossman argues, allocative efficiency means that education gives individuals more access to information and so they can make better-informed choices concerning their consumption, lifestyle and other behaviours affecting health, including consumption of health services. One may argue that these choices are at least partly facilitated by higher income, given the increased cost of healthier behaviour. Lynch (2006) investigates the relationships between education, income and health across cohorts from 1972-2001 in the U.S. He finds that while the direct effect of education is weakening, its indirect effect *through* income has been strengthening across cohorts. Lynch finds that approximately "30% of the effect of education on health is attributable to income"[84] on average, although this does vary widely across cohorts.

Lundborg (2008) uses a twins study to eliminate any unobserved factors (for example family background and genetic traits) that may simultaneously affect education and health, in much the same way studies have exploited zygosity to find monetary returns to education. The study uses both self-reported health and the number of chronic conditions experienced in an attempt to eliminate any misreporting of health outcomes, and controls for income as a mediating variable. The study finds that education is positively associated with self-reported health but negatively related to the number of chronic conditions and, given the methodology used, it can be concluded that this effect is causal. Lundborg goes on to investigate whether overall health is affected through lifestyle via smoking, physical activity and occupational hazards, however whilst linked, he cannot establish a causal relationship. This raises another issue regarding the mechanisms through which education affects health. Smoking behaviour, for example, could be argued to be a health outcome which may be influenced by education directly through access to information, and indirectly through peer effects or through occupational choice by way of network effects. Smoking will then affect overall health later in life.

Following Lundborg, I will investigate smoking behaviour and overall health in section four, even though the former may affect the latter. Given that the outcomes are not mutually exclusive, it is very difficult to calculate an accurate representation of the

---

complete one year of secondary schooling. This may then have subsequent effects on continuing secondary schooling.

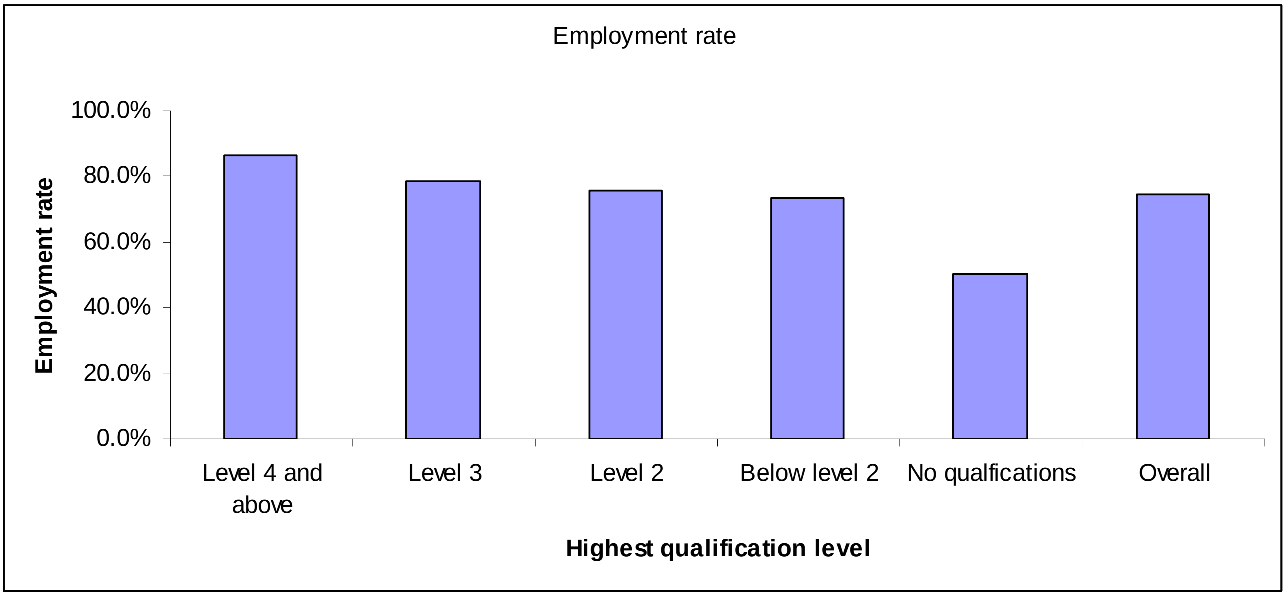
[84] Lynch, S., 2006, Explaining Life Course and Cohort Variation in the Relationship between Education and Health: The Role of Income, Journal of Health and Social Behaviour, 47:4, p331

monetary value of overall returns. This assumption used by Haveman and Wolfe may be too strict to value total returns with any accuracy. The next category to be discussed is the labour market.

5.2.2 Labour market

The positive relationship between education level and employment is well known; Figure 8 shows employment rates in England by highest qualification level for 2004. This is suggestive of a causal effect but may also be due to unobservable characteristics such as motivation, career priority or family background influences (e.g. gender roles). The evidence for a causal relationship is discussed here.

Figure 8: Employment rate by highest qualification



Source: Office of National Statistics, English Local Labour Force Survey 2003/04[85]

The evidence of the causal effect of education on labour market outcomes is relatively scarce. Fullan and Loubser (1972) propose that education may improve one's adaptive capacity – that is, the ability to manage oneself and focus on career aims even when the environment is changing, for example experiencing a labour market shock. Other proposed mechanisms, particularly for job satisfaction, include expectations and aspirations associated with more education.

[85] 2004 is used as a direct comparison to the BCS 2004 sweep.

Riddell and Song (2009) exploit changes in the compulsory school leaving age in Canada to estimate the causal effect of education on the probability of re-employment and on job search intensity following a negative employment shock. The authors find some support for Fullan and Loubser as education measured both as qualifications and years of schooling significantly affects both re-employment and job search. Oreopoulos and Salvanes (2009) find that education is linked (negatively) to unemployment and the probability of being on welfare, and positively to occupational prestige[86].

Laplagne et al. (2007) investigate the relationship between health, education and labour market participation using a number of econometric specifications, as part of a public policy review in Australia. The authors control for both unobserved characteristics, which may affect both education and labour market participation, such as motivation, using a panel multinomial logit model, and also assess the joint determination of health and participation using a simultaneous equations model. They find evidence of education indirectly affecting participation via (self-reported) health status. The direct (marginal) effect of education on participation is significant and large, particularly university-level education[87], between 8 and 9% for males, and 15 to 20% for females.

Cameron et al. (2001) examine the effects of education on labour force participation in five developing Asian countries, and although cross-country differences exist, university-level education has a significant impact in each country except Korea, while primary education has little effect in all but Sri Lanka and Indonesia. There is evidence that gender roles in each country correlate with the relationship between education and labour market participation of women – more traditional gender roles result in a weak relationship whereas the countries in which gender roles are not rigidly defined result in a stronger relationship between education and participation. This evidence clearly shows some of the benefits of education in terms of labour market outcomes.

There is however evidence of negative effects associated with education. Job satisfaction declines with education, partly because of the increased hours of work associated with the types of jobs normally undertaken by the more highly educated, although it also has an added, but small, indirect positive effect through income. The

[86] This is calculated from subjective rankings of occupations by way of a nationally representative sample in the U.S.
[87] Compared to being in education up to year 11 at most.

consensus in the literature is that higher education levels are associated with higher aspirations (although, as far as I am aware, the direction of causality has not been proven either way) and so for given hourly pay, job satisfaction declines with income (Gardner and Oswald 2002).

Expectations clearly play an important role in determining one's job satisfaction; Clark (1997) shows that the job satisfaction differential between males and females is due to different expectations. This is supported by evidence showing that for highly educated individuals (therefore presumably with the same aspirations and expectations in the labour market) this gender differential disappears. The other important aspect that has emerged in the literature is where the individual's education level does not match the requirements of the job. Cabral Vieira (2005) shows that perceived over-education (by the individuals themselves) has a negative effect on overall job satisfaction, as well as on aspects related to satisfaction, such as job security, hours worked and the type of work performed. McGuiness and Sloane (2011) show that overskilling also results in lower job satisfaction. However Buchel (2002) shows that there are some benefits to the firm of employing over-educated individuals; they are healthier, more career minded, more likely to participate in on-the-job training and have longer tenure than workers educated to the requirements of the job. Finally, Hamermesh (2001) shows that the distribution of job satisfaction in the U.S. has widened between the 1978 and 1988 cohorts, and the 1978 and 1996 cohorts, and seems to be correlated with shocks in wage inequality (but not permanent wage inequalities).

The literature shows that there are many facets of an individual's success in the labour market that may be affected by their education level – in this study I will examine the effect of education on job satisfaction. As well as one's work life, education may also have an effect on an individual's home life – particularly in relation to family formation. This is discussed below.

5.2.3 Household and family effects

The commonly reported negative relationship between education and fertility has been investigated in detail by Castro Martin (1995), using a single sweep of data from the Demographic and Health Surveys covering 26 countries at different stages of development. The relationship does not apply to all countries, but depends on structural, cultural and socioeconomic factors and how they interact with education. However, Castro Martin does find that education has a significant causal effect on fertility; although the relationship is weak in countries with low educational attainment overall, the relationship strengthens with increasing education levels and then diminishes once a "relatively low level of fertility has been reached"[88]. The mechanism through which this occurs seems to be the way that education affects contraceptive use, delays marriage (and therefore family formation) and preferred family size. Education can have important and significant effects on other household and family members (Behrman and Wolfe 1987). Lindelow (2006) finds that in Mozambique, education, particularly of mothers, significantly and positively affects health care choices that parents make for their children, such as maternity care, immunisations and nutrition. Education also affects children's abilities though inherited intelligence and better investments in the home for the top 1% of students (Leibowitz 1974) and mother's education significantly affects skills in low-income families (Murnane 1981).

5.2.4 Social participation

This section discusses the evidence that education influences civic participation. It is believed that education results in lower information costs to individuals when it comes to voter registration. Other proposed mechanisms that affect civic participation via education include social network effects and improved critical thinking which enables individuals to make better sense of politics.

The correlation between education and voting behaviour in the U.S. is well-established, but questions remain concerning the causality of the relationship. More recent literature has focused on using various empirical methods to establish causality, and results suggest that better education leads to more inclusion and voting. In the U.K. the relationship is not as strong; in fact, the different polities give some indication of a possible mechanism through which education affects voting. Milligan et al. (2004) find that, through exogenous changes in compulsory schooling levels, citizenship increases with education. However, the key difference between the two systems is in voter registration; in the U.S., individuals themselves hold responsibility for registering to vote in upcoming elections, whereas in the U.K. individuals are actively assisted in electoral registration by government officials, who are responsible for maintaining the

[88] Castro Martin, T., 1995, Women's Education and Fertility: Results from 26 Demographic and Health Surveys, Studies in Family Planning,, 26:4, p. 200

electoral register. The U.S. results are found to be closer to those for the U.K. when conditioning on voter registration. Thus, one mechanism through which education may affect participation is through lower costs to more educated individuals in the processes involved in registering for forthcoming elections. Milstein Sondheimer and Green (2010) use pilot studies of U.S. public policy interventions to increase early-age quantity and quality (through class size) of schooling and again find evidence that the relationship between this and subsequent voting is causal.

Dee (2004) examines the relationship between secondary education and university entrance and civic participation using longitudinal data from the U.S. Using instrumental variables to control for likely endogeneity, he finds that education has significant positive effects on voting, newspaper readership and volunteering work, controlling for type of school in the specification.

5.2.5 Subjective well-being and motivational attributes

The well-being literature suggests an indirect effect of education on happiness through income via status or conspicuous consumption effects, although there is evidence that the direct effect of education on happiness is close to zero (due to the fact that education is a choice variable and is therefore invested until marginal utility is zero). The delayed nature of investment in this dataset, possibly due to constraints earlier in life, may still have positive marginal benefits for these individuals, and so may prove a direct effect of education on life satisfaction, through social participation, greater knowledge and broadened horizons, or through status.

The literature on life satisfaction and well-being (and particularly its implications for public policy) has grown rapidly over recent years (Layard 2005), but has generally focused on its relationship with income and working hours. Income does seem to have a causal effect on happiness, although its precise nature is less clear. The Easterlin (1995) Paradox shows that developed countries do not get happier over time even though income increases, yet on a micro-level income does have a positive effect (Clark et al. 2008). Clark and Oswald (1996) provide evidence that it is relative income that matters and absolute income only has an effect up to a subsistence level. This may take the form of comparisons with others, or with one’s past (or future) income. However, as individuals adapt to income changes and may also adopt reference points, this effect may dissipate over time, even when income changes are permanent.

There is some evidence of education having both positive and negative effects on mental well-being; Gardner and Oswald (2002) find that there is a U-shaped relationship between education and stress, and life satisfaction falls as education increases when controlling for status and income, but also are positive indirect effects through status itself (such as employment status).

I will examine this relationship further in this chapter, using a fixed effects ordered logit model that controls for individual-specific reference points for income (Ferrer-i-Carbonell and Frijters 2004). Booth and van Ours (2008) use this method to examine the effects of hours worked on working hours and life satisfaction. This will be discussed in more detail in Section 5.3 (p285).

5.2.6 Consumption

Education may have consumption externalities to individuals through mechanisms such as access to, and processing of, information, greater productivity and of course through income.

Attempts to examine whether any consumption benefits occur through education originated with Michael (1972). He proposed that education increases nonmarket productivity in consumption, and more educated individuals act as though they have higher real income than they do, with higher income elasticities on luxuries than those with lower education. His empirical work finds a positive (albeit small) effect of education on consumption. Other possible mechanisms are changing tastes or the price of time.

Solmon (1975) examines how education affects savings behaviour. He finds that, controlling for income, education has a positive effect on saving and that more educated individuals save in different ways and for different reasons. More educated individuals are more likely to invest in riskier financial markets whereas those with less education tend to invest into fixed return saving plans. Also, more educated individuals are more likely to report that the main reason for saving was to provide education for their children. This was formalised in a model by Chanda (2008), arguing that a reason for the observed decline in household saving is that, as returns to education have increased, individuals may invest more in human capital than physical capital.

5.3 Regression analysis

5.3.1 Fixed effects logit model

A fixed effects logit model is used to analyse the effect of education on various non-market returns. Two sweeps of the British Cohort Study 1970 are used, at ages 30 and 34. This approach has two distinct advantages over much of the literature. Firstly, the BCS70 is rich in data and allows an investigation into the effects of education on a number of different non-market returns, rather than one specific outcome or returns from one category discussed above. Secondly, we can observe any changes in education level between the two sweeps, allowing one to establish a causal effect of education on non-market returns, whilst controlling for individual-specific traits such as personality, ambition and ability. In the case of education this is important. There would be endogeneity within an OLS or random effects specification because of the correlation between education, a choice variable, and unobserved individual characteristics included in the error term, whereas a fixed effects model controls for these unobservable characteristics. I will then examine the effect of education on an aggregated psychological and physical health measure, and some other non-monetary outcomes, always controlling for income. Given the issues regarding valuing any non-market outcomes caused by education, as discussed in the literature section (p272), I will not attempt to place a monetary value on any of the outcomes examined in this study. Descriptive statistics of the key variables used in the analysis are presented, followed by a discussion of the specifications used.

Table 35

Qualification gain between 2000 and 2004			
		Academic	Vocational
No	Count	7201	5771
	Percent	93.9%	75.2%
Yes	Count	471	1901
	Percent	6.1%	24.8%

Table 2 shows that there were 2372 cases where individuals gained (at least) one qualification between 2000 and 2004. The majority of these (80.1%) were vocational;

this would be expected given that they can be completed whilst on the job[89]. The modal characteristics of individuals that gained an academic qualification in this period are married, female, whose highest academic qualification was a degree (with a level three vocational qualification) in 2000. Individuals that gained a vocational qualification are female, married, whose highest vocational qualification was level 3 (with a level one academic qualification). As discussed in the literature review, vocational qualifications are usually taken by individuals with low academic achievements, so this would be expected. Table 36 presents the descriptive statistics for the log of real hourly earnings in 2000 and 2004[90], and their differences from pay predicted by an earnings equation. This was an attempt to examine whether there are different effects on satisfaction when an individual is above or below their own reference point. I have included separate variables to account for this. If

$pay > predicted, rpayp = pay - predicted,\ otherwise\ rpayp = 0$,
$pay < predicted, rpayn = predicted - pay,\ otherwise\ rpayn = 0$.

Table 36

	Count	Minimum	Maximum	Mean	Std. Deviation
ln real hourly pay 2000	6490	0.80	3.58	2.1251	.38840
ln real hourly pay 2004	4949	1.41	3.60	2.2765	.41395
Pay>predicted 2000	1032	0.00	1.86	.3797	.29184
Pay<predicted 2000	1155	0.00	1.39	.3670	.27057
Pay>predicted 2004	607	0.00	1.56	.4128	.29777
Pay<predicted 2004	677	0.00	1.37	.4154	.29269

Pay is similar between the two years, and the distribution of the difference between predicted and actual earnings is fairly even (the standard deviations of the differences are similar for 2000 and 2004).

89 Information on specific qualification gains is included in Appendix D Table 1.
90 Pay in 2004 is deflated to 2000 prices using the inflation (RPI) for end of June figures. The year ly midpoint is used as the surveys were carried out throughout each year, not at one particular point in time (data obtained from the Office of National Statistics).

The first part of this analysis will examine the fixed effects (ordered) logit model first proposed by Ferrer-i-Carbonell and Frijters (2004), and used by Booth and van Ours (2008) to examine job satisfaction. This model allows the econometrician to adapt ordered responses on well-being questions to a fixed effects model, without losing a significant amount of observations. I will discuss this model and how it applies to this research, followed by a discussion of the regression results.

The model is an extension of Chamberlain's (1980) model, which reduces data to a binomial logit, but only includes individuals where observed satisfaction between the two data points crosses some arbitrarily chosen threshold (by the econometrician), for example only changing to 'very good' from something less. This means that in the cases where satisfaction levels do change but without crossing the threshold this information is lost, and only one specific change in satisfaction can be included in the specification.

The Ferrer-i-Carbonell and Frijters model makes two key assumptions; firstly, satisfaction is a positive transformation of welfare. Secondly, all time-varying factors are assumed to be observed. The fixed (unobserved) factors are assumed to influence the levels of the variables, but not their changes. Therefore, a fixed effects model of this type has the advantage of controlling for time-invariant factors such as personality, ambition and innate ability whilst retaining all of the important information required even with ranked responses.

Following Booth and van Ours, the specification used here is:

$$Pr(y_{it}=j)=\Lambda(u_{i,j}-v_i-\beta' x_{it})-\Lambda(u_{i,j-1}-v_i-\beta' x_{it}),$$

where $u_{i,j}$ is the individual-specific threshold and v_i is the individual-specific fixed effect. The threshold is calculated as $u_i=\sum_i y_{it}/n_i$, where n_i is the number of observations for individual i.

In this case, t=2, and therefore all observations for which $y_{it}>u_i$ are transformed into $z_{it}=1$, all obs. for which $y_{it}\leq u_i$ are transformed into $z_{it}=0$ and all individuals whose satisfaction changes over the two time periods are included in the model[91]. The one

[91] The descriptive statistics for each of the well-being variables is included in Appendix D table 2-6.

limitation of this method is that is cannot account for the magnitude of change in satisfaction, only the ranking. Therefore, if different levels of education have effects of differing magnitude on satisfaction, this will not be captured by this model.

The model used here examines the effect of education on job satisfaction, life satisfaction and financial satisfaction[92]. Those individuals who were working towards a qualification (but not yet achieved or completed it) at the time of the latest sweep were excluded from the sample. The specification also includes the log of hourly earnings, measures of relative pay – calculated by predicting pay via a Mincerian earnings function[93]. The (fixed effects) results of the life outcomes analysis are presented in Table 36. Pay is included here to isolate the effects of education over and above the monetary returns to education which may also affect these outcomes.

It should be noted that the Hausman specification test produces negative chi-squared statistics; this is because the $Var[b]-Var[\beta]$ matrix is not positive definite. There is debate over whether this is an indication of a strong failure to reject the null hypothesis of random effects being the more efficient estimator, or whether an alternative should be used in order to ensure a positive chi-squared statistic. The alternative test implemented here is an artificial augmented regression written by Schaffer and Nelson[94] that estimates the mean of each of the variables used in the analysis and includes them as regressors in the random effects equation. The specification test is then whether the coefficients of the means of the variables are significantly different to zero. The interpretation of this test is that in a random effects

[92] Expected life satisfaction in 10 years and expected financial satisfaction in one year were also examined in an attempt to model whether education had an effect on an individual's expectations for their well-being. However, some unintuitive and unexplainable results were produced, particularly the consistently negative effect of absolute pay on outcomes. Given that this is a time in one's life where many changes of circumstance may occur, for example marriage, children and health, detailed changes in status variables were included in the analysis, and again resulted in insignificant yet negative coefficients on the other included variables. There are two things to say regarding this problem. Firstly, it is difficult to interpret the meaning of this specification; an increase in pay between 2000 and 2004 results in a fall in expected financial satisfaction between 2001 and 2005. Secondly, one may not expect this and it is difficult to find any intuitive reasoning behind this result, other than the effect of expectations themselves. These two outcomes were therefore dropped from the well-being analysis, but (with the same controls used in the models presented) are included in Appendix D (Tables 7 and 8). Ferrer-i-Carbonell and Frijters (2004), amongst others, find that satisfaction is U-shaped in age because of over-inflated expectations in their 30's and 40's (Santos 2007) that are never realised, and expectations then readjust to move achievable levels.

[93] Models including changes in health (self reported), economic status, marital status and children, which may be particularly important changes at this time in the life-course, were also analysed in an attempt to make sense of the results on expected satisfaction variables, but the unintuitive signs on the coefficients remained.

[94] See http://www.stata.com/statalist/archive/2005-08/msg00837.html by V. Wiggins, 2005

model, there is a common constant term across all individuals, and therefore the coefficients on the means will be zero. In a fixed effects specification, individual-specific effects result in the coefficients of the means being significantly different from zero. The Hausman specification test examines any differences between the coefficients in the fixed and random effects model; here there were obvious differences between the coefficients. Given this, and the likelihood of endogeneity in the model, fixed effects seemed the more plausible, so the use of the alternative specification test was favoured over the argument that a negative chi-squared indicates a failure to reject the null. As one can see in Table 37, the chi-squared statistics from the augmented regressions are evidence that a fixed effects specification is preferred.

Table 37: Fixed effects logit model

Qualification gained between 2000-2004	Job satisfaction *Fixed effects*	Life satisfaction *Fixed effects*	Financial satisfaction *Fixed effects*
Academic	0.006	**0.384**	**0.281**
p-value	*0.967*	***0.030***	***0.093***
Vocational	0.118	0.089	0.018
p-value	*0.168*	*0.366*	*0.848*
ln pay	**0.313**	0.066	**0.552**
p-value	***0.008***	*0.628*	***0.000***
Specification test	chi2(3)=18.28 Prob > chi2=0.0004	chi2(3)=8.01 Prob > chi2=0.0459	chi2(3)=56.85 Prob > chi2=0.0000

The results presented are estimated from a standard fixed effects model, not from the augmented regression. This is also true for subsequent analyses.

The results show that, when controlling for pay, gaining an academic qualification only has a positive impact on life satisfaction. This is interpreted as 'a gain of an academic qualification between 2000 and 2004 causes an increase in life satisfaction between these two time periods, even when controlling for unobserved individual effects such as ambition, ability and life goals.' Pay has significant and positive effects on job satisfaction and financial satisfaction. Gaining an academic qualification also has a positive effect on financial satisfaction, possibly through improved investment or savings behaviour, as discussed above (page 284), although this is only marginally significant.

The literature on happiness has found that it is not only income that matters, but how one's income compares to the income of those around them (Easterlin 1995, Layard 2005) and is due to individuals' having relative utility functions in terms of income (Clark et al. 2008). This reference group may be friends, family, work colleagues or some notion of 'average' pay for some characteristic or status, such as education. Here, I follow Clark and Oswald (1996) and predict pay from the Mincer earnings equation ('expected pay' from here on in) used in Chapter Three, with a full set of control variables (p104). These variables are then included with the other variables in the regression. The results are presented in Table 38. In this specification, there was a failure to reject the random effects model for job satisfaction and life satisfaction, but a fixed effects specification is preferred for financial satisfaction. The probable reason for this is that, even though the whole sample is used to predict pay, the coefficients are nonetheless estimated at the mean, so it is less likely than the previous specification to reject a random effects model due to endogeneity.

Table 38: Logit model including relative pay

Qualification gained between 2000-2004	Job satisfaction *Random Effects*	Life satisfaction *Random Effects*	Financial satisfaction *Fixed Effects*
Academic	0.124	**0.389**	0.295
p-value	*0.316*	***0.002***	*0.293*
Vocational	**0.137**	0.010	0.160
p-value	***0.056***	*0.897*	*0.316*
ln pay	**-0.203**	**-0.266**	0.279
p-value	***0.015***	***0.002***	*0.332*
Pay>predicted	0.001	-0.180	0.530
p-value	*0.995*	*0.266*	*0.132*
Pay<predicted	**-0.360**	-0.095	0.054
p-value	***0.021***	*0.529*	*0.882*
Constant	**-0.428**	**-0.644**	
p-value	***0.026***	***0.001***	
Specification test	chi2(5)=8.90 Prob > chi2=0.1131	chi2(5)=3.45 Prob > chi2=0.6312	chi2(5)=32.46 Prob > chi2=0.0000

The impact of gaining an academic qualification on life satisfaction remains significant. Gaining a vocational qualification now has a significantly positive effect on job satisfaction, whereas earning less than predicted (by a Mincer earnings equation) has, as expected, a significant negative effect. The change in pay between 2000 and 2004 is now negative – this was significantly positive when relative pay was not included in the specification (see Table 37, p289). Clark and Oswald (1996) predict pay from an external dataset, rather than endogenously, due to issues regarding unobservables that may determine pay and non-market outcomes. They find relative pay and absolute pay to have statistically equal and opposite effects on job satisfaction, although in that case the signs are opposite to the random effects specification here[95]. Here, the earnings function is specified for all individuals, not just those who gained a qualification between 2000 and 2004. This should ensure consistency here. For financial satisfaction, absolute pay is no longer significant.

5.3.2 Psychological and physical health

The second part of this analysis considers psychological and physical health outcomes which may be affected by education, such as efficacy, stress and mental health[96]. These binary responses are aggregated as score variables to examine the overall effect of education on composite measures of psychological and physical health. Two arguments underline this decision; firstly, the effect of education may manifest itself in various ways for different individuals and, secondly the variables in each measure may be related and so it can be more informative to use more general measures of psychological and physical health outcomes. Those individuals with any missing responses in the variables are scored as missing for the composite score also[97]. The individual binary variables are ranked so that for each response, a '1' is what one would expect to be deemed as an improvement in health between 2000 and 2004[98]. Chevalier and Feinstein (2006) examine the effect of education on mental health using the NCDS at age 42, and find a positive relationship, but do not use a differencing model. Also, they do not distinguish between academic and vocational qualifications, but do

[95] The (rejected) fixed effects specification shows similar findings to Clark and Oswald.
[96] See Appendix D Table 9 for individual regression analysis of each of the eleven outcomes considered.
[97] There are 2179 cases where this is the case in the overall dataset.
[98] This is the case for all variables apart from health and smoking, where a minus one indicates health problems since the last interview and that the individual is a smoker, respectively. This was to ensure that the framing and directional effect of the responses were consistent across all individual outcomes.

distinguish between qualification levels. Individuals in this analysis are younger than those analysed in the NCDS. Descriptive statistics are presented in Table 39.

Table 39: Descriptive statistics for psychological and physical health

Physical health			
		2000	2004
Health problems since 2000	No	N/A	42.8
	Yes		57.2
Exercises regularly	No	21.7	21.6
	Yes	78.3	78.4
Feels tired most of the time	No	64.8	61.2
	Yes	35.2	38.8
Feels ought to cut down on drinking	No	75.0	67.1
	Yes	25.0	32.9
Smokes	No	62.3	68.7
	Yes	37.7	31.3
Psychological health			
Often feels depressed	No	81.3	82.5
	Yes	18.7	17.5
Worries about things	No	52.4	52.5
	Yes	47.6	47.5
Feels keyed up and jittery	No	95.0	92.9
	Yes	5.0	7.1
Gets what s/he wants out of life	No	20.5	17.5
	Yes	79.5	82.5
Feels in control of life	No	9.7	7.4
	Yes	90.3	92.6
Runs life how s/he wants	No	5.3	5.0
	Yes	94.7	95.0

One can see that for the overall sample, most of the responses change little over the time period in question. However, almost half of the sample experienced health problems during this time period, and there was also a decrease in the proportion of individuals who felt they drink too much and smoke regularly. The fixed effects logit for the aggregate score variable is presented below.

Table 40: Fixed effects regression model

Qualification gained between 2000-2004	Physical health *Fixed Effects*	Psychological health *Fixed Effects*
Academic	**-0.455**	0.020
p-value	***0.000***	*0.762*
Vocational	**-0.740**	0.020
p-value	***0.000***	*0.588*
ln pay	**-0.894**	-0.048
p-value	***0.000***	*0.347*
Constant	3.505	5.184
p-value	*0.000*	*0.000*
Specification test	chi2(3)=395.23 Prob > chi2=0.0000	chi2(3)=89.74 Prob > chi2=0.0000

In this fixed effects specification, one can see that gaining an academic qualification has a significant negative effect on physical health. Gaining a vocational qualification has an even larger significant effect, even when controlling for pay. This fixed effects model shows the opposite sign to Chevalier and Feinstein, either due to the different methodology employed or due to the different component measures used. An increase in pay also has a large and significant effect on physical health; in fact this effect larger than the qualification effects. Increasing pay is linked with positions of more responsibility in the workplace and higher up the occupational scale. The expectations placed on an individual with higher earnings are likely to be to the detriment of physical health. Also, one must consider the likely age effect that may occur; as age increases pay increases, but physical health is likely to worsen. The analysis shows that qualifications do not, by this stage of one's life, have an effect on psychological health.

This analysis shows that academic qualifications have a distinct 'benefit' (i.e. it is has a smaller negative effect) compared to vocational qualifications for one's physical health. This may partly be an occupational effect; there are clear differences between the types of jobs the vocationally and academically qualified do in the labour market, but also peer effects may be present, for example in smoking behaviour or drinking behaviour.

However, this may also be partly due to differences that occur outside of the labour market that stem from the differences between those who undertake academic and vocational qualifications. The mechanisms through which these outcomes occur that were alluded to in the review of the literature, for example non-market productivity or allocative and productive efficiencies or time preferences, may differ between the academically and vocationally qualified. Academic and vocational qualifications clearly have different learning processes associated with them and there is a distinction between the type of skills and knowledge obtained, which may affect outcomes differently via the mechanisms discussed. This analysis does not examine the mechanisms through which these outcomes occur and so far the literature says little on this, due to the difficulties discussed above (p272). This analysis asks new questions regarding these mechanisms and how they work; is it that different mechanisms affect outcomes for different qualifications, or do the same mechanisms affect outcomes differently by education type? One is optimistic that the increasing depth of this field and the increasingly rich data sources available can be used to answer the enduring questions on mechanisms, and the new questions raised here.

5.3.3 Other outcomes

The final part of this chapter examines three other non-market outcomes associated with education, namely work-related training, whether an individual owns a personal computer, and voting behaviour. As shown in Table 41, a higher proportion of individuals in the sample owned a PC and voted in 2004 than in 2000, but more received training in 2000 than in 2004.

Table 41: Descriptive statistics for Training, Home PC and Voting

	Training		Home PC		Voted	
	2000	2004	2000	2004	2000	2004
No (%)	63.1	76.8	52.8	18.9	38.4	36.7
Yes (%)	36.9	23.2	47.2	81.1	61.6	63.3

Once again, a fixed effects logit model is used, so the coefficients are interpreted as an effect on the change of status of the binary independent variable.

Table 42: Other outcomes logit model

Qualification gained between 2000-2004	Training *Fixed Effects*	Home PC *Fixed Effects*	Voted *Fixed Effects*
Academic	-0.510	2.384	0.107
p-value	*0.009*	*0.000*	*0.674*
Vocational	-0.756	2.107	0.193
p-value	*0.000*	*0.000*	*0.160*
ln pay	-0.283	2.085	-0.150
p-value	*0.054*	*0.000*	*0.425*
Specification test	chi2(3)=195.22 Prob > chi2=0.0000	chi2(3)=72.51 Prob > chi2=0.0000	chi2(3)=36.26 Prob > chi2=0.0000

The results show that education has significant effects on training and computer ownership. As one would expect, gaining a qualification has a negative effect on work-related training[99]. An individual who gains a qualification is less likely to complete a training course within the same time period. Vocational qualifications have a larger effect because they are closer substitutes to training than academic qualifications which may be more general in nature.

Gaining an academic qualification has a larger effect on PC ownership than a vocational qualification. The table below shows that this may be work related; gaining an academic qualification may increase the likelihood of using a computer at work[100], and as a result via either the need to access work from home, or because of improved computer skills, an individual may decide to invest in a home computer. Table 43 below shows some support for the proposed hypothesis; it is clear that those who use a PC at work in 2000 and 2004 are more likely to have purchased a PC between the two time periods. This of course has spill-over benefits to the rest of the family. Indeed, access to a PC at home is listed as a component of material well-being in the OECD poverty measures for educational development of children[101]. Also, the previous government introduced a programme to provide grants for low income families to buy PC's and

[99] This is defined as 3 or more days of work-related training, not covered elsewhere in the survey, i.e. qualifications and government-run training schemes such as the New Deal and Access.

[100] As discussed in Chapter Four, p154

[101] Bradshaw et al. (2006) Comparing Child Well-being in OECD Countries: Concepts and Methods http://www.unicef-irc.org/publications/pdf/iwp2006_03_eng.pdf, p37

internet access at home[102], to enable and accelerate children's learning both in the home and at school.[103]

Table 43: PC ownership

Use of PC at work 2000		PC purchased between 2000 and 2004: No	PC purchased between 2000 and 2004: Yes
Yes	Percentage	30.19	69.81
No		46.67	53.33
Use of PC at work 2004		No	Yes
Yes	Percentage	28.89	71.11
No		47.16	52.84

An interesting result here is that an increase in education does not affect voting behaviour in a fixed-effects specification. The correlation between education and civic participation, such as voting in general elections, is well-established. However, in this fixed effects model, the coefficients are insignificant. Firstly, as mentioned above, it has been found that the relationship between education and voting behaviour is not as strong in the UK as in the US, due to voter registration. However, research has still found a significant relationship. This analysis may show that the unobserved fixed effects are driving the increased participation, rather than education itself.

5.4 Conclusion

This chapter has attempted to investigate whether education has a causal effect on non-market life outcomes. These are an important component of overall returns to education; however they have received less attention than monetary returns due to difficulties in establishing a causal link between the two. This analysis exploits a rich dataset, the British Cohort Study 1970 and uses a fixed effects model and, where appropriate, a random effects model, in an attempt to contribute to the literature on non-market returns. It investigates the effect of increasing one's education later in life on a

[102] http://www.direct.gov.uk/en/Nl1/Newsroom/DG_183990
[103] One cannot rule out the possibility that the direction of causality is in the reverse direction; individual's gaining a qualification at this time in their lives may do so through distance learning, for example through the Open University, and therefore may invest in a PC to undertake the qualification.

number of non-market returns, such as psychological and physical health, well-being measures and civic participation. Most of the literature focuses on one specific outcome or category; here, the BCS70 allows one to examine many facets of returns.

One can conclude that there are some non-monetary returns to education, even when controlling for pay, however academic and vocational qualifications result in different outcomes. Academic qualifications seem to have a strong effect on life satisfaction, however how much of this is due to constraints earlier in life leading to restricted education being fulfilled later in life is unclear. Gaining a vocational qualification has a significant effect on job satisfaction, but neither qualification types have a significant effect on financial satisfaction over and above the associated increased monetary returns.

Interestingly, gaining an academic qualification has a significant negative effect on psychological and physical health, yet vocational qualifications have stronger detrimental effects. Gaining qualifications also has negative effects on the amount of training received, and increases the likelihood of owning a personal computer. Surprisingly, education has no effect on voting behaviour in a fixed effects model, whilst most of the literature finds the opposite, although the effect in the UK is usually less strong than in the U.S. This result may support the proposition that voting is affected by unobserved mechanisms such as ability and critical thinking rather than through education itself. More research is required to understand the mechanisms at play regarding non-market outcomes, and a new question raised here is whether the differences in returns resulting from vocational and academic qualifications are driven by the same mechanisms with different degrees of influence, or by different mechanisms altogether, due to the disparity of learning processes.

It should be noted that, as discussed earlier (see p271), that many of these non-monetary returns may accrue over time and be more apparent later in one's life. For example, health problems are likely to accumulate over a longer period of one's life than this analysis is able to cover. Therefore one may conclude that although this time in one's life may be important in terms of monetary returns to education (as age-earnings profiles discussed in the literature review show) it may be that non-monetary returns are shown to be more significant later in life. This implies that future work in this area on later sweeps of this cohort would be valuable in the literature, as it would firstly provide more data for analysis and secondly will enable this question to be examined.

Bibliography

(2010) "Government 'planning to measure people's happiness" BBC News, http://www.bbc.co.uk/news/uk-politics-11756049 15th November 2010, first accessed 19/11/2010.

Behrman, J. and B. Wolfe (1987), "How Does Mother's Schooling Affect Family Health, Nutrition, Medical Care Usage, and Household Sanitation?", *Journal of Econometrics*, 36, pp 185-204.

Booth, A., and J. van Ours (2008), "Job Satisfaction and Family Happiness: The Part-time Work Puzzle", *Economic Journal*, 118 (February), F77-F99.

Bradshaw, J., P. Hoelscher & D. Richardson (2006), "Comparing Child Well-being in OECD Countries: Concepts and Methods", Innocenti Working Paper-2006-03 (December) http://www.unicef-irc.org/publications/pdf/iwp2006_03_eng.pdf, accessed 05/07/10.

Buchel, F. (2002), "The Effects of Overeducation on Productivity in Germany – The Firm's Viewpoint", *Economics of Education Review*, 21, pp 263-275.

Butler, J. S., R. Burkhauser, J. Mitchell & T. Pincus (1987), "Measurement Error in Self-Reported Health Variables", *The Review of Economics and Statistics*, 69:4 pp 644-650.

Cabral Vieira, J. (2005), "Skill Mismatches and Job Satisfaction", *Economics Letters*, vol. 89, pp 39-47.

Cameron, L., J. Dowling, and C. Worswick (2001), "Education and Labor Market Participation of Women in Asia: Evidence from Five Countries", *Economic Development and Cultural Change*, University of Chicago Press, vol. 49(3), pp. 461-77.

Castro Martin, T. (1995), "Women's Education and Fertility: Results from 26 Demographic and Health Surveys", *Studies in Family Planning*, 26:4.

Chamberlain, G. (1980), "Analysis of Covariance with Qualitative Data", *The Review of Economic Studies*, 47:1, pp225-238.

Chevalier, A. and L. Feinstein (2006), "Sheepskin or Prozac? The Causal Effect of Education on Mental Health", IZA Discussion Papers, 2231.

Clark, A., P. Frijters and M. Shields (2008), "Relative Income, Happiness and Utility: An Explanation For the Easterlin Paradox and Other Puzzles", *Journal of Economic Literature*, 46:1, pp95-144.

Clark, A. and Oswald, A. (1996), "Satisfaction and Comparison Income", *Journal of Public Economics*, 61(3), pp. 359-381.

Dearden, L., S. Machin & A. Vignoles (2009), "Economics of education research: a review and future prospects", *Oxford Review of Education*, 35:5, pp. 617-632.

Dee, T. (2004), "Are there civic returns to education?", *Journal of Public Economics*, 88, pp1697-1720.

DirectGov Home Access programme
http://www.direct.gov.uk/en/Nl1/Newsroom/DG_183990, first accessed 02/08/2010.

Easterlin, R. (1995), "Will Raising the Incomes of All Increase the Happiness of All?", *Journal of Economic Behaviour and Organization*, 27:1, pp35-47.

Ferrer-i-Carbonell, A., and P. Frijters (2004), "How Important is Methodology for the Estimates of the Determinants of Happiness?", *Economic Journal*, 114(497), pp641-659.

Fullan, M., and J. Loubser (1972), "Education and Adaptive Capacity", *Sociology of Education*, 45:3, pp271-287.

Gardner, J. and A. Oswald (2002), "How Does Education Affect Mental Well-Being and Job Satisfaction?", summary paper given to the NIESR Conference, 6th June 2002.

Grossman, M. (2006), "Education and Nonmarket Outcomes", in Hanushek E., and Welch F (eds.), *The Handbook of the Economics of Education*,., North-Holland, pp. 577-633.

Hamermesh, D. (2001), "The Changing Distribution of Job Satisfaction", *The Journal of Human Resources*, 36:1, pp 1-30.

Haveman, R. and B. Wolfe (1984), "Schooling and Economic Well-Being: The Role of Nonmarket Effects", *The Journal of Human Resources*, 19:3, pp. 377-407.

van Kippersluis, H., O. O'Donnell, E. van Doorslaer (2009), "Long Run Returns to Education: Does Schooling Lead to an Extended Old Age?", Tinbergen Institute Discussion Paper no. 2009-037/3.

Laplagne, P., M. Glover, A. Shomos (2007), "Effects of Health and Labour Force Participation", Australian Productivity Commission, Staff Working Paper.

Layard, R. (2005), "Happiness: Lessons from a New Science", London, Allen Lane.

Leibowitz, A. (1974), "Home Investments in Children", *Journal of Political Economy*, vol. 82 no. 2, pp. 111-131.

Lindelow, M. (2008), "Health as a Family Matter: Do Intra-household Education Externalities Matter for Maternal and Child Health?", *Journal of Development Studies*, 44:4, pp. 562-585.

Lundborg, P. (2008), "The Health Returns to Education: What Can We Learn from Twins?", Tinbergen Institute Discussion Paper no.2008-027/3.

Lynch, S. (2006), “Explaining Life Course and Cohort Variation in the Relationship between Education and Health: The Role of Income”, *Journal of Health and Social Behaviour*, 47:4, pp. 324-338.

McGuinness, S. & P. Sloane (2011), "Labour market mismatch among UK graduates: An analysis using REFLEX data," *Economics of Education Review*, vol. 30(1), pp. 130-145.

McMahon, W. (1998), “Conceptual Framework for the Social Benefits of Lifelong Learning”, *Education Economics*, vol. 6 no. 3, pp. 309-346.

Meara, E., S. Richards, D. Cutler (2008), “The Gap Gets Bigger: Changes In Mortality And Life Expectancy, By Education, 1981-2000”, *Health Affairs*, 27:2, pp. 350-360.

Michael, R. (1972), “The Effect of Education on Efficiency of Consumption”, NBER Occasional Paper 116, New York, Columbia University Press.

Milligan, K., E. Moretti and P. Oreopoulos (2004), “Does education improve citizenship? Evidence from the United States and the United Kingdom”, *Journal of Public Economics*, 88, pp. 1667-1695.

Milstein Sondheimer, R., and D. Green (2010), “Using Experiments to Estimate the Effects of Education on Voter Turnout”, *American Journal of Political Science*, vol. 54, no. 1 (January) pp. 174-189.

Murnane, R. (1981), “New Evidence on the Relationship Between Mother’s Education and Children’s Cognitive Skills”, *Economics of Education Review*, vol. 1 no.2, pp. 245-252.

Oreopoulos, P., and K. Salvanes (2009), “How Large Are Returns to Schooling? Hint: Money Isn’t Everything”, NBER Working Paper no. 15339, September.

Oriol Escardibul, J. (2005), “The Non-monetary Effects of Education on Smoking in Spain”, *European Journal of Education*, 40:1, pp. 45-58.

Riddell, W. & X. Song (2009), "The Causal Effects of Education on Adaptability," CLSRN Working Papers, no. 8.

Santos, C. (2007), "Estimating Linear Birth Cohort Effects. Revisiting the Age-Happiness Profile," Open Discussion Papers in Economics 58.

Solmon, L. (1975), “The Relationship between Schooling and Savings Behaviour: An Example of the Indirect Effects of Education”, in Juster, F. (eds.), *Education, Income and Human Behaviour*, NBER, pp 253-294 .

Wolfe, B., and S. Zuvekas (1995), “Non-Market Outcomes of Schooling Institute for Research on Poverty”, Discussion Paper no.1065-95.

Appendix D

Table 1

Qualification gained	CSE	GCSE	GCE	A/S level	A Level	Scottish secondary certificate
Count	7	34	14	26	22	9
Qualification gained	Diploma of Higher Education	Degree	Other degree qualification	Higher degree	Nursing Qualification	PGCE
Count	92	29	110	51	32	21
Qualification gained	Other teaching	BTEC	City and Guilds	RSA	Pitmans	NVQ
Count	54	193	473	150	50	511
Qualification gained	GNVQ	ONC	HNC	Trade Apprenticeship	HGV	Other vocational
Count	25	30	102	54	71	662

N.B. The specific qualification gains reported here do not sum to the total for the derived aggregate qualification measures for academic and vocational qualifications. This is because some individuals did not report exactly which qualification was gained.

Table 2: Job satisfaction

			Job satisfaction 2004					
			Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Very satisfied	Total
Job satisfaction 2000	Very dissatisfied	Count	12	14	14	44	34	118
			10.2%	11.9%	11.9%	37.3%	28.8%	100.0%
	Dissatisfied	Count	20	66	75	168	115	444
			4.5%	14.9%	16.9%	37.8%	25.9%	100.0%
	Neither satisfied nor dissatisfied	Count	20	65	178	281	192	736
			2.7%	8.8%	24.2%	38.2%	26.1%	100.0%
	Somewhat satisfied	Count	37	158	267	1176	816	2454
			1.5%	6.4%	10.9%	47.9%	33.3%	100.0%
	Very satisfied	Count	32	72	125	704	1074	2007
			1.6%	3.6%	6.2%	35.1%	53.5%	100.0%
	Total	Count	121	375	659	2373	2231	5759
			2.1%	6.5%	11.4%	41.2%	38.7%	100.0%

Table 3 Financial satisfaction

			Financial satisfaction 2004					
			Finding it very difficult	Finding it quite difficult	Just about getting by	Doing alright	Living comfortably	Total
Financial satisfaction 2000	Finding it very difficult	Count	17	18	47	19	14	115
			14.8%	15.7%	40.9%	16.5%	12.2%	100.0%
	Finding it quite difficult	Count	23	57	129	99	44	352
			6.5%	16.2%	36.6%	28.1%	12.5%	100.0%
	Just about getting by	Count	34	96	587	615	234	1566
			2.2%	6.1%	37.5%	39.3%	14.9%	100.0%
	Doing alright	Count	24	73	539	1478	891	3005
			.8%	2.4%	17.9%	49.2%	29.7%	100.0%
	Living comfortably	Count	13	29	228	748	1605	2623
			.5%	1.1%	8.7%	28.5%	61.2%	100.0%
	Total	Count	111	273	1530	2959	2788	7661
			1.4%	3.6%	20.0%	38.6%	36.4%	100.0%

Table 4: Expected satisfaction

			Expected financial satisfaction in one year 2004			
			Worse off	About the same	Better off	Total
Expected financial satisfaction in one year 2000	Worse off	Count	64	275	199	538
			11.9%	51.1%	37.0%	100.0%
	About the same	Count	207	1926	1127	3260
			6.3%	59.1%	34.6%	100.0%
	Better off	Count	180	1560	1993	3733
			4.8%	41.8%	53.4%	100.0%
	Total	Count	451	3761	3319	7531
			6.0%	49.9%	44.1%	100.0%

Table 5: Life satisfaction

			Life satisfaction 2004					
			Completely dissatisfied	2	3	4	Completely satisfied	Total
Life satisfaction 2000	Completely unsatisfied	Count	24	30	31	53	38	176
			13.6%	17.0%	17.6%	30.1%	21.6%	100.0%
	2	Count	14	80	102	108	19	323
			4.3%	24.8%	31.6%	33.4%	5.9%	100.0%
	3	Count	31	137	411	539	92	1210
			2.6%	11.3%	34.0%	44.5%	7.6%	100.0%
	4	Count	32	120	533	2568	782	4035
			.8%	3.0%	13.2%	63.6%	19.4%	100.0%
	Completely satisfied	Count	23	19	91	667	1027	1827
			1.3%	1.0%	5.0%	36.5%	56.2%	100.0%
	Total	Count	124	386	1168	3935	1958	7571
			1.6%	5.1%	15.4%	52.0%	25.9%	100.0%

Table 6: Expected life satisfaction

			Expected life satisfaction in ten years 2004					
			Completely dissatisfied	2	3	4	Completely satisfied	Total
Expected life satisfaction in ten years 2000	Completely Dissatisfied	Count	12	3	8	39	53	115
			10.4%	2.6%	7.0%	33.9%	46.1%	100.0%
	2	Count	2	9	27	33	10	81
			2.5%	11.1%	33.3%	40.7%	12.3%	100.0%
	3	Count	13	20	96	168	87	384
			3.4%	5.2%	25.0%	43.8%	22.7%	100.0%
	4	Count	22	39	219	1545	958	2783
			.8%	1.4%	7.9%	55.5%	34.4%	100.0%
	Completely Satisfied	Count	48	9	100	1122	2908	4187
			1.1%	.2%	2.4%	26.8%	69.5%	100.0%
	Total	Count	97	80	450	2907	4016	7550
			1.3%	1.1%	6.0%	38.5%	53.2%	100.0%

Table 7: Expected well-being regressions

Qualification gained between 2000-2004	Expected life satisfaction *Random Effects*	Expected financial satisfaction *Fixed Effects*
Academic	-0.136	-0.455
p-value	*0.364*	*0.011*
Vocational	-0.166	0.001
p-value	*0.040*	*0.990*
ln pay	-0.206	-0.382
p-value	*0.001*	*0.003*
Constant	-0.951	
p-value	*0.000*	
Specification test	chi2(3)=1.27 Prob > chi2=0.7362	chi2(3)=17.62 Prob > chi2=0.0005

Table 8: Expected well-being regressions including relative pay

Qualification gained between 2000-2004	Expected life satisfaction *Random Effects*	Expected financial satisfaction *Fixed Effects*
Academic	-0.097	-0.572
p-value	*0.519*	*0.063*
Vocational	-0.139	-0.062
p-value	*0.099*	*0.712*
ln pay	-0.300	-0.407
p-value	*0.001*	*0.136*
Pay>predicted	0.120	0.164
p-value	*0.470*	*0.595*
Pay<predicted	-0.100	0.426
p-value	*0.533*	*0.284*
Constant	-0.775	
p-value	*0.000*	
Specification test	chi2(5)=5.88 Prob > chi2=0.3179	chi2(5)=14.87 Prob > chi2=0.0109

Table 9: Individual outcome (binary) regressions for psychological and physical health

Outcome	Academic		Vocational		In pay	
	Coefficient	*p-value*	Coefficient	*p-value*	Coefficient	*p-value*
Health problems	18.499	*0.985*	19.434	*0.979*	2.935	*0.000*
Exercises regularly	0.293	*0.268*	-0.177	*0.176*	-0.186	*0.309*
Feels tired most of the time	-0.609	*0.000*	-0.669	*0.000*	-0.955	*0.000*
Feels should cut down on drinking	-0.378	*0.104*	-0.739	*0.000*	-0.570	*0.003*
Smokes	-1.117	*0.009*	-0.757	*0.000*	-0.453	*0.068*
Feels depressed	0.332	*0.255*	0.045	*0.776*	-0.175	*0.443*
Worries about things	0.175	*0.451*	0.070	*0.577*	-0.051	*0.770*
Feels keyed up and jittery	-0.623	*0.224*	-0.547	*0.043*	-1.331	*0.000*
Get what he/she wants out of life	0.010	*0.974*	0.102	*0.491*	0.154	*0.507*
Feels in control of his/her life	-0.078	*0.843*	0.314	*0.091*	0.113	*0.693*
Runs life as he/she wants	-0.315	*0.596*	-0.191	*0.511*	-0.305	*0.492*

<u>Chapter Six:</u>

Conclusion

6.1 Concluding comments

This thesis examines returns to education for a cohort of individuals born in one week in 1970 in the UK. It contributes to the literature in this field in a number of ways. The dataset used is the first cohort survey undertaken where individuals entered the education system with the minimum school leaving age at 16, and the first for which the NVQ framework was restructured to accredit comparable vocational and academic qualifications. These individuals also entered university around the time that the increase in participation in higher education begun. This increased enrolment in Higher Education has continued, and generated an on-going debate concerning the dynamics of returns to education in the UK. This dataset allows us to consider returns for a cohort with more years of education and to therefore assess whether supply now meets – or even exceeds – demand. This analysis provides a reliable comparison with similar empirical work using earlier cohort surveys carried out in the UK; the work using the National Child Development Survey (NCDS) of 1958 is typically used as a benchmark; Dearden et al.'s (2002) analysis of the NCDS is used as a comparison study. Cohort surveys provide an excellent source of information to analyse returns to education because they include detailed responses on the individual's family and educational background, and test scores that give an accurate representation of a child's ability. Also, because individuals are surveyed at regular time intervals targeting stages that are important in terms of development (and consequently for returns to education analyses), the regular collection of data close to the event can reduce the problems of recall bias that might arise in cross section studies which collect historic data.

After an extensive review of the empirical and methodological literature in this field, the first investigative chapter of this thesis exploits the rich dataset to examine returns to education in the UK for this cohort, at 30 and 34 years of age. By this time, individuals should have enough labour market experience since completing their education to provide an accurate assessment of the value of their qualifications in the labour market. The analysis uses OLS, IV and quantile regressions to estimate the returns to academic and vocational qualifications. Vocational qualifications have historically provided little in terms of value in the labour market; partly because they are typically occupation-specific, and partly because of the confusing framework within which these qualifications are structured. The low returns, changing industrial structure and growing participation in academic education contributed towards shortages in skilled trades and other occupations associated with vocational qualifications. One hypothesis considered in Chapter Three was that shortages in particular occupations may, in a traditional supply and demand framework, result in some vocational qualifications holding a significant – and even rising – value in the labour market. However, this does not seem to be the case for this cohort. Most vocational qualifications still offer lower returns than their academic counterparts (by NVQ level), apart from some higher level vocational qualifications. The returns to academic qualifications are generally slightly lower than those reported by Dearden et al. (2002), however not by all that much.

As discussed in Chapter Two, there is conflicting evidence regarding the evolution of returns to education over time. Some research has found stable or increasing returns, whilst others have found that returns have indeed fallen. There is evidence that over-education has a significant presence in the UK labour market, particularly amongst graduates. Various reasons has been proposed; supply of qualified workers exceeding its' demand, labour market mismatch, unobserved factors affecting employment and lack of skills. Over-educated individuals are penalised in the labour market compared to those whose job level is commensurate to their qualifications. Given the evidence of over-education, increasing participation means a wider range of abilities amongst the participants, and a greater number of participants at each level of quality or ability, which, one would hope if the education system is performing correctly, is reflected in their grades. One consequence of the greater variance in quality of participants might be a similar variance in the returns to qualifications. There is no comparable study using the NCDS which would allow us to assess whether variance in returns has increased or not across cohorts, however the results from the quantile regression shows that there is variation in returns to qualifications for this cohort. This has clear consequences for those individuals who receive low returns to their education and raises the question of whether they receive a reasonable return to their investment.

A further consequence relates to the increasing numbers of graduates within each degree class; how do firms distinguish between equally qualified graduates? Chapter Four presents an argument that attempts to consolidate the contrasting evidence on returns to education discussed above, and proposes one possible answer to the above question. Firms (particularly large corporate firms) are increasingly using psychometric testing and assessment centres to assess the soft skills of potential employees as part of the recruitment process. These tests can be designed to mirror the tasks performed on the job and allows firms to assess individuals for the types of skills required for the job (for example team work), and also test whether individuals are well matched to the firm. Chapter Four argues that firms use their recruitment processes to reveal whether or not equally qualified graduates have these soft skills, which, according to the National Employers' Skills Surveys, are in high demand by the firm and in short supply. According to this hypothesis, those individuals who possess these skills, given their qualifications, are more successful in finding employment. In such circumstances, if there is an over-supply of skilled workers, those without soft skills will be more likely to be over-educated and 'bumped down' to jobs that require lower qualifications. If this is the case, then one would expect these soft skills to hold significant value in the labour market and there will be positive returns to soft skills – above those for qualifications – and that returns to education may be lower when controlling for these skills.

However, measuring soft skills is problematic. The evaluation of soft skills in the BCS is self-response data, so there may be issues regarding the objectiveness of one's self-assessment, particularly of intangible assets. It is also unlikely that firms reward individual soft skills, but rather evaluate an individual's skills overall through more general traits or abilities. A Principal Components Analysis is used to decompose self-reported soft skills into underlying traits and the results are intuitive; personal, technical and numerical skill traits are found to be the three principal components. These traits are then added to the wage equation used in Chapter Three, and the results show that soft skills are rewarded and that returns to qualifications remain significant but at generally lower rates. One can conclude that skills and qualifications are both valued by employers and should be treated as distinct qualities in the returns literature. Secondly, this fall in returns is indicative that the original hypothesis in the chapter may be correct. The links between education, qualifications, soft skills and labour market success is a ripe area for research, and this particular question should be investigated further. As more recent cohorts have passed from education to the labour market in larger numbers, it is important to identify the various components of their human capital, and the associated labour market returns. Part of this is the development of accurate measures of soft skills, such as psychometric test scores that are used by firms themselves. Ensuring that graduates accumulate these skills should be considered when public policies are designed. This is a difficult area for policy as it may be argued that some dimensions of soft skills are personal characteristics that are developed throughout one's life and therefore public policy intervention may have little impact. However, the National Employers' Skills Surveys show that many employees lack these skills and this has a negative impact on business performance, and so this issue needs to be addressed.

The third empirical chapter of this thesis, Chapter Five, completes the picture of returns to education for this cohort, by examining non-monetary returns at age 34, for example well-being, physical and psychological health and civic participation. The results obtained are likely to be an underestimate of the full non-monetary returns because a number of these influences may arise or accumulate over a longer period of time. This analysis examines a number of different dimensions of well-being for one cohort; typically in the literature just one return or one category of returns is examined. This is the first advantage of this analysis. A second, although certainly not exclusive to this analysis, the BCS70 allows one to establish a causal effect of education on non-monetary returns as one can control for time-invariant effects that may influence one's educational choice or some of the associated returns. Although some of the outcomes typically identified in the literature were not found here, probably due to the young age of this cohort, many were. The analysis of the impact of education on well-being uses a methodology designed by Ferrer-i-Carbonell and Frijters (2004) to create individual-specific thresholds as a reference point for analysing well-being. This analysis also includes a measure of expected pay, predicted by the estimation of returns in Chapter Three. Controlling for pay, gaining an academic and vocational qualification has a significantly positive effect on life and job satisfaction respectively. Both academic and vocational qualifications have a negative effect on psychological and physical health even at this early stage in the life course, although the effect of gaining a vocational qualification is much larger. This may reflect the particular pressures at this key stage in career formation – the associated increase in seniority, particularly for those gaining vocational qualifications on the job, and the extra responsibilities that come with it. An interesting extension to this work would be to track the non-monetary returns for this cohort over their lifetime to better understand how and when these effects, that are consistently reported in the literature but don't appear so strongly here, occur.

In summary, this thesis provides estimates of rates of return to qualifications in the UK for the most recent cohort for which appropriate data is available, the British Cohort Study 1970. This is a valuable contribution to the literature because cohort surveys provide information, particularly at an early age, that is crucial to the formation of education and labour market outcomes, for example early-age ability tests, which cross-sectional data do not. Cohort surveys can ease problems caused by recall bias and provide more accurate information throughout the life course than cross-sectional surveys are able to do. Comparing these results to previous cohort surveys then provides a way of analysing how returns to education have changed – using similar datasets – over time, given the changing nature of participation in further and higher education. The results are suggestive of a slight fall in returns to some qualifications. Although small, if this decline is due to over-participation, it has larger consequences for more recent cohorts as the increasing trend in participation has continued, and therefore close scrutiny should be paid to their returns, as soon as data becomes available.

The second empirical chapter considers how soft skills are evaluated by employers, and uses Principal Components Analysis to decompose soft skills ratings into underlying traits. Although Factor Analysis has been used to estimate soft skills from a number of questions concerning job tasks, to my knowledge, this is the first time that individual skill ratings have been analysed in this way. The work supports other literature arguing for a greater distinction between education and skills in the human capital literature. This analysis shows that the development of soft skills should be given more attention by individuals, and education institutions, to improve employability and job match. Universities, in particular, are increasingly concerned with graduate employment outcomes, both because it enhances their standing in league tables (which now include a measure for employability), and it will attract new entrants to their university; encouraging the development of soft skills, in addition to the development of 'hard' skills specific to that degree programme, will be one means of doing this. This is particularly important at this time given the economic climate and jobs market, and high competition for graduate jobs. Given the importance soft skills have in the labour market, shown by this analysis, more also needs to be done to provide a detailed, reliable and objective set of measures that can be implemented in surveys in the future.

The third empirical work is innovative in that it brings together a large literature on many facets of non-monetary returns to education to analyse a variety outcomes from one data source. Using a fixed effects specification restricts the analysis to those outcomes for which data is available in both the 2000 and 2004 sweeps of the cohort survey, and therefore also restricts the analysis to a relatively early point in the life course in terms of many of the returns considered. This work can progress in the future by extending the analysis to later sweeps of the survey. This will allow for a wider range of outcomes to be considered in the fixed effects specification, and also allows for an analysis of various mechanisms and ages at which these outcomes occur. Also, one limitation of this analysis is that it is restricted to finding an average return across all qualifications (either academic or vocational). It may not be the case that each level of qualification affects outcomes by the same magnitude. Therefore, the technique used needs to be developed further to account for this.

6.2 Future work

This thesis raises a number of questions that should be considered in future work. Firstly, one should keep track of the returns to more recent cohorts of individuals, with available data[104], to continue to study the returns to education and the demand and supply of qualifications in the labour market. This should include estimates of the variance in returns as well as estimates at the mean. How the returns have changed, if at all, as participation has increased is an important issue, and will remain so in the future given firstly, the change in fees structure of Higher Education over recent years, and the expected decline in graduates because of participation rates and demographic changes that may occur in the future.

Concerning research on soft skills, the Programme for the International Assessment of Adult Competencies will go a long way towards building a framework that will allow assessment of soft skills in a more reliable and consistent fashion. This can then be employed to track the value of soft skills over time, which this work shows, is an important aspect of demand and supply of labour. However, the research in this Thesis does raise some issues for further consideration. The gap between the skills that UK education institutions are providing students with, and the skills required by employers, needs to be closed. Closer links between education and business is required to ensure the international competitiveness of both the education institutions themselves and the high-skill sectors of the labour market. Therefore, more research is required into how interventions can be used to improve these soft skills.

In relation to non-monetary returns, more research is required to understand the mechanisms through which these outcomes occur. By tracking outcomes across the life-

[104] The Millennium Cohort Study is the next comparable study, however the individuals covered in this survey have not even completed primary level education, and so the wait for the evidence from the most recent birth cohort will be a long one.

course for this cohort one can examine the times at which particular outcomes manifest, or track differences in outcomes over time, for example by type of qualification. This will contribute to the understanding of these mechanisms and any interventions that may improve outcomes for society and the individuals themselves.

6.3 Policy implications

As a general starting point, it is important to note that, given the dynamic nature of demographic trends, schooling achievement, participation in higher education and the labour market, it is always important to scrutinise and assess education policy. However, this may be a particularly crucial time for ensuring that the UK further and higher education systems are both well designed to ensure that education leavers meet the needs of employers in terms of skills and knowledge, and remains internationally competitive. The evidence presented in this thesis shows that both are at risk. Here I will summarise why this is the case, with particular reference to the evidence in this work, and discuss how policy may help to ensure that the education system in the UK meets these aims.

Achievement in compulsory education has been increasing, as has participation in tertiary education over the past three decades. However, in the last few years the proportion of graduates has stabilised, with just over one-third of each cohort graduating from university. The cohort analysed in this thesis graduated in the early 1990's, and was therefore amongst the earliest waves of this increased participation in Higher Education. This means that, although it is the most up to date cohort survey available for this type of analysis (the latest sweep, 2008, was released in September 2010), it can only indicate what might be happening to more recent cohorts rather than provide any conclusive evidence. However, it is clear from this research that there is a variation in returns to education across the cohort, and the increased variance in ability of entrants that undoubtedly is a consequence of the increased participation rates surely extends into an increased variance of returns also. The evidence here may also show that returns did fall between the 1958 and 1970 cohorts, and therefore, if this has continued as participation has increased, it is surely incumbent upon policy makers to ensure that enough information on monetary and non-monetary returns is available so that individuals can make well-informed decisions regarding their education investment.

Entrants to higher education are usually well-informed about likely monetary returns, although one may argue not with detailed or sufficiently contemporary evidence, but perhaps these should be placed in the context of returns to other qualifications, for example vocational qualifications, to show that these too can be rewarded at higher levels. Very recent evidence suggests that the UK higher education participation may have reached a tipping point; the most recent evidence by the OECD shows that the proportion of graduates fell in 2008 compared to previous years, and now lies behind that of many other OECD countries, and this may harm the UK's international competitiveness. The OECD argues that, even in the current economic climate, this is therefore not a time to reduce expenditure on higher education in the UK[105]. Despite the OECD's recommendations, the funding changes following the government spending review and the Browne Report have recently been announced, and will be discussed below. To remain competitive I would argue that it is not the proportion of graduates that is important, but that high-skilled labour supply is at a level and quality that ensures that the needs of business is met. Also, the main demographic group that enter Higher Education (18-20 year olds) is going to significantly fall in numbers over the next decade, before rising again in the decade after that (Bekhradnia 2008). This is not withstanding any future change in the proportion of graduates, which has already begun to fall, perhaps influenced by the increases in tuition fees that have already occurred. Therefore, the returns to higher education will be under scrutiny once again, given the changing numbers, proportion and fees structure and funding of higher education institutions. The recently announced funding cuts to the Higher Education teaching budget, as part of the government spending review, has meant that a substantial proportion of the burden of degree funding will be transferred to the student, through an increase in the maximum fees chargeable by the institution[106].

The current economic climate, along with the increased participation, has resulted in competition for jobs amongst graduates becoming even more intense. With the long-lasting impact of over-education in the first job, it is even more important that graduates are able to secure graduate-level employment. If the argument proposed in this thesis is correct, then they can do this by ensuring they have not only technical skills and knowledge, but also the soft skills demanded by firms that the National

[105] http://www.oecd.org/document/52/0,3343,en_2649_39263238_45897844_1_1_1_1,00.html
[106] Statement on higher education, Department for Business, Innovation and Skills http://www.bis.gov.uk/news/speeches/david-willetts-statement-on-HE-funding-and-student-finance

Employers' Skills Surveys show are in short supply. This will help distinguish themselves from other graduates with the same level of qualification, and may also help to facilitate social mobility. The latter depends on the interaction between one's background and the development of soft skills; research is required into this area, and any necessary interventions implemented, to ensure that skill formation does not become another barrier to social mobility in the UK. More generally however, there is also a responsibility for policy makers to ensure that the UK labour market is in good health; in this instance by helping to design policy that results in the labour supply having the skills required by employers.

This could be done in one of two ways; the Confederation of British Industry, which is already pressuring universities to improved soft skills amongst graduates, or the Sector Skills Councils, which are already used to provide a link between employers and government with particular influence on vocational qualifications, could also aim to forge direct links between business and universities (or specific degree subjects) to help improve the soft skills practice and training for degree programmes. Increasing the number of sandwich degrees, where one year of full-time work in a particular industry is required as part of the degree programme, is one way of doing this. The other option would be for policy makers to encourage universities to seek sponsorship from private enterprise for soft skills training programmes. One supermarket chain, Morrisons, has already announced a 'corporate degree' involving academic studies alongside working for the company, in return for earnings and sponsorship of tuition fees. Harrods, GlaxoSmithKline, Tesco and McDonald's are doing something similar[107]. These businesses are sponsoring more occupation-specific courses, but there could be a role for business on more academic courses too. In terms of a focused soft skills programme, this could cover employability, psychometric testing to encourage participants to identify and develop weaker skills, and also recruitment training. These skills are of course generic, and therefore firms would need an incentive to invest; this scheme naturally gives the firm an opportunity to identify candidates for jobs, therefore providing an efficient and direct recruitment process. Another option would be for firms to provide bursaries or internships to promising students. Given the current economic climate and the funding cuts that will restrict higher education institutions in at least the near future, the involvement of business in university skills training

[107] 'Morrisons to pay tuition fees for students on university course it funds' http://www.guardian.co.uk/education/2010/oct/19/morrisons-pay-university-tuition-fees,

programmes would be the more practical option as it may also provide extra funding to institutions.

Bibliography

"UK at a tipping point?" http://www.bbc.co.uk/news/education-11203790, first accessed 01/11/2010.

"OECD Education at a Glance 2010", http://www.oecd.org/document/52/0,3343,en_2649_39263238_45897844_1_1_1_1,00.html, first accessed 24/11/2010.

Bailey, N., and B. Bekhradnia (2008), "Demand for Higher Education to 2029", Higher Education Policy Institute Report, published 11th Dec 2008 http://www.hepi.ac.uk/466-1366/Demand-for-Higher-Education-to-2029.html.

"Morrisons to pay tuition fees for students on university course it funds", The Guardian, published 9th October 2010, first accessed 24/11/2010 http://www.guardian.co.uk/education/2010/oct/19/morrisons-pay-university-tuition-fees.