

**The Differential in Earnings Premia Between
Academically and Vocationally Trained Males in the
United Kingdom**

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June 2001

Published by
Centre for the Economics of Education
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

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ISBN 0 7530 1474 2

Individual copy price: £5

The Centre for the Economics of Education is an independent research centre funded by the Department of Education and Employment. The view expressed in this work are those of the authors and do not necessarily reflect the views of the Department of Education and Employment. All errors and omissions remain the authors.

Executive Summary

This paper estimates the rate of return associated with alternative levels and types of qualification in the United Kingdom. The analysis is restricted to males aged between sixteen and fifty-nine and uses alternative estimation techniques including ordinary least squares, instrumental variables and a Heckman Selection approach. In addition, the work presented here utilises different information sources, both cross sectional (Labour Force Surveys) and longitudinal (National Child Development Study). This is done in an attempt to compare the findings when using alternative information sources which contain markedly different information relating to the personal characteristics of the individuals being analysed.

It is found that there is a statistically significant differential in the earnings premium achieved by the academically and vocationally qualified at the every level of qualification within the National Vocational Qualification classification of qualifications. This differential is invariant to the method of estimation and the data source. The differential approximates 5% at National Vocational Qualification Level 1, rising by an additional 5% at each successive level of qualification. This implies that degree holders achieve a 20% premium over those males in possession of vocational qualifications at an equivalent level of qualification attainment (NVQ Level 4).

Several reasons are suggested as to why there might exist an earnings differential between the academically and vocationally trained and this is done to highlight possibilities for future research. Specifically, the earnings differential might be attributable to differences in the personal characteristics of the academically and vocationally trained (i.e. at a given level of qualification the academically trained possess a greater level of innate ability compared to their vocational counterparts (as measured by reading and mathematical test scores at the age of seven in the NCDS)); the nature of qualification provision in the United Kingdom resulting in the fact that attitudes towards and the treatment of the academically and vocationally trained is non-comparable in the United Kingdom labour market. Finally, it suggested that the degree of monopsony power possessed by firms that hire either academically or vocationally trained employees accounts for the differential in earnings between the two types of qualification holder. In other words, the differentials that exist might be as a result of differences between firms, however it remains to be seen whether this is the case or whether the differences are attributable to differences within firms.

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Acknowledgements

Gavan Conlon is a research officer at the Centre for Economic Performance at the London School of Economics and co-ordinator of the Centre for the Economics of Education. The writing of this paper was aided by the Economic Social Research Council and Nuffield College, Oxford.

The Centre for the Economics of Education is an independent research centre funded by the Department of Education and Employment. The view expressed in this work are those of the authors and do not necessarily reflect the views of the Department of Education and Employment. All errors and omissions remain the authors.

1. Introduction

There have been numerous attempts to ascertain the return associated with additional years in education in the United Kingdom and the return to various qualifications or to alternative levels of higher education.

Many of the studies in this area have as their main focus the straightforward rate of return to an additional year of schooling or the earnings premium associated with particular **levels** of qualification, such as the difference in earning power of an individual holding an undergraduate degree as opposed to GCE 'A' levels (Blundell *et al.*, 2000). However, there has been little analysis of the differential in earnings premium associated with different types of qualification¹, either academic - or vocational, holding the level of qualification constant². For instance, what is the difference in the earnings premium to an undergraduate degree and a City & Guilds Full Technological Certificate?

It could be claimed that it is wholly expected that there would be differentials in the earnings premia between the academically and vocationally trained due to the fact that there is self-selection into different levels and types of qualification. In other words, more 'able' students undertake additional years of schooling and qualifications compared to less able students, and in addition the more able students opt to undertake and complete academic qualifications as opposed to vocational qualifications and it is this fact that accounts for the differential. Thus, there may exist two sources of endogeneity, self-selection into higher levels of qualification and selection into alternative types of qualification³.

The implication of these findings is that although there are difficulties associated with the estimation of returns at different **levels** of qualification due to sample selection and endogeneity bias, the issue is not such an problem when considering differentials in the rates of return across qualification type. Selection into alternative qualification types does not appear to be determined by ability characteristics, but to a significant extent by family background characteristics.

¹ Note that this the decision to classify qualifications according to the level at which the qualification is attained and whether the qualification is academic or vocational is somewhat, though not entirely, arbitrary. Qualifications are not simply academic or vocational. Often, there are areas of overlap between the two types of qualification. The classification of qualifications according to type used in this analysis is presented in Tables 1 and 2.

² There is disagreement regarding the classification of qualification to particular levels of National Vocational Qualification framework. In particular, this paper broadly classifies qualification according to the time taken to achieve the qualification and the entry requirements needed to commence the qualification. However, as noted by Dearden, McIntosh, Myck and Vignoles (2000), there are informational and conceptual difficulties in determining the time taken to complete qualification (*ie* block or day release). As a result, the estimates of rates of return are sensitive to the assumptions made in the analysis. In this paper, the earnings premia of the qualified over those possessing no formally recognised qualifications is presented rather than rates of return.

³ In previous work, Conlon (2000), the determinants of both the level and type of qualification attained were explored using a sample of males from the National Child Development Study. Specifically, using mathematical and reading test scores at the age of seven, which have been used repeatedly in the literature (Dearden, 1999, Blundell *et al.*, 1997) as a proxy for unobserved ability, the relationship between qualification attainment (level and type) and test scores was questioned. There was a clear and unambiguous relationship between the highest level of qualification attained and the mathematical and reading test scores posted at the age of seven. However, it was found that mathematical test scores at the age of seven play a minor role in determining whether academic or vocational qualifications are obtained. Reading test scores at the age of seven are influential in the determination of whether a male obtains academic or vocational qualifications. However, once interaction terms between the level of parental education and the test scores are introduced into the model, the explanatory power of reading test scores on qualification type is greatly reduced. The prior belief that the academically qualified are more 'able' than the vocationally trained and that this differential in aptitude can be measured (or illustrated) using reading and mathematical test scores remains highly uncertain.

Despite the difficulties associated with Ordinary Least Squares and Instrumental Variables approach to the estimation of the wage equation (which will be discussed), this paper will use both methods to look at the rates of return to additional years of schooling and the highest level of academic and vocational qualifications⁴. This paper uses information from the National Child Development Study (5th Follow Up) and the Labour Force Survey between 1992 and 1998 (both individual cross sections and pooled) to look at the rate of return to qualifications according to the National Vocational Qualification classification of qualifications. Correction terms will be added to allow for the fact that only males in employment provide a response to income questions.

It is found that the estimated return to an additional year of schooling approximates 6.5-7.0% according to OLS estimates. This figure is in line with other studies in the United Kingdom (Harmon and Walker, 1995; Berlinski, 2000; Dearden, McIntosh, Myck and Vignoles, 2000). Similarly, when using Instrumental Variables in an attempt to correct for schooling endogeneity⁵ and despite the well documented difficulties associated with this procedure, the rate of return to additional years schooling is higher than when instruments are omitted.

There is a statistically significant differential in the earnings premium between the academically and vocationally qualified at the every level of qualification. This differential occurs irrespective of the method of estimation. The differential approximates 8-10% at lower levels of qualification (NVQ Levels 1 and 2) and 12-18% at higher levels of qualification (NVQ Levels 3 and 4).

When the data is segmented into two smaller samples consisting of the high qualified (NVQ level 3 and above) and the low qualified (NVQ levels 1 and 2), the effect is to marginally reduce the differential in the rate of return between the academically and vocationally trained for the low qualified and marginally increase the differential between qualification types for the more highly qualified. In addition, for the sample of low qualified males, the return to schooling where no qualification is obtained increases and the return to explicit qualifications is reduced in absolute terms compared to the entire sample. The converse results are obtained for the restricted sample of high-qualified males lending support to the argument regarding the use of Instrumental Variables by Card (1999). The differential in return between qualification types at every level of qualification is invariant to the method of estimation and data source.

The paper is set out as follows: Section 2 provides the methodology behind the classification of qualifications; Section 3 provides methodology behind the estimation of the returns to academic and vocational qualifications; Section 4 discusses the results while Section 5 concludes.

⁴ Note that many individuals undertake and complete both academic and vocational qualifications. This paper analyses the determinants of the highest qualification attained. As set out in the appendices, qualifications are classified according to the National Vocational Qualification classification of qualifications. If an individual possesses an academic qualification at NVQ level 4 (say) and a vocational qualification at NVQ level 3 (say), then this individual is coded as possessing an academic qualification as their highest qualification for the purposes of this analysis. If an individual holds both academic and vocational qualifications at the same level of qualification, then the final qualification attained determines whether they are coded as being academically or vocationally trained. This final 'tie break' criterion is based on the assumption that individuals obtain qualifications of increasing difficulty over time. It is clear that this does not capture the full story since many individuals acquire academic qualifications initially and undertake additional vocational qualifications in order to do a specific job. In other words, individuals undertake additional low levels of vocational qualification (say) in order to gain the specificity of training required for a particular job, even though this qualification may (or may not) be below their existing qualifications. See Conlon (2001) for additional analysis of the earnings premia associated with combinations of academic and vocational qualifications.

⁵ See Weale (1993), Heckman (1979), Harmon and Walker (1995), Blundell *et al* (1997) and Bound, Baker and Jaeger (1995) for discussion of the issue of endogeneity and specification error.

2 Methodology: Classification of Qualifications

In attempting to compare the earnings outcomes of the academically and vocationally trained, information from the Labour Force Surveys between 1993 and 1998 is utilised, which is one of the most detailed information sources combining formal qualifications and economic activity.

The most difficult issues associated with this topic in particular is the coding of the data to reflect comparability of qualifications within particular levels of qualification as well as comparability across time. Initially, it was questioned whether to adopt the nominal classifications presented in official government statistical publications and to use these classifications as a backward looking benchmark. In other words, we questioned the concept of “equivalence” between academic and vocational qualifications.

It is clear that it is impossible to completely classify qualifications according to either the level or the type attained, which are by their very nature difficult to compare, however, it was decided to consider the specific entry requirements and the time taken to compete the qualification in question as a basis for equivalence. For some qualifications, it is clear what the entry requirements are, however, there are still many situations in which the data does not allow us to be more stringent in our classification. For instance, for a person who has obtained a higher degree, it is clear that the entry requirement will be an undergraduate degree. However, there is no information available regarding the grade of the undergraduate degree required or the quality of the institution involved. Therefore, we are forced in many respects to adopt the lowest common denominator in terms of entry requirement.

The most problematic issue associated with the classification of vocational qualifications (apart from the fundamental definition of what exactly constitutes a vocational qualification) is the fact that historically, there has been a complete lack of a centralised structure concerned with the award and validation of vocational qualifications (Cruz-Castro, 2000). It is only since the introduction of the National Council for Vocational Qualifications that there has been a unified approach to the provision and award of vocational training and qualifications⁶.

Therefore, for many of the qualifications that we are considering, there are organisation specific entry requirements. The entry requirement for most courses, both academic and vocational, is dissimilar between institutions. It is important to stress this point more fully. There is a common belief that the variation in entry requirements is restricted to the provision of vocational qualifications. It is more the case that entry requirements for academic programmes are equally dissimilar across institutions, especially as the level of qualification increases. In the case of the provision of many academic and vocational qualifications, the validating authority makes no decision regarding the qualifications of the potential students at the point of entry but simply validate (or not) the qualification at the point of exit. The classification of qualifications for this analysis is presented in Tables 1 and 2.

⁶ Until recently, there were over 60 organisations capable of awarding vocational qualifications.

Table 1: Description of Academic Qualifications by NVQ Equivalent Labour Force Survey 1991 and National Child Development Study (5th Follow Up)

NCDS Description of Academic Qualifications	NVQ	NVQ	LFS 1991 Description of Academic Qualifications
University or CNAA Higher Degree – (MSc, PhD)	5	5	Higher Degree
University or CNAA Post Graduate Diploma	5		
University or CNAA First Degree – including (B.Ed)	4	4	First Degree
- University or CNAA Diploma or Certificate including Dip HE and TTCC Certificate (NOT CNAA VALIDATED)	4	4	Other Degree Teaching: Higher Education, Secondary Level or Primary Level
Full professional qualification (Membership awarded by professional institution)	4		
Part of professional qualifications eg: Part I of two part course	4		
More than 1 GCE 'A' Level	3	3	GCE 'A' Level or Equivalent
1 GCE 'A' Level	2		
Scottish CSYS	3		
Scottish Higher Grade	3		
Scottish Standard Grades – grades 1-3	2		
Scottish 'O' grade – passes or grades A-C	2		
GCE O Level passes or grades A-C	2	2	GCE 'O' Level or Equivalent
GCSE grades A-C	2		
CSE grade 1	2		
CSE grade 2-5	1	1	CSE (Not Grade 1)
No Qualifications	0	0	No Qualifications

Table 2: Description of Vocational Qualifications by NVQ Equivalent Labour Force Survey 1991 and National Child Development Study (5th Follow Up)

NCDS Description of Highest Qualifications	NVQ	NVQ	LFS 1991 Description of Qualifications
Nursing qualifications - Nursing NNEB)	4	4	Nursing Qualification
BTEC HNC or HND	4	4	BTEC HNC or HND
SHNC/SHND	4		
ONC/HND (or SNC/SND)	3	3	BTEC ONC or OND
National General Certificate or Diploma	3		
JIB/NJC or other Craft/Technician Cert.	2		
Insignia Award in Technology (CGIA)	2		
C&G Full Technological Cert. (FTC)	4		
C&G Advanced/Final/Part II or III	3		
C&G Craft /Intermed. /Ordinary/ Part I	2	2	City and Guilds (ALL)
C&G Operative	1		
C&G – Can't say which	2		
C&G Other	2		
Trade Apprenticeship (No Quals)	2	2	Trade Apprenticeship (No Quals)
RSA - Stage 3	3		
RSA - Stage 2	2		
RSA – Stage 1	1		
Other Technical or Business Qualifications incl.HGV, PSV, etc	1	1	Other Professional / Vocational Qualifications
Any other qualification 1,2, 3	1		
		1	Youth Training Certificate
No qualifications	0	0	No Qualifications

3. Methodology: NCDS: Ordinary Least Squares

The standard Ordinary Least Squares estimating equation is as follows:

$$\ln(\omega_i) = \sum_{k=0}^{10} \beta_k NVQ_{ki} + \zeta' AB_i + \rho' FAM_i + \omega' OTH_i + \varepsilon_i$$

where $\ln(\omega_i)$ is the natural log of hourly wages for individual i , NVQ_{ki} represents the level of qualification obtained by individual i for $k=1,2,\dots,10$. This specification highlighted is due to the fact that there are 10 categories of qualification ranging from NVQ level 1 to NVQ Level 5, both academic and vocational, in the National Vocational Qualification framework⁷. NVQ_{ki} is coded 1 if individual i has obtained vocational qualification at level k as their highest qualification and 0 otherwise. Therefore, the β_k coefficients provide the earnings premium associated with qualification level k . In this specification of the model, β_0 represents the earnings premium associated with an additional year of schooling where no qualification has been obtained.

⁷ This paper makes no attempt to estimate the returns to given subject areas.

AB_i is a vector of ability variables consisting of

- Mathematical test scores at the age of seven and eleven
- Reading test scores at the age of seven and eleven

FAM_i is a vector of personal background variables consisting of

- Severe Financial Difficulties Aged 11
- Severe Financial Difficulties Aged 16
- Number of Siblings
- Age at which father left full-time education
- Age at which mother left full-time education
- Accommodation Aged 16
- School Aged 16
- Region Aged 16
- Father's Social Class Aged 16
- Father's Employment Status Aged 16
- Whether Mother worked Aged 16

OTH_i is a vector of other job characteristics relating to

- Union membership
- Temporary of Permanent Contract
- Firm Size
- Public / Private Sector
- Industry

3.1 NCDS: instrumental variables approach

The standard instrumental variables approach requires the two-stage estimation of the following equations

$$\ln(\omega_i) = \alpha SCHOOL_i + \sum_{k=1}^{10} \beta_k NVQ_{ki} + \zeta' AB_i + \omega' OTH_i + \varepsilon_i$$

$$SCHOOL_i^* = \gamma' FAM_i + v_i$$

where $SCHOOL_i^*$ is a normally distributed latent variable such that $SCHOOL_i = j$ if $\mu_{j-1} \leq SCHOOL_i^* \leq \mu_j$ where the 'cuts' μ_j are estimated from the model. As before, $\ln(\omega_i)$ is the natural logarithm of hourly wages, $SCHOOL_i$ represents the years of schooling obtained by individual i , NVQ_{ki} for $k=1,2,\dots,10$ corresponds to the 10 levels of qualification attainable by individual i in the NVQ classification of qualifications and AB_i is a vector of ability variables as previously discussed⁸. In this case, the requirements of the explanatory vector FAM_i is that it contains

⁸ In particular, the variables used as instruments are whether the cohort member experienced severe financial difficulties aged 11, severe financial difficulties aged 16, number of siblings, age at which father left full-time education, age at which mother left full-time education, accommodation aged 16, school aged 16, region aged 16, father's social class aged 16, father's employment status aged 16 and whether the cohort member's mother worked when cohort member was aged 16. As with the majority of other studies, which use instruments not of a

variables that can be used to explain the determinants of schooling but are not contained in AB_i or OTH_i .

3.2 NCDS: Heckman selection approach

In order to minimize the effect of the bias associated with a standard Ordinary Least Squares estimation the model is extended and the following equation is estimated⁹:

$$\ln(\omega_i) = \sum_{k=0}^{10} \beta_k NVQ_{ki} + \zeta' AB_i + \omega' OTH_i + \xi \lambda_{SCHOOL_i} + \vartheta \lambda_{TYPE_i} + \phi \lambda_{EMPNOT_i} + \varepsilon_i$$

where NVQ_{ki} is as before, λ_{EMPNOT_i} corresponds to the inverse Mills ratio or employment selection adjustment term, λ_{SCHOOL_i} corresponds to schooling level selection adjustment term, and λ_{TYPE_i} corresponds to the qualification type selection adjustment term¹⁰.

3.3 LFS: Ordinary Least Squares

The standard Ordinary Least Squares estimating equation is as follows:

$$\ln(\omega_i) = \sum_{k=0}^{10} \beta_k NVQ_{ki} + \omega' Z_i + \varepsilon_i$$

where $\ln(\omega_i)$ is the natural log of hourly wages for individual i , NVQ_{ki} represents the level of qualification obtained by individual i for $k=1,2,\dots,10$. NVQ_{ki} is coded 1 if individual i has obtained a vocational qualification at level k as their highest qualification and 0 otherwise. Therefore, the β_k coefficients provide the earnings premium associated with qualification level k . In this specification, β_0 represents the return associated with an additional year of schooling where no qualification has been obtained.

Z_i is a vector of variables consisting of

- Accommodation Details
- Marital Status

'policy' nature (such as the change in the minimum school leaving age in the United Kingdom), these instruments are weak at best.

⁹ Full details are provided in the appendices. Note that for the selectivity terms to be valid, each of the equations for SCHOOL, TYPE and EMPNOT should be independent and it is clear that the inclusion of the selection term into the type of qualification attained is restrictive. In most standard analyses (Blundell *et al.*, 1997), no attempt is made to correct for selection into the type of qualification attained, as selection into a particular qualification route is not considered to be problematic. In alternative specifications where the selection term into the type of qualification attained is suppressed, the results are not substantially different from those presented here, indicating that this might be indeed the case.

¹⁰ Note that this specification of the model depends on the independence of the selection terms (level and type of qualification attained). In the results section, the estimates presented indicate that it is in fact the case that selection into the type of qualification is not a serious methodological issue warranting substantial additional analysis, whereas, selection into the level of qualification and employment remains so.

- Number of Dependent Children under 16
- Employment/ Unemployment/ Inactivity Status of Other Adults in Household
- Years Since Leaving Full-Time Education
- Region of Residence
- Industry
- Union Membership
- Temporary or Permanent Contract
- Firm Size
- Public / Private Sector

3.4 LFS: instrumental variables

In the case of the Labour Force Survey, due to the lack of information regarding an individual's family background and personal characteristics; as before the model requires the two stage estimation of

$$\ln(\omega_i) = \gamma' SCHOOL_i + \sum_{k=1}^{10} \beta_k NVQ_{ki} + \omega' Z_i + \varepsilon_i$$

$$SCHOOL_i^* = \gamma' Q_i + \varepsilon_i$$

where Z_i is a vector of personal characteristics. Again, the instruments used must determine the decision to undertake additional years of schooling of qualifications but have no explanatory power in relation to the earnings equation. In the case of the Labour Force Survey, the instruments that are used are birth month (Angrist and Krueger, 1991) and Minimum School Leaving Age (Harmon and Walker, 1995).

4. Presentation of Results: Labour Force Survey

The estimates of the rate of return to schooling and qualifications obtained for 16-59 year old men in the United Kingdom using pooled data from 1993 to 1998 are presented in Table 3. For each year the earnings premium associated with each additional year of schooling is estimated in isolation. In addition, a second specification of the model is estimated consisting of the 'residual' premium associated with an additional year of schooling (*ie* a year of schooling where no explicit qualification is obtained) and the premium associated with each level of qualification in the National Vocational Qualification classification of qualifications. In both models, the specifications include additional explanatory terms such as union membership or coverage and other job related characteristics that may determine earnings. The quarterly cross sectional data sets for the six years in question have been pooled and the returns have been estimated with the inclusion of yearly and seasonal dummies¹¹.

The OLS estimate of the gross rate of return to a year of schooling over the entire period approximates 6.7%, and is in line with many other OLS estimates in the United Kingdom (Harmon and Walker, 1995; Dearden *et al*, 2000 and Berlinski, 2000). The return is relatively stable across years and the estimate from any particular year is never more than

¹¹ The numbers of individuals in each year contained in the pooled sample are unequal. In particular, due to changes in the Labour Force Survey sampling procedure, there are approximately twice as many respondents in 1997 and 1998 compared to previous years.

1.7 percentage points different from any other year's estimate. OLS estimates for each of the years 1993-1998 are presented in Table 2.

When the level of qualification is explicitly introduced a meaningful distinction in the earnings performance between the academically and vocationally qualified is highlighted. As would be expected, for both the holders of academic and vocational qualifications, there is an increased return as the level of qualification increases. In particular, according to OLS specifications, the academically qualified at NVQ level 1 achieve a premium of 14.1% over the unqualified.

Table 3: OLS and Instrumental Variables Estimates of the Returns to Education¹² : Pooled Labour Force Surveys 1993-1998: Males 16-59

	OLS		OLS		IV		IV	
Schooling	.067	(.001)	.020	(.001)	.088	(.012)	.045	(.011)
Experience	.081	(.002)	.077	(.001)	.050	(.002)	.071	(.002)
(Experience)²/1000	-.0009	(.025)	-.0008	(.024)	-.0004	(.029)	-.0007	(.029)
Academic Level 1			.141	(.011)			.127	(.012)
Academic Level 2			.269	(.011)			.255	(.012)
Academic Level 3			.439	(.015)			.458	(.015)
Academic Level 4			.540	(.013)			.588	(.012)
Academic Level 5			.584	(.018)			.652	(.018)
Vocational Level 1			.052	(.011)			.044	(.012)
Vocational Level 2			.164	(.010)			.150	(.010)
Vocational Level 3			.270	(.012)			.243	(.013)
Vocational Level 4			.414	(.013)			.403	(.015)
Vocational Level 5			.454	(.081)			.348	(.083)
Sample Size	28496		28496		28496		28496	
Adjusted R²	.3824		.4331		.3579		.4414	

At NVQ level 2 (5 GCSE A*-Cs), the premium increases to 26.9%, while at degree level, unsurprisingly, the premium over the unqualified stands at 54%. The outcome for the vocationally qualified follows a similar increasing relationship as the academically qualified. Males possessing academic qualifications at NVQ level 1 earn a 5.2% premium over the unqualified. At NVQ Level 2 (Trade Apprentice/City and Guilds Craft), the premium over

¹² Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part-time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in. Yearly dummies have also been included.

males holding no qualifications stands at 16.4%, whereas at NVQ Level 4 (Higher National Certificates and Diplomas) the premium achieved is marginally less than 42%.

In addition, note that the 'residual' return to a year of schooling when no qualifications are achieved approximates 2%. However, there are important differentials in earnings between the academically and vocationally qualified at every level of qualification.

At the lower levels of qualification, males with NVQ level 1 academic qualifications achieve an 8.9% premium over their vocational counterparts. At NVQ level 2, the differential between the academically and vocationally qualified is 10.5%. As the level of qualification rises, there is an increase in the premium paid to the academically qualified, but the increase is not extreme. At NVQ levels 4 and 5, the differential rises to 12.6% and 13% respectively. The greatest differential arises at NVQ level 3, standing at 16.9%, however, care should be exercised with this estimate as the sample size associated with those completing GCE 'A' Levels as their highest qualification is substantially smaller than the sample sizes associated with other qualification levels. It is rare that individuals state GCE 'A' levels as being their highest level of qualification, as it is generally the case that those undertaking this qualification do so in order to progress to degree level education.

As would be expected, the instrumental variable approach produces estimates for the return to schooling substantially higher than those produced using an OLS estimator. The pooled estimates are presented in Table 5. In particular, the return to an additional year of schooling approximates 8.8% using pooled estimates compared to the estimate of 6.7% using an OLS method of estimation. When explicit levels and types of qualification are introduced into the model, the residual rate of return to a year of schooling where no qualification is attained is 4.5%, which is more than double the OLS estimate. The returns to explicit levels and types of qualification are similar under IV as under OLS. Compared to a male possessing no formal qualifications, a male holding an academic qualification at NVQ level 2 earns a 25.5% wage premium over a male possessing no formal qualifications, rising to 58.8% at NVQ level 4. On the vocational side, a male holding a trade apprenticeship (or equivalent) achieves a 15% wage premium over the unqualified, rising to 40.3% at NVQ level 4.

According to the IV estimates of the differential in the rate of return between the academically and vocationally trained, using pooled data between 1993 and 1998 stands at 8.3% at NVQ level 1, 10.5% at NVQ level 2, rising to 18.5% at NVQ level 4. This compares to figures of 8.9%, 10.5% and 12.6% at the corresponding levels of qualification according to OLS estimates. The most important point to note is that irrespective of the method of estimation, using information from the Labour Force Survey, the differential in returns between the academically and vocationally qualified remains and is robust to the method of estimation. The only effect of alternative methods of estimation is to produce different earnings premia (in absolute terms) associated with particular levels of qualification but has little effect on the differential between different types of qualification at given levels of qualification. At NVQ Levels 1 and 2, the differential approximates 8-10% while this differential rises to 12-18% at NVQ Level 4.

Table 4: Ordinary Least Squares Estimates of the Returns to Education¹³ Labour Force Surveys 1993-1998: Males 16-59

	1993		1994		1995		1996		1997		1998	
Schooling	.064 (.003)	.017 (.004)	.064 (.003)	.017 (.004)	.061 (.003)	.019 (.004)	.078 (.003)	.024 (.004)	.066 (.002)	.026 (.002)	.066 (.002)	.016 (.003)
Experience	.076 (.005)	.070 (.005)	.070 (.005)	.066 (.005)	.098 (.006)	.092 (.006)	.078 (.005)	.077 (.005)	.083 (.003)	.079 (.003)	.080 (.004)	.074 (.003)
(Experience)²	-.0008 (.074)	-.0007 (.071)	-.0007 (.073)	-.0006 (.070)	-.0010 (.080)	-.0010 (.078)	-.0008 (.070)	-.0008 (.066)	-.0009 (.048)	-.0008 (.047)	-.0008 (.052)	-.0008 (.050)
Academic Level 1		.146 (.039)		.157 (.037)		.117 (.041)		.150 (.030)		.115 (.021)		.170 (.023)
Academic Level 2		.246 (.029)		.262 (.029)		.239 (.033)		.364 (.034)		.264 (.024)		.295 (.026)
Academic Level 3		.513 (.042)		.408 (.041)		.461 (.048)		.443 (.040)		.376 (.030)		.479 (.032)
Academic Level 4		.513 (.035)		.564 (.035)		.500 (.040)		.588 (.035)		.477 (.025)		.607 (.026)
Academic Level 5		.611 (.053)		.646 (.051)		.576 (.057)		.627 (.051)		.490 (.035)		.634 (.036)
Vocational Level 1		.045 (.034)		.073 (.032)		.085 (.036)		.071 (.031)		.017 (.022)		.063 (.024)
Vocational Level 2		.143 (.026)		.219 (.027)		.166 (.032)		.162 (.026)		.150 (.020)		.165 (.022)
Vocational Level 3		.267 (.035)		.256 (.034)		.272 (.039)		.233 (.032)		.272 (.023)		.297 (.024)
Vocational Level 4		.431 (.038)		.432 (.036)		.408 (.040)		.425 (.035)		.376 (.026)		.440 (.027)
Vocational Level 5		- -		- -		- -		- -		.448 (.154)		.506 (.107)
Sample Size	3387	3387	3365	3365	3447	3447	3351	3351	7535	7535	7411	7411
Adjusted R²	.3707	.4235	.3828	.4360	.3688	.4000	.4264	.4852	.3979	.4407	.3596	.4182

¹³ Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in.

It has been argued that one of the reasons why a two stage least squares approach provides higher estimates of the return to schooling than OLS estimates, is that returns to education vary across groups (Card, 1999). The people that are affected by instruments are those very people with higher returns to education. Since the previous analyses focus on the average return to schooling without formal qualifications and the average return to specific qualifications, in this section, the entire sample of males has been divided into two sub-samples consisting of males with high qualifications (NVQ Levels 3,4 and 5) and those with a low level of qualification (NVQ Levels 1 and 2). The IV estimates of the returns to specific levels and types of qualification are presented in Table 5.

Table 5: Instrumental Variables Estimates of the Returns to Education¹⁴ Labour Force Surveys 1993-1998: Males 16-59

	1993		1994		1995		1996		1997		1998	
Schooling	.054 (.037)	.076 (.035)	.044 (.034)	.043 (.031)	.072 (.037)	.060 (.035)	.070 (.020)	.023 (.026)	.079 (.022)	.052 (.021)	.069 (.033)	.059 (.031)
Experience	.051 (.006)	.069 (.006)	.046 (.006)	.057 (.006)	.077 (.006)	.085 (.006)	.062 (.005)	.071 (.006)	.058 (.004)	.072 (.004)	.053 (.004)	.075 (.004)
(Experience)²	-.0004 (.084)	-.0007 (.082)	-.0004 (.083)	-.0005 (.080)	-.0007 (.090)	-.0009 (.087)	-.0005 (.075)	-.0007 (.081)	-.0005 (.055)	-.0007 (.054)	-.0004 (.057)	-.0008 (.056)
Academic Level 1		.139 (.039)		.120 (.038)		.106 (.042)		.146 (.031)		.093 (.022)		.174 (.024)
Academic Level 2		.237 (.032)		.232 (.031)		.219 (.035)		.361 (.037)		.241 (.026)		.309 (.028)
Academic Level 3		.531 (.043)		.399 (.042)		.480 (.048)		.479 (.041)		.396 (.030)		.513 (.033)
Academic Level 4		.560 (.034)		.584 (.033)		.537 (.038)		.674 (.031)		.533 (.025)		.675 (.028)
Academic Level 5		.690 (.048)		.678 (.047)		.618 (.056)		.753 (.044)		.559 (.035)		.729 (.039)
Vocational Level 1		.045 (.034)		.059 (.047)		.064 (.038)		.074 (.032)		-.001 (.023)		.072 (.024)
Vocational Level 2		.139 (.027)		.189 (.028)		.151 (.033)		.148 (.029)		.123 (.021)		.172 (.023)
Vocational Level 3		.255 (.037)		.198 (.039)		.215 (.047)		.231 (.033)		.229 (.026)		.305 (.027)
Vocational Level 4		.434 (.041)		.417 (.036)		.382 (.045)		.427 (.040)		.348 (.029)		.465 (.031)
Vocational Level 5		- -		- -		- -		- -		.501 (.154)		.505 (.112)
Sample Size	3385	3385	3365	3365	3447	3447	3348	3348	7527	7527	7411	7411
Adjusted R²	.3491	.4207	.3484	.4363	.3346	.3988	.3505	.4814	.3709	.4377	.3455	.4131

¹⁴ Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in.

Turning to Table 6, where the returns for those holding **low** qualifications are presented using pooled data, it is clear again that the estimated returns under OLS are less than under the IV approach. In particular the estimate of the return to schooling where no qualification has been attained approximates 4.5% according to OLS estimates. However, the IV approach indicates that the return to a year of schooling where no qualification has been attained is around 5.5% over the corresponding period. This is higher than the estimates produced according to either model when looking at the entire sample. The corresponding figures when analysing the complete sample of males were 2.0% and 4.5% according to the OLS and IV estimates respectively. It is clear that the return to schooling with no qualifications is greater for the low qualification sample when analysed separately than when the total population of males is analysed as a whole.

Table 6: OLS and IV Estimates of the Returns to Education¹⁵: Pooled Labour Force Surveys 1993-1998: Males 16-59 Low and High Qualification Holders

	OLS		OLS		IV		IV	
Schooling	.057 (.002)	.045 (.002)	.039 (.001)	.011 (.001)	.069 (.015)	.055 (.015)	.022 (.012)	.023 (.011)
Experience	.075 (.002)	.076 (.002)	.080 (.003)	.070 (.002)	.063 (.002)	.075 (.002)	.053 (.003)	.068 (.003)
(Experience)²	-.0008 (.029)	-.0008 (.028)	-.0008 (.039)	-.0007 (.037)	-.0006 (.033)	-.0008 (.033)	-.0004 (.043)	-.0007 (.041)
Academic Level 1		.115 (.011)				.115 (.013)		
Academic Level 2		.232 (.011)				.251 (.013)		
Academic Level 3				.471 (.016)				.485 (.016)
Academic Level 4				.592 (.014)				.625 (.014)
Academic Level 5				.659 (.019)				.707 (.019)
Vocational Level 1		.038 (.011)				.049 (.012)		
Vocational Level 2		.150 (.010)				.152 (.011)		
Vocational Level 3				.281 (.012)				.272 (.014)
Vocational Level 4				.437 (.013)				.438 (.016)
Vocational Level 5				.470 (.082)				.435 (.086)
Sample Size	16907	16907	14584	14584	16907	16907	14584	14584
Adjusted R²	.4338	.4278	.3807	.4517	.4362	.4307	.3585	.4506

¹⁵ Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in.

The returns to specific qualifications are lower for the low qualified in the analysis of the restricted sample as opposed to entire population. This is the case under both methods of estimation. Viewing the restricted sample, the return to holding academic and vocational qualifications at NVQ Level 2 are 23.2% and 15.0% respectively under OLS and 25.1% and 15.2% under IV. When looking at the entire sample the corresponding figures are 27.0% and 16.4% under OLS and 25.5% and 15.3% under IV.

The implication is that when analysing the entire population of males that, for the low qualified, there is an upward bias associated with the return to recognised qualifications and a downward bias associated with the return associated with an additional year of schooling where no qualification is attained.

The **differential** in rate of return to specific qualifications between the academically and vocationally qualified is marginally smaller when looking at the sample of low qualified males compared to the entire sample of males. The differential in returns at NVQ levels 1 and 2 were 7.7% and 8.2% respectively according to the OLS estimation and 6.6% and 9.9% according to the IV procedure when looking at the sample of low qualified males. This compares to differentials of 9% and 10.6% when looking at the entire male sample at NVQ levels 1 and 2 respectively according to OLS estimates; and 8.3% and 10.2% respectively according to IV estimates. Looking again at Table 6, where the returns corresponding to the highly qualified are estimated, unsurprisingly, the rate of return associated with a year of schooling where no qualification is attained is lower than that of the entire sample. In particular, according to the OLS estimation, the return approximates 1.1% per year of additional schooling and 2.3% according to the IV estimate. Comparing the returns associated with particular levels of formal qualification, the returns are higher in absolute terms at every level of qualification under both OLS and IV than the estimates produced from the combined sample. The differentials in the earnings premia by qualification according to the sample chosen are presented below in Table 7.

When analysing the entire population of males, for the highly qualified, there is a downward bias associated with the estimate of the returns to recognised qualifications and an upward bias associated with obtaining an additional year of schooling where no formal qualifications are attained.

The differential in return between the academically and vocationally qualified is marginally greater when viewing the restricted sample than when looking at the entire sample. The differential in earnings premia at NVQ Levels 3, 4 and 5 between the academically and vocationally trained stands at 19%, 15.5% and 18.9% respectively according to OLS estimates and 21.3%, 18.7% and 27.2% according to IV estimates. This compares to differentials of 16.9%, 12.6% and 12.6% when looking at the entire male sample at NVQ levels 3, 4 and 5 respectively according to OLS estimates and 21.5%, 18.6% and 30.6% respectively according to IV estimates.

Table 7: Differential in the Estimates of the Returns to Schooling According to Sample: Pooled Labour Force Surveys 1993-1998: Males 16-59

	OLS	IV	OLS	IV
	Low Qualification¹⁶		High Qualification²⁸	
Year of schooling where no Qualification is obtained	+2.5	+1.0	-0.9	-2.2
Academic Level 1	-2.6	-1.2		
Academic Level 2	-3.8	-0.4		
Academic Level 3			+3.2	+2.7
Academic Level 4			+5.2	+3.7
Academic Level 5			+7.5	+5.3
Vocational Level 1	-1.3	+0.5		
Vocational Level 2	-1.4	-0.1		
Vocational Level 3			+1.1	+2.9
Vocational Level 4			+2.3	+3.5
Vocational Level 5			+1.2	+8.7

4.1 Presentation of results: national child development study

In addition to looking at the differentials between the academically and vocationally qualified using the Labour Force Surveys, a similar methodology as before has been applied to the NCDS, the reason being the availability of additional information relating to personal characteristics and family background of the cohort member. However, in using the NCDS data, we are restricted to 33-year-old males, a much smaller sample and a lack of preciseness regarding certain employment characteristics.

Note that several different specifications of the model used to analyse the National Child Development Study are presented. The 5 specifications include a raw analysis where explicit qualifications, ability and family background characteristics are omitted in order to ascertain the raw return to an additional year of schooling. The final specification makes use of the explicit information contained in the survey relating to qualification levels, ability and relevant family background characteristics.

Looking at the alternative specifications of an ordinary Least Squares approach presented in Table 8, the simple return to an additional year of schooling is estimated at 3.8% (specification 1), which is just over half the OLS estimate produced using the LFS. Upon the introduction of specific qualifications (specification 2), the residual return to an additional year of schooling where no qualifications are obtained is estimated at 1.4%, marginally less than the Labour Force Survey pooled OLS estimate of 2.0%.

¹⁶ Estimated rate of return for restricted sample minus estimated rate of return for entire sample

Table 8: OLS Estimates of the Returns to Education: Males National Child Development Survey (5th Follow Up)¹⁷

	OLS (1)		OLS (2)		OLS (3)		OLS (4)		OLS (5)	
Schooling	.038	(.002)	.014	(.003)	.013	(.003)	.033	(.002)	.012	(.003)
Academic Level 1			.052	(.035)	.039	(.035)			.038	(.035)
Academic Level 2			.232	(.032)	.201	(.032)			.190	(.032)
Academic Level 3			.438	(.056)	.396	(.056)			.386	(.056)
Academic Level 4			.444	(.035)	.404	(.036)			.387	(.037)
Academic Level 5			.371	(.047)	.332	(.048)			.310	(.048)
Vocational Level 1			.072	(.038)	.053	(.038)			.045	(.038)
Vocational Level 2			.103	(.032)	.089	(.032)			.084	(.032)
Vocational Level 3			.170	(.033)	.146	(.033)			.142	(.034)
Vocational Level 4			.322	(.038)	.293	(.039)			.280	(.039)
Maths Test Age 7										
2nd Quartile					.037	(.020)	.035	(.020)	.039	(.020)
3rd Quartile					.061	(.021)	.069	(.022)	.061	(.021)
Top Quartile					.086	(.023)	.109	(.024)	.086	(.023)
Reading Test Age 7										
2nd Quartile					.021	(.021)	.037	(.021)	.021	(.021)
3rd Quartile					.019	(.022)	.051	(.023)	.018	(.022)
Top Quartile					.032	(.023)	.107	(.023)	.027	(.023)
Age Father Left FTE										
15-16 Years old									.053	(.021)
16-17 Years old									.040	(.026)
17+ Years old									.079	(.025)
Father's Social Class										
Skilled (Man/N.M.)									-.028	(.015)
Semi Skilled (Man/N.M.)									-.046	(.024)
Unskilled									-.086	(.042)
Sample Size	3100		3100		3100		3100		3100	
Adjusted R²	.2514		.3182		.3230		.2792		.3330	

¹⁷ Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in.

According to specification 3, where the scores obtained in mathematical and reading tests at the age of seven are explicitly introduced as proxies for unobserved ability, the return of an additional year of schooling without any recognised qualification is estimated at 1.3%. The discrepancy between the LFS and NCDS estimates of the raw returns to additional schooling is explicable due to the additional information relating to qualifications contained in the NCDS and the fact that many cohort members who are considered to possess qualifications (PGV, HGV licenses) according to the NCDS classification of qualifications are classified as possessing no formal qualifications according to the LFS.

Other general points of note are the fact that the OLS estimates indicate that the return associated with being positioned in the second quartile in the mathematical test at the age of seven is 3-4% greater than a male finishing in the bottom quartile. This figure rises to 8-11% for males finishing in the top mathematics test quartile at the age of seven. A similar pattern is displayed when looking at reading test scores at the age of seven. The combined effect of including mathematical and reading test scores at the age of seven is to reduce the returns associated at every level of qualification, adding to the belief that standard rate of return analyses which do not control for innate ability produce estimates of the return to schooling or qualifications that are biased. In the final specification, explanatory variables include reading and mathematical test scores at the age of seven, explicit levels of qualification, family background characteristics, including the age at which the cohort member's parents left full-time education, whether the family experienced "difficulties", accommodation status and regional dummies.

In the final specification, the return to an additional year of schooling where no qualification was obtained was estimated at 1.2%. With reference to the returns to explicit qualifications the results from the NCDS do not perfectly coincide with those produced using LFS data. In particular, the returns associated with low levels of qualification, both academic and vocational, are substantially lower using NCDS data compared to the OLS estimates using LFS data. At NVQ Level 1, the return associated with an academic qualification is a mere 3.8% compared to the LFS estimate of over 14% and the return to vocational qualifications at the same level stands at 4.5%. At NVQ level 2, the returns associated with academic qualifications rise to 19%, again about 7% lower than LFS estimates. On the vocational front, there appears to be a large divergence in the estimated return, with the vocationally qualified at NVQ Level 2 posting a return of 8.4%, compared to 16% according to LFS estimates. Upon reaching NVQ level 4, the premium associated with academic qualification approximates 38.7%, whereas the corresponding figure for the vocationally trained is 28.0%. These estimates are considerably lower than estimates based on the LFS.

However, at most levels of qualification, the differential between the academically and vocationally qualified compares favourably with LFS estimates. At NVQ level 1, the vocationally qualified achieve a marginal premium of 0.7% over their academic counterparts, whereas at NVQ level 2, the academically qualified achieve an 11.6% premium over the vocationally trained. At undergraduate degree level, the differential between the academically and vocationally trained is exactly 10.7%. While some of these findings appear to be in contrast to the estimates produced using LFS information, it must be remembered that the categorisation of qualifications across data sets is not equivalent. In particular, according to the LFS anyone possessing a City & Guilds qualification, irrespective of the level, is considered to be qualified at NVQ level 2, while a clear distinction can be made using the NCDS. In fact almost 50% of males with NVQ level 2 qualifications according to the LFS are considered to achieve higher levels of qualification attainment according to the NCDS. This would have the effect that models based on the LFS may produce a higher estimate of the differential in return between the academically and vocationally qualified at

NVQ level 2 than the NCDS and lower estimate of the differential at higher levels of qualification than the NCDS¹⁸.

In Table 9, the details of the estimates of returns to academic and vocational qualifications using the Instrumental Variables and Heckman Selection approaches are presented.

According to IV estimates, the simple return to a year of schooling is estimated at 7.3%, where explicit qualifications, reading and mathematical scores at the age of seven are omitted. This figure is almost double the estimate produced under a similar specification using OLS. Furthermore, even when recognised qualifications are introduced into the model, the estimate of the rate of return to schooling, when no qualification is attained only falls to 3.7%.

Upon the introduction of mathematical and reading scores at the age of seven, the return to schooling falls marginally to 3.6%. However, looking at the return to the various academic and vocational qualifications, the coefficients produced using instruments are substantially larger than the OLS estimates. At NVQ level 2, males holding academic qualifications achieve a 20.6% premium, whereas the holders of vocational qualifications at the same level achieve a premium of 16.6%. At undergraduate degree level, the premium rises to 47.6% while their vocational counterparts achieve a 34% premium.

Looking at the estimates of the returns to schooling (without formal qualifications) and explicit qualifications using Heckman selection procedure (Table 9 below), the greatest return to an additional year of schooling (where qualifications are omitted) is registered at 10.0%. Upon the inclusion of explicit qualification levels, the return to an additional year of schooling where no qualification is obtained stands at 4.0%, marginally higher than the estimates produced under IV methods and substantially higher than the estimates produced under OLS. The returns to explicit levels of qualification are lower at every level of qualification than under IV approach.

Specifically, the return associated with obtaining an academic qualification at NVQ level 2 is estimated at 19% (when mathematical and reading test scores at the age of seven are introduced to the model) compared to 20.6% under IV and 20.1% under OLS. For those males holding a vocational qualification at NVQ level 2, the return is 14.6% compared to 16.6% under IV and 8.9% under OLS.

¹⁸ In Conlon (2000), an analysis of the effect of the reclassification of qualifications on the likelihood of achieving a given labour market state is undertaken. It is found that the likelihood of being employed (or unemployed) is sensitive to the method of qualification classification.

Table 9: Instrumental Variables Estimates of the Returns to Education: Males National Child Development Survey (5th Follow Up)¹⁹

	IV (1)		IV (2)		IV (3)		HECKMAN (1)		HECKMAN (2)		HECKMAN (3)	
Schooling	.073	(.008)	.037	(.008)	.036	(.008)	.100	(.008)	.040	(.069)	.036	(.008)
Academic Level 1			.091	(.035)	.085	(.035)			.069	(.034)	.060	(.034)
Academic Level 2			.230	(.031)	.206	(.032)			.213	(.030)	.190	(.031)
Academic Level 3			.469	(.067)	.441	(.067)			.413	(.413)	.379	(.054)
Academic Level 4			.508	(.039)	.476	(.039)			.473	(.032)	.440	(.033)
Academic Level 5			.469	(.047)	.436	(.047)			.434	(.042)	.400	(.042)
Vocational Level 1			.099	(.036)	.085	(.036)			.077	(.035)	.061	(.035)
Vocational Level 2			.178	(.030)	.166	(.030)			.160	(.029)	.146	(.029)
Vocational Level 3			.234	(.035)	.216	(.035)			.205	(.030)	.185	(.031)
Vocational Level 4			.364	(.038)	.340	(.039)			.337	(.035)	.312	(.035)
Maths Test Age 7												
2nd Quartile					.031	(.019)					.029	(.019)
3rd Quartile					.071	(.020)					.068	(.020)
Top Quartile					.089	(.022)					.084	(.084)
Reading Test Age												
2nd Quartile					.013	(.019)					.012	(.019)
3rd Quartile					.007	(.021)					.006	(.021)
Top Quartile					.020	(.020)					.018	(.021)
ξ (School)							.1825	(.045)	.1879	(.062)	.1653	(.055)
ϑ (Type)							.0756	(.032)	.0798	(.056)	.0657	(.057)
φ (Employment)							.3565	(.125)	.3874	(.148)	.3825	(.045)
Sample Size	3641		3641		3641		4162		4162		4162	
Adjusted R²	.3151		.3108		.3149		.3196		.3204		.3303	

¹⁹ Standard errors are presented in parenthesis. The model specifications include an individual's ethnic characteristics, marital status, accommodation details, number of dependent children under the age of 16 and the economic activity of other members of the household. Job characteristics have also been included such as union membership, whether the job is full-time or part time, temporary or permanent, in the public or private sector and the size of the firm the individual is working in.

Finally note that the differentials between the academically qualified and the vocationally trained are almost identical under the Heckman Selection model as under IV. Specifically, at low levels of qualification, there is no premium paid to the academically qualified at NVQ Level 1, though a premium of 4.0% is paid to the academically qualified at NVQ Level 2 over their vocational counterparts. The differential in earnings under OLS are more than twice those produced under IV and Heckman procedures. However, all three estimating methods provide similar differentials at the higher end of the qualification spectrum. Under OLS, IV and Heckman, the earnings premia paid to the academically qualified at NVQ Level 4 stand at 10.7%, 13.6% and 12.8% respectively. Overall, irrespective of the model specifications utilised there is a consistent differential in earnings premia between the academically and vocationally trained at every level of qualification ranging from 8-10% at the lower levels of qualification (NVQ level 1 and 2) rising to 12-18% at higher levels of qualifications (NVQ Level 4).

5. Conclusions

There is a statistically significant differential in the earnings premium achieved by the academically and vocationally qualified at every level of qualification. This differential is invariant to the method of estimation and the data source. The differential approximates 8-10% at lower levels of qualification and 12-18% at higher levels of qualification.

The question that future research must attempt to answer is why does this differential exist and why does it persist? Several possibilities are suggested here, though none of these hypotheses have been tested empirically. First, the analysis assumes that academic and vocational qualifications are nominally equivalent and that there is no differential in ability between the academically and vocationally trained. It may well be the case that there is no differential in ability or personal characteristics between the academically and vocationally trained in the United Kingdom from a supply side perspective, however, it remains entirely plausible that employers may have alternative perceptions of those in possession of academic and vocational qualifications and thus the holders of these qualifications are rewarded differently in the labour market. Firms hiring the academically and vocationally trained males may have different characteristics or degrees of monopsony power in the local labour market that enable some firms specialising in the hiring of vocationally trained to pay lower wages to new recruits compared to those firms hiring the academically trained. In other words, the differential in earnings might be attributable to differences between firms. In an attempt to ascertain whether this is indeed the case, it might be possible to analyse whether it is the case that in firms where both the academically and vocationally trained are hired if a wage differential exists between different qualification type holders. Are the earnings differentials between the academically and vocationally trained due to differences between firms and associated hiring practices or attributable to differences within firms?

If it is the case that there are earnings differentials between the academically and vocationally trained within firms, then we must further analyse the personal characteristics of qualification holders and the characteristics associated with the actual qualifications and how these characteristics contribute to earnings differentials. For instance, if it is suggested that the academically trained are endowed with general or transferable skills and the vocationally trained are endowed with firm or industry specific skills, then the differential in the outside options possessed by potential employees may contribute to the degree of monopsony power held by the employer. In other words, the very nature of academic qualifications allows their recipients greater earnings and industry mobility compared to the vocationally trained and it is this that accounts for differences in earnings power. However, previous work (Conlon,

2000) illustrates that the level of qualification attained (irrespective of whether it is academic or vocational) determines labour market dynamics, whereas the type of qualification attained plays a negligible role. Therefore, an alternative hypothesis is also suggested to account for this differential in earnings.

Earnings differentials may exist within a firm due to differences in employers' perceptions of academic and vocational qualifications rather than the economic environment in which the firm trades. The manner of qualification provision in the United Kingdom is dichotomous in nature. The academic route of qualification attainment is characterised by central government determining the content and assessment of qualifications along a route that has clearly defined targets and requirements for progression to the next level on the ladder. Conversely, the vocational route has a more disparate structure of training provision, with the government traditionally allowing private (and multiple) institutions greater freedom in determining the content and assessment of vocational qualifications. Added to this is the fact that vocational qualifications are more numerous than academic qualifications, resulting in the fact that vocational qualifications are perhaps less informative about the skill or training that has been undertaken and completed by the individuals in question.

The outcome of this institutional framework of qualification provision is that individuals possessing academic qualifications might be considered to be in possession of more precise signal information to prospective employers compared to their vocational counterparts²⁰. Since academic qualifications are nationally administered, individuals are assessed on a common scale. An employer facing an academically qualified individual may be reasonably confident of the precision of the signal information associated with the academic qualification attained. In contrast, the local administration of vocational qualifications leads to different methods of assessment resulting in additional uncertainty regarding employee suitability. The implication is that the vocationally qualified, being holders of 'risky' qualifications, must pay a risk premium (through lower wages) to the employer due to the lack of precision associated with the attainment of vocational qualifications in the United Kingdom.

²⁰ It is clear that the school attended by the individual plays a role in the process of educational attainment. It is not simply that the individual in question exercises a free choice in the level or the type of qualification attained at the age of 16. It may be the case that attitudes towards debt have the effect of influencing individuals towards shorter educational courses (generally vocational) rather than longer academic qualifications. In addition, it is unwise to underestimate the effect that schools have in determining whether academic or vocational qualifications are undertaken. Schools may encourage or filter pupils into the most appropriate avenues for their perceived abilities and as a result it could be claimed that this school intervention is one reason why academic study is regarded more highly than the undertaking of vocational qualifications.

Appendix

Heckman Selection Correction Terms in NCDS Methodology

To correct for any bias associated with selection into employment by estimating a probit equation

$$EMPNOT_i = \delta' Y_i + \varepsilon_i''$$

where $EMPNOT_i$ is a normally distributed latent variable such that $EMPNOT_i = 1$ if $EMPNOT_i^* \geq 0$ and $EMPNOT_i = 0$ if $EMPNOT_i^* < 0$.

Following Heckman (1979), the inverse Mills' ratio is calculated as follows

$$\lambda_{EMPNOT_i} = \phi(\hat{\delta}Y) / \Phi(\hat{\delta}Y)$$

where ϕ represents the normal probability distribution function and Φ represents the normal cumulative distribution function and Y_i is a vector of exogenous variables that might affect an individual's selection into employment, namely

- School Type at Age 16
- Accommodation Details
- Marital Status
- Number of Dependent Children Under 16
- Economic Activity of Partner
- Region of Residence
- Industry

In order to correct potential bias associated with selection into higher or lower levels of schooling, an ordered probit is run as follows:

$$SCHOOL_i^* = \gamma' FAM_i + \varepsilon_i'''$$

where $SCHOOL_i^*$ is a normally distributed latent variable such that $SCHOOL_i = j$ if $\mu_{j-1} \leq SCHOOL_i^* \leq \mu_j$ where the 'cuts' μ_j are estimated from the model and $j = 0, 1, \dots, n \in N$. The Mills ratios are calculated using the following formula (Heckman, 1979)

$$\lambda_{SCHOOL_i} = \frac{\phi(\hat{\mu}_j - FAM_i' \hat{\gamma}) - \phi(\hat{\mu}_{j+1} - FAM_i' \hat{\gamma})}{\Phi(\hat{\mu}_j - FAM_i' \hat{\gamma}) - \Phi(\hat{\mu}_{j+1} - FAM_i' \hat{\gamma})}$$

again where ϕ represents the normal probability distribution function and Φ represents the normal cumulative distribution function. In this case $\hat{\mu}$ and $\hat{\gamma}$ are the estimated coefficients

from the ordered probit model. In the case of the National Child Development Study, the following vector FAM_i of personal and family background variables is utilised:

- Region of Residence At Age 16
- Father's Years of Education
- Mother's Years of Education
- Father's Social Class in 1965, 1969 Or 1974
- Accommodation Type in 1965, 1969 Or 1974
- Difficulties Experience By Household²¹
- Number of Siblings the Individual Had in 1974
- Child's Position in Sibling Order in 1974

Finally, we add an adjustment term in an attempt to correct for the possible endogeneity of the type of qualification attained. In the above equation, λ_{TYPE_i} corresponds to the inverse Mills ratio or qualification type adjustment term. In particular, we attempt to correct for any bias associated with selection into academic or vocational qualifications estimating a probit equation

$$TYPE_i = \delta' FAM_i + \varepsilon_i$$

where $TYPE_i = 1$ if an academic qualification have been undertaken and completed at any level, and 0 otherwise.

As before, the inverse Mills ratio is calculated as follows

$$\lambda_{TYPE_i} = \phi(\hat{\delta}'FAM_i) / \Phi(\hat{\delta}'FAM_i)$$

where ϕ represents the normal probability distribution function and Φ represents the normal cumulative distribution function and FAM_i is a vector of exogenous variables that might affect and individuals selection into academic qualifications, as previously mentioned.

²¹ The NCDS asks whether the family of the child has had difficulties in all of the following areas: Housing, Financial, Illness and Disability, Mental Illness, Mental sub normality, Father's death, Mother's death, Divorce, Separation, Unemployment, In-laws, Alcohol and Other. A positive response in any individual category is coded 1, and 0 otherwise. The variable used for our purposes is simply the sum of positive responses across all categories mentioned, and categorised as "None", "One" or "More than one".

**Table A1:
Description Of Vocational And Academic Qualifications By NVQ Equivalent Labour
Force Surveys 1999**

Highest Qualification	Post 16	Entry	Category	93	94	95	96	97	98
NVQ level 5	Workplace	None	Vocational	-	-	-	5	5	5
Higher Degree	7 years FTE	First Degree	Academic	5	5	5	5	5	5
NVQ level 4	Workplace	None	Vocational	-	-	-	4	4	4
Other Degree	5 years FTE	A Levels	Academic	4	4	4	4	4	4
First Degree	5 years FTE	GCE A Levels	Academic	4	4	4	4	4	4
Diploma in Higher Ed.	6 years FTE	First Degree	Academic	4	4	4	4	4	4
HNC/HND BTEC Higher	4 years FTE	1 GCE A	Vocational	4	4	4	4	4	4
Teaching (Further Ed)	6 years FTE	First Degree	Academic	4	4	4	4	4	4
Teaching (Secondary Ed)	6 years FTE	First Degree	Academic	4	4	4	4	4	4
Teaching (Primary Ed)	5 years FTE	GCE A Levels	Academic	4	4	4	4	4	4
Teaching (Not Stated)	5 years FTE	GCE A Levels	Academic	4	4	4	4	4	4
Nursing	4 years FTE	5 GCSE A*-C	Vocational	4	4	4	4	4	4
RSA Higher Diploma	5 years FTE	1 GCE A	Vocational	4	4	4	4	4	4
Oth Higher Ed. Below Deg.	3 years FTE	GCE A Levels	Academic	4	4	4	4	4	4
NVQ level 3	Workplace	None	Vocational	-	-	-	3	3	3
GNVQ/GSVQ Advanced	2 years FTE	5 GCSE A*-C	Vocational	-	-	-	3	3	3
2+ GCE 'A' Level Passes	2 years FTE	5 GCSE A*-C	Academic	3	3	3	3	3	3
RSA Advanced Diploma	3 years FTE	1 GCE A	Vocational	3	3	3	3	3	3
OND/ONC/BTEC Natl	2 years FTE	4 GCSE A*-C	Vocational	3	3	3	3	3	3
C&G Advanced Craft	Workplace	C&G Craft	Vocational	3	3	3	3	3	3
Scottish 6 th Year (CSYS)	2 years FTE	Scot Equiv.	Academic	3	3	3	3	3	3
2+ SCE Hr Passes A-C	2 years FTE	Scot Equiv.	Academic	3	3	3	3	3	3
NVQ level 2	Workplace	None	Vocational	-	-	-	2	2	2
1 GCE 'A' Level Pass	2 years FTE	5 GCSE A*-C	Academic	2	2	2	2	2	2
1 SCE Higher Pass	1 year FTE	Scot Equiv.	Academic	2	2	2	2	2	2
A/S Level	1 year FTE	5 GCSE A*-C	Academic	2	2	2	2	2	2
Trade Apprenticeship	Workplace	None	Vocational	2	2	2	2	2	2
GNVQ Intermediate	1 year FTE	2 GCSE A*-D	Vocational	-	-	-	2	2	2
RSA Diploma	1 year FTE	5 GCSE A*-C	Vocational	2	2	2	2	2	2
C&G Craft	Workplace	None	Vocational	2	2	2	2	2	2
BTEC First or Gen Dip	1 year FTE	None	Vocational	2	2	2	2	2	2
GCSE A*-C (O level)	-	-	Academic	2	2	2	2	2	2
NVQ level 1	Workplace	None	Vocational	-	-	-	1	1	1
GNVQ Foundation Lvl	1 year FTE	None	Vocational	-	-	-	1	1	1
GCSE below C (CSE)	-	None	Academic	1	1	1	1	1	1
BTEC First or Gen Cert	1 year PTE	None	Vocational	1	1	1	1	1	1
SCOTVEC modules	-	None	Vocational	1	1	1	1	1	1
RSA Other	1 year FTE	2 GCSE A*-C	Vocational	1	1	1	1	1	1
City and Guilds Other	Workplace	None	Vocational	1	1	1	1	1	1
YT/YTP Certificate	Workplace	None	Vocational	1	1	1	1	1	1
Other Qualification	Workplace	None	Vocational	1	1	1	1	1	1
No Qualifications	-	-	-	0	0	0	0	0	0

Table A2: Instrumental Variables Estimates of the Returns to Education Labour Force Surveys 1993-1998: Males 16-59

	1993		1994		1995		1996		1997		1998		1993-1998	
	Red form Schooling	IV log earnings												
Constant	2.86 (.1768)	-.311 (.188)	2.808 (.178)	.183 (.1764)	1.45 (2.453)	-.646 (.183)	3.306 (1.37)	-.394 (.151)	2.754 (.449)	-.348 (.104)	2.20 (.361)	-.331 (.083)	2.536 (.266)	-.300 (.037)
Years of Schooling		.076 (.035)		.043 (.031)		.060 (.035)		.023 (.026)		.052 (.021)		.059 (.031)		.045 (.0118)
Academic Level 1	-	.139 (.039)	-	.120 (.038)	-	.106 (.042)	-	.146 (.031)	-	.093 (.022)	-	.174 (.024)	-	.127 (.0120)
Academic Level 2	-	.237 (.032)	-	.232 (.031)	-	.219 (.035)	-	.361 (.037)	-	.241 (.026)	-	.309 (.028)	-	.255 (.0120)
Academic Level 3	-	.531 (.043)	-	.399 (.042)	-	.480 (.048)	-	.479 (.041)	-	.396 (.030)	-	.513 (.033)	-	.458 (.0150)
Academic Level 4	-	.560 (.034)	-	.584 (.033)	-	.537 (.038)	-	.674 (.031)	-	.533 (.025)	-	.675 (.028)	-	.588 (.0120)
Academic Level 5	-	.690 (.048)	-	.678 (.047)	-	.618 (.056)	-	.753 (.044)	-	.559 (.035)	-	.729 (.039)	-	.652 (.0180)
Vocational Level 1	-	.045 (.034)	-	.059 (.047)	-	.064 (.038)	-	.074 (.032)	-	-.001 (.023)	-	.072 (.024)	-	.044 (.0120)
Vocational Level 2	-	.139 (.027)	-	.189 (.028)	-	.151 (.033)	-	.148 (.029)	-	.123 (.021)	-	.172 (.023)	-	.150 (.0100)
Vocational Level 3	-	.255 (.037)	-	.198 (.039)	-	.215 (.047)	-	.231 (.033)	-	.229 (.026)	-	.305 (.027)	-	.243 (.0130)
Vocational Level 4	-	.434 (.041)	-	.417 (.036)	-	.382 (.045)	-	.427 (.040)	-	.348 (.029)	-	.465 (.031)	-	.403 (.0150)
Vocational Level 5	-	-	-	-	-	-	-	-	-	.501 (.154)	-	.505 (.112)	-	.348 (.0830)
Minimum SLA	.182 (.1511)	-	.189 (.1425)	-	.202 (.1585)	-	.224 (.2787)	-	.007 (.4449)	-	.247 (.1539)	-	.192 (.0623)	-
Experience	.110 (.082)	.069 (.006)	.101 (.076)	.057 (.006)	.123 (.096)	.085 (.006)	.113 (.065)	.071 (.006)	.099 (.072)	.072 (.004)	.105 (.068)	.075 (.004)	.104 (.052)	.071 (.002)
(Experience)2	-.006 (.001)	-.0007 (.08)	-.005 (.001)	-.0005 (.08)	-.006 (.001)	-.0009 (.08)	-.005 (.000)	-.0007 (.08)	-.006 (.001)	-.0007 (.05)	-.006 (.001)	-.0008 (.05)	-.006 (.001)	-.0007 (.02)
Yorkshire	.052 (.1516)	-.069 (.039)	.196 (.1577)	.038 (.0409)	.436 (.1553)	-.034 (.045)	.164 (.1580)	-.012 (.037)	.429 (.1110)	-.046 (.027)	.272 (.1170)	-.021 (.031)	.278 (0.56)	-.006 (.013)
East Midlands	.211 (.1570)	-.003 (.040)	.234 (.1624)	.009 (.0427)	.193 (.1636)	.059 (.0466)	.323 (.1640)	-.434 (.039)	.444 (.1146)	-.049 (.028)	.369 (.1205)	-.014 (.034)	.321 (.0579)	.009 (.0143)
East Anglia	.577 (.1873)	-.088 (.052)	.459 (.1919)	.064 (.0502)	.364 (.1832)	.007 (.0553)	.287 (.1877)	.036 (.044)	.608 (.1344)	-.012 (.034)	.367 (.1413)	-.128 (.039)	.455 (.0671)	.012 (.0179)
London	1.240 (.148)	.125 (.0585)	1.555 (.155)	.264 (.0663)	1.442 (.153)	.254 (.0663)	1.621 (.154)	.201 (.0582)	1.645 (.109)	.171 (.0438)	1.588 (.113)	.152 (.0608)	1.534 (.054)	.209 (.0225)
South East	.656 (.1353)	.065 (.0418)	.842 (.1407)	.078 (.0459)	.836 (.1386)	.145 (.0489)	.586 (.1380)	.114 (.0369)	.920 (.0986)	.057 (.0311)	.895 (.1034)	-.044 (0.04)	.820 (.0496)	.114 (.0159)
South West	.329 (.1552)	.035 (.0415)	.476 (.1586)	.006 (.0437)	.502 (.1575)	.047 (.0466)	.528 (.1578)	-.001 (.039)	.777 (.1134)	-.092 (.032)	.562 (.1184)	-.108 (.036)	.563 (.0567)	-.003 (.015)
West Midlands	.124 (.1520)	-.005 (.039)	.066 (.1559)	.031 (.0405)	.145 (.1524)	.057 (.0426)	.287 (.1556)	.013 (.0373)	.319 (.1090)	-.038 (.027)	.346 (.1145)	-.056 (.032)	.242 (.0551)	.021 (.0138)
Manchester	.092 (.1528)	-.028 (.039)	.335 (.1572)	.096 (.0410)	.378 (.1554)	.090 (.0428)	.137 (.1551)	.010 (.0363)	.517 (.1116)	-.057 (.028)	.429 (.1169)	-.069 (.034)	.351 (.0559)	.005 (.0145)
Merseyside	.014 (.2331)	-.061 (.057)	.197 (.2296)	.180 (.0618)	-.143 (.242)	.160 (.0736)	.119 (.2373)	-.041 (.057)	.358 (.1620)	-.004 (.039)	.280 (.1718)	.058 (.0468)	.187 (.0833)	.016 (.0195)
Wales	.105 (.1780)	-.028 (.045)	.222 (.1797)	.088 (.0480)	.695 (.1798)	.044 (.0538)	.240 (.1899)	-.008 (.042)	.463 (.1257)	-.052 (0.31)	.416 (.1341)	.031 (.0376)	.347 (.0641)	.001 (.0151)
All Emp in hhld	.186 (.0933)	.082 (.0252)	.032 (.0907)	.259 (.0231)	.147 (.2421)	.113 (.0330)	.001 (.0897)	.082 (.0244)	.125 (.0629)	.135 (.0190)	.078 (.0629)	.337 (.0172)	.098 (.0320)	.104 (.0100)
Black	.047 (.270)	-.239 (.077)	.238 (.2861)	.007 (.0831)	.384 (.2886)	-.204 (.076)	.343 (.2846)	-.131 (.080)	.668 (.1728)	-.182 (.044)	1.016 (.187)	-.041 (.060)	.592 (.0942)	-.146 (.026)
Indian	1.517 (.187)	-.369 (.077)	.987 (.202)	-.285 (.065)	2.198 (.192)	-.278 (.097)	1.334 (.210)	-.141 (.067)	1.244 (.135)	-.160 (.045)	1.417 (.140)	-.125 (.062)	1.425 (.069)	-.221 (.025)
Pakistani	.526 (.7355)	-	3.778 (.677)	-.181 (.263)	2.142 (.708)	-.107 (.196)	1.914 (.792)	-.240 (.153)	1.432 (.431)	-.223 (.124)	2.075 (.460)	.213 (.1530)	1.938 (.237)	-.189 (.074)
Chinese	2.703 (.363)	-.284 (.127)	3.339 (.400)	-.018 (.157)	2.415 (.435)	-.310 (.147)	3.201 (.423)	-.002 (.136)	2.025 (.259)	-.219 (.082)	1.958 (.247)	.001 (.0970)	2.377 (.133)	-.193 (.048)
March-May Birth	.102 (.1589)	-	-.050 (.146)	-	-.043 (.152)	-	-.033 (.145)	-	.032 (.1211)	-	-.068 (.109)	-	-.053 (.032)	-
June-Aug Birth	-.035 (.144)	-	-.160 (.147)	-	-.165 (.150)	-	-.235 (.147)	-	-.052 (.102)	-	-.026 (.056)	-	-.092 (.043)	-
Sep-Nov Birth	.142 (.1563)	-	.075 (.1522)	-	.120 (.1498)	-	.105 (.1520)	-	.202 (.1029)	-	.164 (.1012)	-	.102 (0.530)	-
1994													0.043 (.043)	-.011 (.010)
1995													0.096 (.043)	-.111 (.367)
1996													0.081 (.043)	-.059 (.367)
1997													0.104 (0.37)	-.059 (.367)
1998													-.113 (0.40)	-.024 (.367)
n	3385	3385	3365	3365	3447	3447	3348	3348	7527	7527	7411	7411	28496	28496
R2	.0611	.4329	.0745	.4535	.0735	.4701	.0801	.4814	.0693	.4323	.0536	.4131	.0663	.4319

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