

CHAPTER 16

The Returns to Education in the UK

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1 Introduction¹

This chapter outlines the main features of the UK education system and how that has changed over time; explains the way in which education is financed; briefly surveys the available literature on the returns to education; and presents some new estimates of the returns using a variety of specifications and data sets.

Section 2 outlines the main features of the UK system of education. Section 3 reviews some of the more relevant contributions to the UK applied literature. Section 4 presents new estimates.

2 The UK education system

The UK system is surveyed in more detail in DfEE (1999) and the higher education system is described in Dearing (1998). Below we highlight the essential points.

In Great Britain (GB) parents have a legal duty to ensure that their children obtain education between their 5th and 16th birthdays.² After the age of 16, when education is no longer compulsory, some 70 per cent stay in education, either at school (usually known as sixth-form education) or at further education (FE) colleges. Others go into work, with unemployed school-leavers guaranteed a place on the Government's training programmes for young people.

Many children under five attend state nursery schools or nursery classes attached to primary schools. Others may attend playgroups in the voluntary sector or in privately run nurseries. In England and Wales, many primary schools also operate an early admission policy where they admit children under five into reception classes.

¹ The data was supplied by the Economic and Social Research Council's Data Archive at the University of Essex and are used with permission of Controller of Her Majesty's Stationery Office.

² The minimum school leaving age was raised from 14 to 15 in 1947 and to 16 in 1974 (1975 in Scotland). In Northern Ireland (NI), compulsory schooling begins at age four.

Nursery provision for three-year-olds in the state sector is funded at the discretion of Local Education Authorities (LEA) while places for children under three in voluntary or private pre-school settings are paid for largely by parents. Arrangements in Scotland are broadly similar. The government has recently implemented a free child-care programme for 4-year olds and intends to extend this to 3-year olds in the near future. Much of this free care is provided by schools which has effectively reduced the school starting age to 4.

93 per cent of pupils go to publicly funded schools, usually known as state schools. These make no charge to parents. In most areas children aged five to 10 attend primary schools, and move on to secondary schools at 11 for education up to the age of 16 or beyond. Almost all children in GB enter “comprehensive” schools at age 11 with a small proportion of areas maintaining a distinction between “grammar” schools which provide an academic education and “secondary modern” which traditionally provide a more vocational training. Entry to grammar schools is competitive on the basis of a test at age 11. However, the distinction is now less important because GB and NI have adopted a “national curriculum” which compels all (state-financed) schools to teach exactly the same topics. Independent schools are not funded by state and obtain most of their finances from fees paid by parents and income investments. Some of the larger independent schools are known as public schools. Most boarding schools are independent schools. Qualifications are as in the state sector.

In Scotland, 32 Scottish Local Authorities are responsible for the provision of education locally. School Boards, with elected parent and teacher members, play an important part in the running of Scottish State schools. There are three school categories: state schools, which are maintained and controlled by the LEA; grant-aided schools (including those for special educational needs); self-governing schools (equivalent to grant-maintained schools in England).

In Northern Ireland State schooling is administered centrally by the Department of Education and locally in controlled schools by five Education and Library Boards. There are several categories of school: controlled schools; voluntary maintained schools and voluntary grammar schools. Although all schools in Northern Ireland are open to pupils of all religions, most Roman Catholic pupils attend schools under Catholic management and most Protestant

children attend controlled schools and non-denominational voluntary grammar schools.

In England, Wales and Northern Ireland GCSEs (General Certificate of Secondary Education) are normally taken at age 15–16. Pupils are tested by assessment of work during the course and examinations at the end of the course. GCSEs replaced the ordinary level (O level) and Certificate of Secondary Education (CSE) qualifications in 1988. GCE A level (General Certificate of Education Advanced level) and AS (Advanced Supplementary) examinations are usually taken after two years of further education (mostly aged 18). Passes are graded from A to G (A being the highest grade) primarily on final examinations and provide the main academic qualification for entry to higher education. GCE AS level examinations are at the same standard as GCE A levels, but each examination covers less content

In Scotland the Scottish Certificate of Education, Standard and Higher Grades, are equivalent to the GCSE and GCE A level. The Certificate of Sixth Year Studies (CSYS) builds on Higher Grade, encouraging independent study in preparation for higher education and the world of work. Assessment is by external exam and, in most cases, dissertation or project report.

Young people who decide to stay on in education at the age of 16 usually move into further education (FE). This is provided by a diverse range of institutions, including: sixth forms in secondary schools and sixth form colleges (in England and Wales only); general further education colleges; agricultural and horticultural colleges; art and design colleges; and specialist institutions such as the College of the Sea.

From April 1993, colleges of further education, tertiary colleges and sixth form colleges which previously received grants direct from the Government were given the autonomy to run their own affairs within the further education sector. Colleges are free to determine their own policies regarding tuition fees, except for 16 to 18 year-old home and EU students in full-time education, for whom tuition fees are not usually charged. The Further Education Funding Council (England) funds education and training in 446 institutions, and is responsible for ensuring universal availability of further education places.

A large proportion of young people (about one-third in England and Wales and almost half in Scotland) continues in education at a more advanced level beyond the age of 18. This higher education (HE) sector provides a variety of courses up to degree (usually 3 years) and postgraduate degree level. Over 50 per cent of students are now aged over 25 and many study part-time. Up to 1998 higher education institutions were funded by grant and fees paid by the Government on behalf of students. Tuition fees of £1,000 per year were introduced in 1998 – representing a quarter of the average cost of a course. Tuition remains free for students from lower income families. Loans will not be available for tuition fees. Students do, however, receive grants and subsidised loans to cover their living expenses.

There are 89 universities (one of which, the University of London, comprises over 40 institutions) and 19 colleges and institutes of higher education which have the power to award their own degrees. These include the former polytechnics or new universities, which gained degree awarding in the early 1990s. There are 34 other colleges of higher education, which do not have degree-awarding powers, but provide courses leading to degrees validated by universities. There are currently 1,194,500 full-time and 662,100 part-time students in higher education in the UK.

The Open College provides individuals and employers with open learning courses and support materials. It was initially funded by the Government but is now self-financing. The Open University has pioneered open and distance learning at university level in Britain and has grown to become the country's largest single teaching institution. No formal academic qualifications are required to enrol on undergraduate courses, but the standard of its degrees and other qualifications are as high as those of other universities. In 1995 more than 150,000 students were registered with the Open University, over 10,000 at post-graduate level.

General National Vocational Qualifications (GNVQs), (GSVQs in Scotland) combine general and vocational education. GNVQs provide a path into both education and employment. They are normally studied in school or college. National Vocational Qualifications (NVQs), (SVQs in Scotland) are occupation specific. Based on the competencies required in particular occupations, NVQs are made up of a number of units, which set out industry-defined standards of occupational competence. These describe the

skills and knowledge people need to be able to perform effectively at work.

3 The previous literature

The aim of this literature review is to show the current state of knowledge in the applied research into the private returns to education in the United Kingdom. We endeavour to identify the robustness of results to the choice of data set, model specification and estimation procedure. The first section gives a brief overview of the literature in tabular form. Following on from this we present a more detailed description of the data sets used, the specification of the earnings equation, the estimation procedures and finally the main results

Table 1 outlines the period, data set and variables used in the selected studies. The dependent variable is the logarithm of earnings throughout. Harmon and Walker (1995) use pooled *Family Expenditure Survey* (FES) data for 1978 to 1986. Miles (1997) uses FES data for individual years. In the FES the sample size each year is around 5,000. Harmon and Walker (1999a) use pooled *General Household Survey* (GHS) data for 1974 to 1994. Each year contains approximately 20,000 observations, of which about half have employee/wage data. Bell (1996), Dearden (1998) and Harmon and Walker (1999b) uses the *National Child Development Survey* (NCDS) data, which is a continuing longitudinal survey of people who were born between 3 and 9 March 1958. There have been five waves, the last being in 1991. There were initially over 18,000 in the study, of which 5,000 have been lost due to attrition. Hildreth (1997) and Ermisch and Francesconi (1997) use *BHPS data* for the years 1991 and 1995. The BHPS is a panel survey of 5,500 households (over 10,000 individuals) interviewed annually. Brown and Sessions (1998) use pooled *British Social Attitudes* (BSA) survey data. Beginning in 1983 there are around 3,000 adults in each annual survey.

Bell (1996), Brown and Sessions (1998), Dearden (1998), Ermisch and Francesconi (1997), Hildreth (1997) and Harmon and Walker (1995, 1999a, 1999b) use the log real gross hourly wage using the Retail Price Index as the deflator where necessary. Miles (1997) uses the “normal” level of net weekly household earnings.

Table 1. Summary of previous specifications

	Bell (1996)	Brown & Sessions (1998)	Dearden (1998)	Ermisch & Francesconi (1997)	Harmon & Walker (1995)
Year	1991	1985-1994	1991	1991-1995	1978-86
Data Set	NCDS	BSA	NCDS	BHPS	FES
Data Type	Panel	X Section	Cohort	Panel	X Section
Education Yrs	✓	✓			✓
Qualifications		✓	✓	✓	
Age				✓	✓
Age ²				✓	✓
Experience		✓			
Experience ²		✓			
Region			✓		✓
Family			✓	✓	
School Type			✓		
Employer	✓		✓		
Trade Union	✓		✓		
Sex	✓	M only	✓	✓	M only
Year		✓			✓
Ability	✓		✓		
Occupation	✓				
IV/H2S			✓	✓	✓
Work Selection		✓*		✓	

Note: * Corrected for selectivity into employment and self-employment.

	Harmon & Walker (1999a)	Harmon & Walker (1999b)	Hildreth (1997)	Miles (1997)	Blundell, et al. (1997)
Year	1974-94	1991	1991, 1995	1983, 86, 90	1991
Data Set	GHS	NCDS	BHPS	FES	NCDS
Data Type	X-Section	Cohort	Panel	X-Section	Cohort
Education Yrs	✓	✓	✓	✓	
Qualifications			✓		✓
Age	✓		✓	✓	
Age ²	✓		✓	✓	
Experience			✓		
Experience ²			✓		
Region	✓	✓	✓	✓	✓
Family		✓			✓
School Type		✓	✓		✓
Employer			✓		✓
Trade Union			✓		✓
Sex	M only	M only	✓	✓	✓
Year	✓				
Occupation			✓	✓	
IV/H2S	✓	✓			✓
Work Selection			✓**		✓***

Notes: ** Also corrects for selectivity by union status.

*** Also corrects for selection of sample with A-levels.

Harmon and Walker (1995) and Harmon and Walker (1999a) use years of full-time schooling imputed from the reported school leaving age. Miles (1997) uses the actual school leaving age. Harmon and Walker (1999a) also introduce school leaving age dummies to allow for non-linearity. Harmon and Walker (1999b) uses years of post-16 schooling. Bell (1996), Dearden (1998), Brown and Sessions (1998) and Hildreth (1997) use both years of schooling and qualifications, again to allow for non-linearity in returns. Ermisch and Francesconi (1997) use O level, A level and “higher” dummies and interactions between these and age.

Hildreth (1997) uses both age and actual experience. Brown and Sessions (1998) use potential experience and potential experience squared. Ermisch and Francesconi (1997) use age and age squared, together with their interactions with qualifications. Due to the fact that experience is endogenous Harmon and Walker (1995) and Harmon and Walker (1999a) use age and age squared. Miles (1997) use age and age squared interacted with employment status to allow the life-cycle profile of earnings.

Dearden (1998) uses ordinary least squares (OLS) to obtain estimations of the standard Mincerian earnings function. She then uses the instrumental variable (IV) approach on years of schooling, and on the qualifications model uses a selection model where years of schooling is treated as an ordered probit to overcome the fact that schooling is not a continuous variable. This is a Heckman (1979) two-step procedure where a correction term (the inverse Mills’ ratio) is obtained in the first-stage reduced form equation, and then included as a regressor in the earnings function. Separate estimates are obtained for males and females.

Harmon and Walker (1995) and Harmon and Walker (1999a) estimate using OLS, and then IV (and the Heckman two-step model to correct for the fact that schooling is not a continuous variable). Harmon and Walker (1999a) also use a dummy variables model to allow for non-linearity. Harmon and Walker (1999b) uses OLS and IV on the endogenous component of education. Ermisch and Francesconi (1997) follow a similar approach to Harmon and Walker (1999b) with corrections being included for participation and education selections. The reliance on only qualifications does allow for some non-linearity. Brown and Sessions (1998) again use two-steps, the first of which is a multinomial logit regression to provide a correction term for selection into unemployment, self-employment or

general employment. The second step is again OLS with the relevant correction term included. They endeavour to distinguish between signals of ability and the actual increase in human capital, by utilising the fact that the self-employed give no weight to a signal. Hildreth (1997) provides OLS estimates after selection into unions has been corrected for and includes gender decompositions. This paper attempts to explain changes in the union wage differential. Miles (1997) uses standard OLS in trying to explain cross-sectional variations in household incomes. Bell (1996) obtains standard OLS estimates both with and without ability dummies.

Table 2. Rate of returns to years of schooling

	Males		Females	
	OLS	IV	OLS	IV
Dearden (1998)	4.8%	5.5%	8.3%	9.3%
Harmon and Walker (1995)	6.1%	15.2%		
Harmon and Walker (1999a)	4.1%	14.0%		
Hildreth (1997)*	5.0%		5.0%	
Miles (1997)	≈3%		≈3%	
Brown and Sessions (1998)	10.8%			
Bell (1996*)	4.6%		4.6%	
Harmon and Walker (1999b)	5.1%	9.9%		

Table 3. Total returns to qualifications

		Males		Females	
		OLS	IV	OLS	IV
Dearden (1998)	A level	37.6%	41.7%	37.2%	43.9%
	Degree	50.1%	56.2%	63.6%	73.8%
Hildreth (1997***)	A level	30.9%		30.9%	
	Degree	68.2%		68.2%	
Brown and Sessions (1998)	A level	34.3%			
	Degree	71.2%			
Ermisch and Francensconi (1997**)	A level	0.6%	9.6%	43.5%	
	Degree	26.4%	36.4%	71.3%	
Blundell et al. (1997) ****	Degree	20.8%	17.1%	39.1%	36.8%
Bell (1996)	A level	25.9%		25.9%	
	Degree	45.2%		45.2%	

Notes: * Males and females in the same equation.

***** Education not found to be endogenous for females.

***** Qualification returns calculated as the sum of the returns to years of schooling and qualification dummies.

***** Omitted category is A-level.

Dearden (1998) obtains OLS estimates of 4.8% and 8.3% for males and females, respectively, for the returns to years of schooling, (5.5% and 9.3% using IV). Using OLS Harmon and Walker (1995) and Harmon and Walker (1999a) estimate the male returns to be 6.1% and 4.1%, respectively, which dramatically understates the IV estimates of 15.2% and 14.0%. This downward bias of OLS estimates is consistent with other international studies. Each year of extra schooling in the non-linear model of Harmon and Walker (1999a) provides returns of approximately 5% with OLS, which are roughly doubled when using IV. Harmon and Walker (1999b) who obtain an OLS estimate of 5.1% and an IV estimate of 9.9% support this. Dearden (1998) obtains OLS estimates, using qualifications, of around 15% and 9% per year for males, and 15% and 12% for females, for A-level and degree study respectively.

Hildreth (1997) estimates 5% returns per year with additional estimates for qualifications obtained and place of study. This result is for pooled 1991 and 1995 data with males and females both included. Brown and Sessions (1998) also obtain estimates of the returns to an additional year of schooling of 10.8% for males. Miles (1997) acknowledges the potential downward bias of his estimated returns of 3% due to the holding constant of occupation whilst changing education. Ermisch and Francesconi (1997) estimate returns of approximately 2.5% and 10% per year for males, and 16% and 20% for females, for A-level and degree study respectively, when taking the average of nine slightly different model specifications. Bell (1996) obtains OLS results (not including ability dummies) consistent with other studies. Blundell et al. (1997) using a group with at least one A level as a reference group, obtain estimates for the returns to higher education. Those who obtain a degree have an OLS estimated return of 20.8% for men and 39.1% for women (17.1% and 36.8% having controlled for selection into employment as well as into further education and instrumented for ability).

4 New estimates of the returns to education

This section presents preliminary descriptions of the stylised facts and some estimates of the returns to education for a variety of simple models using several of the available data sets from the UK.

Figure 1. Education and wages - GB men and women in FES

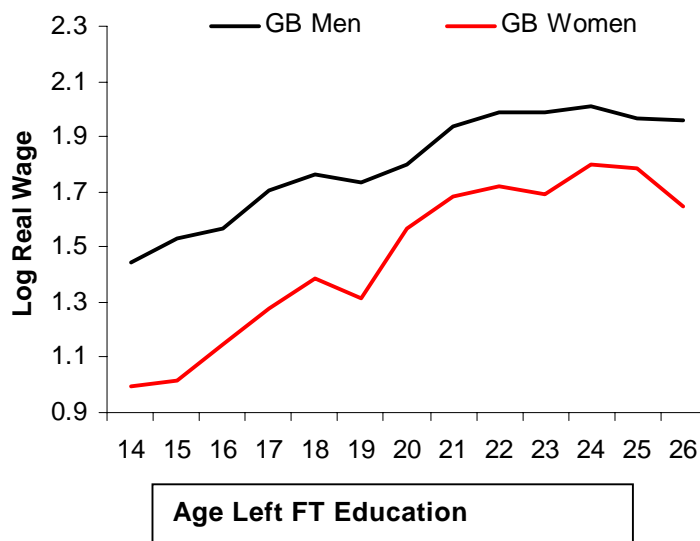


Figure 2. Education and wages - GB men and women in FRS

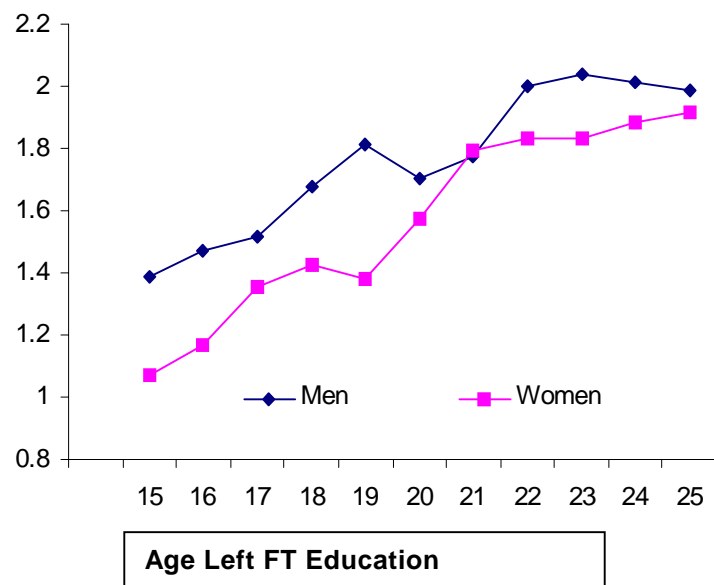


Figure 3. Age and wages by age left school - GB men in FES

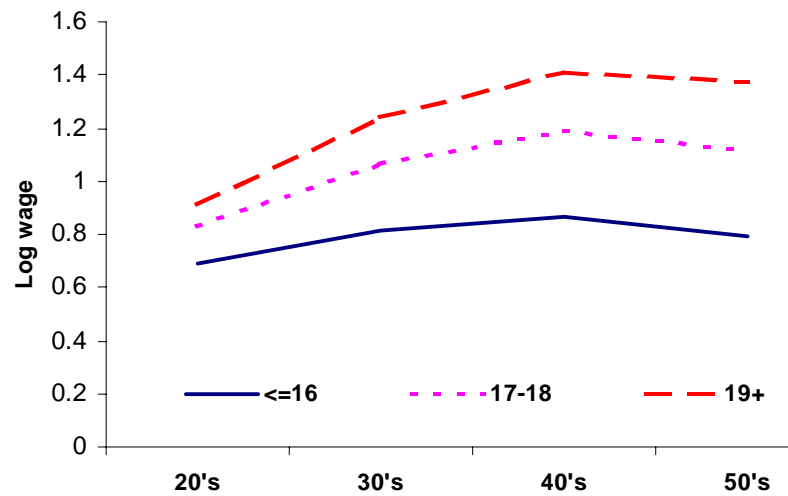
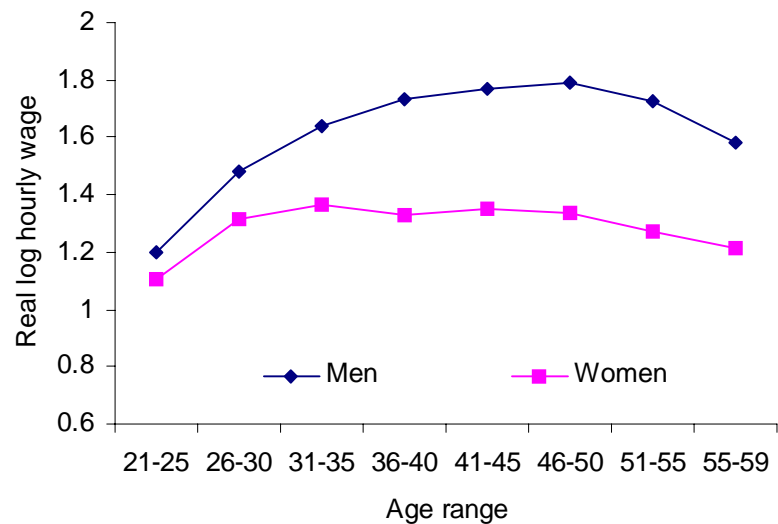


Figure 4. Age and wages - GB men and women in FRS



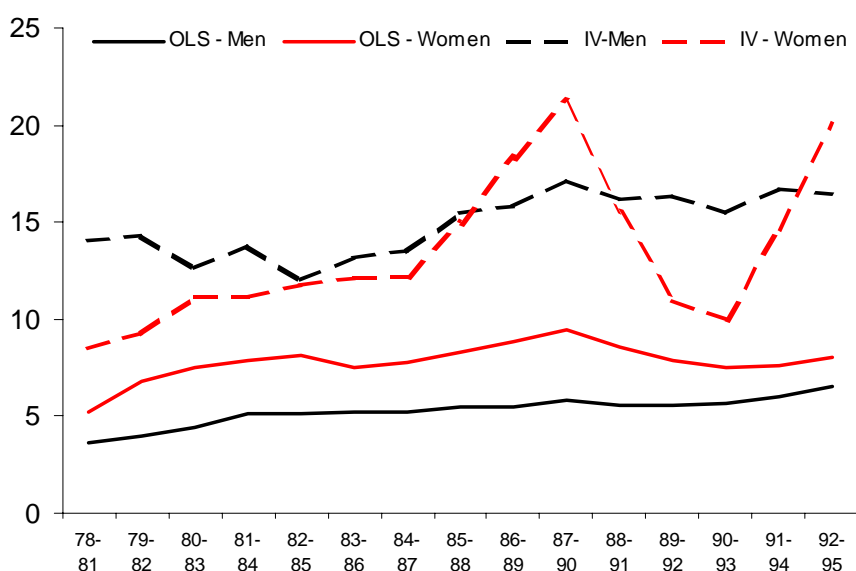
The FES is a random sample of approximately 7,000 households each year and years of education is available for every year from 1978. Figure 1 shows the approximately linear relationship between full-time school leaving age and the log real hourly wage

(there are few observations above 24 and below 15 or in the 19/20 “dip”) for men and women aged 21–59 in Great Britain (i.e. UK excluding Northern Ireland). Note that the relationship for men is distinctly flatter than for women.

The FRS data is a random sample of approximately 25,000 households conducted every year from 1993/4 and Figure 2 shows the same relationship between wages and education in that data.

Figure 3 shows the relationship between log wages and age for individuals with different levels of schooling (for GB men aged 21–59) in FES. Figure 4 shows the average relationships for men and women in FRS pooled for the three years 93/4–96/7. Note the characteristically flatter shape for those with lower levels of education and for women.

Figure 5. Estimated returns to education: UK FES 1978–95



Note: Each estimate is obtained from pooling four consecutive years. Estimates control for quadratic in age, region and year dummies. Instruments are minimum school leaving age dummies and smoking dummy. Total sample is 16,780 women and 25,200 men.

The availability of FES over a long period of time allows us to test for stability of returns over time. In Figure 5 we present estimates of the rate of return estimated from pooling successive four years of FES data using OLS and IV where we instrument education by minimum school leaving age dummies (see Harmon and Walker, 1995) and a smoking dummy (see Evans and Montgomery, 1994). The estimates are highly significant and the differences between men and women and between IV and OLS are statistically significant. The IV estimates are reasonably robust to changes in the instrument set used (see Harmon and Walker, 1999a). Tests of the stability of the estimates over time show significant rises in returns for both IV and OLS up to the early 1990s but not thereafter.

The finding that the returns have been rising, and certainly not falling, is surprising in the light of the dramatic increases in the higher education participation rate that took place over this period. It suggests that the large increase in the supply of graduates failed to keep pace with the demand for them.

In Table 4 we use the pooled FRS data to show that the estimated returns to education vary with respect to the definition of experience. Using a quadratic in age tends to produce the lowest returns of approximately 8% for men and 11% for women, while using potential experience (age minus education leaving age) or actual experience

Table 4. Estimated OLS rates of return: FRS GB employees aged 21-59

	Age	Actual experience	Potential experience	Sample size
All - no gender dummy	0.0943 (0.0009)	0.1183 (0.0009)	0.1085 (0.0010)	59045
All - with gender dummy	0.0925 (0.0009)	0.1085 (0.0009)	0.1068 (0.0009)	59045
Men	0.0793 (0.0012)	0.0986 (0.0012)	0.0987 (0.0013)	29685
Women	0.1066 (0.0012)	0.1200 (0.0012)	0.1161 (0.0013)	29360

Note: All specifications include union membership, region dummies, unemployment by region and month, and a monthly trend variable.

rience (recorded in the data as the sum of the number of years of part-time and full-time work since leaving full-time education) indicates a return to education of approximately 10% for men and 12% for women. The sample sizes are large and the estimates are very precise so even these small differences are statistically significant.

Table 5. OLS rates of return and PT work: FRS GB employees aged 21-59

	All	Men	Women
No hours control	0.0975 (0.009)	0.0842 (0.0012)	0.1121 (0.0013)
PT dummy included	0.0948 (0.0009)	0.0850 (0.0012)	0.1061 (0.0012)
PT instrumented	0.0983 (0.0011)	0.0857 (0.0015)	0.1019 (0.0016)

Note: Estimates control for age, age squared, union status, trend, marital status and gender. Instrument set includes unearned income.

Figure 6. Returns to education by region: men and women in FES/NIFES

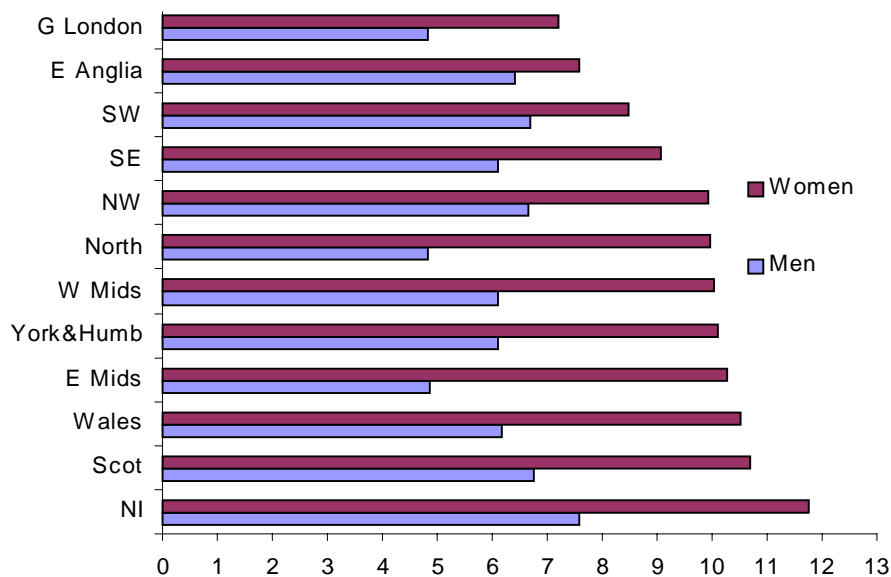


Table 5 shows how the estimated return to education varies according to whether individuals are full- or part-time workers. We instrument part-time status with unearned income although this has no effect on the estimated education return which remains at around 8% for men and 11% for women.

In Figure 6 we use the GB FES and the NIFES pooled together and investigate the extent to which returns to education differ across region. The returns in Northern Ireland are significantly higher than in GB but within GB the differences are not significant.

Finally we use the British Household Panel Survey to investigate the robustness of the return to education to the use of other con-

Table 6. Estimated OLS rates of return: BHPS GB employees aged 21-59, Wave 4

	All	Men	Women
Basic specification	0.071 (0.003)	0.0588 (0.004)	0.0838 (0.004)
with plant size dummies	0.686 (0.003)	0.0564 (0.004)	0.0815 (0.004)
with quadratic in tenure and plant size dummies	0.0695 (0.003)	0.057 (0.004)	0.0818 (0.004)
Sample size	3384	1597	1787

Note: Estimates control for age, age squared, union status, region, marital status and gender.

Table 7. OLS rates of return: BHPS GB employees aged 21-59, Waves 1-6

Wave	All	Men	Women
1991	7.62 (0.38)	6.95 (0.43)	9.43 (0.65)
1992	7.18 (0.30)	6.16 (0.40)	8.16 (0.44)
1993	7.13 (0.31)	5.57 (0.41)	8.64 (0.44)
1994	7.10 (0.31)	6.94 (0.40)	8.38 (0.44)
1995	6.76 (0.32)	5.86 (0.44)	7.32 (0.46)
1996	7.20 (0.32)	6.58 (0.45)	7.41 (0.46)

Note: Estimates control for age, age squared, union status, region, foreign-born, marital status and gender.

trol variables: tenure in the current job and plant size. The results are summarised in Tables 6 and 7. In Table 6 we use just Wave 4 (September 1994) of the BHPS and show that the estimated OLS returns are higher for women than for men but stable with respect to the inclusion of plant size and length of tenure controls. In Table 7 we show that the returns vary little across waves, relative to the precision of the estimates, using the basic specification.

5 Conclusion

The results suggest that the rate of return is stable in the face of specification changes, but that education is endogenous and that estimates which instrument education find substantially higher returns. The returns for men are lower than for women. There is some suggestion that the returns have risen over the 1980s but have remained static since. A reasonable summary of the results suggests that the returns to education estimated by OLS for GB are, in recent years, approximately 7–10% for men and 8–12% for women. However, estimates obtained using a variety of instruments suggest that these OLS estimates are biased downwards quite considerably and that the true returns are in the order of 15%.

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