Fiscal Studies (2004) vol. 25, no. 2, pp. 107–128

Educational Inequality: The Widening Socio-Economic Gap

STEPHEN MACHIN[*] and ANNA VIGNOLES[†]

Abstract

In this paper, we consider research on links between higher education and family background, focusing particularly on the experiences of two cohorts of individuals born in 1958 and 1970. The findings point to a rise in educational inequality during the period relevant to these two cohorts. Specifically, links between educational achievement and parental income / social class strengthened during this period. Furthermore, a person's actual (measured) ability became a poorer predictor of whether they would get a degree than was previously the case. The expansion of higher education in the UK during this period appears to have disproportionately benefited children from richer families rather than the most able. Furthermore, the labour market success or failure of individuals became more closely connected to their parents' income, revealing a fall in the extent of intergenerational mobility over time.

JEL classification: I2.

I. INTRODUCTION

Education has long been seen as a powerful force with the potential to increase opportunity and promote social mobility. Equality of access to education has been a central plank of many policies to advance children from less well-off backgrounds, to break generational cycles of deprivation and to encourage

[*]Centre for the Economics of Education, Department of Economics, University College London and Centre for Economic Performance, London School of Economics.
[†]Centre for the Economics of Education and Centre for Economic Performance, London School of Economics.
Funding from the Sutton Trust, the Treasury's Evidence Based Policy Fund and the EC Framework 5 EDWIN (Education and Wage Inequality in Europe) grant is gratefully acknowledged. This work draws, heavily in parts, on the authors' joint work with Jo Blanden, Fernando Galindo-Rueda, Alissa Goodman and Paul Gregg but the views and interpretations expressed are their own. The authors thank two referees and the past editor, Alissa Goodman, for a number of helpful comments.

economic growth. Indeed, people from across the political spectrum advocate equality of opportunity as a vital part of building a fair society. Certainly, education is an important mechanism underpinning intergenerational mobility in society — namely, the extent to which the economic and social success or failure of people is related to that of their parents.

In this paper, we consider connections between education, income and the extent of intergenerational mobility in economic status, with particular reference to how these relationships have changed through time. We rely primarily on comparisons of two cohorts of individuals, born in 1958 and 1970, although we also supplement the analysis with more recent household data from the 1990s. The majority of the findings make grim reading for proponents of equality of opportunity. In summary, the key findings are as follows:

- The link between parental income and educational achievement strengthened during this period.
- The link between parental social class and educational achievement also strengthened over time.
- A person's early ability (as measured by test scores) became a poorer predictor of how well they do in educational terms.
- The rapid expansion of the higher education system disproportionately benefited children from richer families.
- The labour market success or failure of individuals became more closely connected to their parents' income than was the case in the past, revealing a fall in the extent of intergenerational mobility.
- Cognitive ability, as opposed to education, became marginally more important in the labour market. However, parental income and social class became increasingly important determinants of this ability, thereby also increasing the role of family background in determining both educational and labour market outcomes.

The British education system has expanded over the last four decades, and one would expect that this would have improved equality of opportunity for all socio-economic groups. However, the evidence presented here suggests that, at least in the earlier part of this period (the 1970s and 1980s), Britain actually regressed in terms of educational and economic and social mobility. Parental class and income became more important determinants of both ability and educational achievement (why this might be so is discussed in detail in Section IV) and thus indirectly of the person's eventual labour market success.

The remainder of the paper is structured as follows. In Section II, we discuss some background trends on education and income so as to motivate the later work. Section III discusses the cohort data used for much of the analysis. In Section IV, we consider connections between education, income and social class, placing particular emphasis on how any such connections have changed through

time. Section V then moves to the intergenerational analysis, whilst Section VI probes the changing role of education and ability in the labour market. Finally, Section VII concludes.

II. BACKGROUND TRENDS

There are two underlying trends that need to be considered when discussing the interrelationship between family background, ability, educational attainment and labour market outcomes. These are (1) the expansion of the British education system and (2) the rise in income inequality that has occurred during recent decades.

1. Expansion of the Education System

The expansion of the British education system, particularly higher education (HE), is widely documented and we shall not dwell for too long on it here. Suffice it to say that demand for HE in Britain has generally outstripped supply and that following an expansion on the supply side in the 1980s and in particular the 1990s, a massive increase in participation was observed. For example, Figure 1 shows the increase in HE participation in recent years. Participation was at low levels at the start of the 1960s, with around 6 per cent of the 18- to 19-year-old age cohort participating in higher education, rising to one in three by the year 2000. Growth was steady before 1990, but after that it accelerated noticeably.[1]

This expansion has resulted in many more people obtaining qualifications, particularly higher-level qualifications. Table 1 shows that there has been rapid upgrading of the educational status of the workforce since 1975. The table uses General Household Survey data to report the percentage of workers in five bands according to their highest qualification: degree or higher; a higher vocational qualification;[2] teaching/nursing; a low/intermediate group (comprising A levels, just GCSEs, or lower vocational qualifications); and no educational qualifications.

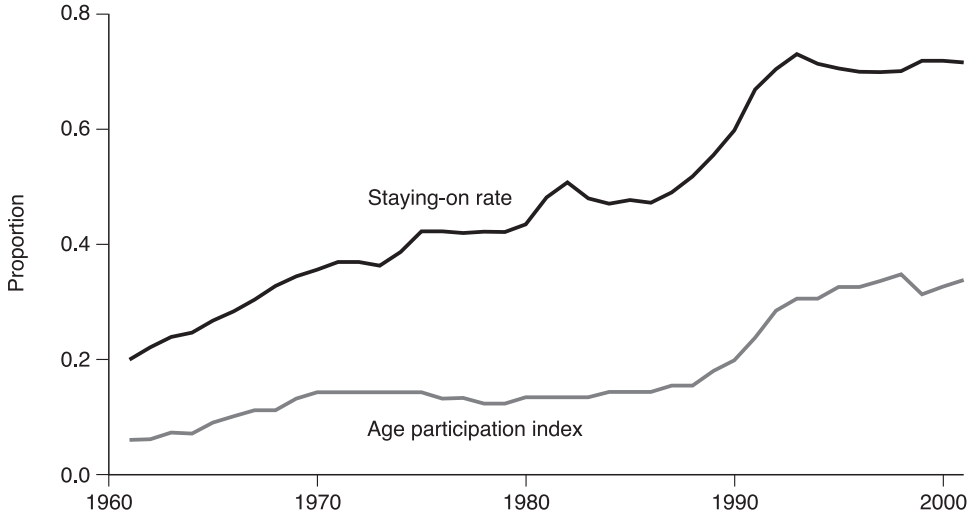
The top part of Table 1 shows that the incidence of working men with a degree rose from 5.8 per cent in 1975 to 16.3 per cent by 1998. Similarly, the share of men in employment with a higher vocational qualification went up rapidly, from 4.7 per cent to 12.1 per cent. But most striking is the falling

[1]The major changes to university student financing, and therefore the cost burden on students, occurred primarily in the 1990s. However, the value of student grants had been significantly eroded over time in the 1980s and 1990s. Given that students faced a rise in the real costs of attending HE, the rise in participation in the 1990s is even more remarkable. However, this trend may well be a partial explanation as to why the socio-economic gap in HE participation was not narrowed during this period, and is an issue we return to later in the paper.

[2]The most important higher vocational qualifications include Higher National Certificates (HNCs), Higher National Diplomas (HNDs) and full City and Guilds awards.

FIGURE 1

Education Participation over Time



Notes: The authors thank Damon Clark for passing the staying-on rates on to them. The higher education age participation index is the number of young (under 21) home initial entrants expressed as a proportion of the averaged 18- to 19-year-old population.
Source: Department for Education and Skills.

TABLE 1

Employment Shares by Education

Per cent

	1975	*1980*	*1985*	*1990*	*1995*	*1998*
Men						
Degree or higher	5.8	8.2	12.1	12.5	15.5	16.3
Higher vocational	4.7	6.8	10.5	11.4	11.7	12.1
Teaching and nursing	1.2	1.3	1.4	1.2	1.3	2.0
Low/Intermediate	38.3	41.2	40.7	47.9	50.7	50.7
No qualifications	50.2	42.6	35.4	27.1	20.7	18.9
Women						
Degree or higher	2.2	3.6	6.2	7.5	10.8	12.5
Higher vocational	0.7	1.3	2.0	2.9	3.8	2.7
Teaching and nursing	5.8	6.8	8.4	7.9	7.4	7.7
Low/Intermediate	33.1	39.6	46.5	52.1	54.3	53.7
No qualifications	58.3	48.8	36.8	29.6	23.6	23.3

Source: Calculated from General Household Surveys. For 1975 through 1995, statistics are based on three pooled years, with the central year reported in the table.

proportion of working men with no qualifications, which goes down from just over half (at 50.2 per cent) in 1975 to less than 20 per cent (18.9 per cent) by 1998.

The patterns for women, in the lower part of the table, are even more marked. The proportion of women in employment with a degree rises over fivefold, from a very low initial level of 2.2 per cent in 1975 to 12.5 per cent by 1998. Interestingly, there has been much less of a shift into higher vocational qualifications compared with men, as only 2.7 per cent of working women possessed such qualifications in 1998. However, mirroring the experience of men, there has been a sharp fall in the size of the group with no qualifications, which plummets from 58.3 per cent in 1975 to 23.3 per cent by 1998.

Although the focus of this paper is on HE, it is also worth noting that participation in post-compulsory secondary schooling also increased. Figure 1 also shows the rate of staying on after the compulsory school-leaving age, calculated for annual cohorts in the Family Expenditure Survey. The graph shows that the incidence of staying on had begun to rise more sharply through the 1980s, with a rise from 42 per cent in 1979 to 52 per cent by 1988. The pace of change accelerates before then tailing off in the early to mid-1990s. By 1999, the staying-on rate had risen to 71 per cent. This large rise appears to be a consequence of the ending of the rationing system of post-compulsory education which had historically operated in the UK when the GCSE (General Certificate of Secondary Education) examinations system was introduced in 1988 (see Blanden, Gregg and Machin (2003) or Gipps and Stobart (1997) for more discussion).

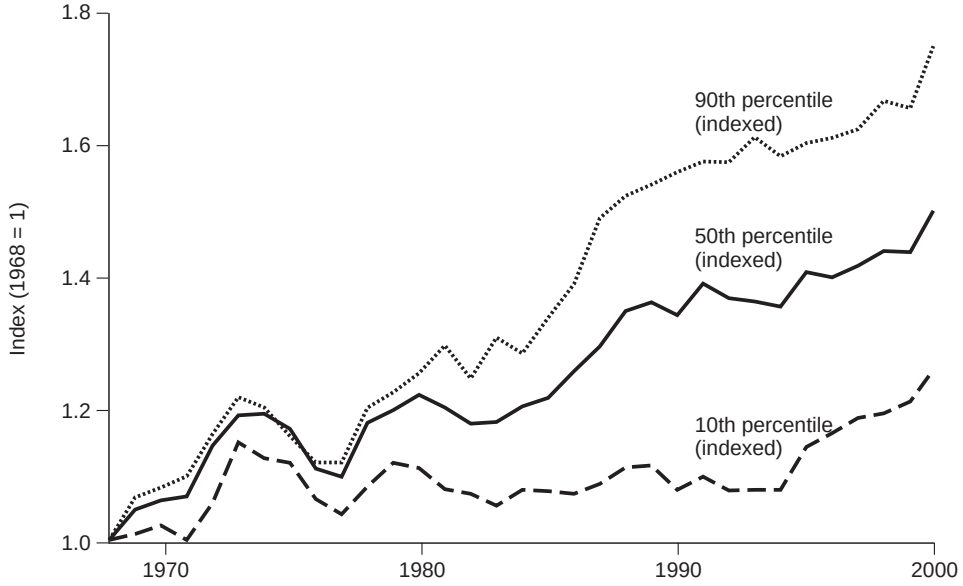
2. Trends in the Income Distribution

Income inequality has also risen sharply since the late 1970s. Figure 2 shows a rapid increase in income inequality for families with children in the UK (this was documented extensively in Gregg, Harkness and Machin (1999)).[3] The graph shows the evolution over time of the 10^{th}, 50^{th} and 90^{th} percentiles of the log real income distribution, where each percentile is indexed to 1 in 1968. In other words, the graph shows income growth for individuals located at each of the percentiles. After not much change in the 1970s, Figure 2 shows the by now familiar pattern of no real income growth for those on the lowest incomes (i.e. those at the 10^{th} percentile) between the late 1970s and the mid-1990s. On the

[3]We focus on the income distribution of families with children to illustrate changes in the circumstances in which children are being raised. This is natural, given that we are interested in children's educational outcomes and how they relate to income. Data from *Social Trends* suggest that 29 per cent of children are being brought up in the bottom income quintile of all households. Only 13 per cent of children are in households in the top fifth of the income distribution. In other words, poorer households have more children and thus the difference in the per-capita income of high- and low-income households may be even greater than indicated in Figure 2.

FIGURE 2

Changes over Time in the Distribution of Log(Real Income) for Families with Children, UK



Note: Sample is all non-pensioner families with children.
Source: Authors' calculations from Family Expenditure Surveys of 1968 through 2000.

other hand, there is significant growth at the median (of about 27 per cent) and very substantial growth (of about 45 per cent) at the 90th percentile. Only since the mid-1990s has the 10th percentile income started to grow in real terms and the distribution of income become more stable.

3. Interaction between the Trends

We know much less about how these two phenomena (rising education participation and rising income inequality) are related to one another. This is partly due to there being only a limited amount of data that one can use to match up individuals' educational attainment with their parents' incomes and social class. The data shortage becomes even more acute when one wants to consider a person's ability as well as their educational level. Only with excellent longitudinal data that follow people through time, and then allow one to track back and match with family background, can one begin to address these issues. In the next section, we therefore present a discussion of data that can be used to study links between education and income, and changes in these relationships through time.

III. DATA

There are two main approaches that one can take when looking at connections between children's education and the characteristics of their parents. The first is to use household-level surveys to study data on children at a specific stage in their education and, importantly, while they are still in the family home. Of course, this approach focuses the analysis on relatively early stages of the education process (i.e. when the children are in school or when they are making the staying-on decision at 16) and precludes any analysis of later educational choices and attainment. The second route, which is adopted for the analyses below, involves looking at longitudinal data where one can match individuals' education with their parents' income, education and social class. In Britain, we have some unique and rich birth cohort studies that permit one to adopt this research strategy. The principal advantage of two of the birth cohort studies that form our main focus is that they contain not only family background information and educational attainment but also, and very unusually, early measures of cognitive ability. We are therefore able to examine changes over time in the complex relationship between family income, ability and educational achievement.

Cohort Data

There are three main sources of cohort data that are drawn upon here. The first is the National Child Development Study (NCDS), a very rich data source which has been used in previous work looking at the effects of family background on child outcomes in the UK (for example, Gregg and Machin (1999 and 2000)). It consists of all those born in a particular week in March 1958 with follow-up surveys at ages 7, 11, 16, 23, 33 and 42.[4]

The second principal data source is the British Cohort Study (BCS), which is very similar in style to the NCDS, covering a full birth population in a week of April 1970, with data collected at ages 5, 10, 16, 26 and 30. As well as being structured in a similar way to the NCDS, the questions asked of the individuals in the two cohorts are frequently identical.[5] As noted above, these two birth cohort studies contain an unusually wide range of information on respondents, including data on their family income,[6] their parents' education levels and

[4]The NCDS data have also been used to look at the transmission mechanisms that may underpin intergenerational mobility: see Gregg and Machin (1999 and 2000), Hobcraft (1998) or Kiernan (1995).

[5]The problem of attrition is obviously an issue in birth cohort studies. However, there is no evidence of differential attrition between the two studies, and similar proportions of respondents were traced from both cohorts (Bynner et al., 2000).

[6]There have been many discussions about the quality of the income data in the cohort studies. In part, we return to this in the discussion about possible measurement error below. The following observations are, however, worth noting at this juncture. For the NCDS, the main worries have been expressed about the three-day week which could have affected responses in 1974, the only wave that collected parental income data. Grawe (2000) and Micklewright (1986) convincingly demonstrate that this does not seem to be a problem. For the BCS, there

interest in education, measures of their own early cognitive development and their eventual educational attainment.

We use these two cohort studies to look at degree acquisition of the cohort member by age 23, and relate this to family income. To do so on a consistent basis, we are forced to consider income at cohort member age 16 as this is the only time family income is reported in the NCDS cohort. The BCS cohort also has income data at cohort member age 10 and this is useful for checking the robustness of results, which may be particularly affected by possible measurement error in single income measures, and we consider this below.

These cohort studies are certainly the largest source of very detailed information on family background and educational outcomes of children. Unfortunately, they are also a little dated. For some aspects of the research, therefore, a pseudo cohort was created from the British Household Panel Survey (BHPS). The BHPS began in 1991 with a sample of 5,500 households. All individuals aged 16 or over were asked to provide extensive information, including details of income and education. Individuals were then contacted in subsequent years and followed through the panel (adding new respondents from the household as they reached 16). At the time of writing, 11 waves, up to 2001, are available for analysis.

We exploited the longitudinal structure of the BHPS data to mimic the cohort data. For example, to look at degree acquisition by age 23 and to link it to parental income at child age 16, we need to observe individuals from age 16 to 23, so they must be present for eight years of the panel. Given the number of waves of data currently available, this limits us to looking at four waves' worth of 16-year-olds. Thus we set up a BHPS cohort in this way so as to compare education–income relations in more recent times with the earlier cohort studies, albeit with much smaller sample sizes than for the cohorts (the education–income relationships discussed below are based on around 5,700 cohort members matched to parents' income in the NCDS, 4,700 in the BCS and 600 in the BHPS).

IV. EDUCATIONAL ATTAINMENT AND FAMILY BACKGROUND

1. Degree Acquisition and Income

Using the data described in the previous section, the first obvious question is whether family income is significantly *associated* with educational attainment and whether this association has shifted over time. As stated earlier, recent decades have seen sharp increases in educational attainment and participation in the UK. It therefore seems important to consider whether these increases have

---

are concerns about the low response in the age 16 (1986) wave. However, one can also look at age 10 income data for the BCS, since income data were also collected in the age 10 survey.

been evenly distributed amongst children and young people from different socio-economic groups. This section considers this question in some detail, showing that educational inequality — measured by the sensitivity of education to parental income — seems to have increased over time at the HE level.

There are myriad ways in which parental income might impact on educational attainment and we are unable to distinguish between them in our predominantly descriptive analysis. For example, poorer parents/children may face liquidity constraints with imperfect capital markets. Since individuals cannot use their human capital as collateral to borrow the costs of their education, children from less well-off families invest in less education. In fact, there is US evidence that longer-term family background factors influence children's educational attainment more than short-term credit constraints (Carneiro and Heckman, 2003;[7] Cameron and Heckman, 2001). Second, there is a direct impact in that richer parents can provide greater educational resources (such as books) and purchase better pre-school childcare (the latter has been found to be important in determining initial and subsequent educational attainment (Danziger and Waldfogel, 2000)). There are also more indirect effects from having greater wealth — for example, via the link between house prices and the education system. Having better primary schools in an area raises house prices; thus wealthier parents can 'buy' better state-provided schooling (Gibbons and Machin, 2003 and 2004). There is also evidence of peer-group effects. Attending a school with a lower proportion of low socio-economic group children is highly beneficial (Feinstein, 2003). Hence, peer-group effects reinforce socio-economic disadvantage.

Understanding the complex relationship between family income and educational attainment is, of course, crucial if policy-makers wish to narrow the socio-economic gap in educational attainment. This paper, however, focuses only on documenting changes in the relationship between these two variables, and, whatever the mechanism, there certainly appears to have been an increase in the strength of the association between parental income and educational attainment.

Table 2 shows the percentage of each of the three cohorts with a degree by the age of 23, split by parental income group, at three points in time: around the late 1970s (i.e. when the 1958 cohort were leaving university), the early 1990s (when the 1970 cohort were leaving university) and the late 1990s (when the BHPS cohorts were in university). The table shows that children of higher-income parents improved their degree acquisition substantially in the 1980s. The rise in educational inequality is clear to see as the percentage of children getting a degree from the top-quintile families rose rapidly over time (the top panel of the table gives data for males and females together and shows this percentage

[7]Carneiro and Heckman include permanent family income as a longer-term family background factor.

TABLE 2

Percentage with a Degree by Age 23 by Parental Income

	Parental income group		
	Lowest 20%	*Middle 60%*	*Highest 20%*
All			
NCDS 1981	6	8	20
BCS 1993	7	15	37
BHPS 1999 (average)	9	23	46
Change, 1981 to 1993	1	7	17
Change, 1993 to 1999	2	8	9
Change, 1981 to 1999	3	15	26
Males			
NCDS 1981	6	11	20
BCS 1993	8	15	38
BHPS 1999 (average)	9	23	48
Change, 1981 to 1993	2	4	18
Change, 1993 to 1999	1	8	10
Change, 1981 to 1999	3	12	28
Females			
NCDS 1981	6	6	21
BCS 1993	6	15	36
BHPS 1999 (average)	8	24	42
Change, 1981 to 1993	0	9	15
Change, 1993 to 1999	2	9	6
Change, 1981 to 1999	2	18	21

Source: Authors' calculations from National Child Development Study, British Cohort Study and British Household Panel Survey data on people aged 23, studied in Blanden, Gregg and Machin (2003). Sample sizes are: NCDS — 5,706; BCS — 4,706; BHPS — 580.

rising from 20 per cent in 1981 to 46 per cent by 1999). At the same time, the percentage from the lowest quintile group rose from a very low level (6 per cent) in 1981 by only 3 percentage points to 9 per cent by 1999. Of course, focusing on the percentage-point increases of each socio-economic group does not take full account of the very low base participation rate of lower socio-economic groups. Thus the participation rate for males from the lowest quintile of the income distribution increased by 50 per cent over the period, compared with 140 per cent for males from the top quintile.

An alternative way of describing these changes is to consider how the relative odds of obtaining a degree or attending university have changed. At the beginning of the period, wealthy children (i.e. those from the top 20 per cent of the income distribution) were 3.3 times more likely to get a degree than children from the bottom 20 per cent of the income distribution. By the end of the period,

the relative odds of rich children acquiring a degree, compared with poor children, had increased still further, to 5.1 times more likely. Certainly, if one considers degree acquisition by age 23 only amongst those who made the decision to stay on after the compulsory school-leaving age, the distinction between relative and absolute changes becomes irrelevant, since one actually sees a fall amongst the lowest income quintile and a very sharp rise amongst the top quintile, revealing widening gaps in both absolute and relative dimensions (not shown here, but see Blanden, Gregg and Machin (2003) and Blanden and Machin (2004), who consider education sequences in more detail).[8]

It therefore appears that educational inequality at the HE level has tended to rise in recent years. These patterns are confirmed in the more detailed statistical analysis in Blanden, Gregg and Machin (2003) that controls for factors that are correlated with both parental income and education participation and looks for different income associations at different stages of the education process. The statistical models reported there show university participation and degree acquisition to have become more strongly connected to parental income. Thus even the sharp expansion of HE participation of the 1990s did not benefit poorer children as much as richer ones. If anything, it reinforced the gap in participation between children from higher- and lower-income families.

2. Higher Education Participation and Social Class

A similar story emerges if one considers recent trends in HE participation broken down by social class, as opposed to parental income.[9] Table 3 reproduces some of Glennerster's (2001) analysis of *Social Trends* data to show no narrowing of the gap for the lower social classes in the link between HE participation and social class. There has actually been a worsening of the gap in absolute percentage points, despite the rapid increase in enrolment in HE seen in the 1990s. Individuals from lower social classes had a very low participation rate at the beginning of the period, so that the percentage increase in their participation was actually greater than that for the higher social groups.

From an individual's perspective, what would seem to matter most is the probability of attending HE, relative to one's peers from different social classes. The evidence here is somewhat weaker if one uses relative odds to compare the prospects of rich and poor children. For example, children with professional parents were 9.2 times more likely to participate in HE than those with unskilled

[8]For degree acquisition conditional upon staying on, the proportion of the lowest income quintile getting a degree by age 23 falls from 26 to 14 per cent between the NCDS and BHPS cohorts, whilst the proportion of the top quintile rises from 43 to 58 per cent (Blanden, Gregg and Machin, 2003).

[9]Patterns broken down by social class are given for completeness. Given the changes in the social class profile of UK society during this period, we prefer to focus more on education participation by income level rather than by social class. Income clearly provides a natural metric which social class does not.

TABLE 3

Higher Education Participation and Social Class in the 1990s

Per cent

	1991–92	*1998–99*	*Change, 1991–92 to 1998–99*
Professional	55	72	17
Intermediate	36	45	9
Skilled non-manual	22	29	7
Skilled manual	11	18	7
Partly skilled	12	17	5
Unskilled	6	13	7
All social classes	23	31	8

Source: Glennerster, 2001, table 11.

parents at the beginning of the period but only 5.5 times more likely at the end of the period. This is at least partially due to the unskilled group being very small, because of important compositional changes in the distribution of occupations (from which social class is derived) occurring through time. This leads us to prefer the income-based measures of educational inequality for looking at changes over time. Nonetheless, the widening of the absolute gap in participation between higher and lower social classes is disappointing, given the considerable efforts made over recent decades attempting to narrow this gap.

3. Ability and Educational Attainment

One might argue that the expansion of HE would tend to favour those from advantaged family backgrounds if these students were the ones best able to take advantage of HE. This might be the case if, on average, students from wealthier backgrounds had better cognitive abilities, and hence better achievement in secondary school and a greater chance of getting into HE. It is important therefore to investigate the interrelationship between family background, cognitive ability and educational attainment.

Galindo-Rueda and Vignoles (2005) do precisely this, using measures of cognitive ability from tests administered to the NCDS and BCS cohorts prior to secondary school, at age 11 and 10 respectively.[10] Since the tests were administered at almost exactly the same age in NCDS and BCS, comparisons between the cohorts as to the effect of early cognitive ability are possible. The test scores in reading, mathematics and general cognitive ability are combined into one measure that describes that child's cognitive ability.

When one takes into account a person's cognitive abilities, the rather depressing results discussed in the previous subsection are confirmed. The effect

[10]They are thus early measures of ability, rather than any indication of 'inherent' ability.

of cognitive ability on educational attainment has actually decreased, while the role of parental social class and income in determining educational attainment has increased. A person's early ability is a poorer predictor of how well they do in educational terms now (or at least when the 1970 cohort attended school in the 1970s and 1980s) than in the past. Likewise, even allowing for ability, the social class of a person's parents actually has a greater impact on their educational attainment now than previously, verifying what was reported in the previous subsection.

What is most striking is the fact that the probability of gaining a higher-level qualification, such as a degree, has increased by a similar number of percentage points for lower- and higher-ability individuals. This is shown in Table 4. Reading across the first row, the table shows the probability of a high-ability boy from a high-income background obtaining a degree, in both the 1958 cohort and the 1970 cohort. Clearly, HE has expanded during this time and thus the probability has increased. The second row shows the same but for low-income, high-ability boys. The final column shows how the gap between richer and poorer students of a given ability has widened. In every case, the gap between richer and poorer students has actually increased over the period. Another way of looking at the results in Table 4 is to say that high-ability poor boys and low-ability rich boys have increased their HE participation by a similar number of percentage points. In other words, it is not the case that the expansion of HE has benefited the richer students just because they are more inherently able (as measured at age 10/11).

Yet another way of describing these trends is to consider the relative odds of getting a degree. A similar story emerges — namely, that the gap between rich and poor has widened for a given level of ability, particularly for girls. At the start of the period, high-ability boys from high-income backgrounds were 1.7

TABLE 4

Probability of Obtaining a Degree

		NCDS (1958 cohort)	*BCS (1970 cohort)*	*Gap growth*
Boys, high ability	High income	59%	76%	+9%
	Low income	35%	43%	
Girls, high ability	High income	60%	77%	+26%
	Low income	38%	29%	
Boys, low ability	High income	1%	8%	+7%
	Low income	2%	2%	
Girls, low ability	High income	5%	15%	+12%
	Low income	4%	2%	

Source: Calculations based on Galindo-Rueda and Vignoles (2005).

times more likely to get a degree than high-ability boys from low-income backgrounds. By the end of the period, they were 1.8 times more likely. The relative odds of high-ability girls from high-income backgrounds getting a degree (compared with high-ability girls from poor backgrounds) increased from 1.6 to 2.7.

These results are confirmed by more formal modelling of educational achievement, as described in Galindo-Rueda and Vignoles (2005), and after allowing for a range of other factors that determine educational attainment, such as parental interest in the child, parental education and other related factors. The same pattern of findings was also found in relation to the probability of obtaining A levels. Thus early ability has become less important in determining whether a person gets an A level, whilst family income has increased in importance.

From this, one can conclude that it is not the most able who have benefited the most from the expansion of the UK education system but rather those from higher-income backgrounds.

V. CHANGES IN INTERGENERATIONAL MOBILITY OVER TIME[11]

The patterns reported above have clear ramifications for understanding current inequality, both within and across generations. We know that graduates subsequently get paid more than less-qualified workers in the labour market. It therefore appears that if more children from relatively rich backgrounds obtain degrees, this will generate increased links between people's income and that of their parents, and this might therefore reduce intergenerational mobility. This section shows that this was indeed the case, at least for a comparison across the NCDS and BCS cohorts.

1. Statistical Regression Estimates

A simple (and commonly used) approach to estimating the extent of intergenerational mobility uses statistical regression techniques to relate children's economic status to that of their parents. The typical formulation for children and parents in family *i* is

$$\ln Y_i^{CHILD} = \alpha + \beta \ln Y_i^{PARENTS} + \varepsilon_i ,$$

where Y is economic status (usually labour market earnings) and ε is an error term. The coefficient β reflects how strongly children's status is associated with parental economic status. The literature usually proceeds to say that a value of zero for β (where child and parental Y are uncorrelated) corresponds to complete

[11]This section draws heavily upon, and reproduces some results from, Blanden et al. (2002).

intergenerational mobility and a value of unity for β (child *Y* is fully determined by parental *Y*) corresponds to complete immobility.

Due to data issues, this exact framework cannot be implemented with the NCDS versus BCS comparison. Ideally, one would like to have measures of the same permanent economic status (be it wages or income) for both generations from both cohort studies. Unfortunately, due to different survey design, this is not possible for the majority of the current analysis. The NCDS parental income data come from separate measures of father's earnings, mother's earnings and other income (all defined after taxes). Because of this detailed breakdown, earlier work on the NCDS was able to compare sons' and fathers' earnings (Dearden, Machin and Reed, 1997). However, a cross-time comparison cannot do this as the BCS only has data on parents' combined income. One is therefore forced to base estimates on the relationship between the cohort member's earnings or income and combined parental income. This will produce different point-in-time estimates of the extent of intergenerational mobility, but these are easily reconciled with the earlier work (see Blanden et al. (2002)). Since the changes in the intergenerational parameter over time are measured on a consistent basis and are anyway of most interest here, this problem is not insurmountable.

Table 5 reports estimates of changes over time in the extent of intergenerational mobility from both cohorts, for males and females separately (from Blanden et al. (2002)). Three sets of results are reported for each. The first, in the top panel of the table, comes from a comparison of cohort members' earnings and parental income. The second comes from a statistical regression that controls for a large set of pre-labour-market-entry variables (detailed in the notes to the table). These variables are a set of child-specific and family factors. The inclusion of these variables is an attempt to identify the effect of changes in family income for otherwise identical individuals. The final set of results looks at changes in intergenerational correlations in family (as opposed to individual) income.

The results in Table 5 paint a strong and very consistent pattern regarding changes in the extent of mobility over time. In all cases, one sees an increase in the intergenerational mobility parameter (that is, the BCS parental income coefficient is higher than the comparable NCDS coefficient). This remains the case when an inequality adjustment is implemented so as to allow for the fact that the income distribution for the later cohort is characterised by greater inequality (Blanden et al., 2002).

The changes over time, showing falls in intergenerational mobility, are shown by the inequality-adjusted estimates of β rising by 0.095 for men and by 0.059 for women. Similarly strong increases in the link with parental income are seen in the results from augmented and family income regressions. All of these increases show a steep rise across cohorts, which resulted in substantial falls in the extent of intergenerational mobility.

TABLE 5

Estimates of Changes in the Extent of Intergenerational Mobility

	Change in intergenerational parameter between 1958 NCDS and 1970 BCS cohorts	*Sample sizes*
Estimates from basic regression (cohort member wages and parental income)		
Sons	0.095 (0.031)	NCDS: 2,246 BCS: 2,053
Daughters	0.059 (0.031)	NCDS: 1,908 BCS: 2,017
Estimates from augmented regression (cohort member wages and parental income)		
Sons	0.091 (0.035)	NCDS: 2,246 BCS: 2,053
Daughters	0.054 (0.037)	NCDS: 1,908 BCS: 2,017
Estimates from basic regression (cohort member family income and parental income)		
Sons	0.139 (0.031)	NCDS: 2,110 BCS: 2,015
Daughters	0.085 (0.029)	NCDS: 2,156 BCS: 2,285

Notes: All regressions control for parents' age and age squared. Augmented regressions include controls for ethnicity, parental education, family structure, whether father was unemployed during childhood and maths and reading test score quintiles at age 10/11. In the family income regressions, the dependent variable is the sum of cohort member's earnings and those of any partner. Standard errors are given in parentheses.
Source: Blanden et al., 2002.

An important consideration is whether these results could be contaminated by measurement error in income as we only have a single measure of this for all three cohorts. Indeed, estimates will be biased downwards if parental income is measured with error so that one is not measuring permanent, or lifetime, income (Solon, 1989 and 1999). In this application, the fact that it is changes over time that are of interest means that this may not present such a problem. The issue of relevance here is whether there is more measurement error in the NCDS income such that there is a greater downward bias for estimates based on that cohort which implies that the rise across cohorts is an artificial one. Two sets of robustness checks in Blanden et al. (2002) suggest that this is unlikely to be the case:

- Simulations given in Blanden et al. (2002) show that, under certain assumptions about measurement error in the BCS (ranging from zero to sizeable amounts), the amount of measurement error needed in the NCDS income data to offset the rise in the intergenerational mobility parameter would be implausibly large.
- In the BCS cohort, income data are available for cohort member age 10 and 16 and so one can time-average the two income measures in the hope of smoothing out some of the measurement error (this is often done in the intergenerational mobility literature when US longitudinal data are analysed). When this is done, the BCS intergenerational mobility parameter does rise, but only moderately.

Thus the rise in the intergenerational correlation does not seem attributable to differential bias due to measurement error in income across the two cohorts considered.

The results of this subsection make it clear that links between child and parent economic status appear to have strengthened considerably in this cross-cohort comparison. This, of course, has occurred at the same time as the link between education and income has strengthened, as described in the previous sections.

2. Transition Matrices

The other commonly used research method for estimating the extent of intergenerational mobility is the use of transition matrices that show where child–parent pairs are moving across the distribution of economic status. Tables 6a and 6b report a set of transition matrices for NCDS and BCS sons and daughters.

The tables show the proportion in each parental income quartile that move into each quartile of the sons' or daughters' earnings distribution. The extent of immobility can be summarised by an immobility index that computes the sum of the leading diagonal and its adjacent cells. These are reported at the tops of the tables. These numbers can be interpreted relative to the immobility index in the case of perfect mobility. If all individuals had an equal chance of experiencing an adult income in each quartile, all cells would contain 0.25 and the immobility index would be 2.5. As we might expect, given what we learned from the regression analysis, all the immobility indices we observe in the tables are above this number.

It is clear that transition analysis confirms the regression finding that mobility has fallen between the cohorts. In almost every case, a higher proportion remain in the same quartile as their parents in the later cohort and there are less extreme movements between generations. In the NCDS, 17 per cent of sons and

TABLE 6a

Quartile Transition Matrices for Sons

Immobility index: NCDS = 2.78, BCS = 2.95

Parental income quartile	Sons' earnings quartile *Bottom*	*2nd*	*3rd*	*Top*
NCDS				
Bottom	0.31	0.29	0.23	0.17
2nd	0.30	0.24	0.23	0.23
3rd	0.23	0.26	0.26	0.26
Top	0.17	0.20	0.29	0.34
BCS				
Bottom	0.39	0.25	0.22	0.14
2nd	0.28	0.29	0.24	0.19
3rd	0.20	0.28	0.27	0.25
Top	0.13	0.17	0.28	0.42

Source: Blanden et al., 2002.

TABLE 6b

Quartile Transition Matrices for Daughters

Immobility index: NCDS = 2.69, BCS = 2.86

Parental income quartile	Daughters' earnings quartile *Bottom*	*2nd*	*3rd*	*Top*
NCDS				
Bottom	0.27	0.31	0.25	0.17
2nd	0.30	0.24	0.22	0.24
3rd	0.25	0.24	0.26	0.24
Top	0.19	0.20	0.27	0.34
BCS				
Bottom	0.33	0.31	0.23	0.13
2nd	0.28	0.28	0.25	0.19
3rd	0.24	0.22	0.28	0.26
Top	0.16	0.19	0.26	0.39

Source: Blanden et al., 2002.

daughters with parents in the bottom quartile rise to the top; in the BCS, this falls to 14 per cent for sons and 13 per cent for daughters. Moving in the other direction, the growth in immobility is shown with 17 per cent for sons and 19 per cent for daughters in the top quartile falling to the bottom in the NCDS, while in the BCS the corresponding percentages are 13 for sons and 16 for daughters. The overall pattern of reduced mobility is very much confirmed by the pattern of results in the transition matrices.

VI. THE CHANGING ROLE OF EDUCATION AND ABILITY IN THE LABOUR MARKET[12]

The findings so far suggest that the expansion of the education system has disproportionately benefited students from wealthier backgrounds, rather than the most able. Furthermore, during this expansion of the education system, intergenerational income inequality has actually increased. There is less socio-economic mobility at the end of the period than at the beginning. Why might this be so? Part of the explanation is that the expansion of the education system has been unequal across the social classes. Two related issues are also relevant, and we consider these in turn.

1. The Role of Education

If education has become more important in the labour market, then the increasingly unequal distribution of educational achievement may reinforce the rise in intergenerational immobility. One test for this would be to see if the value of education or qualifications has risen across the two cohorts. Although the results are tempered by the fact that they could only consider changes across two cohorts (NCDS and BCS) in the 1990s, Galindo-Rueda and Vignoles (2005) find that the returns to education remained broadly the same across the two cohorts. This is interesting in the face of rapidly rising supply due to the expansion of the HE system which, in the absence of other demand-related changes, one would expect to result in falls in education returns.[13]

By and large, therefore, even though educational attainment has become more closely determined by a person's family background, it is not the case that education has become much more important in the labour market. It is the rise in links between education and parental income that matters most in explaining falling intergenerational mobility.

2. The Role of Cognitive Ability

Another possibility is that cognitive ability may have become more valuable in the labour market. If, as is the case with educational attainment, family income has become a more important determinant of cognitive ability, this too could explain a rise in intergenerational immobility. Galindo-Rueda and Vignoles (2005) show that the association between cognitive ability and both labour market participation and earnings has only marginally grown over time. More importantly, however, they also find that parental income and social class have become increasingly important determinants of cognitive development, at least at

[12]For more discussion on the subject matter of this section, see Galindo-Rueda and Vignoles (2005).

[13]Though it is by now well known that demand for skills rose faster than the supply, especially in the 1980s, when wage differentials by education widened out very rapidly (Machin, 1996, 1999 and 2003). The 1990s seem to show much more stability in the education-related wage differentials.

primary-school level. This too will have played an important role in the increasing intergenerational immobility across these cohorts.

3. The Interacting Role of Education and Ability

There are no major differences in the earnings of similarly educated and similarly able individuals from richer and poorer family backgrounds, although this is somewhat truer for graduates than for the less qualified (Galindo-Rueda and Vignoles, 2005). One can conclude therefore that, in terms of changes over time, the impact of family background is largely working through educational attainment and early cognitive ability, rather than having a direct impact on labour market success. Thus it is generally the case that poorer students fail to achieve in the education system and that is why they then go on to do poorly in the labour market. Once they acquire education and cognitive skills, however, they do not do dissimilarly to their wealthier counterparts.

VII. CONCLUSIONS

The central conclusion from this survey of work is that the links between parental income, parental social class and eventual higher education achievement have strengthened over time. Family background, rather than a person's early ability, played a more important role in determining how well someone does for those born in 1970 than for those born in 1958. Furthermore, our analysis of a third, more recent, cohort (who grew up in the 1980s and would have gone to university in the 1990s) shows parental income mattering even more in recent times.

Against a background of educational expansion during this period, these findings should be of concern to policy-makers. The rapid expansion of the higher education system has disproportionately benefited the most privileged students. Obviously, this does not mean that the educational expansion has not increased the chances of all students gaining a good qualification, but rather that it has increased the chances of the wealthiest by more.

The research also indicates that the labour market success or failure of individuals became more closely connected to parental income in the later 1970 cohort than was the case for the 1958 cohort (it is too early to be able to carry out this kind of analysis for the third, BHPS, cohort). Even though these cohorts are only 12 years different in age, the education and economic status of the 1970 cohort are much more strongly connected to parental economic status than were those of the 1958 cohort. Put differently, intergenerational mobility fell sharply across these two cohorts.

In conclusion, simply expanding the education system in the 1980s and 1990s did not narrow the socio-economic gap, a point that should be borne in mind when considering future expansion of the system, especially in the light of

government targets aimed at getting 50 per cent of all young people to attend university by 2010.

REFERENCES

Blanden, J., Goodman, A., Gregg, P. and Machin, S. (2002), 'Changes in intergenerational mobility in Britain', in M. Corak (ed.), *Generational Income Mobility in North America and Europe*, Cambridge: Cambridge University Press, forthcoming.

—, Gregg, P. and Machin, S. (2003), 'Changes in educational inequality', Centre for the Economics of Education, Discussion Paper, forthcoming.

— and Machin, S. (2004), 'Educational inequality and the expansion of UK higher education', *Scottish Journal of Political Economy*, Special Issue on the Economics of Education, vol. 54, pp. 230–49.

Bynner, J., Butler, N., Ferri, E., Shepherd, P. and Smith, K. (2000), 'The design and conduct of the 1999–2000 surveys of the National Child Development Study and the 1970 British Cohort Study', Centre for Longitudinal Studies, Cohort Studies, Working Paper no. 1 (ftp://cls.ioe.ac.uk/pub/Cohort/Acrobat/Cswp1.pdf).

Cameron, S. V. and Heckman, J. J. (2001), 'The dynamics of educational attainment for black, Hispanic, and white males', *Journal of Political Economy*, vol. 109, pp. 455–99.

Carneiro, P. and Heckman, J. J. (2003), 'The evidence on credit constraints in post-secondary schooling', *Economic Journal*, vol. 112, pp. 705–34.

Danziger, S. and Waldfogel, J. (2000), 'Investing in children: what do we know? What should we do?', London School of Economics, Centre for Analysis of Social Exclusion, CASEpaper no. 34.

Dearden, L., Machin, S. and Reed, H. (1997), 'Intergenerational mobility in Britain', *Economic Journal*, vol. 107, pp. 47–64.

Feinstein, L. (2003), 'Inequality in the early cognitive development of British children in the 1970 cohort', *Economica*, vol. 70, pp. 73–97.

Galindo-Rueda, F. and Vignoles, A. (2005), 'Class ridden or meritocratic? An economic analysis of recent changes in Britain', *Journal of Human Resources*, forthcoming.

Gibbons, S. and Machin, S. (2003), 'Valuing English primary schools', *Journal of Urban Economics*, vol. 53, pp. 197–219.

— and — (2004), 'Paying for primary schools: supply constraints, school popularity or congestion?', London School of Economics, Centre for Economic Performance, mimeo.

Gipps, C. and Stobart, G. (1997), *Assessment: A Teacher's Guide to the Issues*, London: Hodder and Stoughton.

Glennerster, H. (2001), 'United Kingdom education 1997–2001', London School of Economics, Centre for Analysis of Social Exclusion, CASEpaper no. 50.

Grawe, N. (2000), 'The three-day week of 1974 and measurement error in the NCDS and FES data sets', Carleton College, unpublished mimeo.

Gregg, P., Harkness, S. and Machin, S. (1999), 'Poor kids: trends in child poverty in Britain, 1968–96', *Fiscal Studies*, vol. 20, pp. 163–87.

— and Machin, S. (1999), 'Childhood disadvantage and success or failure in the labour market', in D. Blanchflower and R. Freeman (eds), *Youth Employment and Joblessness in Advanced Countries*, Cambridge, MA: National Bureau of Economic Research.

— and — (2000), 'The relationship between childhood experiences, subsequent educational attainment and adult labour market performance', in K. Vleminckx and T. Smeeding (eds), *Child Well Being in Modern Nations: What Do We Know?*, Bristol: Policy Press.

Hobcraft, J. (1998), 'Intergenerational and life-course transmission of social exclusion: influences and childhood poverty, family disruption and contact with the police', London School of Economics, Centre for Analysis of Social Exclusion, CASEpaper no. 15.

Kiernan, K. (1995), 'Transition to parenthood: young mothers, young fathers — associated factors and later life experiences', London School of Economics, STICERD, Welfare State Programme Discussion Paper no. WSP/113.

Machin, S. (1996), 'Wage inequality in the UK', *Oxford Review of Economic Policy*, vol. 12, no. 1, pp. 47–64.

— (1999), 'Wage inequality in the 1970s, 1980s and 1990s', in P. Gregg and J. Wadsworth (eds), *The State of Working Britain*, Manchester: Manchester University Press.

— (2003), 'Wage inequality since 1975', in P. Gregg and J. Wadsworth (eds), *The Labour Market under New Labour*, Basingstoke: Palgrave Macmillan.

Micklewright, J. (1986), 'A note on household income in NCDS3', City University NCDS User Support Group, Working Paper no. 18.

Solon, G. (1989), 'Biases in the estimation of intergenerational earnings correlations', *Review of Economics and Statistics*, vol. 71, pp. 172–4.

— (1999), 'Intergenerational mobility in the labor market', in O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics*, vol. 3A, Amsterdam: North-Holland.