The Declining Relative Importance of Ability in Predicting Educational Attainment

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ABSTRACT

Most countries seek to reduce inequality by encouraging educational attainment, particularly by striving for better outcomes for able individuals from poor backgrounds. We analyse whether this has been a feature of Britain's substantial expansion of education during the past several decades. We use two unique longitudinal studies to test whether these improvements have been associated with changes in the role of cognitive ability and parental background in determining educational achievement. We find a decline in the importance of ability in explaining educational performance, in part because low ability children with high economic status experienced the largest increases in educational attainment.

I. Introduction

Most countries seek to improve children's educational levels and standards. Indeed in the last 50 years, there has been an almost unprecedented increase in educational attainment in most, if not all, developed and developing

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countries (Barro and Lee 2000). However, as overall educational attainment has risen, attention has increasingly focused on the related issue of educational inequality. Commonly, equality of opportunity concerns have taken the form of striving for greater educational attainment by more able individuals from poor backgrounds. From an empirical perspective therefore, the key questions are whether family background (family income levels and social class) has become steadily less important in determining educational attainment, and, in corollary, whether actual ability has become a more important factor in predicting how well an individual will do in educational terms.

We consider this important policy issue in the context of the British education system, which makes for an interesting case study because it has undergone some dramatic policy changes in the post-war period, and has also experienced a significant increase in educational attainment over the last 40 years. Whereas in 1960 just 12 percent of the cohort stayed on past the compulsory school-leaving age of 15 years old, 70 percent now stays on in school past the age of 16 (the current compulsory school leaving age) and 45 percent enter higher education. In this paper we use two unique British panel data sets that cover the early part of this expansion,[1] to examine changes over time in the relationship between cognitive ability and educational achievement.

Our results suggest a decline in the role of cognitive ability in determining educational achievement during the period under consideration. A person's early measured cognitive ability became a poorer predictor of their educational achievement, while family background (as measured by parental income at least) became somewhat more important. The fact that cognitive ability became less important would seem to be a retrograde step, especially given the increased importance of family background. Yet part of the explanation for our result is that the achievement of the least able students has risen markedly during the period. In other words, early cognitive ability is a poorer predictor of educational outcomes partly because the qualification levels of the least able have risen so much.

These findings are important from an empirical perspective and also because of how they relate to the broader literature on the link between education and inequality (Benabou 1996; Fernández and Rogerson 1996; Fernández and Rogerson 1998). This literature argues that because human capital investments yield a return later in life and one cannot borrow against these future gains, children from poorer families may underinvest (Fernández and Rogerson 1998). This is particularly the case if schooling is financed from the local tax base, as is the case in the United States. In this instance, poor children will live in poor communities that underinvest in education, and this will lead to still more educational and labour market inequality. According to the Fernández and Rogerson model, a policy intervention that increases educational opportunities for poor children specifically will lead to welfare improvements and reductions in educational and income inequality.[2] In Britain there have been many

1. The older cohort attended school in the late 1960s and 1970s. The younger cohort attended school in the 1970s and 1980s. Thus our results pertain to changes over this period. We cannot comment on the effects of the (accelerated) expansion of the British education system in the 1990s.

2. There is a related literature on the political economy of educational finance and redistribution policies. For example, Benabou (2000) seeks to explain why more unequal societies (such as the United States) actually redistribute less than more equal societies (such Sweden).

policies that have allegedly improved educational opportunities for poorer students and yet, in contrast to the predictions of this theoretical literature, our empirical evidence suggests there has actually been increasing income-driven educational inequality during this period. Of course this may reflect the fact that policies designed to improve educational opportunities for poor students did not actually do so, rather than inherent contradictions in the theoretical literature.

Our paper also relates to a strand of this theoretical literature that focuses on the effects of individuals' ability. De Fraja (2002; 2003) argues that the "ability to benefit from education" is a combination of both family background and innate ability. Thus, although innate abilities may not vary across different socio-economic groups, the impact of family background is such that poorer income groups will nonetheless have fewer "high ability" children. De Fraja's model (2003) suggests that given this, the optimally efficient education policy is one that targets increased educational opportunities specifically at individuals from disadvantaged groups. The reasoning behind this justification for reverse discrimination is intuitive and based on two key assumptions. First, that there is asymmetric information: the government does not know who the high ability people are. Second, that there are positive externalities from education so that the optimal education policy needs to encourage high ability individuals to invest in more education than they otherwise would. Since there are fewer higher-ability poor children, education policies targeted at able but poor students will be less costly and more efficient than those targeted at able richer students, since the latter group is more numerous. Empirically, if such optimal education policies were being undertaken, one should observe that for a given level of ability, individuals from poorer backgrounds have greater educational opportunities and thus invest in more education. Again, this is the reverse of what we have found for Britain, as we now describe in more detail.

The paper is set out as follows. The next section describes our data, its advantages and the cognitive ability measures we construct. Our results section documents the changes in the extent to which cognitive ability and family background factors determine an individual's education level. We then discuss some changes in British educational policy and end with our conclusions.

II. Data

This paper builds on the empirical literature relating cognitive ability to various socioeconomic outcomes (Chevalier and Lanot 2002 for Britain; Cawley et al. 1996 for the United States). It also relates to earlier empirical evidence on the role of family background factors (parental income and social class) in determining educational attainment (Haveman and Wolfe 1995). Our unique data[3] enable us to

3. The data used in this paper have been applied to other aspects of the relationship between socio-economic background, cognitive ability and socioeconomic outcomes (Breen and Goldthorpe 1999; Currie and Thomas 1999; Dearden 1999; Dearden, Machin and Reed 1997; Feinstein and Symons 1999; Harmon and Walker 2000; McCulloch and Joshi 2000; Saunders 1997). Blanden et al. (2002) have also considered intergenerational mobility in these data. There is also a related literature on social mobility: Erikson and Goldthorpe (1985), Saunders (1997) and Schoon et al. (2002), to cite just a few.

overcome some of the problems in this literature and thus we spend some time explaining the advantages of our data sets.

We use highly comparable longitudinal information from two British cohorts, namely, the National Child Development Study of 1958 (NCDS) and the British Cohort Study of 1970 (BCS). The former follows the cohort born in Britain in the week commencing the 3rd of March 1958, with follow ups on the children and their families and school environments at the ages of seven, 11, and 16. Further follow-up studies were undertaken in 1981 (age 23), 1991 (age 33) and 2000 (age 42). BCS is a longitudinal study of British children born between the 5th and the 11th of April 1970, with surveys at ages five, ten, 16, 21, 26, and 30. The two studies are not identical, since respondents were not interviewed at exactly the same ages. Nonetheless, the questions asked of the two sets of respondents were very similar, enabling robust cohort comparisons to be made.

An advantage of our data is that we have full information on each cohort member's early cognitive ability, with two sets of ability test scores prior to the age of 11. We also have information on respondents' initial social class and measures of their subsequent educational attainment. Many other papers in this field have had to rely on more contemporaneous information on cognitive ability, parental social class and respondents' educational attainment, making it difficult to identify any causal relationships.[4]

The descriptive statistics in Table 1 indicate that the later cohort has more education than the earlier (1958) cohort, as expected. Furthermore, the social class structure has changed somewhat between the two cohorts, with an increase in the proportion of the later (1970) cohort claiming to come from an intermediate background. In terms of other family background indicators, respondents from the 1958 cohort had less educated parents and fewer siblings.

In addition to structural changes between the two cohorts, we were also concerned about attrition from the two panels. We therefore undertook various analyses to test for bias due to differential attrition. The proportion of each cohort that attrits, or has incomplete data, by the age of 33 (30 in BCS) is remarkably similar (see Table 1). However, we did find some differential attrition by region and other characteristics. Nonetheless all the results presented here are robust to reweighting based on estimated attrition probabilities.[5]

Of course the variable that we are most interested in is cognitive ability. We follow the methodology used in Cawley et al. (1996) to construct our ability measure. Ability test scores obtained at the age of 11 for the 1958 NCDS cohort and at age 10 for 1970 BCS[6] cohort constitute the basis for most of the analysis because of the proximity in terms of age across cohorts and the similar type of scores derived.[7] However, we also

4. For example, Cawley et al. (1996) use the National Longitudinal Survey of Youth data which test respondents' ability at a much later age (in high school). Carneiro, Hansen, and Heckman (2003) do attempt to account for the effect of completed schooling on later ability measurements.

5. Further information is available from the authors on request.

6. There is considerable overlap for both cohorts in the specific age at which these tests were taken as the data collection process extends for periods longer than one year in both surveys.

7. NCDS test scores at the age of 11 were (i) reading, (ii) math ability, (iii) nonverbal general ability, (iv) verbal general ability, and (v) copying designs. BCS test scores at age ten include (i) maths, (ii) reading, and (iii) British Ability Scale test of general ability.

Table 1
Descriptive Statistics

	Cohort = 1958		Cohort = 1970	
	Mean	Standard Deviation	Mean	Standard Deviation
Highest academic level (percentage)				
No qualifications	16.31		16.17	
CSE	18.29		10.60	
O-level	40.25		37.95	
A-level	10.74		7.81	
Higher education	14.41		27.47	
Father's social class (percentage)				
Unskilled	5.88		3.93	
Semiskilled	15.91		12.71	
Skilled manual	43.15		44.01	
Skilled nonmanual	9.42		9.32	
Intermediate	17.88		22.93	
Professional	5.68		5.80	
Missing	2.07		1.30	
Father's age left schooling	14.74	1.72	15.93	2.22
Father's age at child's birth	30.63	6.15	29.11	5.80
Mother's age left schooling	14.74	1.41	15.72	1.65
Mother's age at child's birth	27.56	5.58	25.99	5.36
Number of siblings	2.07	1.50	1.54	1.13
Observations	9,742		8,971	
Attrition details				
Total in cohort	18,544		17,958	
Subsample (observations without missing ability)	14,121		11,325	
Subsample (observations without missing ability and education)	9,742		8,971	
Subsample (observations without missing ability, education and income)	5,867		6,913	

have ability measures at ages five (BCS) and seven (NCDS), which we use to verify our results. As has been said, all our ability measures precede entry into secondary school and, of course, individuals' eventual educational achievement level.

Because the ability tests administered to the two cohorts were not exactly identical, it is not possible to use a raw test score in the analysis. Using dummies for quintiles of the distribution of separate scores has been the standard approach so far, but the relatively high correlation between the different test scores often leads to multicollinearity problems and other missing data issues.[8] We therefore used principal components analysis to construct an index of cognitive ability for each survey, using the first principal component extracted.

In the psychometric literature, this measure has been frequently associated with the construct *g*, described as the underlying general ability or intelligence factor (Cawley et al. 1996). Arguments about the best way to measure general intelligence continue. We take a pragmatic view. The main reason for using a construct of *g* is to enable the conversion of a set of cognitive ability measures into a single, continuous, cross-cohort comparable variable. Our interpretation of this variable is that of an index that allows us to rank each individual, within her own cohort, in terms of cognitive ability. We do not interpret the index as an absolute measure of cognitive skills, since the average level of cognitive skills may have increased between cohorts, perhaps as a result of increased levels of schooling.

Information about the process of extracting *g* for each cohort from the set of available ability scores is provided in Table 2. The first two columns indicate the principal component order and the cumulative proportion of the overall variation explained by each principal component. Columns 3 and 4 specify the correlation between each test score and the first principal component, which can be considered as an indicator of the contribution of each score to the construct *g*.

Because there are more tests available in NCDS (5) than in BCS (3), we observe that the first principal component in the former case explains a lower proportion of the total variation. Substantial differences in the variation of *g* across cohorts could also be due to test differences, such as the absence of a copying designs test in BCS. We therefore calculated *g* for the NCDS cohort in three different possible ways: including all scores, excluding copying designs, and aggregating verbal and nonverbal ability into one score. We found high (98/99 percent) correlations between these alternative specifications. In particular, the proportion of variance explained by the first component is highly similar across the cohorts, as are the correlations with general ability, maths and reading. This supports the hypothesis that we are not treating different components of ability differently across cohorts.

The distributions of the ability indices are displayed in Figure 1. This too confirms the high correlation between different constructs of *g* for NCDS. It also reveals a very close similarity between the distribution of *g* for NCDS and BCS. This leads us to accept *g* as a comparable index of an individual's cognitive ability ranking within their own cohort.

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8. Most papers using these data (NCDS and BCS) restrict themselves to using the reading and maths quintiles, neglecting important information from the general ability scores. Breen and Goldthorpe (2001) argue that the general ability scores in both NCDS and BCS, although different, are a good proxy for IQ.

Table 2
Cognitive Ability Indices at Age 10/11

Principal Component Rank (1)	Cumulative Variance Explained (2)	Name of Original Test (3)	Correlation (Test Score, *g*) (4)
NCDS (1958 Cohort)—Age 11			
g(5): using five test scores			
1 = g	0.69	Copying designs	0.26
2	0.85	Verbal ability	0.50
3	0.92	Nonverbal ability	0.48
4	0.96	Mathematics	0.49
5	1.00	Reading	0.46
g(4): using four test scores only. Correlation (*g*(5),*g*(4)) = 0.9951			
1 = g	0.81	Verbal ability	0.51
2	0.90	Nonverbal ability	0.49
3	0.96	Mathematics	0.50
4	1.00	Reading	0.48
g(3): using three test scores only. Correlation (*g*(5),*g*(3)) = 0.9862			
1 = *g*	0.84	Verbal and nonverbal ability	0.58
2	0.93	Mathematics	0.58
3	1.00	Reading	0.56
BCS (1970 Cohort)—Age 10			
1 = *g*	0.82	Mathematics	0.57
2	0.91	Reading	0.58
3	1.00	General ability	0.58

Notes: Column 1 indicates the order of extraction of the principal components under different specifications; with values in Column 2 representing the cumulative proportion of variance of scores explained by previous principal components. Column 3 names the tests used to derive each set of principal components. Column 4 provides the correlation of each test score with the first component (*g*) in each case. For the NCDS (age 11) tests, principal components are derived using alternative combinations of test scores: (i) all five, (ii) excluding the copying design test, (iii) as for (ii) but adding the verbal and nonverbal test scores into a single score.

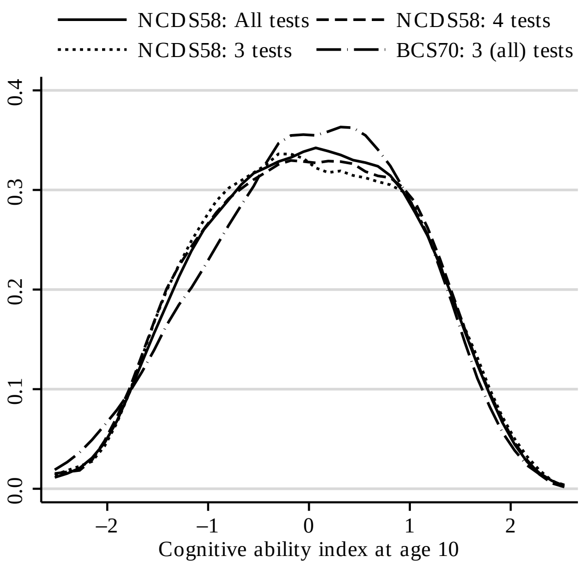

Figure 1
Distribution of Ability Indices by Cohort
Estimated kernel density of cognitive ability indices (first principal component *g*) for NCDS and BCS. See Table 1 for details.

Additional controls used in this paper include: father's social class, measures of family income at age 16, parental education and age when child was born and the number of children in the household at age 11/10.

III. Results

To examine whether cognitive ability played a lesser or greater role in determining educational outcomes for the later cohort, we pooled the data from our two cohorts. We then estimated a generalised ordered logit model, where the dependent variable is the highest achieved academic qualification level (as measured at age 30 in BCS and 33 in NCDS). The generalized ordered logit model does not impose the effect of the explanatory variables to be identical across thresholds, unlike say the standard ordered logit model.[9] The dependent variable consists of five educational attainment categories:

(i) No qualifications

(ii) Certificates of Secondary Education (CSE), grades two to five—obtained at age 16 and equivalent to less than a high school diploma

9. Indeed the hypothesis that the explanatory variables have similar impacts across thresholds is always rejected in the data.

(iii) One or more Ordinary levels (O levels) or grade 1 CSEs—obtained at age 16 but broadly equivalent to high school diploma[10]

(iv) Advanced level (A level)—obtained at age 18 or older and equivalent to high school plus good Scholastic Aptitude Test scores or the first year of college

(v) Degree or above—equivalent to college graduate.

Table 3 presents selected results from a model of educational attainment, which controls for cognitive ability and family background, as well as a number of other individual characteristics. For reasons of space we cannot show the coefficients on each variable for each of the five thresholds. The results in Table 3 pertain specifically to an important threshold from a policy perspective, namely that between high school graduation and first year college (between O levels and A levels). The model was estimated separately for men and women. We included a dummy variable indicating whether the person was in the 1970 cohort, with the base case being someone from the 1958 cohort. This allows for the overall increase in educational attainment across the two cohorts. We then tested for significant interactions between all the controls and the cohort dummy variable, to determine whether cognitive ability, family background and other characteristics had a changing impact on educational attainment across the two cohorts. Our primary focus is the changing role of early cognitive ability in determining educational attainment. We therefore ran our model including very early cognitive ability measures (age five/seven) which are shown in Column 1, Table 3 for boys and Column 3 for girls, as well as our preferred age ten/eleven ability measures,[11] as shown in Column 2 for boys and Column 4 for girls.

As is evident from Table 3, a person's early cognitive ability (whenever measured) is an important determinant of their final qualification level, consistent with the other literature in this field. Our results suggested two further striking findings. Firstly, being more able had a lesser impact on your educational attainment for individuals in the later cohort, since the ability cohort interaction terms were negatively significant. The magnitude of these changes are shown in Figure 2, which shows the relative marginal effect of cognitive ability on the probability of achieving A level or above for each cohort. The marginal effects of ability on educational achievement are greater for the earlier 1958 cohort, significantly so in the case of individuals in the top two ability quintiles. For example, the likelihood of a top ability quintile male from the 1958 cohort acquiring an A level or above is more than 70 percentage points greater than for his peers in the bottom ability quintile. This ability gap narrowed to under 60 percentage points for the later 1970 cohort. This implies that cognitive ability became a less important determinant of educational attainment for the more recent cohort. As can be seen from the graph, qualitatively identical results are obtained when comparing the 2nd and 4th quintiles. These results also held up across the genders and regardless of whether age five/seven tests or age ten/eleven tests were used. Furthermore, the reduced importance of early cognitive ability in determining educational outcomes for the later cohort was observed across all the educational thresholds we considered.[12]

10. See Steedman (1996) for details of qualification equivalences across countries.

11. These ability measures are preferred since the age at which the children took the tests is more similar for both cohorts than was the case for the earlier ability test scores.

12. Full results are available on request from the authors.

Table 3
The Determinants of Educational Attainment at the A Level or Below Threshold

	Boys		Girls	
	Using Age 5/7 Ability Tests	Using Age 10/11 Ability Tests	Using Age 5/7 Ability Tests	Using Age 10/11 Ability Tests
Cohort = 1970	2.3247	2.6000	3.6350	3.0907
	0.9763	*1.0655*	*0.9369*	*1.0159*
Income quintile = 2	0.2489	0.2915	0.0905	–0.0482
	0.1750	*0.1855*	*0.1737*	*0.1790*
Income quintile = 3	0.0690	0.1294	–0.1826	–0.3004
	0.1741	*0.1858*	*0.1826*	*0.1840*
Income quintile = 4	0.3437	0.3420	0.3286	0.2576
	0.1719	*0.1831*	*0.1714*	*0.1719*
Income quintile = 5	0.2809	0.3799	0.5230	0.4379
	0.1787	*0.1870*	*0.1746*	*0.1747*
Income quintile = 2 * 1970	–0.0612	–0.1234	0.1148	0.3122
	0.2241	*0.2409*	*0.2193*	*0.2268*
Income quintile = 3 * 1970	0.1294	0.1186	0.5323	0.6053
	0.2258	*0.2412*	*0.2268*	*0.2308*

Income quintile = 4 * 1970	0.1684	0.1355	0.2913	0.2621
	0.2206	*0.2362*	*0.2194*	*0.2231*
Income quintile = 5 * 1970	0.6033	0.4064	0.5009	0.3759
	0.2375	*0.2528*	*0.2302*	*0.2338*
Ability quintile = 2	1.1149	1.0764	0.9221	0.6564
	0.2672	*0.4469*	*0.2749*	*0.4154*
Ability quintile = 3	1.4719	2.1545	1.4422	1.7582
	0.2630	*0.4040*	*0.2606*	*0.3719*
Ability quintile = 4	2.0947	3.0991	1.8323	3.0552
	0.2513	*0.3985*	*0.2563*	*0.3629*
Ability quintile = 5	2.7352	4.5177	2.4658	3.9473
	0.2500	*0.3972*	*0.2555*	*0.3632*
Ability quintile = 2 * 1970	−0.7395	−0.5102	−0.6657	−0.2299
	0.3040	*0.4854*	*0.3095*	*0.4483*
Ability quintile = 3 * 1970	−0.7644	−1.0459	−0.8702	−0.7887
	0.2990	*0.4407*	*0.2937*	*0.4045*
Ability quintile = 4 * 1970	−1.0627	−1.4843	−0.9730	−1.5272
	0.2866	*0.4349*	*0.2910*	*0.3949*
Ability quintile = 5 * 1970	−1.3003	−1.7804	−1.0538	−1.5362
	0.2864	*0.4337*	*0.2896*	*0.3987*
Number of observations	6,058	6,054	6,374	6,434
Log-likelihood	−7,870.8	−7,356.6	−8,042.7	−7,605.8

Notes: The table shows the coefficients obtained from a generalised ordered logit model. Standard errors in italics. Sample: individuals with valid ability and income data for each specification. Other controls that are not listed include father's and mother's schooling, age, a dummy variable indicating whether the father/mother was living in the household, and number of siblings, all interacted with the cohort variable.

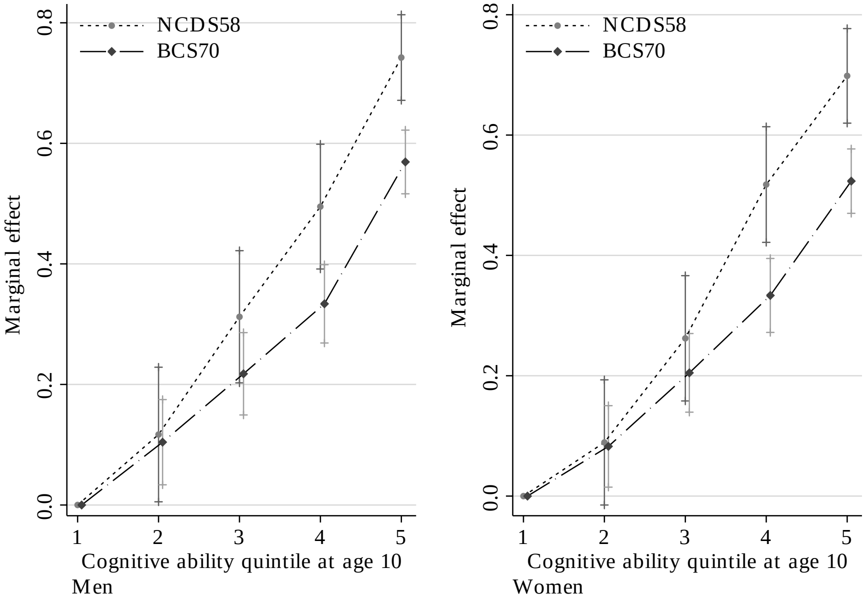

Figure 2
Estimated marginal effects of ability on the probability of achieving A-level or Above.
Notes: Marginal effects relative to lowest ability quintile. Based on the specification shown in Table 3, Columns 2 and 4 for men and women respectively. 95 percent confidence intervals reported.

Our model also included family background variables, such as parental income and social class. In fact both parental income and parental social class are proxy measures for the true monetary and nonmonetary inputs into the child's educational development during childhood, loosely described as family background. Each family background variable has its own drawbacks. Cross cohort comparisons of the impact of parental income are quite problematic, given that the distribution of income widened considerably during this period (1970s and 1980s). Equally changes in the structure of the work force mean that cross cohort comparisons based on parental social class are difficult. Hence although Table 3 shows results using quintiles of the parental income distribution as the primary family background measure, we also estimated our models using social class. In the model in Table 3, the impact of being in the top quintile of the income distribution became markedly greater for the more recent cohort and this trend was observed across all the educational thresholds up to A level. However, when social class was included the interactions between social class and cohort were generally insignificant. This reflects the problem discussed earlier, of using social class as a family background indicator when there have been structural changes in the composition of the social classes over time (and in particular when there have been aggregate increases in the proportion of the work force in the higher social class categories). We can only conclude therefore that family background, as defined by parental income, appears to have a somewhat more important role in determining educational outcomes for the more recent cohort.

We then investigated whether there were interactions between cognitive ability and family background, and whether these were changing over time. A graphical representation of our findings is perhaps the most effective way of showing the changing relationship between ability and educational outcomes by parental income level. Figure 2 shows, for boys, the relationship between cognitive ability and the expected probability of attaining higher education, for both the top and bottom quintiles of the income distribution. Figure 3 does the same for females. In both figures, the continuous line shows the relationship for the NCDS 1958 cohort, the broken line shows the relationship for the 1970 BCS cohort.

Our models have already shown that ability is a good predictor of educational attainment. Figures 3 and 4 confirm that for both cohorts, more able children have a higher probability of attaining higher education (HE), for a given level of parental income. What is also noticeable however is that the income related gap in educational attainment is only observed for the *most able* students in the 1958 cohort. For the 1970 cohort, a gap in achievement between the top and bottom income quintiles emerges at low levels of ability too. Thus for the earlier cohort, if a student is less able they stand a very low chance of attaining higher education, regardless of their income level. This generates a steep ability-educational attainment slope for the 1958 cohort. The steepness of this slope was reduced markedly for the 1970 cohort. In other words, the relationship between ability and educational attainment (measured here at the higher education level) weakened. This is partly because the intercept of the 1970 curves shifted upwards in Figures 3 and 4. Thus the educational attainment of the least able increased across the two cohorts, although substantially more so for the better off students. This pattern was observed across all educational thresholds.

Table 4 confirms this, showing the educational attainment of different ability/ parental income combinations. Three levels of educational attainment are shown, first the proportion with higher education, second the proportion with A levels or above (first year college), and last the proportion with O levels or above (high school graduates). Educational attainment has increased across the board for most income/ ability combinations and particularly for low ability children. However, it is evident that the attainment of those from wealthier backgrounds has been greatest, regardless of their ability.

For example, while around 63 percent of middle ability–low-income[13] students reached O levels or higher among the 1958 cohort, this rose by five percentage points to 68 percent in the 1970 cohort. By contrast, 72 percent of middle ability students from the top of the income distribution reached O levels or higher in the 1958 cohort, rising 12 percentage points to 84 percent for the 1970 cohort. Another illustration is the fact that 24 percent of low ability-low income children achieved O levels or higher (high school graduation) amongst the 1958 cohort. This increased 19 percentage points to 43 percent in the 1970 cohort. Among low ability-high income children in the 1958 cohort, 33 percent achieved O levels or above, which increased 27 percentage points to nearly 60 percent for the 1970 cohort.

13. Students whose parents' income level was in the bottom tercile of the distribution and who come from the middle tercile of the cognitive ability distribution as measured at age ten/eleven.

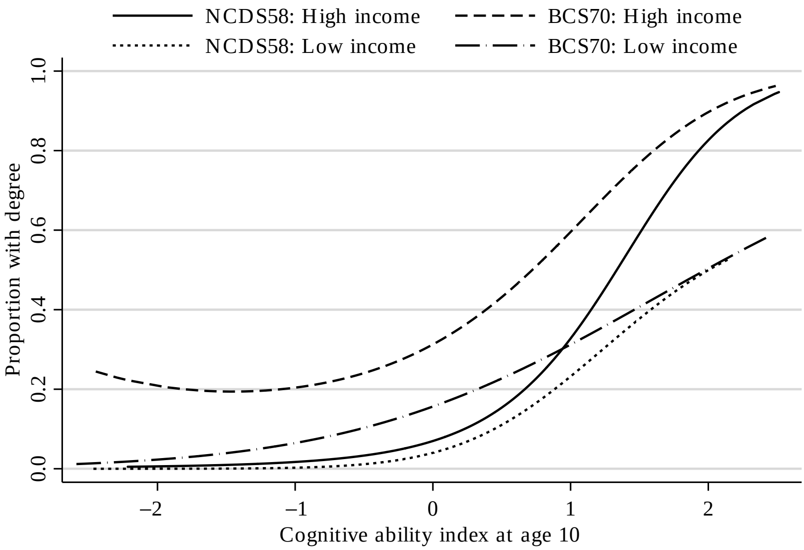

Figure 3
Estimated Probability of Attaining a Qualification at Degree Level or Higher for Males
Notes: Estimated probability of attaining a higher education qualification, by ability, for top and bottom income quintiles.

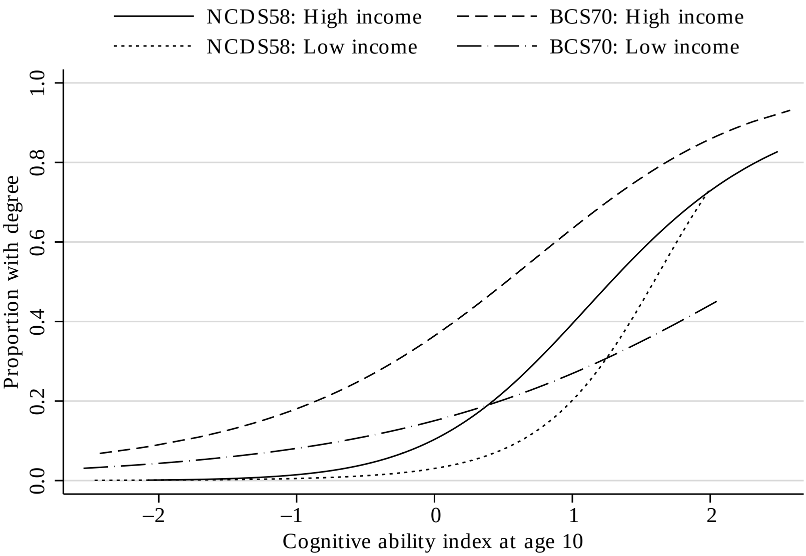

Figure 4
Estimated Probability of Attaining a Qualification at Degree Level or Higher for Females
Notes: Estimated probability of attaining a higher education qualification, by ability, for top and bottom income quintiles.

Table 4
Educational Attainment by Ability and Income Group

	1958 Cohort			1970 Cohort		
	Low Ability Tercile (1)	Mid Ability Tercile (2)	High Ability Tercile (3)	Low Ability Tercile (1)	Mid Ability Tercile (2)	High Ability Tercile (3)
Low-income tercile						
Proportion with higher education or above	0.004	0.050	0.262	0.073	0.157	0.311
Proportion with A-levels or above	0.019	0.105	0.467	0.093	0.217	0.421
Proportion with one O-level/CSE Grade 1 or above	0.244	0.629	0.920	0.425	0.675	0.842
Sample size	*672*	*641*	*572*	*995*	*791*	*518*
Mid-income tercile						
Proportion with higher education or above	0.008	0.050	0.261	0.105	0.186	0.405
Proportion with A-levels or above	0.024	0.120	0.463	0.128	0.249	0.541
Proportion with one O-level/CSE Grade 1 or above	0.296	0.678	0.947	0.533	0.751	0.916
Sample size	*595*	*717*	*683*	*736*	*886*	*753*
High-income tercile						
Proportion with higher education or above	0.012	0.091	0.425	0.154	0.325	0.609
Proportion with A-levels or above	0.045	0.190	0.645	0.192	0.404	0.730
Proportion with one O-level/CSE Grade 1 or above	0.325	0.718	0.966	0.590	0.840	0.961
Sample size	*422*	*685*	*880*	*344*	*711*	*1,239*

Notes: Proportion of each income/ability tercile group attaining each level of education in NCDS and BCS samples. Ability test scores from age 10/11. Males and females have been pooled together.

These results suggest primarily that ability became a less important determinant of educational attainment over the period spanned by the 1958 and 1970 cohorts. The interpretation of this finding is however, complex. Ability became less important partly because the educational achievement of the least able students increased, as shown in Figures 2 and 3. An alternative way of interpreting this finding is that attainment became markedly less related to ability. In other words, it can be viewed as a good or a bad thing that students from the very bottom of the cognitive ability distribution now have a higher probability of getting a degree. If standards have not fallen, this result is a credit to the improvements made in the British education system in raising the attainment of less able children. The result may however, equally reflect falling standards and the growing popular belief that "anyone can get a degree these days." Given the difficulties in interpretation, some analysis of the changes in British educational policy that might have brought about these changes is required.

IV. Changes in British Educational Policy

Our main result is that cognitive ability played a lesser role in determining educational attainment for those born in 1970, as compared to an earlier generation born in 1958. During the period spanned by our two data sets (1960s to 1980s), Britain's secondary education underwent a radical shift from selective to mixed ability schooling. This may have been important in explaining the declining role of early cognitive ability.

At the beginning of the period a large proportion of students in England and Wales (more than 90 percent[14]) were being taught within a selective school system. This selective system consisted of two[15] types of schools, grammar schools and secondary moderns. Grammar schools were more academically oriented and catered for the top fifth of the ability distribution, as identified by students' performance in an age eleven examination in English, mathematics and general intelligence quotient (IQ).[16] Secondary modern schools catered for the remaining four fifths of the ability distribution and were more practical in orientation. Most students in secondary modern schools did not continue schooling beyond the compulsory school leaving age.

In 1965, legislation enabled local school districts to adopt a comprehensive or mixed ability system, whereby students of differing abilities are taught in the same school. Throughout the 1960s and 1970s, selective and nonselective schools coexisted. However, by the end of the period (1980s), most British students were being taught in mixed ability schools. By definition the old selective school system placed great emphasis on a child's early cognitive ability, which directly determined their

14. Less than five percent of schools in 1965 were mixed ability schools.
15. In fact a third type of school existed, namely technical schools. These were very few in number however.
16. Pupils who lived in an area with a selective school system might have anticipated the need to perform well in this age-11 examination. It is possible that their performance in other tests at this age would also be influenced by the fact that they lived in an area with a selective school system. This potential endogeneity is another reason to test the robustness of our results using the age five/seven test scores. We are grateful to an anonymous referee for this suggestion.

educational opportunities (which school they went to) and hence their outcomes. Dismantling this selective system may therefore have reduced the role of cognitive ability in determining educational outcomes.

It is worth noting however, that our data also suggest some diminution of the role of cognitive ability between the ages of five/seven and ten/eleven, during primary school.[17] This might of course stem from changes in educational policy at both the primary and secondary levels, and not necessarily just because of the shift to comprehensive schooling at secondary level. However, since the shift to comprehensive schooling reduced the importance of children's cognitive performance at age ten/eleven, it might also have impacted on performance incentives in primary school. In other words, students, parents and teachers might have reduced their efforts to improve children's cognitive skills in primary school since they were no longer assessed at age 11.[18]

Certainly it is useful to examine the relationship between an individual's family background (parental income and social class) and their educational outcome before and after such a massive shift in educational policy.[19] There is already a large and controversial literature on the effectiveness of the grammar school system (summarised in Crook, Power, and Whitty 1999) However, this is a particularly problematic research area. One obviously needs to evaluate the impact of the two different systems as a whole, rather than the impact of a particular school type. In a separate paper we have assessed the impact of different schooling systems for children of differing ability and family background using the older (1958) cohort, since selective and non-selective systems coexisted during the period that this cohort went to school (Galindo-Rueda and Vignoles 2004). Using the same age 11 ability test for all students, we found that more able students in the selective school system did significantly better than those in the comprehensive system. This confirms that cognitive ability played a greater role in determining outcomes in the selective system and that abolition of selection is likely to reduce the role of cognitive ability. As has been said, this can be viewed as a positive or a negative development. During this period there was a significant increase in the attainment of the least able students. This is clearly something to celebrate and it may of course have been brought about at least partially due to the decline in selective schooling in England and Wales.

V. Conclusions

The primary purpose of this paper was to investigate changes in the role of cognitive ability in determining educational attainment in Britain. Our results

17. Results are available from the authors on request.

18. A further alternative explanation is that we have measurement error in our cognitive ability measures across the two cohorts. Our key result (the diminution of the role of cognitive ability across the two cohorts) remains robust when we used age five/seven cognitive ability measures. However, the literature suggests that measures of IQ and cognitive ability are very sensitive to the age at which the test is taken. The BCS tests precede the NCDS tests at both ages 5 and 10 (age 7 and 11 for the NCDS). Thus we cannot discount the possibility of higher attenuation bias for the BCS tests. Nonetheless, to qualitatively explain our results this relative bias would need to be substantial.

19. Further radical change came later, with the 1988 Education Act, which introduced greater school choice and so-called "quasi-markets" into primary and secondary education in England and Wales.

suggest that the impact of cognitive ability on educational attainment actually decreased over this period, whilst some measures of family background become more important in determining a child's educational attainment. This latter finding at least appears to contradict a large theoretical literature (Benabou 1996; Fernández and Rogerson 1996; Fernández and Rogerson 1998) which has suggested that improved educational opportunities for disadvantaged students would lead to less educational inequality not more. Despite a period of unprecedented educational expansion in the UK, much of which was ostensibly targeted at poorer students, income-driven educational inequality appears to have increased between richer and poorer pupils.

More specifically however, we found that cognitive ability played a lesser role for the more recent cohort partly because the attainment of the least able students had increased substantially over time. We cannot say whether this is due to "dumbing down," with less able students getting more qualifications because the content of qualifications has been reduced, or whether this represents a genuine increase in the achievement of the least able. We do however find some evidence that for England and Wales, the reduction of secondary school selection on the basis of age 11 ability is likely to have reduced the role of early cognitive ability in determining a student's eventual outcome.

One can of course argue that initial ability *should* play a lesser role in determining how well a pupil does in educational terms, since the role of the education system is to provide all pupils, especially the least able, with an opportunity to progress. However, the theoretical literature has suggested that on efficiency grounds, educational policies should be targeted at disadvantaged but able students. U.K. education policy appears to have moved in the opposite direction during this period. Perhaps what the proponents of the comprehensive or mixed ability school system failed to predict was that whilst this change in policy indeed might increase in the attainment of the less able student, this would benefit richer students to a greater extent. For various reasons, richer but less able students were able to take most advantage of the decline in selective schooling, and thus the achievement of this group increased the most.

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