The Role of Credit Constraints in Educational Choices: Evidence from the NCDS and BCS70

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Executive Summary

In this analysis we seek to shed light on the extent to which credit constraints may affect individuals' choices to stay in full-time education past the age of 16 and to complete higher education (HE) qualifications in the United Kingdom, and on how this has varied between individuals born in 1958 and in 1970.

The observed correlation between family income and educational outcomes can be interpreted as arising from two quite distinct sources:

1. short-run credit constraints, whereby a limited access to credit markets means that the costs of funds are higher for children of low-income families;
2. long-run family background and environmental effects, which produce both cognitive and non-cognitive ability and also mould children's expectations and tastes for education, all of which crucially affects schooling choices and outcomes.

The aim of the analysis is to separate out the pure effect on schooling of short-term income constraints from longer term family income and background influences.

We apply to the UK the procedure of Heckman and Carneiro (2003), aimed at estimating the share of individuals who are not staying on or who are not attaining an HE qualification because of short-term 'credit constraints'. The share of the population being 'credit constrained' in their educational choices is defined as any residual gap that remains in the educational participation rates of individuals whose families are in the lower three quartiles of the parental income distribution compared to individuals in the top quartile (who are, by definition, not credit constrained), once having controlled for a number of observed measures of early family and environmental influences.

Note that to the extent to which we were unable to proxy all those early and background long-run factors related to growing up in a family in the top income quartile that also affect educational outcomes, our estimates represent an *upper bound* on the share of individuals truly facing short-run credit constraints.

Especially in the light of this caveat, overall our results do not seem to point to particularly large fragments of the population being credit constrained in their educational choices, although we found evidence that the importance of short-term credit constraints on the staying-on decision has increased for the younger cohort.

As to the decision of whether to stay in full-time education past the age of 16, we found no evidence of credit constraints for individuals born in 1958. By the time the 1970 cohort was making this decision some 12 years later in 1986, however, this situation had changed, particularly for individuals in the top and bottom ability tertiles. In particular, around a 7 percentage point gap in staying-on rates remains between individuals coming from families in the top income quartile and those from the bottom three quartiles.

As to the importance of credit constraints in terms of HE attainment decisions, we find that for males, such constraints seem to have surfaced between the two cohorts, though the share of the younger cohort being affected remains fairly minor (2-3%). By contrast, females of both cohorts seem to have been affected by credit constraints in roughly equal measure (3-6%).

Subject to the proviso that we have no way to gauge if and how these patterns have evolved from the mid 1980s to today, our findings seem to suggest that policies aimed at reducing the possible impact of short-run credit constraints on education decisions should target individuals at the age of 16 (or possibly earlier) when they are making decisions about whether or not to continue in full-time education (e.g. like the Education Maintenance Allowances programme), rather than at 18 when individuals are making Higher Education decisions.

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1. Introduction

In this paper we seek to shed light on the extent to which credit constraints may affect individuals' choices to stay in full-time education past the age of 16 and to complete higher education (HE) qualifications in the United Kingdom. By comparing the experiences of two British birth cohorts, one born in 1958 and one in 1970, we also consider how the incidence of credit constraints has varied over that time frame.[1]

We closely follow the methodology used by Carneiro and Heckman (2003) using US data. They find that at most 8 per cent of American youth are credit constrained in their decision to go to college (variously defined) and argue that there is only a limited role for tuition policy or family income supplements in eliminating schooling and college attendance gaps by income.

As a background, consider Figures 1 and 2, which were obtained by splitting the sample into quartiles based on parental income at age 16 and then looking at the proportion of individuals who stay on in full-time education after the age of 16 (what we refer to as staying on past the minimum) (Fig.1) or complete an HE qualification (Fig.2) by parental income quartiles.[2]

What these raw figures show is that the proportion of individuals staying on or achieving HE markedly rises in a monotonic way as we move from the lowest to the highest income quartile. For instance, the share of young people staying on is about 20 percentage points lower for those in the bottom three quartiles compared to those in the top quartile. Another interesting feature is the similarity in HE completion at all income levels for men and women. This is in stark contrast the large differences in staying on rates for men and women, particularly for those in the bottom half of the income distribution.

[1] In a companion paper, we proceed to then estimate the individual wage returns to staying on and to HE that accrue – or would have accrued – to variously defined *marginal learners* (Dearden, McGrahanan and Sianesi, 2004).

[2] The corresponding Figures for the NCDS cohort are presented in Appendix B.

Figure 1: Proportion staying on by parental income quartiles – BCS70

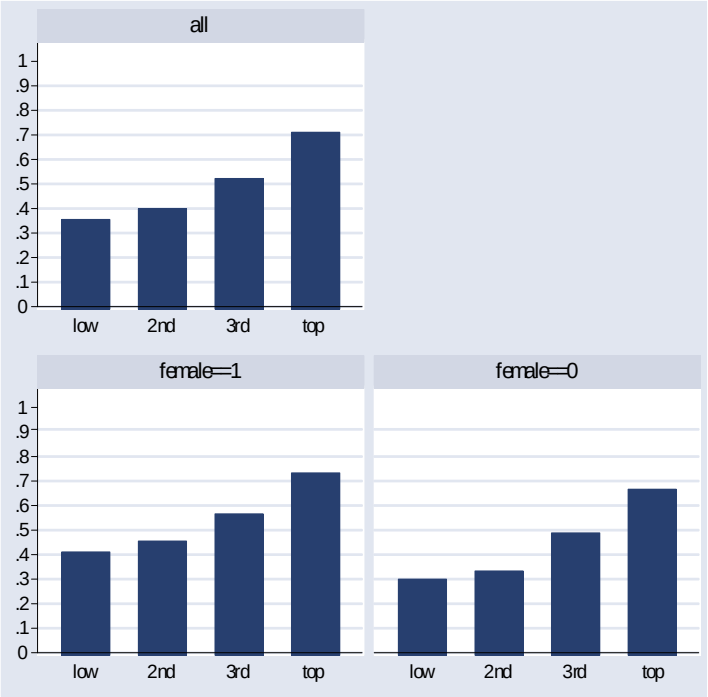
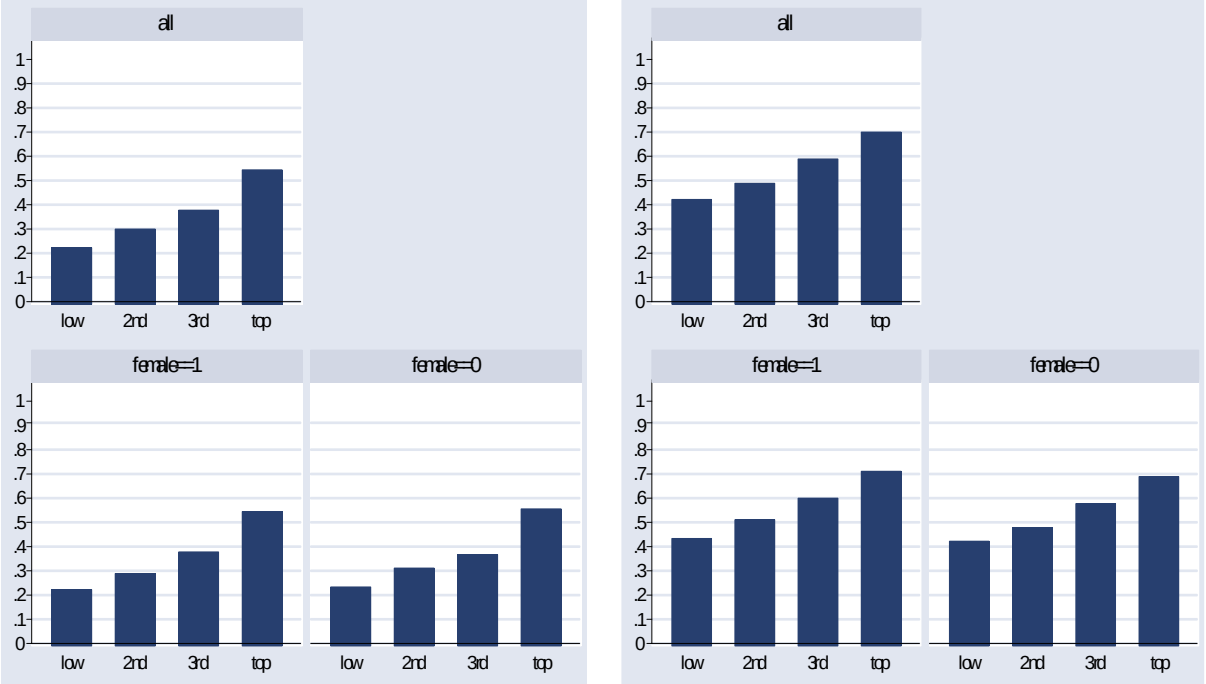


Figure 2: Proportion achieving HE by parental income quartiles – BCS70

a) full sample b) conditional on level 2 qualifications



2. Is this evidence of credit constraints?

This observed correlation between family income and educational outcomes can be interpreted as arising from two quite distinct sources:

1. short-run credit constraints, whereby a limited access to credit markets means that the costs of funds are higher for children of low-income families;

2. long-run family background and environmental effects, which produce both cognitive and non-cognitive ability and also mould children's expectations and tastes for education, all of which crucially affects schooling choices and outcomes.

The problem in identifying the pure effect of short-term credit constraints from the raw correlations observed between family income and schooling outcomes is that parental income also reflects long-run, not just short-run influences on schooling attainment.

The aim of the analysis is to separate out the effects on schooling of short-term income constraints from longer term family income and background influences. To frame the question in more direct policy terms, suppose the government is envisaging a policy which exogenously increases the incomes of families with 16-year-olds. How much, if at all, would the young persons' educational participation increase due to this policy? In other words, to what extent would this government intervention providing financial support when the child is 16 relax binding short-term credit constraints and cause more young people to participate in education? And conversely, for what proportion of the population would it be already too late to affect participation, with children's cognitive and non-cognitive skills, tastes for education, expectations, discount rates and the like already formed?

3. Measurement of credit constraints

In the following, we apply to the UK the procedure of Heckman and Carneiro (2003), aimed at estimating the share of individuals who are not staying on or who are not attaining an HE qualification because of short-term credit constraints. It is important to note that these shares are directly estimated. This means we cannot directly identify the credit-constrained individuals, only the population share who are credit constrained.

Before describing their method in more detail, it is important to highlight what is meant by the term 'credit constrained'.

Heckman and Carneiro (2003) assume that individuals coming from the top quartile of the income distribution are not, *by definition*, credit constrained. Observed differences in attainment between those in the top quartile and those in the lower quartiles are due either to long-run family effects or to short-run credit constraints. In this sense 'credit constraints' are simply any gap that remains in the proportion staying on or completing HE in the lower three quartiles compared to the top quartile after taking into account long-run family effects. Hence it is just a convenient term, representing the residual difference in participation rates once we control for a given number of observed measures of early family and environmental influences. Note that despite our particularly rich data, we might not be able to capture *all* the channels through which growing up in a family with higher income may affect educational

outcomes. It is thus useful to keep in mind that our results represent an *upper* bound on the extent of liquidity constraints.

The basic idea of the analysis by Heckman and Carneiro (2003) is to estimate the impact of family income (belonging to a low quartile relative to the top quartile) on staying on probability and HE attainment *controlling* for long-run family factors. Controlling for ability and family background is meant to purge family income of its long-term family and environmental components.

Box 1 outlines the methodology in detail.

Box 1 – Detailed Methodology

In the first step, measured ability is divided into tertiles. Within each ability tertile, stay-on or HE attainment Y is regressed on quartiles of the distribution of family income at 16, Q, and on family background variables F:

$$Y = \alpha_a + \gamma_a F + \beta_{a1} Q_1 + \beta_{a2} Q_2 + \beta_{a3} Q_3 + u \qquad a=1, 2, 3 \quad (*)$$

where Q_k is a dummy variable for belonging in the k^{th} quartile of the family income distribution.
Within each ability group a, the percentage of individuals constrained in each quartile of family income (vis-à-vis the top quartile) is measured by the β's. For example, for a given ability group, β_1 is the impact on stay-on or on HE attainment of being in the first as opposed to the top quartile of family income, for given family background F; it thus measures the gap in average stay-on or HE attainment between the 1st quartile and the top quartile of family income.
The results from these regressions are presented in the appendix.

In the second step, the adjusted percentage staying on or attaining HE by income quartile k=1,2,3 is given by:

$$\alpha_a + \gamma_a \bar{F} + \beta_{ak} \qquad \text{for } k=1,2,3$$
$$\alpha_a + \gamma_a \bar{F} \qquad \text{for } k=4$$

where $\bar{F}$ is the vector of means of variables F in the target population.
These adjusted shares are presented in the Figures below.

In the final step, the adjusted gaps in stay on rates or HE attainment Y (defined as the percentage of population which is 'credit constrained' relative to the top income group) are calculated as follows. First, within each ability tertile a, the measured gap β_{ak} in Y for each income quartile k relative to the top one is weighted by the percentage of people in the target population who fall in that ability tertile-family income quartile. Within each ability tertile, the weighted gaps for the three bottom quartiles of family income are then added. The share of credit-constrained individuals in the target population is finally obtained by adding over the three ability. These are the total shares shown in the Tables below.
A variant also considered in the Tables is to construct these shares by only taking into account those estimated gaps β_{ak} that are statistically significant in the regressions (*).

We now turn to describe the main ingredients of the analysis: target educational groups, parental income, ability measures and family background variables.

From the discussion it should become apparent that the most recent data that contains all the information required to perform our analysis is the 1970 British Cohort Study (BCS70), a detailed longitudinal study of individuals born in 1970. We will also contrast the results for this cohort to the experiences of the older 1958 cohort of the National Child Development Survey (NCDS) when they were taking the same educational decisions at the same age.[2]

Target educational groups

We consider two key educational choices: staying on in full-time education past the age of 16 and completing any type of higher education. For higher education completion, we consider two eligible (or target) groups. The first is the whole population (with non-missing educational information), and the second is the subgroup of those who have achieved at least a level 2 qualification.[3]

Note also that we consider the impact of credit constraints on the *attainment* of some form of HE, not just to starting it. We feel this is more interesting to our purposes, since credit constraints may lead to a higher propensity to drop-out of higher education.[4]

Ability tertiles

In all our analyses we divide our target population into ability tertiles. As proxies of ability we use math, verbal and general ability tests at the age of 10 and a combined measure of social (or non-cognitive) skills in the BCS70, and English and Maths test conducted at the age of 11 in the NCDS.

Compared to tests taken at age 5 or 7, tests at 10/11 are closer to the education choice of interest, and should thus crystallise both innate or early ability and subsequent parental and schooling inputs (early school performance, school choice/quality, parental inputs etc). At the same time, tests at 10/11 are unlikely to be affected by the educational choices we are considering, in contrast to tests taken at 16, where is likely to depend on staying on and HE decisions.

For each of the cohorts the four (BCS70) and two (NCDS) measures have been reduced to one factor score using principal component factors analysis (a method for simplification which combines many correlated variables into a smaller number of underlying dimensions). For both our NCDS and BCS70 cohorts just one factor explains over 90 and 60 per cent of the variance of the two and four variables. The composite variable generated (with mean zero and unit standard deviation) is then used to divide the population of interest into ability tertiles.

[2] We also experimented with other data sets that have more recent cohorts of individuals. The problem with the more up-to-date BHPS is that it lacks information on cognitive ability measures – a constituent piece of information for our analysis. The sample sizes in the BHPS were also a problem. Another data set we investigated was the EMA data set. Again for this data set the only ability information is in the form of GCSE results, which are likely to have already been affected by participation decisions.

[3] In constructing our level 2 qualification variable we include both academic and vocational qualifications. We also include individuals who have 5 or more GCSE or equivalent qualifications *at any grade*. In our NCDS sample, we only include individuals who do not have missing information on either of our educational measures.

[4] Also, we do not have complete information in the surveys about courses started but not completed.

Quartiles of family income distribution

In both the NCDS and BCS70 we use family income at 16. In the BCS70 income at 10 is also available, but we decided on using income at 16 given that it is closest in time to the educational decisions we are considering and therefore should capture most short-term factors, once we have stripped away other longer term factors. The additional advantage is that we have a consistent measure between the two surveys[5].

In both surveys this income is banded which is not important when deriving quartiles, but means that these groups are not of exactly equal size. We use nominal income.

Family background measures

In addition to our cognitive and non-cognitive ability measures, we also use separate measures of parental education, family size and structure, father's social status at 16, race and region of residence at 16 which capture longer term family and environmental influences.

[5] In the BCS70 around 48 per cent of households have missing income data compared with only 13 per cent at the age of 10. When we restrict our sample to those who have income reported in both waves, the results based on income at 10 on the reduced sample (those with income reported at 10 *and* at 16) are almost identical to those obtained using the full sample (those who have income reported at 10). This suggests that selection in response to the 16 year postal survey is not altering results based on income quartiles at the age of 10. However, the results obtained using income at 10 *versus* income at 16 are quite different for individuals who have data in both waves and this is almost certainly due to the fact that income at 16 rather than 10 is more relevant for the educational decisions we look at. Hence all results presented below use income at 16.

4. Results

4.1 Staying on past compulsory schooling

The first decision we consider is whether a person stays on in full-time education past the minimum school leaving age of sixteen. In the UK, the proportion of young people staying on past compulsory schooling is still relatively low by international standards and credit constraints may be one of the driving factors. This is investigated in more detail below.

Results for the BCS70 cohort

The results for the BCS70 cohort are shown in Figure 3 and Table 1. If we look at the raw unadjusted results we see that the proportion of men staying on in the top income quartile is 22.0 percentage points higher than for men in the other 3 income quartiles. This raw gap is largest for men in the top tertile of the ability distribution. However, once we control for ability, family background and region this difference drops to 7.2 percentage points across all ability groups. This suggests that short term 'credit constraints' may be playing some role in stopping men from poorer backgrounds staying on past the minimum school leaving age. It is clear from Figure 3, however, that this gap is largest in the top ability tertile, where 76.4 per cent of men in the top income quartile stay on compared to 64.8 in the second quartile, 53.7 per cent in the third and 58.4 per cent in the bottom income quartile. In the middle ability tertile there is no evidence of credit constraints.

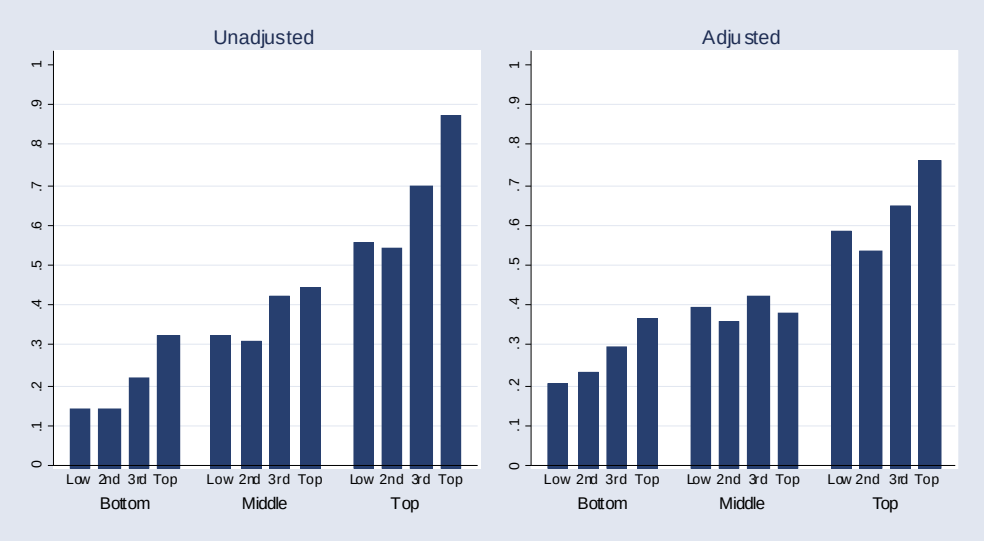
For women, the overall results are similar to those found for men, but there are some differences within ability tertiles. We see from Table 1 that the overall percentage point gap in staying on for those in the bottom 3 quartiles of the income distribution compared to those in the top quartile falls from 19.8 percentage points to 7.1 percentage points when we adjust for ability, family background and regional differences. Again the gap in the middle ability tertile is non-existent (in fact it is negative). In the top ability tertile there is a gap between 7.2 percentage points (3^{rd} quartile) and 12.2 percentage points (2^{nd} quartile). In the bottom ability tertile the gap remains at around 20 percentage points. These results suggest that short term liquidity constraints may be influencing staying on decisions in the bottom and top tertiles of the ability distribution.

But what could explain the presence of liquidity constraints in the staying-on decision?[6]
While due to public funding the direct costs of further education are mostly negligible, individuals from low-income families may be more sensitive to the indirect costs of remaining in full-time education which arise in the form of foregone earnings. In particular, pressing current financial needs of poorer families and of their young people, coupled with limited ability to borrow (disadvantaged individuals being mostly without collateral or sufficient credit histories), may give rise to short-term liquidity barriers to continuing education post the compulsory amount.

[6] Of course, as we mentioned one possibility is for the assumption on which our estimates are based is violated. Specifically, if there are still some background factors and early influences that take place in high-income families and that are correlated with staying on decisions, but which we do not observe, and hence cannot control for, our estimates will represent upper bounds of the actual extent of credit constrained individuals.

Figure 3: Proportion staying on by parental income quartile and ability tertile – BCS70

Males



Females

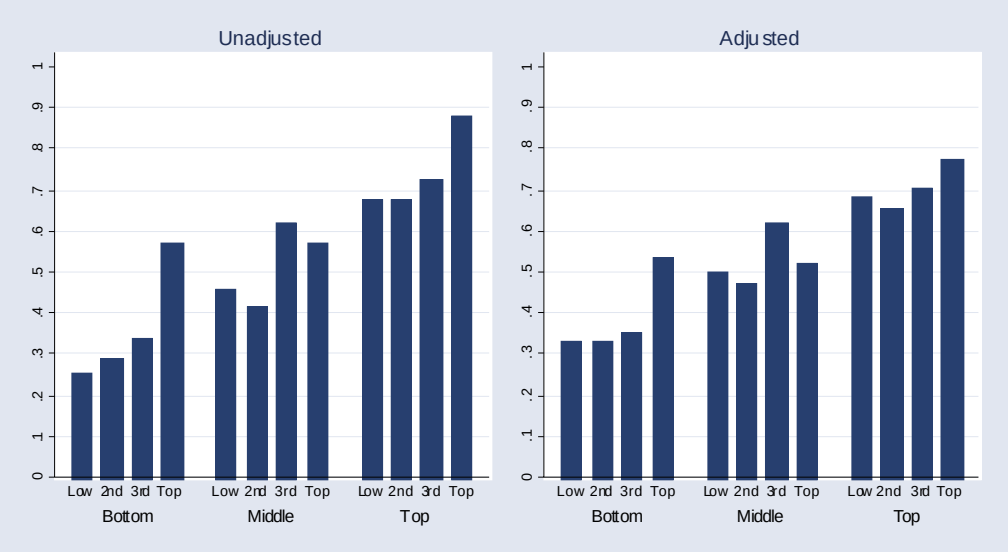


Table 1: Percentage gap in staying on (relative to the top income group) – BCS70

	Males	Females
Raw	0.220	0.198
+ Ability	0.131	0.140
+ Family Background and region	0.072	0.071
+ Only statistically significant gaps	0.070	0.062

Results for the NCDS cohort

From our BCS results we see that there is some evidence that credit constraints may have been affecting staying on decisions for individuals in the bottom and top ability tertiles. One interesting question is whether this is also found for individuals who were making their staying on decisions 12 years earlier in 1974. The results for our NCDS cohort are given in Figure 4 and Table 2. The first thing to note is that the proportion of men and women staying on in 1974 was much lower than the proportion staying on in 1986 so the percentage point gaps are measured from a much lower base. Also, for this cohort, the stay on rates for men and women are broadly similar, which is very different to the situation in the BCS cohort and today.

From Table 2 we see that for men, the raw gap in stay on rates between those in the top income quartile and those in the bottom three quartiles was 15.0 percentage points. However, once we control for differences in ability, family background and region, this difference essentially disappears. Even when we look within different ability tertiles in Figure 4, the gap remains quite small. Again, for the middle ability tertile we find no evidence of credit constraints. For the top ability tertile, there is some evidence that the top quartile has between a 5 and 7 percentage point gap compared to men in the bottom two quartiles. For the bottom ability tertile, there is a 2 to 3 percentage point gap (20.0 per cent compared to between 16.7 (lowest quartile) 17.9 per cent (2^{nd} quartile) and 18.2 per cent (3^{rd} quartile)).

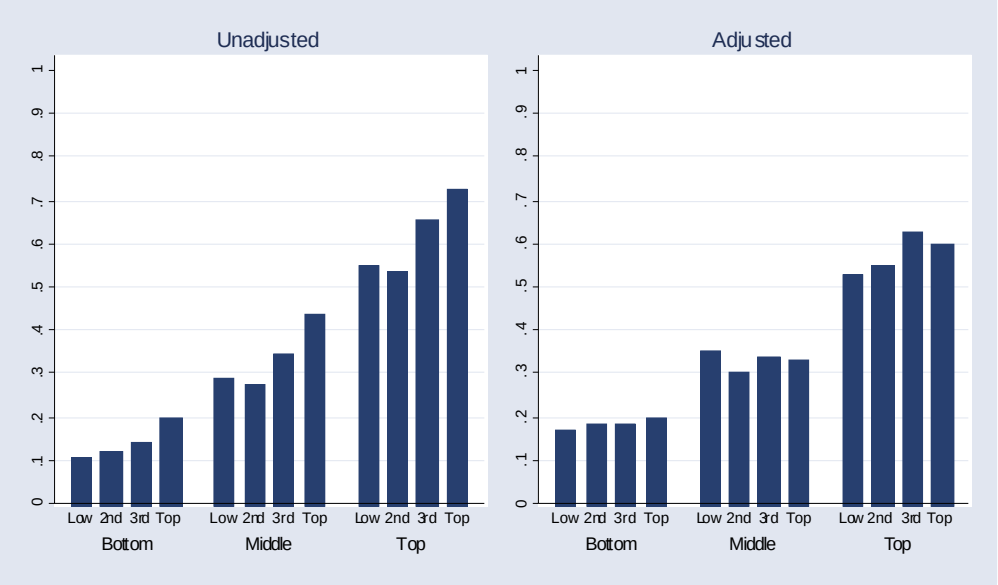
If we turn to the results for females we see a similar story. From Table 2 we see that the gap in stay on rates falls from 14.2 per cent to 2.3 per cent after we control for ability, family background and region. When we look at these results by ability tertile, there is essentially no gap in the top ability tertile, and only modest gaps in the bottom two ability tertiles. Again this result is very different to those found in the BCS cohort.

What do these results suggest? From these two cohorts, it appears that short run credit constraints may be playing an increasing role in preventing students from staying on in full-time education past the age of sixteen. For the NCDS cohort we see that after we control for ability, family background and region, the gap in stay on rates between those coming from families in the top quartile of the income distribution and those coming from families in the bottom three quartiles essentially disappears. This is not the case for the BCS cohort, for whom there remain significant gaps, particularly for students in the top and bottom ability tertiles. Under the important proviso that we are not able to predict whether these patterns have changed since the mid 1980s, these results might suggests that recent policy initiatives like Education Maintenance Allowances may have a role in helping close this gap.[7]

[7] It is also consistent with other research undertaken by the CEE which has found that parental income and other measures of socio-economic status have become relatively better predictors of educational attainment than ability for the BCS cohort relative to the NCDS cohort (see for example, Galindo-Reuda, F. and Vignoles, A. (2003), "The Declining Relative Importance of Ability in Predicting Educational Attainment", forthcoming *Journal of Human Resources*.

Figure 4: Proportion staying on by parental income quartile and ability tertile – NCDS

Males



Females

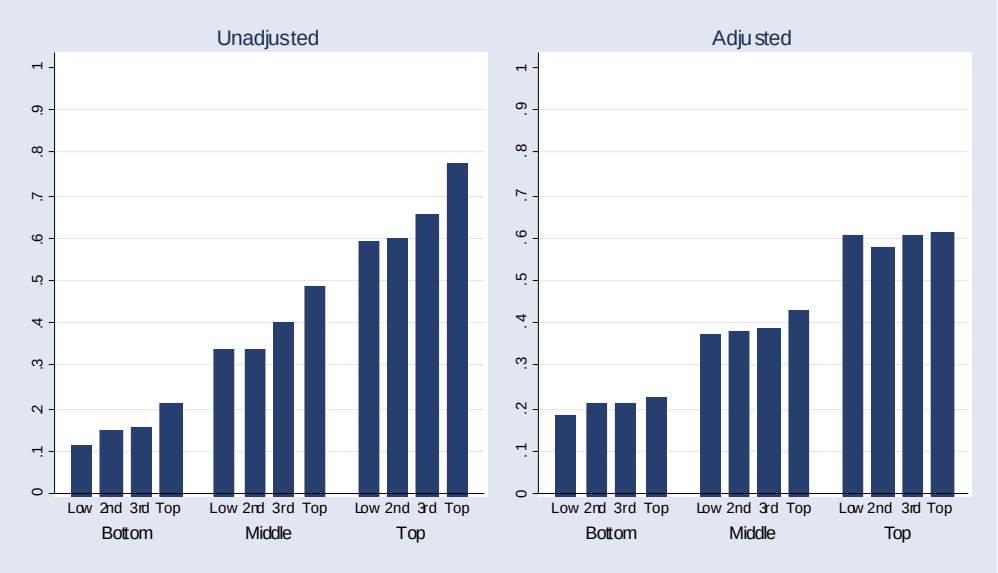


Table 2: Percentage gap in staying on (relative to the top income group) – NCDS

	Males	Females
Raw	0.150	0.142
+ Ability	0.089	0.093
+ Family Background and region	0.013	0.023
+ Only statistically significant gaps	0.000	0.000

4.2 Higher education compared to anything less

We now move on to consider whether short term credit constraints are also influencing the decision to undertake Higher Education. In doing this we use two target groups. In this section we compare individuals who complete higher education to those who do not, regardless of the qualifications they have obtained. This makes our analysis directly comparable to what we were doing in the previous section when looking at the staying on decision.

Results for the BCS70 cohort

Our results for the BCS cohort, who would have been making their higher education decisions in 1988, are shown in Table 3 and Figure 5. The first interesting point to note is that the proportion of men and women completing Higher Education at all ability tertiles is very similar. This is in stark contrast to what we found for our staying on decisions where a much larger proportion of women were staying on compared to men. Thus for men, a larger proportion of those staying on in full-time education go onto Higher Education in this cohort.

We see that for men the raw gap between those completing HE coming from families in the top quartile of the income distribution compared to those completing HE from the bottom 3 quartiles is 18.0 percentage points. Once we control for ability, family background and region, this gap falls to 7.7 percentage points. If we only consider statistically significant gaps, then the difference is 2.8 percentage points.[8] Interestingly, this gap is found in all ability tertiles. So again, there is some evidence that credit constraints could be influencing a small share of the male population in their higher education decisions. Because we are comparing those who complete HE with the whole population, this may in fact be entirely due to the impact of credit constraints on the earlier decision of whether or not to stay in full-time education past the age of 16. We will be able to investigate this issue more detail in the next section when we only compare HE graduates with those with at least a level 2 qualification.

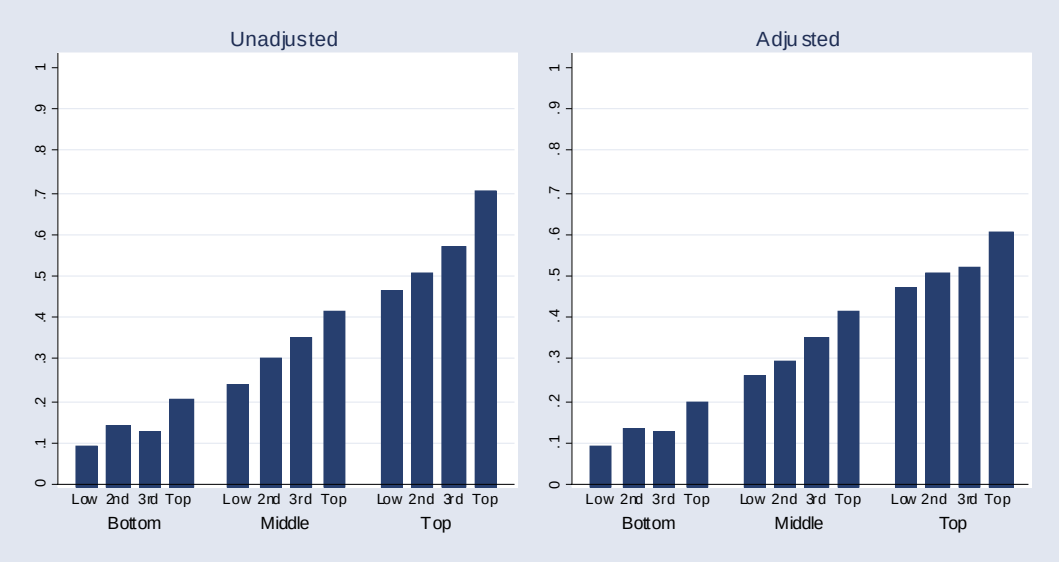
If we turn to the results for women, we see that once we control for ability, family background and region, the gap in HE completion rates between those coming from families in the top quartile of the income distribution and those in the bottom three quartiles falls from 18.7 percentage points to 4.6 percentage points (and only 1.7 percentage points if we only consider statistically significant gaps). This effect is largest for women in the bottom and, to a lesser extent, top ability tertiles (as was the case with staying on decisions).

Our results suggest that there is some evidence that credit constraints may have impacted on HE completion in our BCS cohort, however, this effect is much weaker than that found for staying on decisions at 16. We now move on to see whether this has changed over time by comparing our results to those for the earlier NCDS cohort.

[8] Appendix A provides the estimated coefficients together with their standard errors and p-values for all our educational outcomes for the BCS cohort (NCDS results are available from the authors).

Figure 5: Proportion achieving HE by parental income quartile and ability tertile – BCS70

Males



Females

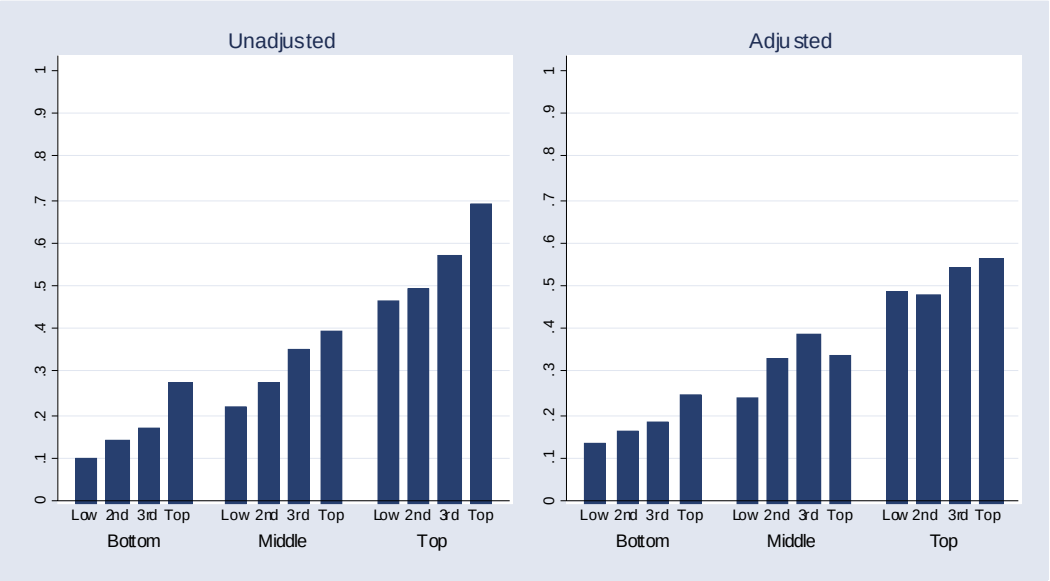


Table 3: Percentage gap in HE attainment (relative to the top income group) – BCS70

	Males	Females
Raw	0.180	0.187
+ Ability	0.102	0.111
+ Family Background and region	0.077	0.046
+ Only statistically significant gaps	0.028	0.017

Results for the NCDS cohort

The results for our NCDS cohort are shown in Table 4 and Figure 6. It is important once again to emphasise that for our NCDS cohort, the proportion of individuals going on to complete HE was much lower than for our BCS cohort. We also see that the proportion of women completing HE in this cohort is lower than the proportion of men, although this difference is concentrated in the top ability tertile.

From Table 4 we see that the gap in HE completion for men coming from families in the top income quartile compared to those in the bottom three income quartiles falls from 12.2 percentage points to 1.8 percentage points after we control for differences in ability, family background and region. This suggests that credit constraints had little impact on both HE completion and staying on decisions for men in this cohort. For women the corresponding gap falls from 13.5 percentage points to 4.9 percentage points (and only 2.8 percentage points if we consider only statistically significant gaps). This suggests that credit constraints may have played a small role in preventing women from completing HE in this cohort. This small effect is similar to that found for the later BCS cohort, and therefore has not changed significantly between the two cohorts (cf what we found for staying on decisions).

4.3 Higher education compared to level 2 or above

In this final section we only compare those individuals with at least a level 2 qualification, to those who have completed Higher Education. We may think that these are the key marginal individuals who would benefit from completing HE and who may have been prevented from completing qualifications because of short term credit constraints.[9]

Results for the BCS70 cohort

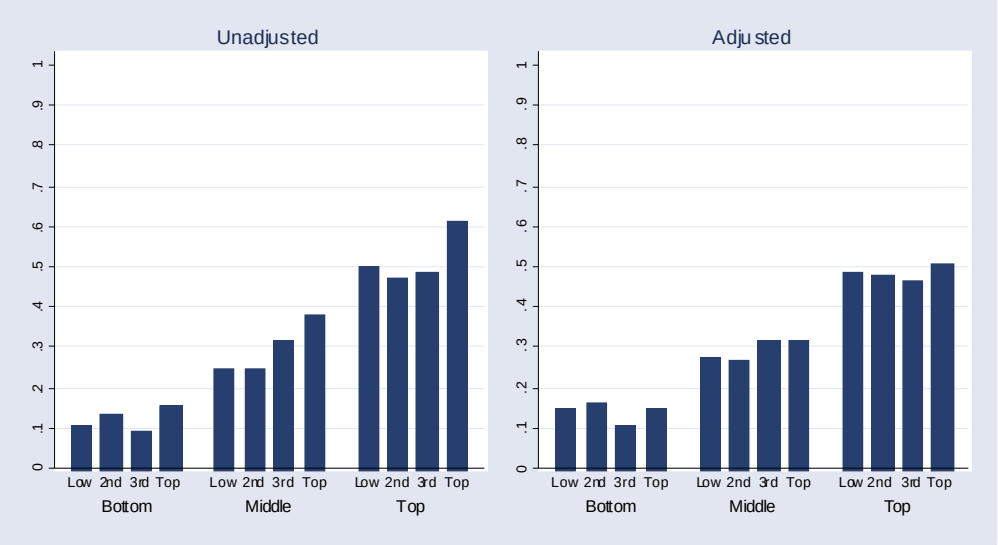
In Figure 7 and Table 5 below, we once again present the raw and adjusted percentage point gaps in degree completion amongst our level 2 target group for each of our income quartiles and ability groups. Table 5 once again averages these gaps separately for males and females. As one would expect, the raw gaps are smaller than what we found in the previous section. For men we see that the raw gap falls from 14.4 percentage points to 4.9 percentage points once we control for ability, family background and region. If we only consider statistically significant gaps the difference falls to 1.6 percentage points. For men the gap varies considerably by ability tertile with the biggest gap found in the middle ability tertile. This is in stark contrast to the earlier staying on decision where not difference was found for this group.

For women the raw gap falls from 16.3 percentage points to 7.7 percentage points once we control for permanent background factors and 2.9 percentage points if we only consider statistically significant gaps. This gap is present in all ability tertiles, but as was the case for men, this is largest for the middle ability tertile (cf the staying on decision). What is interesting is that changing our target group does not alter our findings significantly.

[9] This section most closely replicates the work we did in our interim report. In this report, however, we only considered individuals completing university qualifications rather than higher education. This turns out to be important.

Figure 6: Proportion achieving HE by parental income quartile and ability tertile – NCDS

Males



Females

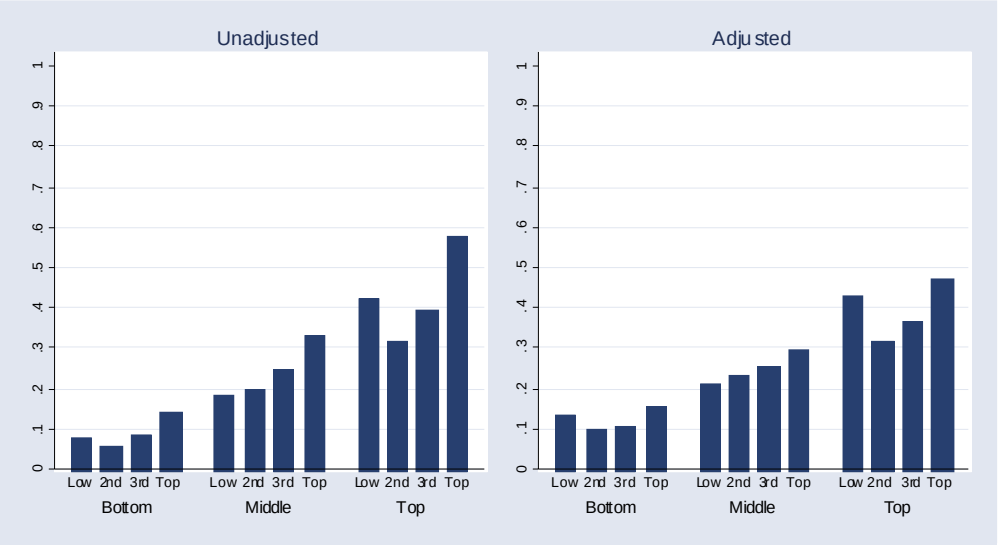
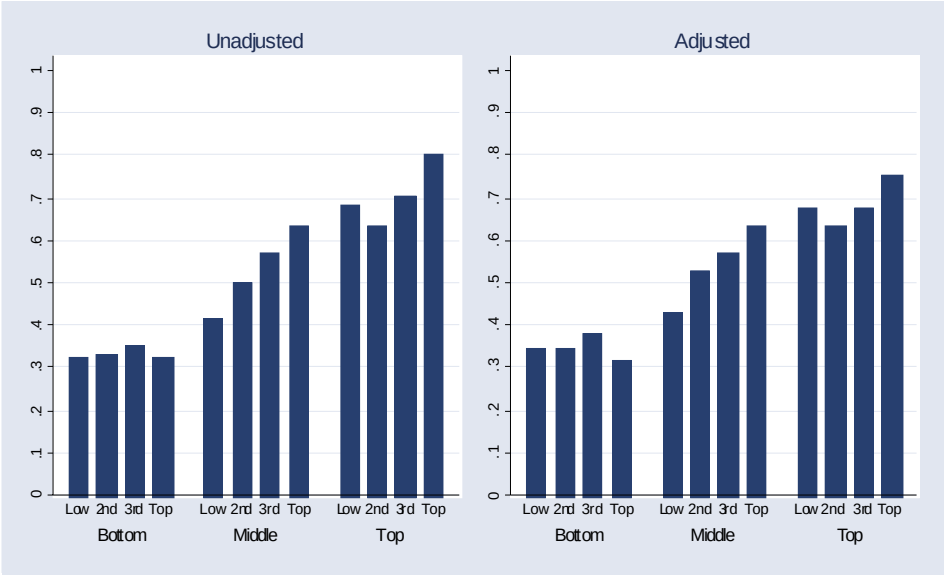


Table 4: Percentage gap in HE attainment (relative to the top income group) – NCDS

	Males	Females
Raw	0.122	0.135
+ Ability	0.069	0.097
+ Family Background and region	0.018	0.049
+ Only statistically significant gaps	0.000	0.028

Figure 7: Proportion of those with any level 2 or above achieving HE by parental income quartile and ability tertile – BCS70

Males



Females

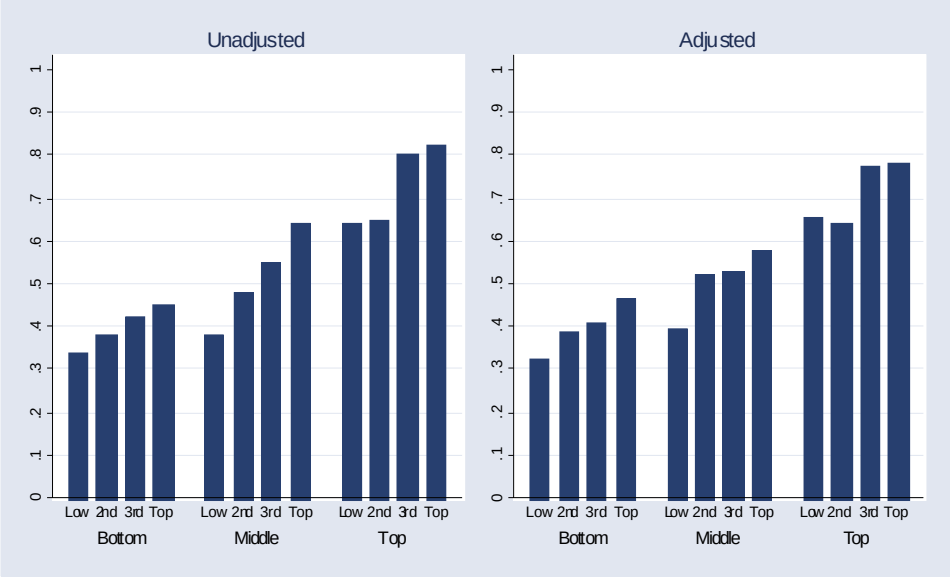


Table 5: Percentage gap in any HE attainment (relative to the top income group) for those with any level 2 or above – BCS70

	Males	Females
Raw	0.144	0.163
+ Ability	0.072	0.104
+ Family Background and region	0.049	0.077
+ Only statistically significant gaps	0.016	0.029

Results for the NCDS cohort

The corresponding results for the earlier NCDS cohort can be found in Figure 8 and Table 6. For men we see that the raw gap in HE completion falls from 9.4 percentage points to –1.4 percentage points once we control for permanent factors (0.0 percentage points if we only consider statistically significant gaps). As was the case with staying on decisions, it appears for this earlier cohort, there is little evidence of short term credit constraints affecting male higher education completion across all ability tertiles.

The story, however, is different for women in this cohort. We see from Table 6 that the gap falls from 13.9 percentage points to 8.5 percentage points once we control for ability, family background and region. Whilst this gap is present in all ability tertiles, by far the biggest contribution is coming from the bottom tertile where there is close to a 20 percentage point difference. The fact that the biggest difference is concentrated in the bottom tertile is probably less of a policy concern, although there is still around a 10 percentage point gap in the top ability tertile.

Overall, our findings of the importance of credit constraints in terms of HE attainment decisions point to quite different patterns for males as opposed to females. For males, credit constraints seem to have surfaced between the two cohorts, though the share of the younger cohort being affected remains fairly minor (2-3% if considering statistically significant gaps only). By contrast, females of both cohorts seem to have been affected by credit constraints in roughly equal measure (if anything, credit constraints have slightly decreased between the two cohorts).

While for NCDS males taking their HE decisions we found no evidence at all for credit constraints being at work, a small fraction of the BCS males seems to be prevented by short-term liquidity constraints in attaining HE. Specifically, 7.7% of the younger male cohort appears to be constrained in their HE attainment (though decreasing to less than 3% if considering statistically significant gaps only); an even lower share of 5% (merely 1.6% in terms of significant gaps) of the male population with at least level 2 qualifications appears to be constrained.

For females, the situation has remained pretty stable for the two cohorts. In particular, around 5% (2-3% significant) of females in both the NCDS and BCS appeared to be credit constrained, and 8.5% (6.4% significant) of NCDS females with at least level 2 were facing credit constraints in their HE decision, this percentage remaining roughly stable at 7.7% (3% significant) in the BCS.

Around the time the NCDS cohort members were making their HE decisions (1976), university students were enjoying the highest level of state support ever. Tuition was fully paid by the local education authorities, and means-tested maintenance grants were available for living expenses. Students could additionally receive housing benefits, as well as unemployment benefits during holidays.

By the time the BCS cohort members were contemplating HE (1988), the conditions for students were slightly less generous: the real value of the grant was somewhat lower[10] and since 1987 students had lost their eligibility to unemployment and housing benefits.[11]

5. Conclusions

In our analyses we have defined the share of the population being 'credit constrained' in their educational choices as the residual gap that remains in the educational participation rates of individuals whose families are in the lower three quartiles of the parental income distribution compared to individuals in the top quartile, once having controlled for a number of observed measures of early family and environmental influences. We stress again that as far as we were unable to proxy all those early and background factors related to growing up in a family in the top income quartile that also affect educational outcomes, our estimates represent an *upper bound* on the share of individuals truly facing short-run credit constraints.

Especially in the light of this caveat, overall our results do not seem to point to particularly large fragments of the population being credit constrained in their educational choices, although we found evidence that the importance of short-term credit constraints on the staying-on decision has increased for the younger cohort.

As to the decision of whether to stay in full-time education past the age of 16, we found no evidence of credit constraints for individuals born in 1958. By the time the 1970 cohort was making this decision some 12 years later in 1986, however, this situation had changed, particularly for individuals in the top and bottom ability tertiles. In particular, after controlling for ability, family background and region, around a 7 percentage point gap in staying-on rates remains between individuals coming from families in the top income quartile and those from the bottom three quartiles. Since our methodology cannot help us understand the mechanisms which might be driving this change, we have no way to gauge if and how these patterns have evolved from the mid 1980s to today.

Overall, our findings of the importance of credit constraints in terms of HE attainment decisions point to quite different patterns for males as opposed to females. For males, credit constraints seem to have surfaced between the two cohorts, though the share of the younger cohort being affected remains fairly minor (2-3% if considering statistically significant gaps only). By contrast, females of both cohorts seem to have been affected by credit constraints in roughly equal measure (if anything, credit constraints have slightly decreased between the two cohorts) with 8.5% (6.4% significant) of NCDS females with at least level 2 were facing credit constraints in their HE decision and 7.7% (3% significant) in the BCS.

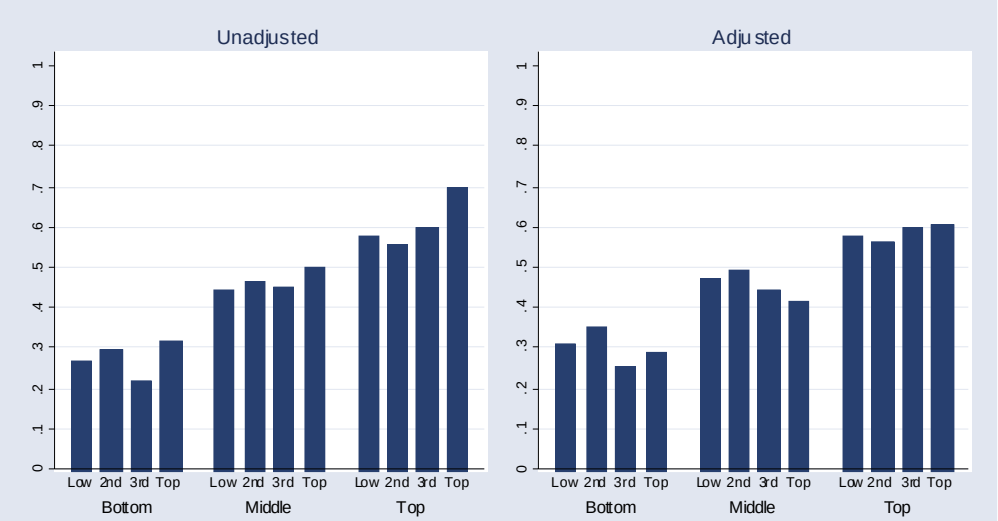
Subject to this proviso and to the caveat above, our findings seem to suggest that policies aimed at reducing the possible impact of short-run credit constraints on education decisions should target individuals at the age of 16 (or possibly earlier) when they are making decisions about whether or not to continue in full-time education (e.g. like the Education Maintenance Allowances programme), rather than at 18 when individuals are making Higher Education decisions.

[10] In 2003 prices, the annual maximum grant in 1976 was 3518, decreased by less than 5% to 3,365 in 1988. Note also that the grant as a proportion of earnings has gone down more. These figures are from Goodman and Kaplan (2003).

[11] The most significant changes in higher education support came in 1990, when grants where frozen. For more details see Blanden and Machin (2004) and Goodman and Kaplan (2003).

Figure 8: Proportion of those with any level 2 or above achieving HE by parental income quartile and ability tertile – NCDS

Males



Females

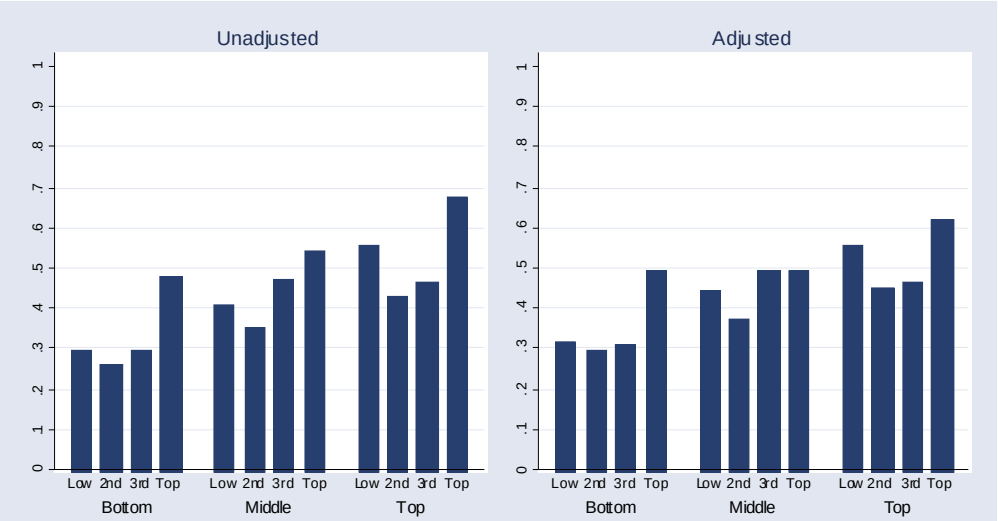


Table 6: Percentage gap in any HE attainment (relative to the top income group) for those with any level 2 or above – NCDS

	Males	Females
Raw	0.094	0.139
+ Ability	0.054	0.124
+ Family Background and region	-0.014	0.085
+ Only statistically significant gaps	0.000	0.064

6. References

Blanden, J. and Machin, S. (2004), "Educational Inequality and the Expansion of UK Higher Education", *Scottish Journal of Political Economy*, 51, 230-249.

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Galindo-Reuda, F. and Vignoles, A. (2003), "The Declining Relative Importance of Ability in Predicting Educational Attainment", forthcoming *Journal of Human Resources*.

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Appendix A – BCS Credit Constraint Regression Results

Staying on past 16

	females			males		
	Coeff.	S.E.	P>|t|	Coeff.	S.E.	P>|t|
Ability group = 1						
low income quartile	-0.200	0.066	0.0047	-0.164	0.057	0.0065
2nd income quartile	-0.205	0.070	0.0061	-0.139	0.061	0.0285
3rd income quartile	-0.178	0.069	0.0138	-0.075	0.057	0.1996
Ability group = 2						
low income quartile	-0.020	0.060	0.7472	0.012	0.060	0.8419
2nd income quartile	-0.047	0.060	0.4437	-0.022	0.064	0.7286
3rd income quartile	0.099	0.055	0.0782	0.042	0.059	0.4851
Ability group = 3						
low income quartile	-0.095	0.050	0.0663	-0.180	0.055	0.0024
2nd income quartile	-0.125	0.049	0.0144	-0.227	0.054	0.0002
3rd income quartile	-0.072	0.042	0.0942	-0.116	0.044	0.0125

HE attainment

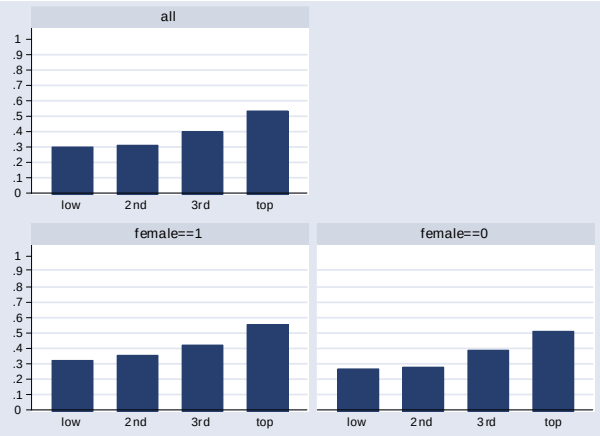
	females			males		
	Coeff.	S.E.	P>|t|	Coeff.	S.E.	P>|t|
Ability group = 1						
low income quartile	-0.116	0.052	0.0310	-0.102	0.051	0.0545
2nd income quartile	-0.092	0.055	0.1037	-0.058	0.055	0.2981
3rd income quartile	-0.070	0.054	0.2025	-0.066	0.052	0.2123
Ability group = 2						
low income quartile	-0.097	0.056	0.0921	-0.156	0.060	0.0141
2nd income quartile	-0.007	0.056	0.8993	-0.118	0.064	0.0739
3rd income quartile	0.050	0.051	0.3336	-0.063	0.060	0.3007
Ability group = 3						
low income quartile	-0.077	0.059	0.1999	-0.132	0.061	0.0365
2nd income quartile	-0.082	0.057	0.1606	-0.097	0.059	0.1086
3rd income quartile	-0.022	0.049	0.6633	-0.079	0.048	0.1105

HE attainment conditional on level 2

	females			males		
	Coeff.	S.E.	P>|t|	Coeff.	S.E.	P>|t|
Ability group = 1						
low income quartile	-0.141	0.100	0.1683	0.028	0.092	0.7657
2nd income quartile	-0.076	0.097	0.4420	0.033	0.089	0.7152
3rd income quartile	-0.052	0.101	0.6097	0.063	0.101	0.5378
Ability group = 2						
low income quartile	-0.184	0.083	0.0329	-0.204	0.099	0.0464
2nd income quartile	-0.062	0.075	0.4115	-0.105	0.089	0.2435
3rd income quartile	-0.055	0.071	0.4462	-0.060	0.090	0.5137
Ability group = 3						
low income quartile	-0.124	0.072	0.0941	-0.073	0.075	0.3364
2nd income quartile	-0.138	0.059	0.0262	-0.117	0.061	0.0645
3rd income quartile	-0.006	0.061	0.9188	-0.079	0.058	0.1833

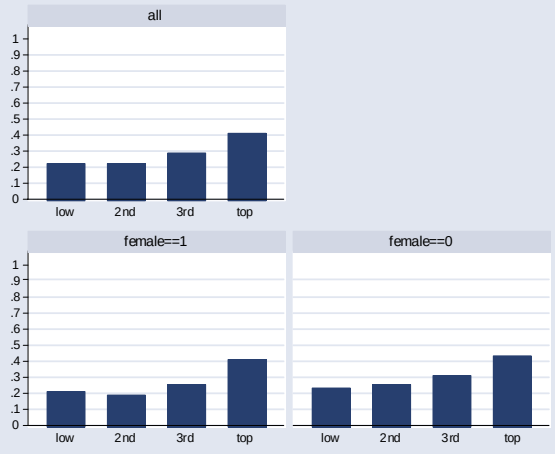
Appendix B – NCDS: Proportion staying on and attaining HE by parental income quartiles

Staying on past minimum

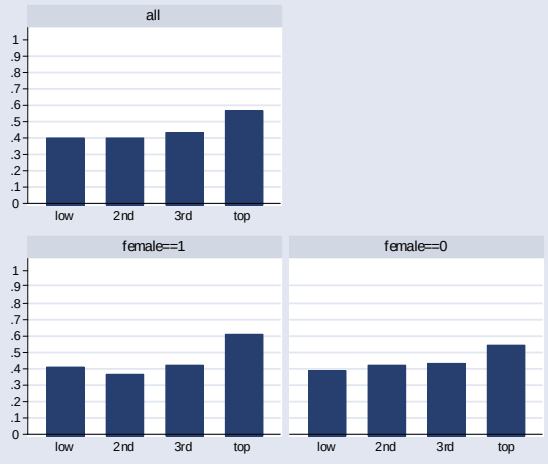


HE attainment

all



conditional on level 2



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