# Educational Attainment and Family Background

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by

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## Abstract

This paper analyses the effect of aspects of family background, such as family income and parental education, on the educational attainment of persons born from 1967 to 1972. Family income is measured at different periods of a child's life to separate long-term versus short-term effects of family income on educational choices. We find that permanent income matters to a certain degree, and that family income when the child is 0-6 years old is an important explanatory variable for educational attainment later in a child's life. We find that short-term credit constraints have only a small effect on educational attainment. Long term factors, such as permanent family income and parental education are much more important for educational attainment than are short-term credit constraints. Public interventions to alleviate the effects of family background should thus also be targeted at a child's early years, the shaping period for the cognitive and non-cognitive skills important later in life.

# 1. Introduction

Improvement in the quality of the labour force is a key issue in the aim for economic growth. The main path to skills improvement in a country is increase in the educational attainment of its citizens. However, we know that educational attainment differs across socio-economic groups and, in particular, that there is a strong correlation between family income and educational outcome (Shavit and Blossfeld, 1993; Dustman, 2004; Lauer, 2003). One interpretation of this is that children from low-income families are more limited in their options due to a lack of funds. An alternative interpretation is that parental income indicates the eventual effects of family background on cognitive and non-cognitive skills and on the formation of tastes for education. These two alternatives have very different policy implications. Credit constrained low income families implies that one should have low tuition fees, scholarships to poor college applicants, etc. The alternative explanation implies that the support to poor students should be replaced with programmes aimed at improved family resources in early childhood, which appears to be the period during which a child's cognitive and non-cognitive skills are shaped.

In Norway, the college participation rate is approximately twice as high for children in the top quartile of parental income distribution than for those in the bottom. For men and women we see a very similar pattern when family income is measured for children of 18; see Figure 1 for females and Figure 2 for males. Even though the income gap in Norway has been stable, the effect of family background on access to higher education has been remarkably persistent. Figures 3 and 4 present similar patterns for children's educational attainment as a function of parental education for females and males respectively. This is true even though it has been the government's explicit goal for several decades to reduce the gap in educational attainment by socioeconomic groups.

The question we ask in this paper is whether the observed correlation between family income and educational attainment given in Figures 1 and 2 is a story of families constrained by income when children start college or one of long term family effects.

We use Norwegian register and census data, where we have information on both children's educational attainment using data from 2000, such as number of years of education and attained college degrees, as well as data on family income at different ages of the children using pension generating income from 1967 and onwards. We are also able to calculate the present value of parental income for the first 18 years of a child's life. The number of siblings in the family is also included, as well as parental education and the mother's level of employment outside the home. We also use the average income when the child is 0-6, 7-13, and 16-18 years old, as well as permanent income defined as the average income when the child is 0-18 years old, to test when family income matters most in educational attainment. We analyse educational attainment for persons born from 1968 to 1972.

The approach we are using follows the approach taken in Carneiro and Heckman (2002, 2003). In their contribution, they criticize some of the previous interpretations given on the relationship between family income and educational attainment and suggest an alternative interpretation (see also Cameron and Heckman, 1998). By far the most frequent explanation of the observed relationship between educational attainment and family income is lack of resources to finance college education; hence, low family income in a child's teen-age years represents a credit constraint in the human capital investment decision. Several empirical papers, notably Griliches (1977) and Card (1999, 2001) report that the estimates of the wage returns to schooling increases when least squares (OLS) are replaced by instrumental variables (IV) estimates, and argue that this is evidence of the existence of short-term credit constraints. This rests on the interpretation that the IV estimates represent the wage returns for those who changed their educational attainment as a response to the instrument(s), namely the credit constrained individuals with high marginal costs of schooling. The focus in the papers by Heckman and Carneiro (2002, 2003) is on the long-term relationship between family income and skill formation, allowing the family resources in the early childhood and throughout the adolescent years to play an important role. A family's level of permanent income turns out to be an important predictor for college enrolment. Lack of resources in early years fosters poor cognitive and non-cognitive environment, low ability, and low expectations, leading to reduced college readiness for the children from the poorest

quartiles. This form of constraint represents a far more decisive factor for educational attainment than lack of family resources in late adolescence, for instance when the child is 16-18 years old.

Long-term constraints do not contradict the existence of short-term credit constraints. Furthermore, the frequently reported correlation between college attainment and parental income around high school graduation should not necessarily be interpreted as a support to short-term rather than long-term constraints. Family income is strongly correlated over the life cycle; hence, income from a child's teen-age years might (also) be a proxy for income in early childhood years. To measure the importance of short versus long term credit constraints one needs information on the family income over the life cycle. In Carneiro and Heckman (2003, Table 2.3) college enrolment is conditioned on permanent income. It turns out that permanent income is very important, while there is no sizeable effect of transitory income, including family income when the child was 16-18 years of age.

The main findings in our paper support some of the findings in Heckman and Carneiro (2002, 2003) for the US. We find that permanent income matters, but also that family income when the child is 0-6 years old is an important explanatory variable for educational attainment later in a child's life. We find only a small effect of short-term credit constraints on educational attainment. Even though family income is significant in determining the educational outcomes of a child, parental education turns out to be the most important factor. In particular, having a father or mother with a college degree increases the probability of the child having a college degree by more than 20 percentage points each.

The paper unfolds as follows. Section 2 describes the data set and the variables used in the empirical analysis. Section 3 discusses the educational system in Norway. A discussion of the econometric model used in analysing the relationship between educational attainment and family background follows in Section 4. The paper discusses the empirical results of the regression analyses in Section 5, and gives some concluding remarks in Section 6.

## 2. Data Set and Variables

The main data sources for our study are administrative registers from Statistics Norway. Each individual is characterized by his or her personal identity code. Information from different administrative registers is merged for each person in the population. The data set covers persons for the birth cohorts of 1968 to 1972. In addition to the information on education for each person measured in 2000, we use information on family background for the period in which the person grew up and started compulsory education. This includes their education and municipality and county as well as information of the number of children in the household. This information is from the National Censuses of Population and Housing in 1970 - see Vassenden (1987). We do not track changes in the family composition taking place from 1970. This type of information is available only from 1986 onwards. Most of the children in our sample were then above 16 years and we would expect the impact of family changes to be relatively small for that age group.

We use both the type and number of years of education achieved, in our empirical analysis. Education is measured in 2000 when the individuals are from 28-33 years old. Years of education is based on the normal duration of the education. It includes only completed (and highest attained) education, and all formal education courses exceeding 300 hours are registered. This variable has 12 values (from nine to 20 years of education). Type of education is based on characteristics of the Norwegian education system and Statistics Norway's standard classification of education. For type of education we distinguish between attainment of a college degree and education below the level of a college degree. The use of college degree as an educational attainment is common in the economics of education; see for instance Heckman and Carneiro (2003).

Family earnings at different ages for the child as well as family income until the child is 24 years of age is possible to calculate since we have information on annual taxable earnings from 1967 to 2000 in our data. This data is from the pension register which is

the register for the public social security program in Norway starting in 1967. The income variable we use includes all individual earnings: wages and income from business activity (including one-person enterprises) before tax. Unemployment benefits, sickness benefits, and disability benefits are also included since they are included in taxable income. We have no measure of income from assets from 1967 and onwards. Since the tax system is progressive with an increasing average tax rate by income, the difference between taxable and disposable income would be larger for high earners compared to low earners, giving a more compressed wage distribution in terms of disposable income. This can have consequences for the interpretation of the estimated coefficients from family income.

Father's and mother's education is represented by a dummy variable indicating whether or not they have a college education or not. Variable description is given in Table 2 while descriptive statistics of the sample is given in Table 3a for the full sample and Table 3b, separating females and males. We have deleted around 13 per cent of the sample due to missing observations on education and family income, see Table 1.

## 3. Education in Norway

From the 1950s to 2000 the Norwegian education system changed both with respect to average educational attainment and the distribution of education. Education policy was a central focus for the government, and many educational reforms took place in order to meet the goals set by the government, both in terms of increasing the education level as well as increasing access to education for all social groups in Norway. Between the 1960s and 1990s, the Norwegian education system went through several major reforms where the goals were both to smooth the transition to higher education in Norway and to increase the equality of opportunity along socio-economic dimensions (see Aakvik, Salvanes and Vaage, 2003, Black, Devereux and Salvanes, 2005 and Raaum, Salvanes and Sørensen, 2003).

For the most part, education in Norway is publicly financed. Excepting a few private colleges, there are no fees for students attending colleges and universities. Furthermore, the State Educational Loan Fund (SELF) provides grants and subsidised loans to pupils in upper secondary schools, and to university and college students. The contribution is meant to cover the costs of living during the educational years, the central objective being promotion of equal rights to education for all persons living in Norway. The applicable amount has been increasing steadily (in real terms) since SELF was founded in 1947. The means testing of the applicants was abolished in the early seventies. The number of students benefiting from grants and loans has also increased steadily, and today most Norwegian students finance their studies, partly or fully, through contributions from SELF.[1]

As in many European countries, educational attainment expanded after World War II. Figure 1 shows the college ratios of females born from 1950 to 1970 split into income quartiles when the child is 18 years old, while Figure 2 shows the same ratios for males. Females have experienced an increase in college degrees while the number has remained relatively stable for men. We find huge differences in college degrees for different family-income quartiles.

## 4. Empirical method

We use a standard OLS regression to estimate the effects of family background variables on the educational attainment of the child. Let $E_i$ be the level of education of individual *i*. Our basic regression is

$$E_i = b_0 + I_f' b_1 + E_f' b_2 + W_m' b_3 + S_f' b_4 + l_C + d_M + e_i \qquad (1)$$

[1] In 1947, some less than 2 200 students received NOK 53 millions, while the numbers today (2003-4) are about 255 000 students receiving NOK 16 000 millions. There are almost as many receivers in high-schools as in university and colleges (45 % vs. 55 %, respectively), but the average college/university student receive twice as much as a high-school student in yearly contribution.

where $I_f$ is a vector of family income variables (sum of father's and mother's income), $E_f$ is a vector of family education variables (whether father or mother has a college degree or not), $W_m$ is a vector of variables measuring mother's labour supply (whether the mother is employed in one of the years in the pre-school period from 4-6, and when the child is 8-10 years old), and $S_f$ is a vector of variables indicating the number of siblings. We include age-cohort dummies, $?_C$, to capture the trend in educational attainment in Norway for these cohorts. We also include an indicator of the county where the family grew up, $d_M$. The marginal effects for dummy variables are calculated as the effect of changes from 0 to 1 in the variables.

We use several different specifications of family income in our regression analysis. In our first specification we only use permanent income. This variable is defined as the average discounted real income when the child is 0-18 years old. In our second specification we split income into different periods of a child's life. We use average discounted real income when the child is 0-6 years, 7-13 years, and 16-18 years. Family income from 16-18 is a test of short-term credit constraints given that we control for long-term family factors such as parental education, permanent income and income when the child is younger than 13.

Our third and fourth specification includes both permanent income and family income split into different periods of a child's life. Our main regression equation, and the one that is comparable to Carneiro and Heckman (2003, Table 2.4) decomposes family income in equation (1) as

$$I_f' b_1 = a_1 I_{f(0\text{–}18)} + a_2 I_{f(0\text{–}6)} + a_3 I_{f(7\text{–}13)} + a_3 I_{f(16\text{–}18)} \qquad (2)$$

where $I_{f(0\text{-}18)}$ is average discounted real family income when the child is 0-18 years old (permanent income), $I_{f(0\text{-}6)}$ is average discounted real family income when the child is 0-6 years old, $I_{f(7\text{-}13)}$ is average discounted real family income when the child is 7-18 years

old, and $I_{f(16\text{-}18)}$ is the average discounted real family income when the child is 16-18 years old.[2]

All the income variables are first adjusted to real 1999 income using the consumer price index. In addition, we discount income down to the year the child was born (t=0) using a discount factor of 3.5 percent. We use the same procedure for discounting as in Carneiro and Heckman (2003, Table 2.3). We both deflate and also discount the family income since we want to calculate the life time income of the family up to the point at which the child turns 20. Deflating only means that we are using real values of earnings calculated over a 20 year period, and discounting means that we measure income at the time of the child's birth although it is earned over a long period. The longer the series, the more the long-term income measures will be affected. Hence, discounting has a rather small impact on the shorter income periods (0-6 years etc.).

## 5. Results

We have available the income stream of the parents from the year of their child's birth, throughout their adolescence, and until the age of 18 for the 1968-1972 Norwegian birth cohorts. This allows us to exploit the short versus long term effects of parental income on the children's educational choice.

Tables 4 and 5 report the results for sons' and daughters' education measured in number of years of schooling, starting with maximum length of family income (0-18 years of age for offspring) as our measure of permanent income in Model (1).

[Tables 4 and 5 about here.]

As expected, the long-term effect appears to be positive. Model (2) identifies the income streams at different periods of the child's adolescent years. 16-18 years of age is

[2] We have also estimated the model using yearly family income divided by family size instead of including the number of siblings in the regression. This gives us larger coefficients of the effects of family income, but they do not change our main results. These regressions are available upon request.

the period where the offspring attend high-school and, more importantly in our context, when they are at the stage of choosing whether to continue into college and/or university. As mentioned in the introductory section, much of the earlier literature is considering this period when it, explicitly or implicitly, explains the correlation between family income and educational outcomes as arising from short-term credit constraints. We do find a positive effect for this period. Note, however, that the long-term effect, represented by family income in the pre-school years, is nearly twice as high for sons (Table 4), and even higher for daughters (Table 5). This lends support to the alternative interpretation of the income-education correlation: Parental income is important not primarily as a measure of short-term credit constraints[3], but as and indicator of stimulating cognitive and non-cognitive environment, high ability, and high expectation and taste for education.

Model (3) combines all our short and long term income measures. For sons, family income now becomes even less important in the late teen-ages. Somewhat surprisingly, the permanent income variable turns out to be insignificant for daughters. Accordingly, the income coefficients remain unaltered, implying that the long-term effect (0-6 years average) clearly dominates over the short-term effect (16-18 years average). Finally, Model (4) allows a rough comparison with the income parameterisation in Table 2.3 of Carneiro and Heckman (2003). Our results correspond to theirs in the sense that they indicate that long term income effects are by far the most important. Contrary to Carneiro and Heckman we find, however, that family income in the offspring's pre-school years is significant also after controlling for permanent income.

Turning to the other covariates of our models, parental education, measured as an indicator of college education, appears to be a very important determinant for the child's length of education. Children where the father has a college degree have on average approximately 1.3 more years of education compared to children from families without this characteristic. The same regularity appears between a mother's education and that of

[3] Recall that education in Norway mostly is publicly financed, and that grants and subsidised loans are available through the State Educational Loan Fund. Both these arrangements are presumed to reduce the short-run credit constraints.), but as and indicator of stimulating cognitive and non-cognitive environment, high ability, and high expectation and taste for education.

her offspring - now estimated to about 0.7-0.8 years extra education relative to the comparison group, and somewhat stronger for daughters than for sons. These results are fairly robust across gender and across the different model specifications. The importance of parental education comes as no surprise. In the same manner as income, college degree is an indicator of a motivating cognitive and non-cognitive environment. Furthermore, it probably indicates skills that parents pass on to their children more strongly than income does. Finally, the relatively compressed income distribution in Norway during the period of investigation also points in the same direction. For example, the wage premium of academics is relatively small; still they pass on their ability, their motivation, etc. for education to their offspring. Together, this reduces the effect of income on education in Norwegian society but of course not the intergenerational transmission of education.

We include dummies for the mother's level of work outside the home during the pre-school (4-6 years of age) and primary school (8-10 years of age) years. To the degree that there is any measurable effect on education, the effect is negative for sons. For daughters the picture is more mixed. The effect is still negative, albeit less so for the 4-6 years period, but turns positive for the 8-10 years period (the exception being Model (1)).

There is an alleged payoff belonging to a family with one, even two, sibling(s). For a more detailed analysis of this finding, see Black, Devereux and Salvanes (2005). The cohort dummies are negative for sons and positive for daughters, reflecting the general tendency of increased female education relative to males for the cohorts in question.

In Tables 4 and 5, the outcome variable is education in number of years, implicitly assuming that our covariates are equally well suited to explaining education, regardless of level and length. To loosen this restriction, Tables 6 and 7 report an alternative educational outcome.

[Tables 5 and 6 about here.]

The effects of family income on the probability of getting a college degree very much resembles the findings reported in Tables 4 and 5. The average probability of receiving a college degree is 0.30 for sons and 0.38 for daughters. A NOK 100 000 increase in family permanent income increases these probabilities to 0.36 and 0.44, respectively. When all short and long term income measures are included (Model 3), the long term components appear as more important by far.

Also for the remaining covariates, the results are fairly robust. The parents' education is the key determinant, also when it comes to college degree. Note that the mother's education now means almost as much as the father's for the daughter's probability of getting a college degree, a likely interpretation being that the mother is a stronger role model for her daughter(s) at this level of education.

## 6. Concluding remarks

This paper has analysed the effect of family income on educational attainment, where family income is measured at different periods of a child's life. We found a small but highly significant effect of family income on educational attainment of the child. We found the effect of family income to be relatively small when the child is 16-18 years old. Thus, short-term borrowing constraint seems to be of little importance in Norway, as compared to long term factors such as permanent income and educational attainment of the father and the mother, i.e. whether they have college degrees or not. However, the income when the child is 0-6 seems to be much more important in relative terms compared to both permanent income and income when the child is 16-18 years old. This result remains robust in different measures of education (for instance years of education and college degree), applies to both sons and daughters, and is particularly distinctive for daughters. This result indicates that family background and investment during childhood is important for cognitive and non-cognitive skills that are important for schooling choices later in life.

However, even if family background seems to matter for a child, the magnitude of the coefficients are very small. Increasing permanent income by, for instance, one standard deviation from the mean increases the years of education by only 0.3. The educational level of the parents seems to be much more important, as also indicated in figures 3 and 4. Having a father with a college degree increases the probability that the child has a college degree by more than 25 percentage points both for males and females. These are huge effects compared to the effect of family income in Norway.

Our results indicate that family background matters even in a country like Norway, despite the fact that Norway has gone far in equalizing the opportunities for education both along geographical and socioeconomic dimensions. However, family background matters primarily through parent's educational level, and not by income.

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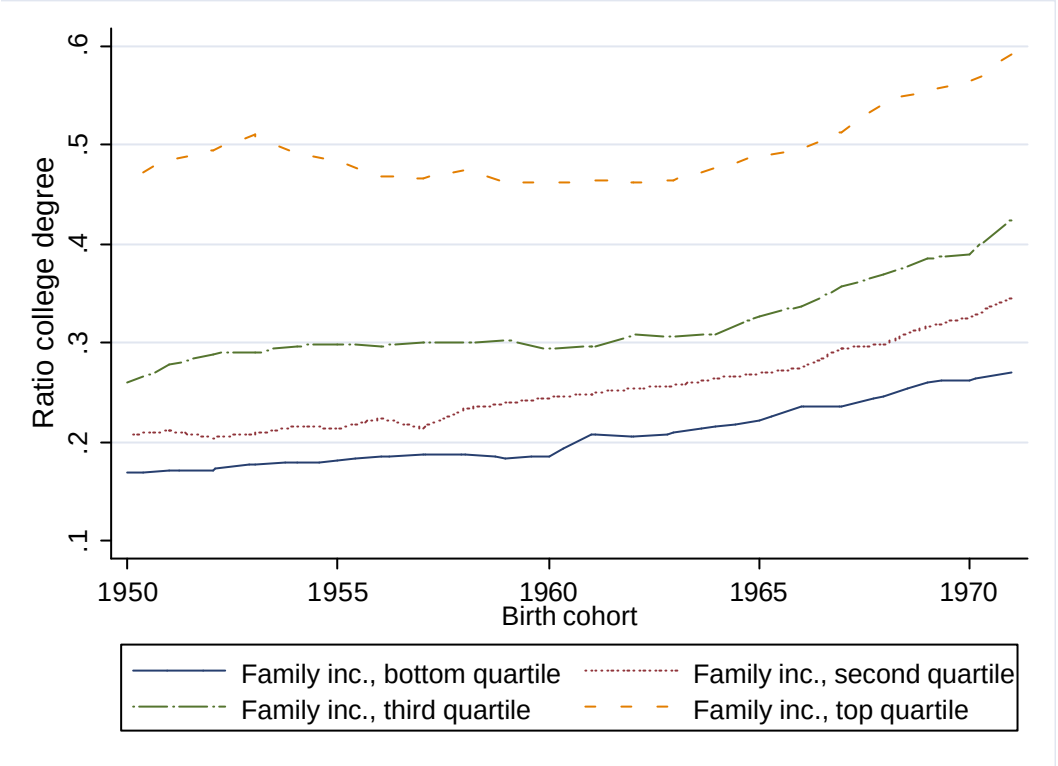


**Figure 1**. Female college rates divided by family income quartiles when child is 18. Cohorts born 1950-1971.

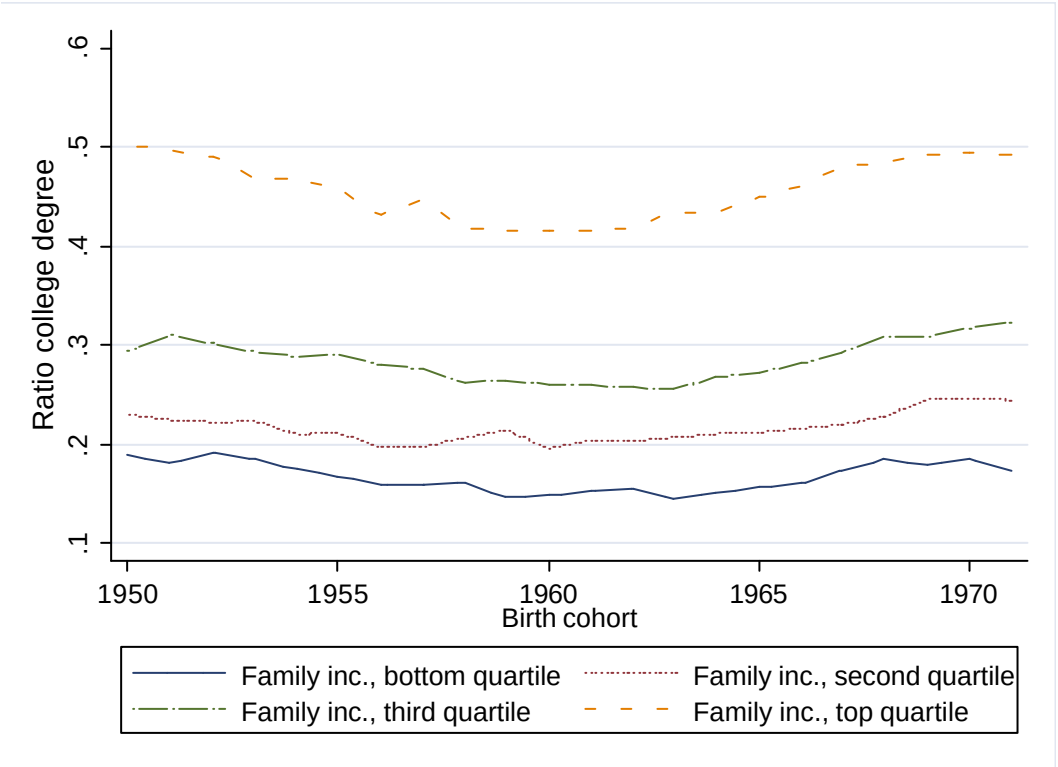


**Figure 2**. Male college rates divided by family income quartiles when child is 18. Cohorts born 1950-1971.

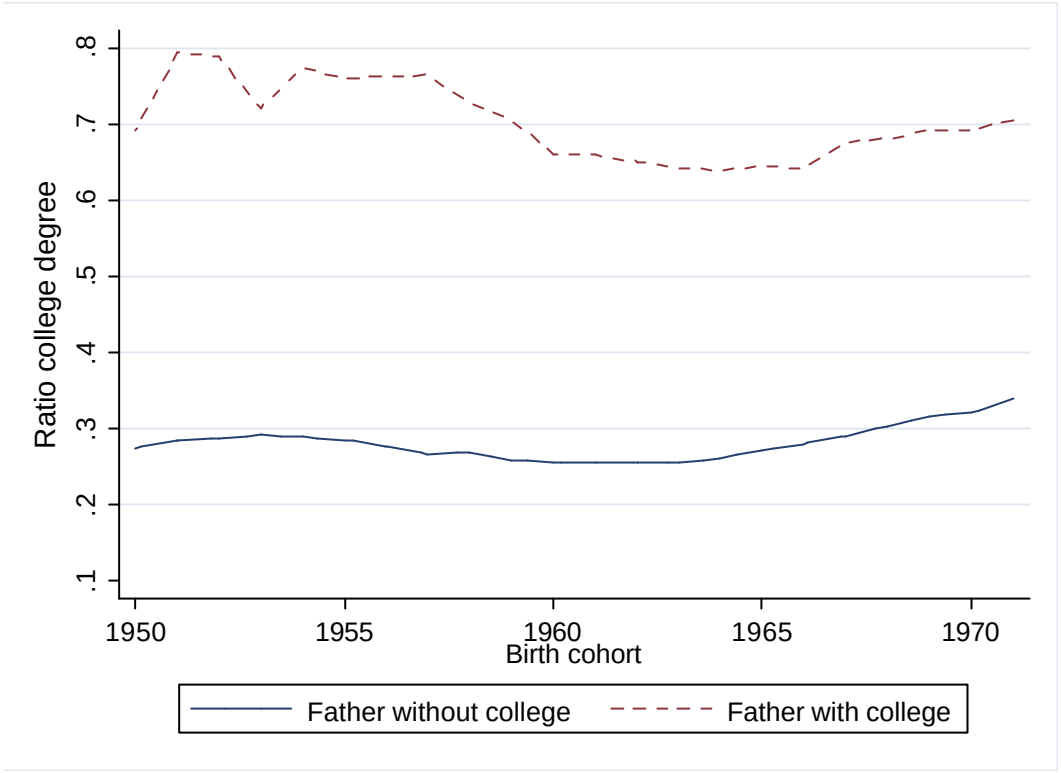


**Figure 3**. Female college rates by father's college status for cohorts born 1950-1971.

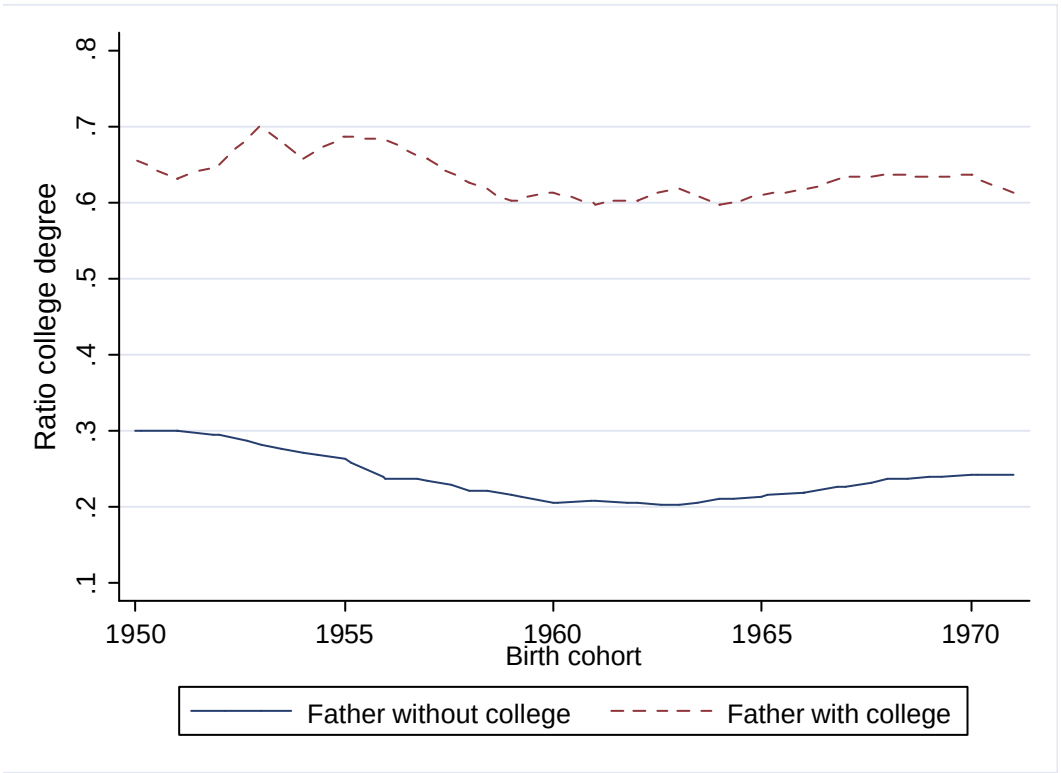


**Figure 4**. Male college rates by father's college status for cohorts born 1950-1971.

**Table 1**. Sample selection.

| |
|---|
| Full sample: 1968-1972 cohort = 349,438 observations. |
| Number of observations dropped due to missing information on own education or missing information on father's income during adolescence is 44,526. |
| Net sample: 1968-1972 cohort = 304,912 observations. |

**Table 2**. Variable description.

| | |
|---|---|
| Fam. inc. (0-18) | = average family income when child is 0-18 years old |
| Fam. inc. (0-6) | = average family income when child is 0-6 years old |
| Fam. inc. (7-13) | = average family income when child is 7-13 years old |
| Fam. inc. (16-18) | = average family income when child is 16-18 years old |
| Moth. college | = 1 if mother has college, 0 otherwise |
| Fath. college | = 1 if father has college, 0 otherwise |
| Moth. work (4-6) | = 1 if mother works when child is 4-6 years old (pre-school) |
| Moth. work (8-10) | = 1 if mother works when child is 8-10 years old |

Note: All income variables are first price adjusted (to 1999 income) and then discounted to the year the child was born (t=0) using a 3 percent discount rate in the regressions.

**Table 3a**. Descriptive statistics. N = 304,912, Birth cohorts 1968-1972.

| Variable | Mean | Std.dev. | Min | Max |
|---|---|---|---|---|
| Number of children in family | 2.8785 | 1.2044 | 1 | 9 |
| Age | 30.0079 | 1.4147 | 28 | 32 |
| Education in years | 12.6084 | 2.2938 | 9 | 21 |
| College degree | 0.3423 | - | 0 | 1 |
| Male | 0.5108 | - | 0 | 1 |
| Father, college degree | 0.1707 | - | 0 | 1 |
| Mother, college degree | 0.0289 | - | 0 | 1 |
| Family income (0-18) | 4.8088 | 1.7981 | 0 | 83.0 |
| Family income (0-6) | 2.9453 | 1.2639 | 0 | 13.3 |
| Family income (7-13) | 5.3237 | 2.0599 | 0 | 79.3 |
| Family income (16-18) | 6.3464 | 3.0380 | 0 | 199.4 |
| Mother work (8-10) | 0.6564 | - | 0 | 1 |
| Mother work (4-6) | 0.4329 | - | 0 | 1 |

Note: Family income is measure in 100,000 NOK (1 USD = 6.3 NOK) in 1999 NOK (Norwegian kroners)

**Table 3b**. Descriptive statistics, male and female. Birth cohorts 1968-1972.

| Variable | Male Mean | Male Std.dev. | Female Mean | Female Std.dev. |
|---|---|---|---|---|
| Number of children in family | 2.8745 | 1.2002 | 2.8828 | 1.2087 |
| Age | 30.0101 | 1.4157 | 30.0057 | 1.4137 |
| Education in years | 12.4840 | 2.2566 | 12.7383 | 2.3251 |
| College degree | 0.3035 | - | 0.3829 | - |
| Father, college degree | 0.1705 | - | 0.1709 | - |
| Mother, college degree | 0.0291 | - | 0.0288 | - |
| Family income (0-18) | 4.7993 | 1.7817 | 4.8188 | 1.8150 |
| Family income (0-6) | 2.9435 | 1.2650 | 2.9472 | 1.2628 |
| Family income (7-13) | 5.3153 | 2.0478 | 5.3324 | 2.0724 |
| Family income (16-18) | 6.3246 | 2.9624 | 6.3692 | 3.1149 |
| Mother work (8-10) | 0.6555 | - | 0.6573 | - |
| Mother work (4-6) | 0.4312 | - | 0.4347 | - |

Note: Family income is measure in 100,000 NOK (1 USD = 6.3 NOK)
in 1999 NOK (Norwegian kroners)

**Table 4**. Education in years. Male. N = 155752, Birth cohorts 1968-1972.

| Education in years | Coef. | Std.Err | Coef. | Std.Err | Coef. | Std.Err | Coef. | Std.Err |
|---|---|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | | (4) | |
| Fam. inc. (0-18) | .3499 | .0054 | - | - | .1012 | .0519 | .1020 | .0147 |
| Fam. inc. (0-6) | - | - | .2204 | .0079 | .1877 | .0185 | .1875 | .0112 |
| Fam. inc. (7-13) | - | - | .0458 | .0068 | .0003 | .0243 | - | - |
| Fam. inc. (16-18) | - | - | .1258 | .0044 | .1026 | .0126 | .1024 | .0066 |
| Moth. college | .6696 | .0328 | .6615 | .0328 | .6613 | .0328 | .6613 | .0328 |
| Fath. college | 1.3054 | .0156 | 1.3009 | .0156 | 1.3003 | .0156 | 1.3003 | .0156 |
| Moth. work (4-6) | -.0486 | .0123 | -.0650 | .0123 | -.0648 | .0123 | -.0648 | .0123 |
| Moth. work (8-10) | -.0733 | .0124 | -.0359 | .0126 | -.0358 | .0126 | -.0358 | .0125 |
| One sibling | .1544 | .0221 | .1376 | .0221 | .1374 | .0221 | .1374 | .0221 |
| Two siblings | .0647 | .0223 | .0494 | .0223 | .0495 | .0223 | .0495 | .0223 |
| Three siblings | -.0639 | .0246 | -.0750 | .0245 | -.0749 | .0245 | -.0749 | .0245 |
| Four siblings | -.2126 | .0275 | -.2163 | .0274 | -.2161 | .0274 | -.2161 | .0274 |
| Cohort 1969 | -.0301 | .0163 | -.0215 | .0164 | -.0222 | .0164 | -.0222 | .0164 |
| Cohort 1970 | -.0638 | .0165 | -.0647 | .0167 | -.0639 | .0167 | -.0638 | .0167 |
| Cohort 1971 | -.0989 | .0165 | -.1202 | .0168 | -.1179 | .0169 | -.1179 | .0168 |
| Cohort 1972 | -.1484 | .0166 | -.1921 | .0173 | -.1892 | .0174 | -.1892 | .0173 |
| Constant term | 10.8277 | .0346 | 10.8168 | .0346 | 10.8152 | .0346 | 10.8152 | .0346 |

Note: County dummies are included (18 dummy variables) but not reported to save space.

**Table 5**. Education in years. Female. N = 149160, Birth cohorts 1968-1972.

| Education in years | Coef. | Std.Err | Coef. | Std.Err | Coef. | Std.Err | Coef. | Std.Err |
|---|---|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | | (4) | |
| Fam. inc. (0-18) | .3220 | .0056 | - | - | .0304 | .0502 | .0332 | .0152 |
| Fam. inc. (0-6) | - | - | .2504 | .0083 | .2602 | .0182 | .2417 | .0117 |
| Fam. inc. (7-13) | - | - | .0177 | .0071 | .0313 | .0235 | - | - |
| Fam. inc. (16-18) | - | - | .1127 | .0043 | .1198 | .0124 | .1059 | .0067 |
| Moth. college | .8340 | .0350 | .8258 | .0349 | .8258 | .0349 | .8266 | .0349 |
| Fath. college | 1.2606 | .0165 | 1.2572 | .0165 | 1.2573 | .0165 | 1.258 | .0165 |
| Moth. work (4-6) | -.0003 | .0130 | -.0252 | .0131 | -.0253 | .0131 | -.0251 | .0131 |
| Moth. work (8-10) | -.0215 | .0131 | .0244 | .0133 | .0244 | .0133 | .0256 | .0133 |
| One sibling | .1090 | .0236 | .0965 | .0236 | .0965 | .0236 | .0964 | .0236 |
| Two siblings | -.0005 | .0237 | -.0131 | .0237 | -.0132 | .0237 | -.0131 | .0237 |
| Three siblings | -.1581 | .0262 | -.1695 | .0261 | -.1697 | .0261 | -.1696 | .0261 |
| Four siblings | -.3612 | .0291 | -.3641 | .0291 | -.3643 | .0291 | -.3640 | .0291 |
| Cohort 1969 | .0434 | .0174 | .0479 | .0174 | .0482 | .0174 | .0479 | .0174 |
| Cohort 1970 | .0388 | .0176 | .0276 | .0177 | .0274 | .0177 | .0278 | .0177 |
| Cohort 1971 | .0878 | .0175 | .0495 | .0179 | .0489 | .0179 | .0501 | .0179 |
| Cohort 1972 | .0495 | .0176 | -.0191 | .0184 | -.0199 | .0184 | -.0189 | .0184 |
| Constant term | 11.0240 | .0368 | 11.0041 | .0367 | 11.0045 | .0367 | 11.0054 | .0367 |

Note: County dummies are included (18 dummy variables) but not reported to save space.

**Table 6**. College degree. Male. Marginal effects. N = 155752, Birth cohorts 1968-1972.

| College degree (0-1) | dF/dx | Std.Err | dF/dx | Std.Err | dF/dx | Std.Err | dF/dx | Std.Err |
|---|---|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | | (4) | |
| Fam. inc. (0-18) | .0649 | .0012 | - | - | .0271 | .0116 | .0204 | .0033 |
| Fam. inc. (0-6) | - | - | .0379 | .0017 | .0291 | .0041 | .0311 | .0025 |
| Fam. inc. (7-13) | - | - | .0089 | .0015 | -.0032 | .0054 | - | - |
| Fam. inc. (16-18) | - | - | .0247 | .0010 | .0184 | .0028 | .0199 | .0015 |
| Moth. college | .1454 | .0087 | .1444 | .0087 | .1444 | .0087 | .1443 | .0087 |
| Fath. college | .2599 | .0038 | .2590 | .0038 | .2588 | .0038 | .2588 | .0038 |
| Moth. work (4-6) | .0025 | .0028 | -.0000 | .0028 | .0000 | .0028 | .0000 | .0028 |
| Moth. work (8-10) | -.0134 | .0029 | -.0069 | .0029 | -.0068 | .0029 | -.0070 | .0029 |
| One sibling | .0177 | .0050 | .0142 | .0050 | .0141 | .0050 | .0141 | .0050 |
| Two siblings | -.0007 | .0051 | -.0037 | .0051 | -.0037 | .0051 | -.0037 | .0051 |
| Three siblings | -.0235 | .0055 | -.0255 | .0055 | -.0255 | .0055 | -.0255 | .0055 |
| Four siblings | -.0466 | .0060 | -.0470 | .0060 | -.0469 | .0060 | -.0469 | .0060 |
| Cohort 1969 | -.0037 | .0037 | -.0015 | .0037 | -.0018 | .0037 | -.0017 | .0037 |
| Cohort 1970 | -.0059 | .0038 | -.0049 | .0038 | -.0047 | .0038 | -.0048 | .0038 |
| Cohort 1971 | -.0144 | .0037 | -.0165 | .0038 | -.0159 | .0038 | -.0160 | .0038 |
| Cohort 1972 | -.0185 | .0037 | -.0242 | .0039 | -.0234 | .0039 | -.0236 | .0039 |

Note: County dummies are included (18 dummy variables) but not reported to save space.

**Table 7**. College degree. Female. Marginal effects. N = 149160, Birth cohorts 1968-1972.

| College degree (0-1) | dF/dx | Std.Err | dF/dx | Std.Err | dF/dx | Std.Err | dF/dx | Std.Err |
|---|---|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | | (4) | |
| Fam. inc. (0-18) | .0639 | .0013 | - | - | .0061 | .0118 | .0088 | .0036 |
| Fam. inc. (0-6) | - | - | .0489 | .0020 | .0509 | .0043 | .0464 | .0028 |
| Fam. inc. (7-13) | - | - | .0045 | .0017 | .0073 | .0055 | - | - |
| Fam. inc. (16-18) | - | - | .0213 | .0009 | .0227 | .0029 | .0195 | .0015 |
| Moth. college | .2125 | .0095 | .2119 | .0095 | .2119 | .0095 | .2120 | .0095 |
| Fath. college | .2633 | .0038 | .2638 | .0038 | .2639 | .0038 | .2639 | .0038 |
| Moth. work (4-6) | .0064 | .0030 | .0018 | .0030 | .0018 | .0030 | .0018 | .0030 |
| Moth. work (8-10) | -.0016 | .0031 | .0075 | .0031 | .0075 | .0031 | .0077 | .0031 |
| One sibling | .0149 | .0055 | .0130 | .0055 | .0130 | .0055 | .0129 | .0055 |
| Two siblings | .0004 | .0056 | -.0015 | .0056 | -.0015 | .0056 | -.0016 | .0056 |
| Three siblings | -.0271 | .0061 | -.0292 | .0061 | -.0292 | .0061 | -.0292 | .0061 |
| Four siblings | -.0616 | .0066 | -.0623 | .0066 | -.0623 | .0066 | -.0623 | .0066 |
| Cohort 1969 | .0104 | .0041 | .0111 | .0041 | .0111 | .0041 | .0111 | .0041 |
| Cohort 1970 | .0069 | .0042 | .0044 | .0042 | .0043 | .0042 | .0045 | .0042 |
| Cohort 1971 | .0204 | .0042 | .0125 | .0042 | .0124 | .0042 | .0127 | .0042 |
| Cohort 1972 | .0132 | .0042 | -.0007 | .0043 | -.0008 | .0043 | -.0005 | .0043 |

Note: County dummies are included (18 dummy variables) but not reported to save space.