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ACCOUNTING FOR INTERGENERATIONAL EARNINGS PERSISTENCE: CAN WE DISTINGUISH BETWEEN EDUCATION, SKILLS, AND HEALTH?

by

Lalaina Hirvonen

Accounting for Intergenerational Earnings Persistence: Can We Distinguish Between Education, Skills, and Health?*

Lalaina Hirvonen†

Abstract

This paper illustrates the difficulty in disentangling the underlying channels of intergenerational earnings persistence by means of path analysis and recursive models. On closer examination, these models manifest their shortcomings as regards accounting for how parental earnings have a direct impact on their offspring's earnings, but also have an effect through other factors such as education, skills and health. The estimated effects of these mediating factors are likely to capture the influence of other mechanisms not taken into account in the analysis. Nonetheless, the results suggest that education is the most important mechanism in the earnings transmission process, although it is sensitive to the inclusion of other covariates and the order in which these are entered into the equation. Nonlinear specifications suggest that the effect of a father's earnings on his son's has the greatest impact primarily through education and IQ in the upper middle categories of the earnings distribution of the fathers, while health status is of secondary importance.

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†Swedish Institute for Social Research, Stockholm University, SE-106 91 Stockholm, phone: +46 8 162519, e-mail: Lalaina.Hirvonen@sofi.su.se

1 Introduction

The transmission of socioeconomic status across generations has been a widely examined subject over the past fifteen years.[1] So far, extensive literature has uncovered various pattern of intergenerational earnings persistence in several countries. The Nordic countries, for instance, have been found to have a higher level of intergenerational mobility and consequently a low persistence of inequality compared to the U.S. Still, little is known about the underlying factors that contribute to the inheritance of position of parents in the earnings distribution.

A further step in the study of the persistence of inequality is therefore to discern potential channels through which economic advantages and disadvantages are passed on from one generation to another. Parental influence on children's earnings operate through various channels. The acquistion of human capital such as education is one of the most evident channel through which family backgrounds affect the adult earnings of the offspring.

The use of path analysis in empirical studies on intergenerational transmission of earnings is consistent with the Becker-Tomes (1979, 1986) theoretical framework, from which two different effects characterizing the intergenerational earnings linkage can be derived: a direct effect of the parents' economic status on the offspring's future earnings, and an indirect effect through the parents' investment in their children's education. Fundamentally, these two effects are captured by the typical measures of intergenerational economic association. A seemingly appealing approach is to estimate a recursive model in which parental earnings not only have a direct impact on the offspring's earnings but they also have an impact via other factors such as education. Among the handful of contemporary studies that implement this approach is Eide and Showalter (1999) who use U.S. data, and find that education accounts for almost a third of the relationship between a father's and son's earnings.[2] Also for the U.K., Blanden, Gregg and Macmillan (2007), applying a similar approach, find that education is a major contributor to the intergenerational persistence of economic status with nearly 46 percent of earnings resemblance between fathers and sons accounted for.

Studies have shown a direct link between poor health and lower productivity in the labour market (Case, Fertig and Paxson, 2005). Likewise, the impact of physical status on educational achievement may also have an indirect impact on labour productivity. As the parents' investment in their children's well-being also involves caring for their health, the transmission of earnings is concerned with the impact of child health on future adult earnings. Eriksson, Bratsberg and Raaum (2005) use Danish youth cohort data to examine the importance of health as a mechanism through

[1] For recent overviews, see Corak (2006) and Björklund and Jäntti (2009).

[2] Österbacka (2001) also examines the importance of education as a channel using a variance decomposition technique.

which intergenerational economic transmission takes place. Their results show that health status accounts for 28 percent of the father-son earnings relationship.

Earlier research has established that skills such as cognitive and non-cognitive abilities, which are highly associated with family circumstances, largely determine an individual's labour earnings and contribute to the transmission of inequality across generations (Osborne Groves, 2005). Although education is primarily designed to promote cognitive development, it has been shown that non-cognitive skills such as motivation, persistence and dependability are important predictors of students' academic grades and valuable assets in the labour market (Carneiro and Heckman, 2003). Moreover, there is empirical evidence that environmental factors and parental ability influence the offspring's non-cognitive ability (Heckman, 2000). In a recent attempt to disentangle the effects from various transmission factors, Blanden, Gregg and Macmillan (2007) indicate that cognitive variables have a stronger link with parental income than non-cognitive variables. They find that cognitive variables contribute to 27 percent of the earnings persistence, while non-cognitive skills account for 19 percent of the intergenerational economic relationship. However, cognitive and non-cognitive variables account for 32 percent of the earnings persistence when taken together in the same intergenerational equation.

The main contribution of this paper is to take the previously cited research a stage further by simultaneously considering several factors underlying the intergenerational economic linkage, namely education, cognitive and non-cognitive skills, and health, in one and the same study. Taking the divergent results above as a starting point, I explore whether it is possible to distinguish between the extent to which these factors contribute to the persistence of economic status across generations.

Next, I also explore possible nonlinearity when considering the impact of education, skills, and health on the intergenerational earnings persistence. Most studies on intergenerational mobility focus on the average measures of persistence and provide easily interpretable information about the economic link between parents and offspring. Yet the effect of parental background is not necessarily identical over the entire earnings distribution. In fact, it is likely that the transmission of economic status across generations is subject to nonlinearity as suggested by, for instance, Bratsberg et al. (2007). The adoption of non-parametric methods to estimate more flexible models for the relationship between a father's and his son's earnings presents an alternative to the log-linear functional form. Therefore, I apply spline regression to cast a light on the role of mediating factors at different stages of the earnings distribution. Moreover, I include daughters in the analysis and compare the extent of earnings transmission between sons and daughters with respect to level of education and field.

My analysis differs from previous ones by benefiting from the use of Swedish Military Enlistment data. A key advantage of this unique data set is the accurate records of all Swedish males' test scores at the age of 18, as well as information on mental and physical health. Moreover, I have access to a high quality data set

from Statistics Sweden, which has a number of advantages, among others a large and representative sample as well as more detailed measures of education such as level and field of education.

The remainder of this paper is structured as follows. Section 2 presents the model and econometric framework, Section 3 provides a variable description and outlines the data used. Section 4 presents the OLS results for the whole sample of sons and results for sons with a high level of education. The last part of Section 4 includes results of the nonlinear approach and those from the comparison between sons and daughters. Section 5 contains a summary of the results and conclusions.

2 Model and econometric framework

The persistence of earnings across generations is captured by the standard model in intergenerational earning mobility, a regression of the son' s earnings on those of the father's

$$y^{oi} = \alpha_1 + \beta_1 y^{fi} + \varepsilon_{1i} \tag{1}$$

where y^{oi} and y^{fi} represent the offspring's and the father's long-run earnings in family i. The regression coefficient of interest β_1 is the intergenerational elasticity, when using the logarithm of earnings. It measures the percentage differential in the son's log earnings with respect to a marginal percentage change in the log earnings of his father.

The intergenerational earnings association can be characterized by two effects that are consistent with the Becker-Tomes theoretical framework. Specifically, there is not only the direct impact of parental earnings on the offspring's future earnings, but also an indirect impact through the parents' investment in their children's education (Becker and Tomes, 1979, 1986). The direct effect may capture social norms such as work ethics, social network effects such as family connections in accessing the labour market, but it could also consist of wealth transfers. The indirect effect through education captures for instance the access to education for individuals from different family backgrounds. In terms of path analysis, education constitutes a mediating factor between parental earnings and those of their offspring. This relationship can be represented in two structural equations

$$S^{oi} = \varphi + \theta y^{fi} + \epsilon_i \tag{2}$$

$$y^{oi} = \alpha_2 + \beta_2 y^{fi} + \phi S^{oi} + \varepsilon_{2i} \tag{3}$$

When estimating the intergenerational equation using the offspring's education and the father's earnings as explanatory variables as in equation (3), the purpose is to obtain a direct effect by isolating the earnings coefficient from the indirect effects

of the father's earnings via education. However, this decomposition of the direct and indirect effects requires a relatively strong econometric assumption, which is difficult to test empirically. In particular, in order for the OLS-estimates of the direct and indirect effects to be identified, the error terms ε_{2i} and ϵ_i in the two structural equations must be uncorrelated (Greene, 2000, Chapter 15). Consequently, OLS applied on (3) would yield inconsistent estimates of the coefficient on offspring's education.

The parental impact on a child's earnings also operates through various channels, other than education S^{oi}. In this study, such channels could be the offspring's cognitive ability IQ^{oi}, and non-cognitive abilityPsy^{oi}, as well as health H^{oi}

$$IQ^{oi} = \alpha_3 + \beta_3 y^{fi} + \varepsilon_{3i} \tag{4}$$

$$Psy^{oi} = \alpha_4 + \beta_4 y^{fi} + \varepsilon_{4i} \tag{5}$$

$$H^{oi} = \alpha_5 + \beta_5 y^{fi} + \varepsilon_{5i} \tag{6}$$

When considering education as the only mediating variable, we have

$$y^{oi} = \alpha_6 + \beta_6 y^{fi} + \phi(\varphi + \theta y^{fi}) + \eta_{6i} \tag{7}$$

Taking the other transmission mechanisms in (4), (5) and (6) into account, equation (4) becomes

$$\begin{aligned} y^{oi} &= \alpha_6 + \beta_6 y^{fi} + \phi S^{oi} + \gamma_1 IQ^{oi} + \gamma_2 Psy^{oi} + \gamma_3 H^{oi} + \varepsilon_{6i} \\ &= \alpha_6 + \beta_6 y^{fi} + \phi(\varphi + \theta y^{fi}) + \gamma_1(\alpha_3 + \beta_3 y^{fi}) + \gamma_2(\alpha_4 + \beta_4 y^{fi}) \\ &\quad +\gamma_9(\alpha_5 + \beta_5 y^{fi}) + \varepsilon_{6i} \\ &= \alpha_6 + \beta_6 y^{fi} + (\phi\theta + \gamma_1\beta_3 + \gamma_2\beta_4 + \gamma_3\beta_5) y^{fi} + (\phi\varphi + \gamma_1\alpha_3 + \gamma_2\alpha_4 + \gamma_3\alpha_5) \\ &\quad +\varepsilon_{6i} \end{aligned} \tag{8}$$

Quantifying the effect attributed to the direct and indirect effects of the father's earnings on those of his offspring

$$\frac{\partial y^{oi}}{\partial y^{fi}} = \beta_6 + (\phi\theta + \gamma_1\beta_3 + \gamma_2\beta_4 + \gamma_3\beta_5) \tag{9}$$

where β_6 is the direct effect, and the terms in the parentheses constitute the sum of the indirect effect through the mediating variables; of which $\phi\theta$ is the indirect effect via education, $\gamma_1\beta_3$ and $\gamma_2\beta_4$ are the indirect effect via cognitive and non-cognitive abilities respectively. The last term $\gamma_3\beta_5$ represents the indirect effect through health.

The above specifications are based on the assumption that the conditional expectation of the offspring's earnings is linear in the father's earnings. Although these specifications provide valuable and easily interpretable results, the effect of parental background does not need to be identical over the entire earnings distribution. In

fact, Bratsberg et al. (2007) find that the intergenerational relationship is subject to nonlinearity and the degree of economic persistence is therefore likely to differ along with the earnings distribution. Estimating more flexible models such as a spline function can be an alternative to the log-linear functional form.[3] A spline regression is a dummy variable model subject to some continuity restrictions, and allows a free choice of the knots at which the regression slopes are allowed to change.[4] The percentiles of a father's earnings serve as endpoints of various ranges in the spline function

$$y^{oi} = \alpha_1 + \alpha_2 y^{fi} + \delta_1 d_1(y^{fi} - y_5^{fi}) + \delta_2 d_2(y^{fi} - y_{10}^{fi}) + \epsilon_i \tag{10}$$

where y^{oi} is the offspring's average log earnings, the thresholds values y_5^{fi} and y_{10}^{fi} correspond to the 5th and 10th percentiles of the father's average log earnings y^{fi}, the dummy variables are $d_1 = 1$ if $y^{fi} \geq y_5^{fi}$ and zero otherwise, $d_2 = 1$ if $y^{fi} \geq y_{10}^{fi}$ and zero otherwise.

3 Data

3.1 Variable description

This study differs from previous ones by benefiting from the Swedish Military Enlistment data, which have the great advantage of providing accurate information about all Swedish males at around the age of 18.[5] Military enlistment was mandatory for every male Swedish citizen at around the age of 18, and the data consists of tests on health and physical status, cognitive ability as well as an assessment of the personal characteristics of a conscript made by a licensed psychologist to provide an indication of his mental ability. The principal aim of the Swedish Military Enlistment Battery is to sort out individuals into different sections of the military system, with a view to selecting those who are capable of performing more qualified tasks.[6]

Achievement test scores on cognitive ability stem from general ability assessments designed to capture spatial, verbal, logical and technical comprehension. These four subtests are transformed into a general intelligence factor, which accounts for intellectual ability and indicates the individual's IQ. The non-cognitive ability measure

[3]Eide and Showalter (1999) also consider nonlinearity by implementing a quantile regression approach on U.S. data to see whether additional schooling increases earnings differently for sons at the bottom of the earnings distribution compared to those at the top.

[4]For more on spline models, see Greene (2000), Chapter 7, p.121-122.

[5]In my sample, 0.01% enlisted at 16 years of age, 0.38% at 17 and 93,51% signed in at the age of 18. Further, 5.59% joined the military at 19, 0.44% at 20, and 0.07 % and 0.01% enlisted at the age of 21 and 22 respectively.

[6]The Swedish Military Enlistment test (Carlstedt, 2000) has been used in recent studies in returns of schooling (Nordin, 2008) and differences on labour market outcomes (Nordin and Rooth, 2009) as well as returns to cognitives and non-cognitive ability (Lindqvist and Vestman, 2009); and also on intergenerational association in IQ (Björklund, Hederos Eriksson and Jäntti, 2010).

comes from information about the personal characteristics of the conscript, assessed by a certified psychologist. For instance, a high score in the mental ability to function, which is a reasonable measure of non-cognitive ability, is attributed to individuals who excel in persistence, social skills and emotional stability.

The achievement test scores are normalized into a nine-point scale. The score results are stanine (standard nine) distributed with a mean 5 and a standard deviation of 2, where each score falls into a category instead of having a unique value.[7] Stanines are often used to categorize performance in certain tests, where a person's exact score is not as important as identifying groups of people with a similar performance score, particularly those who are above or below average. I convert the stanine test scores of IQ and mental ability, which originally might have been treated as continuous values from 1 to 9, into categorical variables where each of the values is a dummy variable.

The Swedish Military Enlistment Battery also contains information on health and physical status such as height and weight. In the analysis, health is measured using the Body Mass Index (BMI), defined as the weight in kilograms divided by the square of height in metres. BMI at the age of 18 represents a plausible indication of future BMI, which in turn serves as a proxy for health status.

The education and earnings variables are taken from population register data at Statistics Sweden (SCB). Detailed information about the individual's educational attainment from the 1999 version of the Swedish education register is converted into years of schooling.[8] In addition to the level of education, I also use the field of education in the analysis to shed light on a possible gender gap in educational outcomes, which might reflect the dissimilarity in occupation in the labour market.[9]

The register data contain information about the income of all individuals. Since earnings are a direct indication of the returns to education, health, cognitive and non-cognitive abilities in the labour market, I find labour earnings to be a suitable measure of income in this study.[10] The son's earnings are measured between the ages of 32 and 38.[11] To obtain a reasonable proxy for long-run earnings, I take the average

[7]Stanines (% of scores): 1 very poor (4%), 2 poor (7%), 3 considerably below average (12%), 4 slightly below average (17%), 5 average (20%), 6 slightly above average (17%), 7 considerably above average (12%), 8 superior (7%), 9 very superior (4%).

[8]Their educational attainment, measured when they were 32 to 38 years old, is translated into detailed measures of level and field of education. Starting with primary school, which is obligatory at 6 or 7, I define seven levels of education with a corresponding total number of years: primary education corresponds to 7 years, lower secondary education to 9 years, short and long upper secondary education amount to 11 and 12 years, short and long university education amount to approximately 14 and 15.5 years and finally PhD studies amount to 19 years.

[9]The fields of education are: general education; arts, humanities and religion; teacher training; administration, economics, social science and law; industry and technology; transport and communication; health; agriculture, forestry and fishing; service and defence.

[10]Earnings are defined as a combination of wages, salaries and business income, including sickness and parental leave benefits.

[11]It has been shown that annual earnings at these ages are likely to reflect their long-run earnings and yield the least unbiased indicator of lifetime earnings (Böhlmark and Lindquist, 2006).

over 1997-2002 log labour earnings for sons. Averaging over the log labour earnings 1970-1975 for fathers also helps to eliminate most of the transitory fluctuations.

3.2 Sample criteria and descriptives

I use a high-quality Swedish data set obtained from Statistics Sweden's (SCB) registers, which consists of a 35-percent random sample of individuals born in Sweden between 1961 and 1967. The most important advantage of this data is the multigenerational nature of the population register, which makes it ideal for the study of intergenerational association as it offers a clear identification of children and makes it easy to match them with their parents. In order to access an applicable measure of skills and health, I combine sons' data from the SCB register with data from the Swedish Military Enlistment, which records all young Swedish men, at around the age of 18 and their health status, physical fitness, cognitive and non-cognitive abilities.

Descriptive statistics are shown in Table 1. The sample size is restricted to individuals with over SEK 1000 in annual labour earnings, and the father's age is limited to 20-60 in order to avoid any possible effects of outliers in the results. The sample in the main analysis consists of 81,400 sons with a mean age of 34.8 in 1999. In the family of origin, the father's mean age in 1970 was 35.8 and his average of log labour earnings was 12.25 (SEK 208,980). The corresponding mean average of the sons' log labour earnings was 12.39 implying a mean of SEK 240,400 for the level of earnings. All earnings are expressed using the 2002 price levels.

Table 1: Descriptive Statistics for Sons and Fathers

	All sons				Sons with more than 12 years of education			
Variable	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Age in 1999	34.8	1.9	32.0	38.0	34.8	1.9	32.0	38.0
Son's log labour earnings	12.48	0.43	7.20	17.29	12.57	0.56	7.18	16.45
Years of schooling	12.1	2.1	7.0	19.0	14.1	1.5	12.0	19.0
Father's age in 1970	35.8	6.9	20.0	60.0	35.3	6.7	20.0	60.0
Father's log labour earnings	12.25	0.55	6.92	15.48	12.39	0.56	6.92	15.48
Sample Size	81,413				35,572			

Earnings are averaged over 1997-2002 for sons, and over 1970-1975 for fathers, all in 2002 price levels.

Table 2 displays the relationship between the son's earnings, education, his father's earnings and the different stanine categories of the son's IQ, mental ability and BMI. The association between the son's log earnings and both his level of IQ and mental ability is clearly a positive one. As expected, sons who belong to the above average category of cognitive and non-cognitive skills tend to earn more in the labour market. More years of schooling also correspond to higher earnings, even if

the relationship between education and IQ and mental ability starts relatively flat in the lower stanine categories and then slopes upwards towards the top. There is a positive link between the father's earnings and the son's level of IQ and mental ability.[12] While cognitive and non-cognitive skills almost have the same effect on the son's earnings and education, sons of fathers with high earnings tend to have a slightly higher IQ compared to mental ability. In all cases, the relationship between son's BMI, log earnings and education is relatively flat in the middle stanine categories, and forms an inverse U-shaped pattern.

Table 2: Relationship Between IQ, Mental ability, BMI, log Earnings and Education

Stanine values	1	2	3	4	5	6	7	8	9
					IQ				
Log earnings	12.05	12.16	12.23	12.28	12.35	12.44	12.54	12.62	12.70
Father's log earnings	12.06	12.09	12.13	12.16	12.21	12.28	12.35	12.41	12.48
Years of education	10.2	10.4	10.74	11.04	11.7	12.5	13.3	14.0	14.7
Proportion	0.020	0.055	0.095	0.139	0.242	0.176	0.137	0.087	0.049
					Mental ability				
Log earnings	11.93	12.10	12.18	12.28	12.37	12.46	12.55	12.64	12.73
Father's log earnings	12.16	12.14	12.15	12.19	12.21	12.27	12.35	12.42	12.46
Years of education	10.7	10.8	11.1	11.5	11.8	12.4	13.0	13.5	13.8
Proportion	0.007	0.034	0.083	0.174	0.263	0.212	0.147	0.064	0.015
					BMI				
Log earnings	12.27	12.36	12.40	12.42	12.42	12.40	12.39	12.37	12.32
Father's log earnings	12.16	12.20	12.22	12.22	12.26	12.27	12.27	12.27	12.26
Years of education	11.3	11.7	12.0	12.0	12.2	12.2	12.2	12.1	12.0
Proportion	0.040	0.071	0.119	0.171	0.197	0.171	0.118	0.070	0.040
Sample Size	81,413								

Stanines (% of scores): 1 very poor (4%), 2 poor (7%), 3 considerably below average (12%), 4 slightly below average (17%), 5 average (20%), 6 slightly above average (17%), 7 considerably above average (12%), 8 superior(7%), 9 very superior (4%).

[12]Table A1 in the Appendix shows that the correlation between son's years of schooling and IQ is 0.57. Also, son's years of schooling have a stronger correlation with his labour earnings than IQ, 0.31 and 0.27 respectively.

4 Empirical results

4.1 OLS results

4.1.1 Direct and indirect effects

I start to estimate equations (2) and (3) from Section 2, with the aim of reporting the direct and indirect effects of a father's earnings on those of his son. The indirect effects through the father's investment in his son's education, skills and health are computed according to equation (9). The results are reported in Table 3.

It is important to bear in mind that the results from this kind of decomposition of direct and indirect effects are likely to be impaired by the correlation in the error terms of the covariates. However, the analysis still illustrates the mechanisms underlying the intergenerational transmission of earnings.

Since previous research has established that education is a primary predictor of individual's earnings potential, I first include the level of education in the father-son earnings association, and estimate equation (3). The first row of Table 3 reports that the direct effect of the father's earnings on those of the son's is 0.090, and the indirect effect is 0.077. Accordingly, the sum of the direct and indirect effect is 0.167, which can be interpreted as the total effect of the father's earnings on the son's earnings. Hence, the magnitude of the indirect effect implies that 46 percent of the total effect is mediated by the son's education, and 54 percent can be accounted as the direct effect.

Next, I add the son's IQ together with his level of education to the intergenerational equation. The direct effect of the father's earnings on his son's now shrinks to 0.083, while the indirect effect through the level of education narrows down to 0.058 compared to 0.077, when only the son's education is included in the estimation. The indirect impact of the father's earnings on his son's through IQ is 0.025. From the second row of Table 3, education appears to be a more important mediating variable between the father-son earnings relationship as it accounts for 35 percent of the total effect compared to the 15 percent accounted by IQ.

The indirect effect through education decreases further to 0.050, i.e. from 46 to 30 percent, when including cognitive and non-cognitive skills together along with education in the father-son intergenerational earnings linkage. Now, the direct effect of a father's earnings on son's earnings is also smaller 0.078 compared to 0.090 when education is the only mediating factor taken into account. The indirect effect of the father's earnings via IQ is 0.019, while the corresponding effect through mental ability is 0.021. Hence, education still plays an important role as a channel through which the intergenerational transmission of earnings persistence takes place, compared to abilities. The level of education accounts for 30 percent of the earnings transference between father and son, while IQ and mental ability contribute equally with about 11 percent of the earnings transmission.

The last step in this exercise estimates equation (8), where also BMI is added to the earlier list of mediating factors. Including BMI together with education, IQ and mental ability in the intergenerational relationship does not alter the results much compared to those from earlier specifications. The direct effect of the father's earnings on the son's earnings remains the same, 0.077. The transmission of earnings across generations through BMI is nearly nonexistent, namely 0.00045. This suggests that either health is not a crucial transmitter of economic status between father and son, or the son's BMI at around 18 might not be accurate enough as an indication of his future health.

Table 3: Direct and Indirect Effects of the Father's Earnings on those of the Son's

Direct Effect	Indirect Effect through				Total Effect
	Education	IQ	Mental ability	BMI	
0.090	0.077				0.167
(54)	(46)				
0.083	0.058	0.025			0.167
(50)	(35)	(15)			
0.078	0.050	0.019	0.021		0.167
(46)	(30)	(11)	(12)		
0.077	0.050	0.019	0.020	0.00045	0.167
(46)	(30)	(11)	(12)	(0.3)	
Sample Size	81,413				

Percentage in parentheses. Education is defined as years of schooling, inferred from information on level. The independent variable is the average of son's log labour earnings 1997-2002 in 2002 price levels.

The impact of education is reduced gradually with the inclusion of other potential earnings transmitters. Specifying the intergenerational elasticity into parts ascribed to the direct and indirect effects of a father's earnings on the son's shows that education is the most influential mechanism. Meanwhile, the results also indicate that education is extremely sensitive to the inclusion of other covariates in the equation. Specifically, considering education alone as a transmission mechanism appears to overstate its impact in the transference of economic status. This could very well be the case for the results in Eide and Showalter (1999), which report that the OLS estimates of the father's earnings decrease by nearly a third, from 0.34 to 0.24 when the son's years of schooling are included in the equation. As my results in the first row of Table 3 indicate, it is highly likely that the estimate of the impact of education obtained partially contains some of the effects that should be ascribed to IQ and mental ability.

Although the source of the transmission of earnings is hard to determine, the results of this analysis suggest that it partly reflects education, IQ, mental ability and BMI. It is reasonable to argue that considering various factors together, as opposed

to solely studying one factor in the analysis, gives a broader picture of the underlying structure of the intergenerational transmission.

4.1.2 Changing the order of the mediating variables in the intergenerational equation

I now change the order in which I enter the mediating variables into the intergenerational equation. I start by estimating equation (1), a baseline specification with the regression of the average of a son's log labour earnings in 1997-2002 on those of his father's averaged over 1970-1975. Thereafter, to mimic previous research and with a view to present the problem in disentangling the impact of one factor from another, I estimate different specifications where I include only one factor at a time in order to assess their individual impact on the earnings persistence.

This exercise consists of estimating equation (3) in Section 2, only now I replace education alternating between IQ, mental ability and BMI. The OLS results are presented in the first column of Table 4. The first specification estimates the conventional father-son earnings relationship, and the last specification includes all mediating factors simultaneously in order to gauge their combined effect on the earnings transmission. Therefore, the first and last specifications in the first column of Table 4 are expected to deliver the same results as their counterparts in Table 3.

From the first row and the first column of Table 4, the father-son elasticity is 0.165. Previous Swedish estimates for father-son elasticity range from 0.13 to 0.28.[13] Possible explanations for the fact that my estimate of 0.165 belongs to the lower level of this range could be the different sample criteria used and the alternative ways of measuring long-run earnings in earlier studies on intergenerational mobility. As in Table 3, including only the level of education in the intergenerational mobility model reduces the father-son elasticity from 0.165 to 0.090, in other words, a 45-percent drop in the estimates.[14] Likewise, 29 percent of the earnings resemblance between fathers and sons is attributed to cognitive ability measured by IQ, and 21 percent of the earnings persistence is ascribed to mental ability. As before, health status seems to have a negligible impact on the intergenerational relationship. In previous research on the importance of health as a mechanism through which intergenerational economic transmission takes place, Eriksson, Bratsberg and Raaum (2005) use a battery of questions concerning whether the respondents in the Danish youth cohort data are currently suffering from a list of illnesses such as hypertension, migraine or cancer. Their results show that 28 percent of the relationship between a father's and son's earnings is accounted for when self-reported health measures are included in the analysis.

[13] See Björklund, Clark, Edin, Fredriksson and Krueger (2005), chapter 8, for an overview of the Swedish estimates in previous studies.

[14] Note that the father-son intergenerational elasticity here is 0.165 compared to the total effect of 0.167 in Section 4.1.1. The discrepancy may be caused either by rounding-off errors or a possible difference in the underlying computation.

Now to the last specification where all mediating factors are added simultaneously in the model. The father-son elasticity decreases from 0.165 to 0.077. Together, the level of education, IQ, mental ability to function and BMI account for 54 percent of the inheritance of economic status. Combined, the effect of all the mediating factors (54 percent) is about half of the sum of the separate impact of education, IQ, mental ability and BMI (96 percent).[15]

While the 54 percent refers to the effect of all mediating factors on the father-son transmission of earnings, the 96 percent says something about the covariance of the variables used in the analysis. The sum of the separate effects also depends on the number of variables added together in the equation. The more covariates that are considered in the analysis, the greater the covariance is, so this percentage share could very well exceed 100 percent if the estimation encompasses more covariates other than education, skills and BMI.

My results are in line with Blanden, Gregg and Macmillan (2007), who also find that cognitive skills are more important in the transmission of economic status than non-cognitive ability.[16] Using British data, their results suggest that cognitive variables such as reading, maths, general ability scores at the age of 11 contribute to 27 percent of the earnings persistence, while variables outlining non-cognitive skills, such as extroversion, locus of control and self-esteem account for 19 percent of the intergenerational economic relationship. On the other hand, they find that cognitive and non-cognitive variables together account for 32 percent of the earnings persistence. It is interesting to note that these effects do not usually add up to the total share of earnings association when they are considered concomitantly in the same intergenerational equation. Decomposing the effects by means of the path analysis model is complicated by the correlation between the error terms of the covariates in the equations. Freedman (1992) also discusses the shortcomings of path analysis model in the estimation of factors influencing intergenerational relationship.

4.1.3 Using a predetermined measure of cognitive ability

Ideally, measuring IQ after the individual has completed the obligatory 9 years of education and just before she starts upper secondary school, at the age of about 16, would have given a more accurate effect of IQ uninfluenced by difference in years of education. However, since I only have access to test scores for men when they are drafted for military service at the age of 18, I assess the impact of IQ by analyzing a sample of 35,572 sons who have completed twelve years of schooling or more. Descriptive statistics for this subsample are presented in the right-hand column of Table 1. Imposing this condition is expected to give a cleaner effect of education,

[15]See Table A2 in the Appendix for the percentage share of each factor's impact on the intergenerational earnings persistence.

[16]Lindqvist and Vestman (2009) use the Swedish military data in the context of labour market outcomes, and find that cognitive skills are more important determinant of earnings in the upper half of the distribution, while non-cognitive ability plays an essential role in acquiring a job.

Table 4: OLS and Linear Splines for Sons

Log earnings	OLS	p<5	5<p<10	10<p<25	25<p<50	50<p<75	75<p<90	90<p<95	95<p
Baseline	0.165	0.006	-0.009	0.275	0.383	0.366	0.388	0.264	0.191
	(0.003)	(0.008)	(0.050)	(0.051)	(0.047)	(0.037)	(0.038)	(0.070)	(0.030)
Level of education	0.090	0.016	0.031	0.217	0.259	0.140	0.120	0.143	0.127
	(0.003)	(0.007)	(0.031)	(0.049)	(0.045)	(0.036)	(0.603)	(0.067)	(0.029)
IQ	0.117	0.021	0.012	0.231	0.294	0.200	0.224	0.194	0.168
	(0.003)	(0.007)	(0.048)	(0.050)	(0.045)	(0.036)	(0.037)	(0.068)	(0.030)
Mental ability	0.131	0.020	0.033	0.200	0.287	0.257	0.306	0.205	0.155
	(0.003)	(0.007)	(0.033)	(0.050)	(0.045)	(0.036)	(0.037)	(0.068)	(0.030)
BMI	0.163	0.007	-0.005	0.272	0.378	0,362	0.383	0.262	0.188
	(0.003)	(0.008)	(0.050)	(0.051)	(0.046)	(0.037)	(0.038)	(0.070)	(0.030)
All	0.077	0.029	0.049	0.174	0.210	0.086	0.087	0.108	0.112
	(0.003)	(0.007)	(0.047)	(0.048)	(0.044)	(0.035)	(0.036)	(0.066)	(0.029)
Sample Size	81,413								

The independent variable is the average of son's log labour earnings 1997-2002 in 2002 price levels

apart from the influence of cognitive ability. Tables 6 and 7 report the results of the analysis using a predetermined measure of cognitive ability, which correspond to the results in Tables 4 and 5 for the whole sample.

Starting from Table 5, the percentage share of the direct effect of a father's earnings on his son's earnings is somewhat higher, namely between 59 to 75 percent now compared to 46-54 percent for the whole sample. In the first row where the level of education is the only covariate included in the intergenerational model along with the father's earnings, the direct effect of the father's earnings on the son's is 0.097, while the indirect effect through education is 0.033. The total effect is now smaller than before after isolating the impact of education, 0.130 compared to 0.167. Thus, the persistence in earnings is lower for sons with a high level of education. It is reasonable to assume that poorly educated sons are likely to have fathers with a low level of education. Consequently, sons in the subsample may consist of those who experience an upward mobility in education. This high degree of mobility in the subsample might be overrated if the low-educated sons who were left out are likely to be those who still have the same socioeconomic position as their fathers in the earnings distribution.

Now the level of education accounts for 25 percent of the transmission of economic status between father and son. The subsample consists of sons with short and long upper secondary education (11 and 12 years), those with short and long university education (14 and 15.5 years) and those who have completed their PhD studies (19 years). The reduced impact of education might reflect the fact that there is relatively little variation left of the education variable, since the last category with PhD studies comprises only of a small group.

Table 5: Direct and Indirect Effects for Sons with More than 12 Years of Education

Direct Effect	Indirect Effect through				Total Effect
	Education	IQ	Mental ability	BMI	
0.097	0.033				0.130
(75)	(25)				
0.088	0.027	0.015			0.130
(68)	(21)	(11)			
0.077	0.025	0.012	0.018		0.130
(59)	(19)	(9)	(13)		
0.077	0.025	0.013	0.015	0.0002	0.130
(59)	(19)	(10)	(11)	(0.14)	
Sample Size	35,572				

Percentage in parentheses. Education is defined as years of schooling, inferred from information on level. The independent variable is the average of son's log labour earnings 1997-2002 in 2002 price levels.

Entering IQ into the equation together with level of education only very slightly decreases the indirect effect of a father's earnings on those of his son through education, from 0.033 to 0.027. On the other hand, IQ now accounts for 11 percent of the earnings transmission with an indirect effect of 0.015. The importance of IQ as a mediating factor remains nearly the same as in Table 3. The level of education, which accounts for 21 percent of the earnings persistence, is still the leader in its function as a channel through which a father's earnings affect his son's economic outcome.

In the third row of Table 5, the magnitude of the indirect effect of a father's earnings on his son's through education decreases marginally to 0.025 after mental ability together with education and IQ are included in the equation. Interestingly, mental ability accounts for 13 percent of the transmission of economic status compared to the 9 percent ascribed to IQ. The difference in the indirect effect through IQ and mental ability, which amounted to 29 and 20 percent before, suggests that, in this subsample, non-cognitive skills appear to make almost the same contribution as cognitive ability to the father-son earnings persistence. This is slightly different from the results in the previous section, where IQ contributes more to the transmission of economic outcomes than mental ability.

Again, including BMI together with education, IQ and mental ability does not alter the results. With all the factors accounted for in the intergenerational equation, education remains a vital channel of earnings transmission, although its impact is markedly reduced from 30 percent in the total sample to 19 percent now. Education is followed by IQ and mental ability, which contribute equally to the generational earnings persistence. The measure of health status seems to contribute little to the economic relationship between father and son.

Now to the first column of Table 6, which displays the OLS results when the order of the inclusion of the covariates are changed in the equation. The intergenerational elasticity from the baseline specification is 0.128, which is noticeably smaller than its counterparts, 0.165, in Table 5. Next, only 24 percent of this elasticity is ascribed to the level of education, thus, the impact of education is less substantial than the 45 percent found earlier.

Restricting the sample to only include those who are well-educated is most likely to reduce the variation in the education variable. Nevertheless, the level of education still plays a central role in the earnings transmission. IQ and mental ability contribute equally with 15 percent to the transmission of earnings, which implies that abilities now contribute to a somewhat greater extent than before. Combined, the level of education, IQ, mental ability and BMI together account for 40 percent of the earnings persistence compared to 53 percent. Together, the corresponding sum of the effects is smaller now in Table 6, 54 percent compared to 95 percent in Table 5.[17]

[17]See Table A2 in the Appendix for a comparison of the percentage impact of each factor on the earnings persistence.

Table 6: OLS and Linear Splines for Sons with more than 12 Years of Education

Log earnings	OLS	p<5	5<p<10	10<p<25	25<p<50	50<p<75	75<p<90	90<p<95	95<p
Baseline	0.128	-0.004	-0.061	0.421	0.212	0.246	0.249	0.105	0.233
	(0.005)	(0.012)	(0.092)	(0.087)	(0.061)	(0.045)	(0.059)	(0.113)	(0.051)
Level of education	0.097	0.0002	-0.067	0.399	0.169	0.167	0.192	0.054	0.220
	(0.005)	(0.011)	(0.091)	(0.085)	(0.060)	(0.045)	(0.058)	(0.111)	(0.051)
IQ	0.109	0.003	-0.059	0.417	0.160	0.177	0.212	0.073	0.236
	(0.005)	(0.011)	(0.091)	(0.085)	(0.060)	(0.045)	(0.058)	(0.111)	(0.051)
Mental ability	0.109	-0.005	-0.016	0.342	0.157	0.211	0.198	0.102	0.195
	(0.005)	(0.011)	(0.090)	(0.085)	(0.059)	(0.044)	(0.057)	(0.110)	(0.050)
BMI	0.128	-0.003	-0.056	0.419	0.211	0.249	0.244	0.118	0.224
	(0.005)	(0.012)	(0.092)	(0.087)	(0.061)	(0.045)	(0.059)	(0.113)	(0.051)
All	0.077	0.011	-0.022	0.336	0.095	0.106	0.123	0.040	0.186
	(0.005)	(0.011)	(0.088)	(0.083)	(0.058)	(0.043)	(0.056)	(0.108)	(0.049)
Sample Size	35,572								

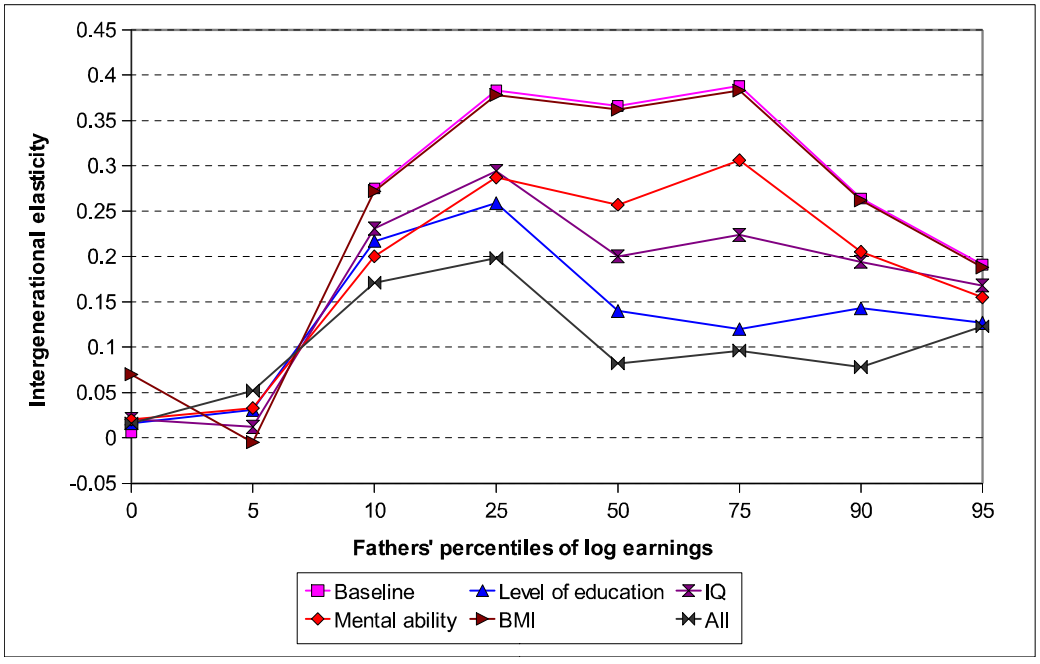
The independent variable is the average of son's log labour earnings 1997-2002 in 2002 price levels

4.2 Non-linearities: the spline regression results

Now I proceed using spline regression to explore whether sons of fathers at the top and bottom of the conditional earnings distribution are differently mobile. The results presented in the second column, to the right of the OLS estimates in Table 5 depict some nonlinearity.

Looking at Figure 1, this nonlinearity is easily perceived by the distinct patterns of a rising intergenerational elasticity from the 25th to the 50th percentile of the son's earnings distribution, and a decreasing one between the 50th-75th percentiles. The slopes are particularly different for sons of middle-class fathers and those who belong to the 75th-90th percentiles of the earnings distribution. This is especially evident when all transmission mechanisms are taken into account in the same intergenerational equation, as the slope of the spline regression looks nearly half as steep as in the baseline specification. Likewise, when education is included in the estimation, the spline regression slope becomes relatively flat compared to the baseline specification and the specifications which account separately for IQ, mental ability, and health.

Figure 1: Spline results of the impact of mediating variables on the father-son earnings persistence



Returning to Table 4, the degree of the intergenerational linkage is somewhat weak at the lower end of the distribution, yet the generational persistence rises in the middle and manifest a downward tendency towards the top in an inverted S shaped. The results show that fathers with earnings between the top 0.10 and 0.25 percentiles have a high propensity to transfer their economic position to their sons. A coefficient estimate of 0.388 implies that a 10-percent earnings differential among high earners translates into about 4-percent differential among sons. The average persistence is less than half, namely 1.6 percent. Hence the nonlinear approach denotes the presence of a higher earnings persistence compared to its log-linear counterpart.

The level of education contributes as much as 62 percent to the earnings persistence for sons of fathers belonging to the 50th and the 75th percentiles. The decline in the elasticity estimate when education is included in the equation, is also important for the upper middle classes, between the 75th and the 90th percentiles. Furthermore, including IQ in the estimation suggests that cognitive ability has a pronounced impact in terms of a 45-percent decrease in the intergenerational earnings persistence. In their study on the impact of skills on labour market outcomes, Linqvist and Vestman (2009) also find that IQ is essentially important for individuals who have wages above the median, and that non-cognitive skills have an impact on job acquisition for those at the lower end of the distribution. By and large, mental ability and BMI have the least impact on the persistence of earnings, compared to the level of education and IQ.

On the whole, the spline regression results show that the intergenerational elasticity increases with the father's earnings, so there is a high persistence in earnings, and education seems to be the propelling force driving the results. The higher intergenerational dependence in earnings at the upper end of the earnings distribution is consistent with previous results for Sweden where Björklund, Roine and Waldenström (2008) find that the intergenerational mobility decreases within the top percentiles of the earnings distribution.

Table 6 present the spline regression results for those who have completed twelve years of schooling or more. Imposing this condition tends to reinforce the role of education in the transmission of economic status from father to son. Looking at the first row of Table 6, the spline regression estimates are now smaller at the lower end of the distribution, and the magnitude of the intergenerational elasticity also decreases modestly at the top. As for the combined impact of all the mediating factors taken together in the last row of Table 6, the estimates are greater compared to those in Table 5, especially at the top of the son's earnings distribution.The education estimates

in the second row of Table 6 also become smaller at the 10th to 50th percentiles, but increase in magnitude towards the top. The intergenerational elasticity estimate decreases slightly in Table 6, from the 25th-50th to the 90th-95th, with IQ as a covariate, yet the high dependence in economic outcomes remains stable at the very top. All in all, the spline results conditional on having 12 years of schooling or more suggest a relatively greater mobility at the lower part of the distribution and more dependence in earnings in the top percentiles.

4.3 Comparison between sons and daughters

Since the corresponding information in the test scores to the data from the Swedish military data is unavailable for daughters, I resort to a comparison between sons and daughters, using education. In addition to level of education, I also use field of education in this analysis.

It is a well-established fact that men and women differ greatly in their choice of educational field. However, previous research on the role of education in the intergerarational transmission of earnings has mainly taken years of schooling rather than field of education into consideration (e.g. Eide and Showalter, 1999, Blanden, Gregg and Macmillan, 2007). Moreover, prior studies have revealed the existence of occupational gender division in Sweden (Meyersson-Milgrom, Petersen and Snartland, 2001), and that the gender wage gap might reflect the fact that men and women have different jobs (Albrecht, Björklund and Vroman, 2003). The field of education is meant to capture the gender difference in the choice of subject of interest at school, which should reflect the dissimilarity in occupation in the labour market.

To begin with, Table A3 displays descriptive statistics for a sample of 81,413 daughters. Tables 1 and A3 show that the mean of the daughter's log labour earnings is 11.94, the corresponding figure for sons is 12.39 implying a mean of SEK 153,277 and SEK 240,386 respectively. The standard deviation of the log earnings is higher for daughters, 0.58 compared to 0.43 for sons, while the variation of fathers' log earnings is nearly the same for both sons and daughters, 0.55 and 0.54 respectively. All earnings are expressed using 2002 price levels. Not surprisingly, daughters have on average more years of schooling compared to sons, 12.3 for daughters and 12.1 for sons.

I first comment the OLS results in the first column of Table A4 and then proceed to those from the spline regression. The results for daughters are reported in the upper half of Table A4, and those for sons are presented in the lower half. The elasticity of the son's earnings with respect to those of father's is 0.165 and the corresponding elasticity is slightly lower for daughters, namely 0.123. Previous research also find that daughters are somewhat more mobile intergenerationally compared to sons (Österberg, 2000, Hirvonen, 2008). When taking level of education into account separately in the father-daughter intergenerational regression, the elasticity estimate decreases by half, from 0.123 to 0.062. This striking fall in the coefficient estimate

implies that education also constitutes an important mediating variable in the earnings linkage between father and daughter. This might mean that nearly half of the degree of earnings transmission between fathers and daughters is mediated by education. For sons, 45 percent of father-son earnings resemblance can be accredited to education.

Now to the third row of Table A4. Adding the field of education contributes little to the dependence of outcomes between fathers and sons. There is only a modest fall in the magnitude of the estimates when the field of education of the daughter is entered into the equation.

The results of the comparison between sons and daughters, with respect to education, suggests in particular, that the length of education plays a more influential role than the chosen field of education, as far as accounting for the persistence of earnings is concerned. Therefore, I do not find evidence in favour of the gender gap in educational outcomes in the intergenerational earnings persistence. Instead my results could just as well suggest that gender differences in choice of field of education may also result from different labour market expectations.

Taken together, the results of the comparison show that education has almost the same effect on the inheritance of inequality for sons and daughters. On the one hand, daughters' earnings are slightly less dependent on fathers' earnings, the degree of persistence in earnings is 0.167 for fathers-daughters compared to 0.123 for fathers-sons. On the other hand, the economic status of fathers has an impact on daughters' earnings through education to a higher propensity compared to sons.

5 Conclusions

This study uses a large and representative sample to explore what lies behind the intergenerational earnings persistence. The main purpose is to investigate whether it is possible to distinguish between the extent to which various factors such as education, cognitive and non-cognitive skills, and health contribute to the persistence of economic status across generations.

The first part of the analysis consists of estimating a recursive model in which paternal earnings have a direct impact on the son's earnings, but also via other factors such as level of education, IQ, mental ability and BMI. This kind of decomposition of the direct and indirect effects relies on the assumption that the error terms in the structural equations must be uncorrelated. However, there are strong beliefs that in practice, these mediating factors are positively correlated with each other and with some unobserved factors. As expected, I find that the impact of education on the earnings transmission process decreases gradually with the inclusion of other potential transmitters of earnings. Quantifying the intergenerational elasticity into parts ascribed to the direct and indirect effects implies that education is the most influential mechanism. Meanwhile, the results also points towards the fact that education is

sensitive to the inclusion of other covariates and the order in which they are included in the equation.

The second part of the analysis uses a predetermined measure of cognitive ability in the estimation to further assess the role of education beyond the impact of the cognitive ability. The level of education remains the most central channel through which earnings transmission takes place although its impact is weaker in the results for sons with twelve or more years of education.

Another contribution of this paper is to investigate whether the role of education, skills and health differ in various parts of the earnings distribution. The spline regression results corroborate previous findings on notable nonlinearity in the father-son earnings resemblance. When adding the different transmitters separately, the effect of a father's earnings on those of his son has an impact mostly through level of education and IQ, especially in the upper middle categories of the father's distribution.

An additional analysis of the comparison between sons and daughters with regard to education suggests that a daughter's earnings are slightly less dependent on her father's earnings. Also, the inclusion of educational field in the analysis suggests that the level rather than field of education plays an important role in the transfer of economic position. Overall, education has more or less the same effect on the inheritance of inequality for daughters and sons, although its impact is slightly more pronounced for daughters than for sons.

My analysis highlights specifically that it is difficult to distinguish between the mechanisms behind the intergenerational earnings association. While it is certainly possible to pick out different mediating factors, considering one factor at a time can lead to a different interpretation of the results than accounting for a number of factors simultaneously in the same equation. The separate impact of one factor at a time tends to be much greater, presumably because the estimate is likely to capture the potential effect of other factors not taken into account in the estimation.

Ultimately, the problem of omitted variable bias is likely to impair the results, yet including more covariates in the equation should also decrease the degree of the total inconsistency in the estimates. Normally, the more variables are involved in the equation, the higher the propensity for them to net out the effect of bias. Despite these concerns, my results still present a useful upper bound to the true impact of these factors on the persistence of earnings.

All in all, although it is not possible to definitely discern one mechanism from another, we can make progress in the area, and learn more from below the surface when studying various factors together in the same analysis instead of focusing on one single factor as the sole source of the transmission of earnings persistence across generations.

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A Appendix

Table A1: Correlation Between Earnings, Education, Skills and BMI

	All Sons		Sons with more than 12 years of education	
	Years of schooling	Log earnings	Years of schooling	Log earnings
IQ	0.569	0.270	0.305	0.186
Mental ability	0.351	0.262	0.126	0.227
Years of schooling	1.000	0.306	1.000	0.192
Log earnings	0.306	1.000	0.192	1.000
Sample Size	81,413		35,572	

Table A2: The Impact of Mediating Factors on the Earnings Persistence

Log earnings	Baseline	Level of education	IQ	Mental ability	BMI	All
	All sons N=81,413					
Elasticity	0.165	0.090	0.117	0.131	0.163	0.077
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Percent		45	29	21	1	53
	Sons with 12 or more years of education N=35,572					
Elasticity	0.128	0.097	0.109	0.109	0.128	0.077
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Percent		24	15	15	0	40

The independent variable is the average of son's log labour earnings 1997-2002 in 2002 price levels

Table A3: Descriptive Statistics for Daughters and Fathers

Variable	Mean	S.D.	Min	Max
Age in 1999	34.8	1.9	32.0	38.0
Daughters' log labour earnings	11.94	0.58	7.22	15.54
Years of schooling	12.3	2.0	7.0	19.0
Father's age in 1970	35.8	6.9	20.0	60.0
Father's log labour earnings	12.25	0.54	6.94	14.75
Sample Size	82,399			

Earnings are averaged over 1997-2002 for daughterss, and over 1970-1975 for fathers, all in 2002 price levels.

Table A4: OLS and Linear Splines for Sons and Daughters (with Level and Field of Education 1990)

Log earnings	OLS	p<5	5<p<10	10<p<25	25<p<50	50<p<75	75<p<90	90<p<95	95<p
	Daughters N=82,399								
Baseline	0.123	-0.041	0.024	0.222	0.261	0.380	0.321	0.277	0.047
	(0.004)	(0.008)	(0.053)	(0.053)	(0.050)	(0.040)	(0.039)	(0.074)	(0.033)
Level	0.062	-0.015	0.068	0.145	0.174	0.168	0.093	0.185	-0.017
	(0.004)	(0.008)	(0.051)	(0.051)	(0.048)	(0.038)	(0.038)	(0.072)	(0.031)
Field	0.105	-0.034	0.033	0.187	0.221	0.335	0.286	0.249	0.038
	(0.004)	(0.008)	(0.052)	(0.052)	(0.049)	(0.039)	(0.038)	(0.073)	(0.032)
Level and	0.055	-0.016	0.067	0.147	0.150	0.157	0.071	0.160	-0.023
field	(0.004)	(0.008)	(0.051)	(0.051)	(0.047)	(0.038)	(0.037)	(0.071)	(0.031)
	Sons N=81,413								
Baseline	0.165	0.006	-0.009	0.275	0.383	0.366	0.388	0.264	0.191
	(0.003)	(0.008)	(0.050)	(0.051)	(0.047)	(0.037)	(0.038)	(0.070)	(0.030)
Level	0.090	0.016	0.031	0.217	0.259	0.140	0.120	0.143	0.127
	(0.003)	(0.007)	(0.031)	(0.049)	(0.045)	(0.036)	(0.603)	(0.067)	(0.029)
Field	0.142	-0.005	0.009	0.238	0.339	0.343	0.367	0.253	0.192
	(0.003)	(0.007)	(0.049)	(0.050)	(0.046)	(0.036)	(0.037)	(0.068)	(0.030)
Level and	0.090	0.006	0.034	0.211	0.242	0.130	0.124	0.108	0.139
field	(0.003)	(0.007)	(0.047)	(0.048)	(0.044)	(0.035)	(0.036)	(0.066)	(0.029)

The independent variable is the average of sons'/daughters' log labour earnings 1997-2002 in 2002 price level. The fields of education are: general education; arts, humanity and religion; teacher training; administration,economics, social sciences and law; industry and technology; transport and communication;health and social services; agriculture, forestry and fishing; service and defence.