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Intergenerational top income mobility in Sweden: Capitalist dynasties in the land of equal opportunity? ☆

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ABSTRACT

This paper presents new evidence on intergenerational mobility at the top of the income and earnings distributions. Using a large dataset of matched father-son pairs in Sweden, we find that intergenerational transmission is very strong at the top, more so for income than for earnings. At the extreme top (top 0.1%) income transmission is remarkable with an intergenerational elasticity of approximately 0.9. We also study potential transmission mechanisms and find that IQ, non-cognitive skills and education of the sons are all unlikely channels in explaining the strong transmission. Within the top percentile, increases in the income of the fathers, if they are related at all, are negatively associated with these variables. Wealth, on the other hand, has a significantly positive association. Our results suggest that Sweden, known for having relatively high intergenerational mobility in general, is a society in which transmission remains strong at the very top of the distribution and wealth is the most likely channel.

1. Introduction

This paper investigates intergenerational income mobility with a focus on the top of the distribution. More precisely, we study the income association of matched father-son pairs, based on a representative sample of all men born in Sweden in 1960 through 1967. Our sample consists of more than 100,000 pairs (35% of that population), which means that we are able to obtain good precision estimates of intergenerational transmission for fractions as small as 0.1% of the income distribution.

There are two main motivations for this study. The first is based on the growing literature on top income shares over the long run.[1] In addition to giving us new comparable long-term series of inequality, this literature has shown the importance of studying the top of the distribution in more detail in order to understand important aspects of overall inequality.[2] In particular, it has been shown that the recent surge in inequality in many countries has been driven mainly by large income increases in the top percentile (or even smaller fractions). However, this literature has not yet explicitly addressed intergenerational mobility. Understanding mobility is crucial for evaluating

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[1] Starting with Piketty (2001), Atkinson (2004), and Piketty and Saez (2003), a number of studies have followed a common methodology to create a homogenous series of top income shares over the long term for a number of mainly industrialized countries. Roine and Waldenström (2008) study the Swedish case. Atkinson and Piketty (2007, 2010) survey much of this work, its methodology and main findings.

[2] For example, the literature on top incomes has shown that the top decile is typically a very heterogeneous group both in terms of income composition (although the composition has also changed over time for some groups) and in terms of the volatility of their income share. For most countries, it also seems that most of the movement in the share of the top decile group is, in fact, driven by the top percent, a finding that runs the risk of not being captured if data are based on smaller, often top-coded samples.

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inequality in general, and the same obviously applies for the recent increase in top income shares. Indeed, when asked about the fairness of high-income concentration, most people respond that it is crucially important *how* those at the top got there. If success depends on “hard work” or being “more skillful”, people seem to tolerate inequality — even high degrees of it. If, however, the rich have amassed their wealth because of inheritance, a certain family environment, or “connections and knowing the right people”, this is generally viewed as unfair.[3] Atkinson and Piketty (2007) note that the change in the composition of the top incomes in Anglo-Saxon countries, where top wage earners have replaced capital income earners, indicates that today's highest incomes in these countries are not primarily based on inherited wealth. This is supported by the findings in Kopczuk and Saez (2004), who show that the recent increase in income concentration in the U.S. has not been accompanied by any major increase in wealth concentration. Edlund and Kopczuk (2009), who assess wealth mobility in the U.S. by the share of women in the top of the distribution, find that this share has decreased substantially over the past decades, also indicating a decreasing role of inheritance among the rich.[4] Although these findings are indicative for questions regarding mobility, our study explicitly addresses the intergenerational association of top incomes as well as their potential transmission mechanisms.

The second motivation for this study is previous research on intergenerational mobility, particularly the studies that have addressed non-linearities. Most of these studies focused on the differences in mobility patterns across the entire range of the bivariate income distribution.[5] In contrast, we focus on the top of the distribution and in particular on fractions at the very top that in most of this literature are unusually small. The work most similar to ours is that of Corak and Heisz (1999), who offer a thorough exploration of non-linearities in intergenerational mobility. They use a very large sample of Canadian men and look at both earnings and income.[6] The main differences between their study and ours are that (1) we explicitly focus on the top of the distribution, using the exactly same income concepts and income fractiles as in this top income literature, and (2) that we explicitly consider specific transmission channels (IQ, non-cognitive skills, education and different measures of wealth).[7]

Studying the same fractile groups and using the same income concepts as in the top income literature, we find that, first, the intergenerational transmission is generally much stronger at the very top of the distribution (the top 1 percentile group). At the extreme top (the top 0.1 percentile group) the transmission is remarkably strong, with intergenerational elasticities of approximately 0.9 in our main specifications. Second, the earnings transmission is also high for these groups but generally lower than that of total income, suggesting that capital may play a key role in explaining the strong transmission. Third, from our analysis of the channels of transmission, we conclude that sons' IQ, non-cognitive skills and education as well as the wealth of the sons, are all positively related to the incomes of the fathers in the distribution in general. However, in the top percentile group, this is true only for measures of wealth, again indicating that the plausible channel for the strong transmission at the top is capital. Cognitive skills, non-cognitive skills and education are rather negatively correlated with the income of the fathers at the very top of the distribution.

In the next section of the paper we present our data. Section 3 contains our main results on intergenerational income associations at the top. We also present transition matrices as an alternative measure of intergenerational mobility. In Section 4 we check the robustness of our main results. In Section 5 we explore possible transmission channels (IQ, non-cognitive skills, education and various measures of wealth), and finally, in Section 6, we conclude with a discussion of our results and also suggest some interesting topics for future research.

2. Data

We use Swedish data compiled from administrative registers managed by Statistics Sweden. The starting point for constructing our data set is a random sample of 35% of all men born in Sweden in 1960 through 1967. These are the sons in our study. Using the multi-generational register we can connect the sons to their biological fathers, and using income registers we can add annual income data based on compulsory reports from employers to the tax authorities or from personal tax returns, to the data for both fathers and sons. To the extent that fathers have more than one son in the relevant group, all of these will appear in our data set.

The objective then is to obtain good estimates of lifetime incomes. For sons we observe their incomes from 1996 through 2005, that is, when they were in their 30s and early 40s. This is a period in life when even annual incomes have been shown to be unbiased proxies for lifetime income with only classical measurement errors (Böhlmark and Lindquist, 2006). To eliminate most of the transitory fluctuations, we average the sons' annual incomes over the entire ten-year period.

When measuring the incomes of the fathers, we also seek a good proxy for long-run income, but there are additional arguments for measuring income at the time when their children grew up because this captures important determinants of the intergenerational transmission of incomes.[8] We satisfy both of these requirements by measuring the income of the fathers as the average of income during the years 1974 through 1979, that is, when their sons were between 7 and 19 years old and thus mostly living with their parents. The reason for having a somewhat shorter time window for fathers than for sons is that we prefer not to use incomes before 1974 because of a change in the definition in the income data. We also cannot use the incomes of the fathers in the 1980s because fathers are already

[3] The quotes are formulations from a Gallup poll used in Fong (2001) and questions appearing in the International Social Justice Project, but there are many other examples of similar formulations in, for example, the World Values Survey, the General Social Survey, the International Social Survey, etc. Some studies have focused on the differences in perceptions of why people are rich or poor, and particularly on the differences between the US and Europe with respect to such beliefs (e.g., Alesina et al., 2001; Alesina and Glaeser, 2004). However, the view that if a person's overall wealth is the result of hard work, then the accumulation of the wealth is fair (and vice versa if the person has not made any effort) seems to be shared across countries. For example, Jencks and Tach (2006) report that a majority of people in Germany, Japan, the U.K. and the U.S. agreed with the statement that “[inequality] is fair but only if there are equal opportunities” (based on data collected by the International Social Justice Project (ISJP) in 1991).

[4] Kopczuk et al. (2010) study *within lifetime income mobility* in the U.S. and find that the probability of remaining in the top percent of the distribution from one period to the next has changed little over the past decades.

[5] For example, Eide and Showalter (1999), Grawe and Mulligan (2002), Couch and Lillard (2004), Grawe (2004), Hertz (2005), Jäntti et al. (2006), and Bratsberg et al. (2007) are all (at least partly) concerned with non-linear patterns in the overall distribution. Typically, these studies explore differences across quartiles or deciles rather than percentiles or even fractions of percentiles. This is largely driven by the underlying questions (such as the impact on the intergenerational elasticity from credit constraint on educational investments), but also by the fact that studying small fractions of the distribution requires a very large sample.

[6] Another closely related study is Finnie and Irvine (2006), who also consider the top groups using Canadian data. Their study is, however, different in that they investigate the “origins” of individuals located in today's top groups by means of a transition matrix. More precisely, they trace the decile in the distribution of family market incomes in the early 1980s, which were the points of origin for individuals in various top groups.

[7] A recent paper by Corak and Piraino (2011) considers a previously overlooked channel. They study the extent to which fathers and sons have the same employer and find that this “inheritance of employer” is much more common at the top of the distribution. This could clearly play a role in understanding nonlinearities.

[8] Several previous studies in the intergenerational literature have chosen to measure fathers' incomes in this way. See Corak (2006), Björklund and Jäntti (2009), and Black and Devereux (2010) for recent surveys. Mazumder (2005) focuses on the implications of the length of the window for fathers' incomes.

older than their sons and such an extension would make the age gap even larger.[9]

We use two concepts of income. The first is *total income*, which is income from all sources (labor, business, capital and realized capital gains) before taxes and transfers.[10] This is the same measure that was used previously in the study of the evolution of top income shares; see Roine and Waldenström (2008). Thus, our estimates of intergenerational mobility at the top correspond directly to the estimates of the static top income inequality. Our second measure is *earnings*, which includes income from work for employees and self-employed.[11]

Of course many specific problems arise when measuring incomes and earnings at the absolute top of the distribution; see Roine and Waldenström (2010) for more discussion. Overall we are broadly confident that the Swedish register data used in this study correctly measure top incomes. For example, income tax reports are not only submitted by individuals, but employers and financial institutions are also required by law to report what they have paid out to individuals and there is no top coding in the income and earnings registers. In addition, the two most important sources of measurement error that may still be present can bias our results downward, implying that we may actually underestimate the effects that we find.[12] First, our earnings measure never includes capital incomes even though items such as bonuses and realized stock options can be a relatively important form of compensation for top earners. To the extent that such capital-based compensation has become more prevalent since the 1970s, which is arguably also the case in Sweden, we systematically underestimate top earnings among sons. If this mismeasurement of the dependent variable is positively correlated with the earnings of the fathers, which we have grounds to believe, we could underestimate the intergenerational transmission for earnings. Second, since Sweden liberalized its capital account around 1990, there has been a drastic increase in cross-border capital movements among the wealthy. In a recent study of the Swedish household wealth concentration, Roine and Waldenström (2009) show that significant shares of wealth owned by the richest Swedes may be placed in off-shore locations. As a result, capital income among high-income earning sons may be underestimated. Although the extent to which this influences our mobility estimates is highly uncertain, there is again a risk that we underestimate the intergenerational transmission.

In addition to studying the intergenerational transmission of earnings and incomes we are also interested in analyzing potential mechanisms through which this may work. We consider four channels for which we can obtain good data for the sons in our sample: education, IQ, non-cognitive skills and wealth. Our measure of education is based on Statistics Sweden's education registry. The variable is available in seven levels that we recode to years of schooling.[13] Our measures of IQ and non-cognitive ability are obtained from the Swedish military's compulsory enlistment tests that are conducted around age 18.[14] The IQ test has four parts (synonyms, inductions, metal folding and technical comprehension), which are reported on a scale from 1 to 9. The results of the tests are transformed to an overall measure of cognitive ability, also ranging from 1 to 9. The variable follows a Stanine scale that approximates a normal distribution. The measure of non-cognitive skills is the outcome of interviews with the conscripts by certified psychologists. The overall objective of these interviews is to assess the conscripts' ability to cope with the psychological requirements of military service. The psychologists assign each conscript a score between 1 and 9, and the variable is again constructed to follow the Stanine scale with a normal distribution.

We also use three wealth variables. From the wealth register at Statistics Sweden, we retrieve market-valued estimates of net worth and financial assets for all individuals in the country. Financial assets (bank accounts, ownership of stocks, bonds and mutual funds) and debts (any type) are from statements that by law must be reported directly by the financial firms to the tax authorities. Pertinent information on all private housing and real estate (except condominiums) is from the housing and property registers. We also use taxable wealth, which is reported by individuals on their tax returns, but is available only for those with sufficiently high wealth to be taxed (roughly the top fifth).

When determining the sample used in the estimations, we begin by requiring the fathers to be residents during all of the years 1974 through 1979 and the sons in all of the years 1996 through 2005. We then use separate samples for income and earnings; we use only those father-son pairs for which both had positive income observations each observation year, and do the corresponding in the earnings sample.[15] A further requirement of our main samples is that our potential transmission variables — education, IQ, non-cognitive skills and wealth — do not have missing values. This, together with the requirement of positive values for all years, causes us to lose observations, so we therefore also run robustness checks to see how the results vary when we use different samples and when we include observations with reported zero income and earnings (treating the zeros in some alternative ways as explained below). These results are reported in Section 4.

Table 1 reports descriptive statistics for the income and earnings samples of our main analysis and descriptive statistics for the variables used in the analysis of potential transmission mechanisms. Our income sample contains 108,277 pairs of fathers and sons and the earnings sample contains 85,848 pairs.[16] Thus we observe more than 1000 father-son pairs in the top income percentile and more than 100 the top 0.1 percentile group. The mean and median in both the income and earnings samples are approximately the same for fathers and for sons. At the top of the distribution, however, incomes are substantially higher, especially for the sons. This indicates the importance of analyzing earnings and incomes separately, especially when studying

[9] The change in data definition in 1974 is due to a legal change that made a set of social insurance benefits taxable and thus from then on also included in the income data. Another reason for not using fathers' incomes during the 1980s is that most sons by that time would had moved away from their parents, which weakens one of the presumed transmission channels, namely that the children and parents lived under the same roof. As we discuss below, neither the different age distributions of the fathers and sons nor the different length of time windows when computing income averages matters for the study's findings.

[10] Total income (*sammanräknad nettoinkomst* for the fathers and *summa förvärvs- och kapitalinkomst* for the sons) also includes taxable social insurance benefits such as unemployment insurance, pensions, sickness pay and parental leave benefits.

[11] Earnings (*arbetsinkomst*) is an income concept created by Statistics Sweden by combining wages and salaries and business income. It also includes earnings-related short-term sickness benefits and parental-leave benefits but not unemployment and (early) retirement benefits.

[12] More precisely Statistics Sweden's income and earnings data rely on personal tax assessments through 1977 for wages, salaries, and transfers, and through 1987 for interests and dividends. Thereafter reports are from employers (and authorities for transfers) and banks respectively. Thus, our sons' data are from employers and banks and most of our fathers' data are from personal reports. The latter source introduces a potential measurement error in the income of the fathers that could result in an underestimation of intergenerational transmission.

[13] We assign 9 years of schooling for compulsory education, 11 for short high school, 12 for long high school, 14 for short university, 15.5 for long university, and 19 for Ph.D.

[14] See Cesarini (2010) and Lindqvist and Vestman (2011) for more information about these tests and evaluations of them for research purposes such as the one in this study.

[15] Our income and earnings data are in units of 1 SEK for all except two years when they are in 100 SEK. We adjust for this in our analysis by multiplying the incomes and earnings in the two latter years by 100. Still, there may be a concern that when taking logs of incomes near the lowest income limit the initial difference in limits could influence the results. Rerunning the main analysis requiring incomes and earnings to be at least 100 SEK instead of only being positive, however, does not change the results (available upon request).

[16] These numbers can be compared to 151,148 sons who were born in Sweden in 1960 through 1967 and who resided in Sweden all years 1996 through 2005, that is, the population about which we want to make inferences. Table A1 explains how the sample changes depending on our requirements. In Section 4, we examine whether our results are sensitive to these decisions and find that they are not.

Table 1
Descriptive statistics for main income and earnings samples.

Variable	Type	Mean	S.D.	Min	P10	P50	P90	P95	P99	P99.9	Max
Fathers											
Age in 1979	Inc.	45.1	7.2	27	36	44	55	58	64	73	86
	Earn.	44.7	6.8	28	36	44	54	57	62	69	81
Income in 1979	Inc.	252	140		137	227	382	470	751	1,313	12,263
	Earn.	258	127		157	232	386	472	740	1,213	4,573
Average income 1974–1979	Inc.	254	137	3	151	226	379	467	756	1,280	13,950
	Earn.	256	122	1	160	229	382	466	740	1,157	4,467
Average log income 1974–1979	Inc.	12.34	0.42	7.74	11.89	12.32	12.84	13.04	13.52	14.02	16.39
	Earn.	12.32	0.56	6.88	11.94	12.33	12.85	13.04	13.50	13.95	15.24
Sons											
Age in 2005	Inc.	40.9	2.0	38	38	41	44	44	45	45	45
	Earn.	40.9	2.0	38	38	41	44	44	45	45	45
Income in 2005	Inc.	357	431		180	299	546	689	1,292	4,592	45,223
	Earn.	351	224		187	309	548	675	1,093	2,834	10,802
Average income 1996–2005	Inc.	304	283		173	265	452	553	920	3,099	43,346
	Earn.	302	165	3	177	272	453	540	806	1,981	13,051
Average log income 1996–2005	Inc.	12.46	0.48	3.13	11.98	12.47	12.98	13.17	13.58	14.48	17.50
	Earn.	12.46	0.49	5.94	11.91	12.49	12.99	13.17	13.54	14.32	16.10
IQ	Inc.	5.2	1.9	1	3	5	8	8	9	9	9
	Earn.	5.3	1.9	1	3	5	8	8	9	9	9
Non-cognitive skills	Inc.	5.2	1.6	1	3	5	7	8	9	9	9
	Earn.	5.3	1.6	1	3	5	7	8	9	9	9
Education years	Inc.	12.0	2.1	7	9	11	15	16	18	20	20
	Earn.	12.1	2.1	7	9	11	15	16	20	20	20
Net worth	Inc.	378	2,596	−24,371	−136	120	1,023	1,643	3,938	12,500	734,300
	Earn.	360	1,163	−24,371	−130	133	993	1,552	3,600	12,000	78,190
Financial assets	Inc.	145	2,361	0	0	27	314	558	1,482	6,433	746,400
	Earn.	137	618	0	0	30	315	553	1,479	5,917	64,115
Taxable wealth	Inc.	46	546	−1,991	0	0	0	91	1,202	5,178	85,112
	Earn.	44	509	−1,908	0	0	0	91	1,202	4,826	85,112

The income (earnings) sample consists of father-son pairs with positive income (earnings) all years. Incomes, earnings and all wealth measures are in thousand 2005 SEK. IQ and non-cognitive skills are in Stanine scale. Observations are 108,277 (incomes) and 85,848 (earnings). Fathers are observed during 1974–1979 and sons during 1996–2005 (except for Net worth and Financial assets which are averages based on the period 1999–2005). See text for further details.

the top of the distribution. Coefficients of variation are in line with the previously documented trends for top income shares in Sweden, which indicate sharp increases for total income but only moderate changes for earnings (see Roine and Waldenström, 2008, for details). We also note that the age of the fathers is somewhat higher in the income sample, which is plausible given that few fathers have positive earnings after their retirement at the age of 65.[17]

3. Econometric models and main results

Our point of departure is the prototypical model in intergenerational income mobility research

$$y_{si} = \alpha + \beta y_{fi} + \varepsilon_i \tag{1}$$

where y_{si} is the natural log of income of a son in family i and y_{fi} the corresponding measure for his father.[18] We want to estimate the intergenerational relationship between long-term incomes following the standard approach in the literature, and therefore we use multi-year average incomes throughout. We also control for the ages of the fathers and sons (linearly and quadratically) in all of our regressions.

The regression coefficient β is the intergenerational elasticity, that is, it measures the percentage differential in the sons' expected income with respect to a marginal percentage differential in the incomes of the fathers. In the case that the variance of the long-term incomes in both generations is the same, the elasticity is also the intergenerational correlation in the log incomes. In our study, the distinction between the elasticity and the correlation is not relevant because our focus is on the intergenerational transmission at the top of the distributions.

We extend Eq. (1) using non-linear regressions by means of a spline function with pre-defined knots, which are income levels in the distribution of the fathers' incomes at which the slope is allowed to change (see Greene, 1997, pp. 388f).[19] The knots are defined in agreement with the top income literature and are income percentiles P50, P75, P90, P95, P99 and P99.9. The interpretation of the coefficient β for each of these regressions is, therefore, the percentage differential in the sons' *expected* income with respect to a marginal percentage differential in the incomes of the fathers *given that the father had an income in the respective fractile group*. The specified model now looks as follows

[17] The difference in age distributions of the fathers and sons does not matter much for our conclusions. We have run a number of robustness checks, restricting the sample so as to make the fathers more similar to the sons with respect to age. For example, we have excluded fathers younger than 38 and older than 45 (which are the age boundaries in the son sample) but this does not affect our results. Neither does the difference in the length of the time windows seem to matter much to our findings. We have tried shorter windows for the sons, making them more similar to the fathers, without any notable effect on our findings. These estimates are all available upon request.

[18] Obviously, it would be interesting to incorporate mothers and daughters too. We limit the analysis to father–son relationships partly to make comparisons with previous studies more clear but mainly for data coverage reasons.

[19] We have also run the entire analysis using regressions in which we relax the continuity requirement of the spline, and instead split the sample at the specific income percentiles. This means running LS-regressions separately for those father-son pairs in which the fathers' incomes are in the P0–P50, P50–75, P75–90, P90–P95, P95–99, P99–P99.9, and P99.9–100, respectively. The results are essentially the same and are available on request. In Björklund et al. (2010), we also report quantile regression estimates, which address a different issue than the one we focus on here.

Table 2
Main results: linear spline regressions across fathers' fractiles.

	Global	Piecewise linear (spline)						
	P0–100	P0–50	P50–75	P75–90	P90–95	P95–99	P99–99.9	P99.9–100
Incomes								
Father income	0.260	0.143	0.430	0.400	0.293	0.207	0.392	0.896
(N = 108,277)	(0.004)	(0.007)	(0.023)	(0.032)	(0.066)	(0.051)	(0.111)	(0.213)
Pr $(\hat{\beta}=\hat{\beta}^{Global})$		[0.000]	[0.000]	[0.000]	[0.625]	[0.299]	[0.238]	[0.003]
Earnings								
Father earnings	0.168	0.065	0.575	0.348	0.331	0.168	0.341	0.447
(N = 85,848)	(0.004)	(0.005)	(0.025)	(0.036)	(0.074)	(0.055)	(0.116)	(0.159)
Pr $(\hat{\beta}=\hat{\beta}^{Global})$		[0.000]	[0.000]	[0.000]	[0.029]	[0.991]	[0.136]	[0.079]

Results based on estimating Eq. (1). Robust standard errors are in parenthesis. P-values from test of equality with the global OLS coefficient are in brackets. Constant term suppressed.

for knot k, which in our case is simply a level of income corresponding to a certain percentile p in the fathers' distribution (in our estimations we include eight knots):

$$y_{si}=\alpha+\beta y_{fi}+\sum_{p=1}^{P}\delta_p\left(y_{fi}-k_p\right)+\varepsilon_i. \quad (2)$$

Our main results from the regressions across the fathers income fractiles are reported in Table 2. The conventional least squares regression model (1) yields estimates of the intergenerational elasticity of 0.260 for income and 0.168 for earnings when all of the observations over the whole distribution are used.[20] These numbers are in line with previous results for Sweden. When looking at the results across the fathers' income fractiles, these indicate significantly higher numbers in the top percentile compared with the remainder of the distribution, and a remarkably high transmission in the 0.1 percentile group. As shown by the p-values, the difference between the estimates for the very top and the global estimate for the full population are statistically significant. Literally, our result for the top 0.1 group suggests that a 10% income differential among the high-income fathers is transmitted into a 9% differential among the sons. This should be contrasted with the average transmission in the entire population, which is only 2.6%.[21]

Turning to earnings, we find qualitatively similar patterns but with a weaker increase at the very top. The coefficient for the top 0.1 percentile group is significantly higher than for the entire population, but it is still only half as large as it is for income. This difference between income and earnings suggests that it is the capital income component that is strongly inherited at the very top of the distribution.

Our results are summarized in Figs. 1 and 2. In addition to corroborating previous findings on average Swedish income mobility, the results also reveal new evidence on notable non-linearities in this relationship across the distribution of income and earnings. Specifically, we find that although the income associations are relatively weak in the population at large, this changes markedly in the top of the distribution. At the absolute top of the distribution, we find very strong associations and among the fathers in the top 0.1 percentile group income increases are almost completely transmitted to their sons. These non-linear transmission patterns are also evident in the earnings distribution, although to a lesser extent.

Finally, it is also worth illustrating the mobility pattern with a transition matrix. In contrast to the regression results, which show local sensitivity in different segments of the distribution, transition matrices show global mobility across the whole distribution. In particular the matrices allow us to study the prevalence of large steps and "unusual events" in the income distribution from one generation to the next. Table 3 presents a transition matrix for income with the

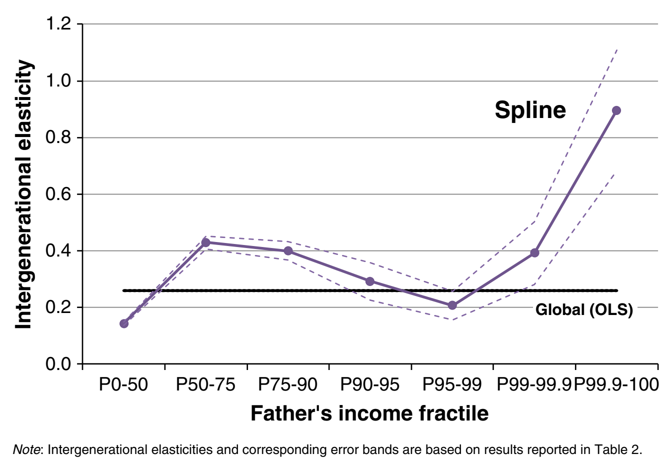


Fig. 1. Income transmission across the distribution.Intergenerational elasticities and corresponding error bands are based on results reported in Table 2.

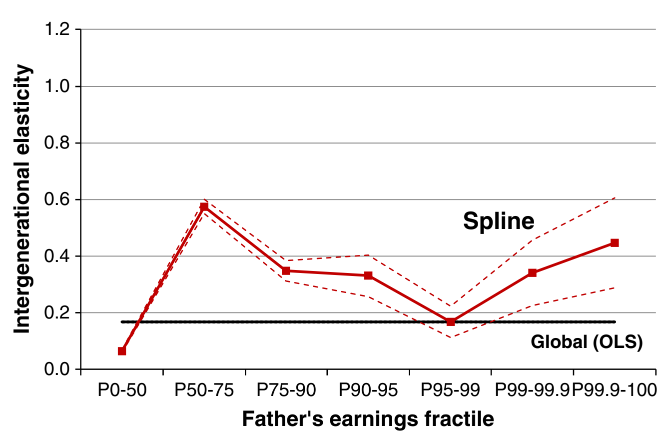


Fig. 2. Earnings transmission across the distribution.Intergenerational elasticities and corresponding error bands are based on results reported in Table 2.

[20] Although, this difference between income and earnings might appear striking, it should be noted that the estimates also differ in terms of trends in dispersion. Specifically, the ratio of the standard deviation of the fathers' and sons' long-run incomes fell by 12.5 percent (0.42/0.48) and the corresponding ratio increased by 14 percent (0.56/0.49) for earnings. In other words, the intergenerational correlations (defined as the estimated intergenerational elasticities multiplied by the ratio of the standard deviations) are 0.23 and 0.19 in the two cases.

[21] It is worth noting that this is a measure of the expected transmission *given* that the father is in this top group, rather than a measure of how difficult it is to get to this group. See Hertz (2005) for more on the interpretation of different measures of mobility.

Table 3
Transition matrices.

a) Incomes

	Son's income fractile								
	P0–25	P25–50	P50–75	P75–90	P90–95	P95–99	P99–99.9	P99.9–100	
Father's income fractile									
P0–25	33.2	29.3	22.9	10.1	2.6	1.5	0.3	0.0	100.0
P25–50	26.0	29.8	27.2	11.9	3.0	1.8	0.3	0.0	100.0
P50–75	22.4	25.0	28.3	16.0	4.5	3.2	0.6	0.0	100.0
P75–90	19.6	18.6	24.2	21.1	8.2	6.9	1.3	0.2	100.0
P90–95	16.8	13.2	20.5	24.5	11.5	10.4	2.8	0.4	100.0
P95–99	16.4	11.3	15.8	23.4	13.3	14.9	4.5	0.4	100.0
P99–99.9	16.3	7.4	11.3	19.8	15.3	21.7	6.4	1.8	100.0
P99.9–100	11.9	3.7	8.3	11.9	10.1	27.5	19.3	7.3	100.0

b) Earnings

	Son's earnings fractile								
Father's earnings fractile									
P0–25	32.5	29.7	23.0	10.1	2.7	1.7	0.3	0.0	100.0
P25–50	26.5	29.8	26.9	11.7	2.9	1.8	0.3	0.0	100.0
P50–75	22.8	24.6	28.0	15.8	4.7	3.3	0.6	0.1	100.0
P75–90	19.3	18.3	24.4	21.4	8.4	6.8	1.4	0.2	100.0
P90–95	17.2	14.0	21.7	23.0	10.4	10.3	2.9	0.4	100.0
P95–99	15.7	11.4	16.3	25.6	12.7	13.9	4.0	0.4	100.0
P99–99.9	15.8	7.1	13.6	21.7	14.5	19.1	7.0	1.2	100.0
P99.9–100	10.5	4.7	12.8	17.4	12.8	30.2	9.3	2.3	100.0

same group limits as in our regressions. The table reveals that 7.3% of the sons of the fathers in the P99.9–100 fractile group show up in the same fractile group for the sons. This number is 73 times higher than 0.1, which would indicate independence between fathers' and sons' incomes. Forming 19.3% of the P99–99.9 group, the sons are 21 times more likely to appear in this group compared with random assignment. At the same time as many as 11.9% (in contrast with 25% with independence) in the group with the richest fathers appear in the P0–25 group of sons. Large upward steps from the bottom half of the distribution to the very top do not appear in our data, although a non-negligible fraction (0.3% in contrast to 0.9%) move to the P99–99.9 fractile group of the sons.

The results for earnings are similar to those for total income in most of the distribution, but again there are important differences. In the very top 2.3% of the sons of the fathers in the P99.9–100 group appear in the corresponding group. This makes the sons 23 times as likely to appear in that group when compared with independent assignment. Although this is a high number, it is much lower than the probability, namely 73 times, under random assignment that is in the analysis of income. Similarly, 9.3% of the sons with fathers in the top 0.1 end up in the P99–99.9 group in the sons' distribution. This makes them approximately 10 times more likely to be in that group compared with random assignment but at the same time it is a significantly lower number than the corresponding 21 for the income results.

4. Robustness analyses

In our main sample we require positive observations for all years and also require that we have observations for the sons' transmission mechanism variables. This is because we want to conduct the mechanism analysis on the same sample as the one for which we have our main results. This procedure, however, creates different samples for earnings and incomes and also means that we lose a relatively large number of observations. Clearly, we want to ensure that our results are not sensitive to these effects. Table A1 shows how our sample changes depending on the various requirements we introduce.

We start by asking whether the difference in results for income and earnings is in any way driven by the fact that the estimations in Table 2 were performed on two different samples. In rows 1a and 1b of Table 4, we report estimates for the same model as in Table 2, but we require that fathers had both positive incomes and positive earnings each year from 1974 to 1979 (giving us the same sample for earnings and incomes). The results are similar to those in our main specification, suggesting that the differences in results between income and earnings are not attributable to the differences in the samples.

Next we check how our results change if we include observations with zero reported income or earnings (in one or several years). We treat these zeros as missing values, that is, average income over the years for which we have positive reported values, which is approximately the same as interpolating over the zeros. We do so because we think that, for the most part, the zeros are likely to reflect some form of reporting problem or mistake. Consider, for example, individuals who have studied or been unemployed the whole year, or who have left the labor force (for retirement or for some other reason) for the whole year. Although it may be the case that such persons actually have zero income from work, in most cases it is unlikely that they would not collect some taxable social transfers or capital income. This would seem especially strange at the top of the distribution. In addition, in cases where the tax declaration process is not completed or if there is a dispute between the individual and the tax authorities, this is also recorded as a zero. This situation, in turn, seems more likely at the top of the distribution. In rows 2a and 2b, we report estimates using the same requirements as in our main analysis but which now also include observations where zeros are present. The main difference that we find is that the coefficients for income become slightly lower while the earnings coefficients go up at the top level. However, the overall picture of transmission remains unchanged; it is stronger at the top and more so for income than for earnings.[22]

Finally we consider the case in which we drop the condition that we require observations of the sons' transmission mechanism variables.

[22] We have also checked what happens when we treat zeros as being correct and include these values when averaging. This results in coefficients that show the earnings transmission to be even stronger. The general non-linear pattern remains. Treating zeros as correct also introduces the problem of using the log of averages or the average of logs when calculating the long run income. We have tried different specifications and all of these show qualitatively similar results (available from the authors on request).

Table 4
Robustness analysis: linear spline regressions on incomes and earnings.

	Global	Piecewise linear (spline)						
	P0–100	P0–50	P50–75	P75–90	P90–95	P95–99	P99–99.9	P99.9–100
Alt. sample 1: Main sample, but require both positive income and earnings all years								
1a. Father income	0.293	0.145	0.461	0.396	0.324	0.252	0.426	0.895
(N = 85,753)	−0.004	(0.008)	(0.022)	(0.031)	(0.066)	(0.049)	(0.109)	(0.225)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.001]	[0.634]	[0.407]	[0.222]	[0.007]
1b. Father earnings	0.168	0.056	0.535	0.376	0.339	0.167	0.297	0.365
(N = 85,753)	−0.004	(0.004)	(0.022)	(0.030)	(0.062)	(0.046)	(0.104)	(0.274)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.033]	[0.885]	[0.152]	[0.079]
Alt. sample 2: Main sample, but also include observations with zeros (although exclude zeros from the averages)								
2a. Father income	0.248	0.135	0.417	0.416	0.329	0.257	0.410	0.902
(N = 117,837)	−0.005	(0.009)	(0.021)	(0.028)	(0.059)	(0.045)	(0.102)	(0.225)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.541]	[0.434]	[0.248]	[0.007]
2b. Father earnings	0.132	0.058	0.520	0.369	0.346	0.182	0.313	0.454
(N = 116,366)	−0.003	(0.005)	(0.024)	(0.032)	(0.067)	(0.049)	(0.107)	(0.158)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.007]	[0.768]	[0.174]	[0.071]
Alt. sample 3: Main sample, but also include observations where sons lack any of the transmission variables								
3a. Father income	0.262	0.143	0.458	0.390	0.277	0.220	0.346	0.827
(N = 130,047)	−0.004	(0.006)	(0.021)	(0.030)	(0.062)	(0.047)	(0.106)	(0.201)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.815]	[0.369]	[0.430]	[0.005]
3b. Father earnings	0.169	0.063	0.596	0.350	0.324	0.152	0.322	0.355
(N = 101,635)	−0.003	(0.004)	(0.023)	(0.033)	(0.069)	(0.052)	(0.112)	(0.284)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.024]	[0.749]	[0.172]	[0.512]
Alt. sample 4: Same as alt. sample 3, but include observations with zeros (although exclude zeros from the averages)								
4a. Father income	0.251	0.128	0.431	0.434	0.305	0.249	0.383	0.748
(N = 142,046)	−0.005	(0.008)	(0.019)	(0.026)	(0.054)	(0.042)	(0.097)	(0.222)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.841]	[0.288]	[0.357]	[0.041]
4b. Father earnings	0.134	0.056	0.535	0.376	0.339	0.167	0.297	0.365
(N = 139,210)	−0.003	(0.004)	(0.022)	(0.030)	(0.062)	(0.046)	(0.104)	(0.274)
Pr ($\hat{\beta} = \hat{\beta}^{Global}$)		[0.000]	[0.000]	[0.000]	[0.006]	[0.977]	[0.218]	[0.474]

Robust standard errors are in parenthesis. P-values from a test of coefficient equality with the global OLS coefficient are in brackets.

Table 5
Transmission mechanisms: descriptive statistics.

a) Incomes								
		Sons with fathers in the following income fractile:						
Son variables		P0–50	P50–75	P75–90	P90–95	P95–99	P99–99.9	P99.9–100
Income	Mean	268	296	347	394	452	581	1,498
	(S.d.)	(180)	(158)	(314)	(334)	(466)	(812)	(4,453)
IQ	Mean	4.8	5.2	5.9	6.3	6.5	6.7	6.3
	(S.d.)	(1.8)	(1.8)	(1.8)	(1.7)	(1.7)	(1.6)	(1.7)
Non-cog. skills	Mean	4.9	5.2	5.6	5.8	6.0	6.2	6.1
	(S.d.)	(1.6)	(1.6)	(1.6)	(1.6)	(1.6)	(1.6)	(1.7)
Net worth	Mean	282	288	440	647	944	2,575	6,387
	(S.d.)	(794)	(851)	(1283)	(1798)	(2803)	(24,417)	(16,208)
Financial assets	Mean	93	111	182	254	363	1,537	2,853
	(S.d.)	(290)	(327)	(936)	(887)	(1243)	(24,454)	(7624)
Taxable wealth	Mean	18	27	60	111	210	554	2488
	(S.d.)	(194)	(430)	(441)	(775)	(1006)	(2321)	(9099)
Education years	Mean	11.5	12.0	12.8	13.4	13.8	14.4	13.8
	(S.d.)	(1.8)	(2)	(2.3)	(2.3)	(2.4)	(2.4)	(2.4)
N		53,730	27,333	16,456	5416	4300	941	101
b) Earnings								
		Sons with fathers in the following earnings fractile						
Earnings	Mean	270	300	341	383	423	477	583
	(S.d.)	(109)	(144)	(188)	(229)	(353)	(338)	(430)
IQ	Mean	4.9	5.3	6.0	6.4	6.6	6.8	6.5
	(S.d.)	(1.8)	(1.8)	(1.8)	(1.7)	(1.7)	(1.6)	(1.7)
Non-cog. skills	Mean	5.0	5.4	5.7	5.9	6.0	6.3	6.3
	(S.d.)	(1.5)	(1.5)	(1.6)	(1.6)	(1.6)	(1.5)	(1.6)
Net worth	Mean	275	291	436	677	877	1363	3627
	(S.d.)	(866)	(907)	(1127)	(2019)	(1949)	(3805)	(8175)
Financial assets	Mean	96	111	180	275	350	566	1999
	(S.d.)	(307)	(335)	(845)	(1244)	(1174)	(1882)	(5483)
Taxable wealth	Mean	20	25	56	123	212	364	2277
	(S.d.)	(199)	(233)	(395)	(863)	(1112)	(1512)	(10,025)
Education years	Mean	11.5	12.1	12.9	13.5	13.9	14.6	14.0
	(S.d.)	(1.8)	(2)	(2.3)	(2.3)	(2.4)	(2.4)	(2.2)
N		42,639	21,676	13,012	4306	3393	745	77

Table 6
Mechanisms of transmission: top incomes.

Father income fractiles	Dependent variables (different son outcomes): Income	IQ	High IQ	Non-cog. skills	High non-cog. Skills	Education years	High Education
P0–50	0.143	0.223	0.005	0.248	0.006	0.357	0.020
	(0.007)	(0.025)	(0.004)	(0.022)	(0.003)	(0.026)	(0.004)
P50–75	0.430	3.064	0.312	2.058	0.200	3.517	0.403
	(0.023)	(0.089)	(0.017)	(0.077)	(0.013)	(0.100)	(0.018)
P75–90	0.400	2.206	0.374	0.879	0.105	3.167	0.503
	(0.032)	(0.112)	(0.025)	(0.098)	(0.019)	(0.140)	(0.027)
P90–95	0.293	0.728	0.102	0.821	0.117	1.052	0.256
	(0.066)	(0.203)	(0.052)	(0.186)	(0.041)	(0.274)	(0.056)
P95–99	0.207	0.715	0.141	0.579	0.130	1.741	0.299
	(0.051)	(0.134)	(0.037)	(0.129)	(0.031)	(0.193)	(0.040)
P99–99.9	0.392	−0.304	−0.032	0.726	0.024	−0.383	0.026
	(0.111)	(0.270)	(0.077)	(0.239)	(0.067)	(0.389)	(0.084)
P99.9–100	0.896	−0.357	−0.144	−0.956	−0.050	−0.734	−0.109
	(0.213)	(0.268)	(0.080)	(0.370)	(0.069)	(0.489)	(0.124)
N	108,277	108,277	108,277	108,277	108,277	108,277	108,277

	Net worth	Log net worth	Log pos. net worth	Financial assets	Log financial assets	Tax wealth	Log tax wealth	Log pos. tax wealth
P0–50	−0.135	0.207	0.001	0.393	0.000	−0.238	−0.207	−0.135
	(0.012)	(0.081)	(0.004)	(0.057)	(0.003)	(0.043)	(0.041)	(0.012)
P50–75	0.501	3.898	0.197	3.538	0.092	1.703	1.598	0.501
	(0.051)	(0.287)	(0.030)	(0.191)	(0.016)	(0.163)	(0.155)	(0.051)
P75–90	0.579	2.617	0.342	2.432	0.142	1.917	1.785	0.579
	(0.101)	(0.355)	(0.077)	(0.226)	(0.032)	(0.247)	(0.234)	(0.101)
P90–95	0.815	2.968	−0.065	2.252	0.253	2.749	2.586	0.815
	(0.438)	(0.648)	(0.356)	(0.390)	(0.108)	(0.557)	(0.528)	(0.438)
P95–99	1.700	0.945	1.276	1.090	0.419	2.940	2.728	1.700
	(0.823)	(0.434)	(0.801)	(0.245)	(0.129)	(0.457)	(0.434)	(0.823)
P99–99.9	3.358	2.499	1.417	1.487	1.330	4.822	4.678	3.358
	(1.639)	(0.853)	(1.333)	(0.441)	(0.681)	(1.128)	(1.085)	(1.639)
P99.9–100	15.462	1.976	8.410	2.665	5.205	5.244	5.159	15.462
	(6.516)	(0.937)	(4.073)	(0.355)	(3.809)	(1.444)	(1.411)	(6.516)
N	108,277	108,277	108,277	108,277	108,277	108,277	102,515	108,277

The dependent variable is specified in column headings and independent variable is father income in different income fractiles, connected through a linear spline. Constant terms are suppressed. Robust standard errors are in parenthesis. High IQ, non-cognitive skills and education are dummy variables equal to one when sons are in roughly the top five percentiles in the respective distributions. Wealth variables are in millions of Swedish kronors or logged ditto. "Positive" wealth means that all observations with negative or zero wealth are replaced by one (which in log form becomes zero). For further details of variables and methods, see Table 1 and the main text.

This gives us significantly larger samples. In rows 3a and 3b of Table 4, we show the results when we have the same requirements as in our main regressions and when we also include all of the observations with positive values for all years but for which we do not have the transmission mechanism data. In rows 4a and 4b we report the results when we also allow zero observations to be present. The basic results are again similar to our main results.

5. Transmission channels

Establishing the high degree of income transmission from father to son at the top of the distribution obviously raises questions about its sources. Why is it that the intergenerational association is so strong in the top? What is it that sons of income-rich fathers inherit that translates into such a strong income relationship? Even though one may interpret the differences between the results for earnings and total income as indicative of the importance of capital, questions remain and there is no general method that can be used to answer them.[23] The basic problem is that almost every plausible factor can work directly as well as indirectly through a number of different channels. Assets, education, intelligence, and social skills can affect one another as well as have direct effects on income, and they can be transmitted from one generation to the next through various processes.

A seemingly straightforward approach would have been to estimate a recursive system of equations in which parental income is allowed to have an indirect impact on income-enhancing variables (such as IQ) in one equation and a direct effect (net of IQ) in another equation. With estimates from such equations the total "effect" could be disentangled into direct and indirect ones. However, it is well known that such a system of equations requires strong identifying assumptions. In particular, the error terms in the equations must be uncorrelated, which typically seems like a strong assumption. Here we limit ourselves to looking for suggestive evidence about variables that could account for the dramatic discontinuity in income transmission at the very top of the fathers' income distribution. Our approach is to simply change the left-hand variable in our basic model. Thus, instead of the sons' incomes, we use other outcomes of the sons that capture possible channels of transmission such as IQ, non-cognitive skills, education and wealth. If the association between these outcomes and the father's income is positive, this indicates a potential channel of transmission. If, however, there is no association, or if the association is negative, it seems difficult to construct a model I which this particular factor plays a role in explaining the positive income association across generations.

We use six different measures of four plausible transmission mechanisms: IQ, non-cognitive skills, education, and three different measures of wealth, namely, net worth, financial assets, and taxable wealth. For the IQ, non-cognitive skills and education measures we also run separate regressions using dummy variables for the highest level of achievement because we are looking for variables that can explain income and earnings at the very top.

Table 5 reports descriptive statistics by fathers' income and earnings fractile groups. These statistics themselves suggest which mechanisms are important at the top and which are not. In the income

[23] Goldberger (1989) points to the general difficulty of disentangling various processes behind intergenerational transmissions. Solon (1999) includes a comprehensive discussion of this.

Table 7
Mechanisms of transmission: top earnings.

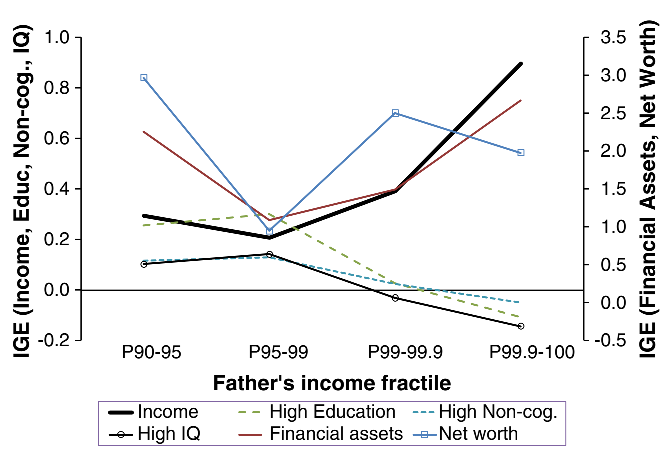
	Dependent variables (different son outcomes):						
Father earnings fractiles	Earnings	IQ	High IQ	Non-cog. skills	High non-cog. skills	Education years	High education
P0–50	0.065	−0.068	−0.013	−0.048	−0.005	0.031	−0.002
	(0.005)	(0.016)	(0.003)	(0.012)	(0.002)	(0.017)	(0.003)
P50–75	0.575	3.609	0.380	2.400	0.232	4.240	0.491
	(0.025)	(0.095)	(0.019)	(0.081)	(0.015)	(0.110)	(0.020)
P75–90	0.348	2.019	0.362	0.647	0.090	3.038	0.519
	(0.036)	(0.126)	(0.029)	(0.111)	(0.023)	(0.161)	(0.032)
P90–95	0.331	0.648	0.100	0.913	0.144	0.915	0.213
	(0.074)	(0.235)	(0.062)	(0.216)	(0.049)	(0.321)	(0.066)
P95–99	0.168	0.761	0.167	0.537	0.125	1.778	0.320
	(0.055)	(0.154)	(0.044)	(0.149)	(0.037)	(0.221)	(0.046)
P99–99.9	0.341	−0.168	−0.004	0.843	0.003	0.254	0.104
	(0.116)	(0.338)	(0.101)	(0.310)	(0.088)	(0.490)	(0.105)
P99.9–100	0.447	−0.685	−0.240	−0.964	0.046	−2.324	−0.371
	(0.159)	(0.532)	(0.173)	(0.823)	(0.164)	(0.738)	(0.175)
N	85,848	85,848	85,848	85,848	85,848	85,848	85,848

	Net worth	Log net worth	Log pos. net worth	Financial assets	Log financial assets	Tax wealth	Log tax wealth	Log pos. tax wealth
P0–50	−0.258	−0.567	−0.030	−0.336	−0.013	−0.423	−0.382	−0.258
	(0.015)	(0.047)	(0.003)	(0.029)	(0.002)	(0.036)	(0.034)	(0.015)
P50–75	0.816	5.223	0.268	4.327	0.109	2.106	1.972	0.816
	(0.057)	(0.304)	(0.037)	(0.195)	(0.016)	(0.177)	(0.169)	(0.057)
P75–90	0.398	1.939	0.205	1.990	0.121	1.907	1.779	0.398
	(0.077)	(0.401)	(0.046)	(0.248)	(0.030)	(0.282)	(0.267)	(0.077)
P90–95	1.288	3.236	0.508	2.279	0.325	3.345	3.171	1.288
	(0.225)	(0.752)	(0.141)	(0.441)	(0.123)	(0.653)	(0.619)	(0.225)
P95–99	0.714	0.534	0.314	0.879	0.522	2.397	2.168	0.714
	(0.231)	(0.504)	(0.136)	(0.277)	(0.178)	(0.524)	(0.497)	(0.231)
P99–99.9	1.112	2.447	0.274	1.376	−0.905	2.454	2.570	1.112
	(1.161)	(1.053)	(0.697)	(0.518)	(1.264)	(1.373)	(1.317)	(1.161)
P99.9–100	10.875	0.803	7.290	2.669	13.262	8.207	6.838	10.875
	(6.844)	(2.286)	(4.804)	(0.826)	(9.901)	(2.707)	(2.687)	(6.844)
N	85,848	85,848	85,848	85,848	85,848	85,848	81,415	85,848

The dependent variable is specified in column headings and independent variable is father earnings in different earnings fractiles, connected through a linear spline. Constant terms are suppressed. Robust standard errors are in parenthesis. High IQ, non-cognitive skills and education are dummy variables equal to one when sons are in roughly the top five percentiles in the respective distributions. Wealth variables are in millions of Swedish kronors or logged ditto. "Positive" wealth means that all observations with negative or zero wealth are replaced by one (which in log form becomes zero). For further details of variables and methods, see Table 1 and the main text.

sample, IQ, non-cognitive skills and education increase over the distribution until the very top where the variables actually fall a bit. In contrast, all indicators of wealth rise markedly in the top and particularly when moving from P99–99.9 to P99.9–100. In the earnings sample, the three skill measures are either stable or decline slightly at the very top, whereas the wealth indicators again increase markedly. The level of wealth at the top of the fathers' earnings distribution is, however, clearly lower than at the top of the income distribution.[24]

In Tables 6 and 7 we turn to regression analysis. In addition to estimates for the raw mediating variables, we report estimates for dummy variables for the highest level of IQ, non-cognitive skills and education, as well as the log of the wealth variables.[25] The results from the descriptive tables hold up even when we look at transmission within the top income fractiles. Whereas all skill variables are positive at least through P95–99, they are always insignificant (often even with a negative point estimate) at the very top. Thus, we find it unlikely that skill is an important mediating variable for the strong income and earnings transmission at the very top. Wealth, however, appears very different at the top of the distribution. For income, the coefficients are always positive and clearly significantly different from zero except when taxable wealth in measured in absolute terms.



Note: The figure shows estimated intergenerational elasticities as reported in Table 8.

Fig. 3. Mechanisms of income transmission.The figure shows estimated intergenerational elasticities as reported in Table 8.

[24] The strong earnings transmission in the top also suggests that there may be labor market channels that are not considered here. Corak and Piraino (2011) find interestingly strong transmission among employees at the top that are likely to play a role in explaining non-linearities in earnings transmission.

[25] High IQ, non-cognitive skills and education are dummy variables equal to one when the sons are approximately in the top five percentiles in the respective distributions.

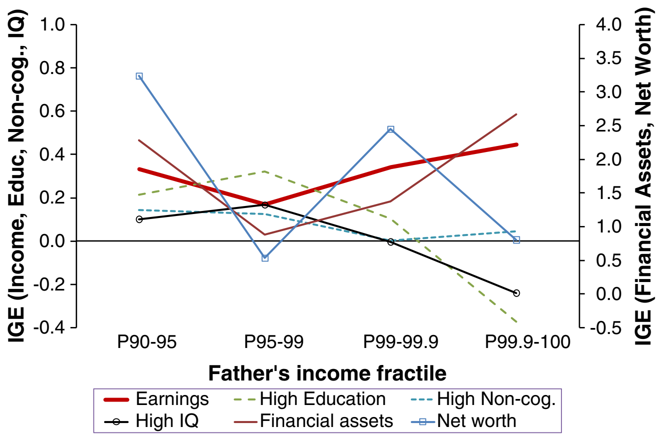


Fig. 4. Mechanisms of earnings transmission.The figure shows estimated intergenerational elasticities as reported in Table 9.

We summarize the results for income in Fig. 3. For earnings, the coefficients are also positive but not always significantly so and the logged variables (which express elasticities) are lower than those of income. We summarize the results for earnings in Fig. 4.

6. Concluding discussion

Our results have implications for the study of intergenerational mobility in general as well as for understanding mobility in Sweden. As in the top income literature, we conclude that it is crucial to study even small fractions within the top of the distribution to obtain a more complete picture of intergenerational mobility. Discussing “the top” as consisting of the top 20, top 10, or even the top 5%, runs the risk of missing important aspects. Indeed, our most striking results do not appear until within the top percentile. Furthermore, as is also suggested by the top income literature, it is important to separate different sources of income, particularly to distinguish between earnings and income including capital income. Both the degree of transmission and the channels are likely to be different, depending on the source of income.

With respect to mobility in Sweden, our main finding is that the intergenerational transmission of income is remarkably strong at the very top of the distribution and that the most likely mechanism for this is inherited wealth. However, our results also confirm what previous work has shown, namely that transmission is relatively low in general. A possible interpretation of this finding, alluded to in the title of the paper, is that family background plays a relatively minor role in determining people's economic outcomes in general, although at the same time “capitalist dynasties” at the very top of the distribution do persist. Interestingly, this result is very much in line with an often-heard characterization of Sweden as a society that has tried to combine high egalitarian ambitions with good investment incentives for large capital holders. However, from an international comparative perspective, our findings resemble those of Corak and Heisz (1999), the only comparable study so far. Using Canadian data, they find an average intergenerational elasticity of around 0.2 for both earnings and total income. For the top percentile the corresponding elasticities are approximately 0.4 and 0.8 for earnings and income respectively. Although they are not perfectly comparable, these figures are relatively similar to ours. Examining what these non-linearities look like in other countries and also further exploring the potential mechanisms certainly seems like important future research topics.

Appendix A

Table A1
Structure of attrition.

	Number of observations	
	Income	Earnings
1. All sons, born in Sweden in 1960–1967 and part of the multigenerational register, registered as living in Sweden all years 1996–2005.	151,148	151,148
2. All sons in 1 and with at least one positive income (earnings) observation.	150,902	148,612
3. All sons in 1 and with 10 positive income (earnings) observations.	142,716	126,045
4. All sons in 3 with a known biological father.	140,710	124,379
5. All sons in 4 with a biological father who was registered in Sweden all years 1974–1979.	134,673	119,300
6. All sons in 5 with a biological father who has at least one positive income (earnings) observation.	134,599	118,638
7. All sons in 6 with a biological father who has positive income (earnings) observations all years 1974–1979.	130,047	101,635
8. All sons in 7 for whom we also observe IQ, non-cognitive skills and education.	108,277	85,848

References

Alesina, Alberto, Glaeser, Edward, 2004. Fighting Poverty in the U.S. and Europe: A World of Difference. Oxford University Press.

Alesina, Alberto, Glaeser, Edward, Sacerdote, Bruce, 2001. Why Doesn't the United States Have a European-Style Welfare State? Brookings Papers on Economic Activity 2, 1–69.

Atkinson, Anthony B., 2004. Top incomes in the UK over the twentieth century. Journal of the Royal Statistical Society, Series A 168 (2), 325–343.

Atkinson, Anthony B., Piketty, Thomas (Eds.), 2007. Top Incomes over the Twentieth Century — A Contrast between European and English-Speaking Countries. Oxford University Press.

Atkinson, Anthony B., Piketty, Thomas (Eds.), 2010. Top Incomes — A Global Perspective. Oxford University Press.

Björklund, Anders, Jäntti, Markus, 2009. Intergenerational income mobility and the role of family background. In: Nolan, B., Salverda, W., Smeeding, T. (Eds.), Oxford Handbook of Economic Inequality. Oxford University Press, Oxford.

Björklund, Anders, Roine, Jesper, Waldenström, Daniel, 2010. Intergenerational top income mobility in Sweden: capitalist dynasties in the land of equal opportunity. Working Paper 9/2010. Swedish Institute for Social Research, Stockholm University.

Black, Sandra E., Devereux, Paul J., 2010. Recent Developments in Intergenerational Mobility. NBER WP 15889.

Böhlmark, Anders, Lindquist, Matthew, 2006. Life-cycle variations in the association between current and lifetime income: replication and extension for Sweden. Journal of Labor Economics 24 (4), 879–900.

Bratsberg, Bernt, Røed, Knut, Raaum, Oddbjørn, Naylor, Robin, Jäntti, Markus, Eriksson, Tor, Österbacka, Eva, 2007. Nonlinearities in intergenerational earnings mobility: consequences for cross-country comparisons. The Economic Journal 117 (519), C72–C92.

Cesarini, David, 2010. Family influences on Productive Skills, Human Capital and Life-cycle Income. (Manuscript).

Corak, Miles, 2006. Do poor children become poor adults? Lessons from a cross-country comparison of generational earnings mobility. Research on Economic Inequality 13 (1), 143–188.

Corak, Miles, Heisz, Andrew, 1999. The intergenerational earnings and income mobility of Canadian men: evidence from longitudinal income tax data. Journal of Human Resources 34 (3), 504–533.

Corak, Miles, Piraino, Patrizio, 2011. The intergenerational transmission of employers. Journal of Labor Economics 29 (1), 37–68.

Couch, Kenneth A., Lillard, Dean R., 2004. Non-linear patterns in Germany and the United States. In: Corak, Miles (Ed.), Generational Income Mobility in North America and Europe. Cambridge University Press.

Edlund, Lena, Kopczuk, Wojciech, 2009. Women, wealth and mobility. American Economic Review 99 (1), 146–178.

Eide, Eric R., Showalter, Mark H., 1999. Factors affecting the transmission of earnings across generations: a quantile regression approach. Journal of Human Resources 34 (2), 253–267.

Finnie, Ross, Irvine, Ian, 2006. Mobility and gender at the top tail of the earnings distribution. Economic and Social Review 37 (2), 149–173.

Fong, Christina, 2001. Social preferences, self-interest, and the demand for redistribution. Journal of Public Economics 82 (2), 225–246.

Goldberger, Arthur S., 1989. Economic and mechanical models of intergenerational transmission. American Economic Review 79 (3), 505–513.

Grawe, Nathan, 2004. Reconsidering the use of nonlinearities in intergenerational earnings mobility as a test for credit constraints. Journal of Human Resources 39 (3), 813–827.

Grawe, Nathan D., Mulligan, Casey B., 2002. Economic interpretations of intergenerational correlations. Journal of Economic Perspectives 16 (3), 45–58.
Greene, William H., 1997. Econometric Analysis, 3rd edition. Prentice Hall, Upper Saddle River, NJ.
Hertz, Tom, 2005. Rags, riches, and race: the intergenerational economic mobility of black and white families in the United States. In: Bowles, S., Gintis, H., Osborne Growes, M. (Eds.), Unequal Chances. Princeton University Press.
Jäntti, Markus, Bratsberg, Bernt, Røed, Knut, Raaum, Oddbjørn, Naylor, Robin, Österbacka, Eva, Björklund, Anders, Eriksson, Tor, 2006. American Exceptionalism in a New Light: A Comparison of Intergenerational Earnings Mobility in the Nordic Countries. IZA DP no. 1938.
Jencks, Christopher, Tach, Laura, 2006. Would Equal Opportunity Mean More Mobility? In: Morgan, S.L., Grusky, D.B., Fields, G.S. (Eds.), Mobility and Inequality. Stanford University Press.
Kopczuk, Wojciech, Saez, Emmanuel, 2004. Top wealth shares in the United States, 1916–2000: evidence from estate tax returns. National Tax Journal 57 (2), 445–487.
Kopczuk, Wojciech, Saez, Emmanuel, Song, Jae, 2010. Earnings inequality and mobility in the United States: evidence from social security data since 1937. Quarterly Journal of Economics 125 (1), 91–128.
Lindqvist, Erik, Vestman, Roine, 2011. The labor market returns to cognitive and noncognitive ability: evidence from the Swedish enlistment. American Economic Journal: Applied Economics 3 (1), 101–128.
Mazumder, Bhashkar, 2005. Fortunate sons: new estimates of intergenerational mobility in the United States using social security earnings. The Review of Economic and Statistics 87 (2), 235–255.
Piketty, Thomas, 2001. Les hauts revenus en France au 20ème siècle. Grasset, Paris.
Piketty, Thomas, Saez, Emmanuel, 2003. Income inequality in the United States, 1913–1998. Quarterly Journal of Economics 118 (1), 1–39.
Roine, Jesper, Waldenström, Daniel, 2008. The evolution of top incomes in an egalitarian society: Sweden, 1903–2004. Journal of Public Economics 9 (1–2), 366–387.
Roine, Jesper, Waldenström, Daniel, 2009. Wealth concentration over the path of development: Sweden, 1873–2006. The Scandinavian Journal of Economics 111 (1), 151–187.
Roine, Jesper, Waldenström, Daniel, 2010. Top incomes in Sweden. In: Atkinson, A., Piketty, T. (Eds.), Top Incomes – A Global Perspective. Oxford University Press.
Solon, Gary, 1999. Intergenerational Mobility in the Labor Market. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics vol. 3A. Elsevier, Amsterdam, North Holland.