Intergenerational Educational and Earnings Mobilities Trends in the U.S. since the 60s

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Abstract

Since the 80s in the U.S., we show that there are more upward mobilities *(i)* in educational attainment, and *(ii)* in earnings. But, we also show that rank-rank correlation between children and parents earnings is stable across cohorts, thus suggesting that the rise in upward earning mobility is driven by a larger shift in inequalities within parents earnings than within children earnings. We also show that the impact of the income rank of parents with no college degree is very low on the earnings rank of their children, the income differences between parents with no college degree being not relevant in explaining the income positions of their children. For children of parents graduated from college, a high parental income allows them to insure against intergenerational income fall, thus generating a correlation between the income of the parents and that of their children.

Keywords: Educational mobility, Earnings Mobility, Inequalities, Education, Earnings
JEL Classification: D31, I24, J62

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1 Introduction

The cohesiveness of the United States depends on the Americans' prospects regarding educational and earnings mobilities, defined broadly as changes in status between parents and children (OECD, 2018). Americans must perceive this social mobility, that materialize the "American Dream":[1] the guaranty that everyone can access to compensation according to their merit (Alesina, et al., 2018) or, the existence of a strictly positive probability of ending up in the Top 25% of earnings even with parents having an income in the bottom half of the income distribution (Chetty et al, 2014). Hence, Americans might tolerate earnings inequality if mobilities are significant.[2]

Is this trust on the "American dream" based on factual evidence? The aim of this paper is to measure the trends in intergenerational educational mobility, i.e. the evolution across cohorts of the educational attainment of children given those of parents, as well as the intergenerational earnings mobility, i.e. the evolution across cohorts of the children's earnings conditionally to those of their parents. To this end, we use the National Longitudinal Survey of Youth (NLSY) which provides valuable information on the linkages between parents and children, and allows to estimate their changes over time (trends) as the two surveys (1979, 1997) cover youths born between 1957 to 1984.

We show that the probability for a child of parents without tertiary educational attainment to be bachelor graduate, called the upward educational mobility, has remained stable for cohorts born between 1957 and 1965, but has significantly increased for those born between 1980 and 1984, suggesting a causal effect of the opening of the universities[3] on the upward educational mobility in the U.S.[4] At the same time, we also identify a break in the "social reproduction of the "elites" (Bourdieu (1987)): a child of bachelor graduate parents, born between 1957 and 1964, had 3.5 times more chances to be a bachelor graduate than if her parents had not a tertiary education, but "only" 2.25 times more if she was born between 1980 and 1984.[5] Hence, the intergenerational educational mobility have risen in the U.S. since the 60s, our data confirming that the upward mobility is the stonger force at work. [6] These first empirical results could then lead to predict an increase in the income mobility in the U.S.. What do we learn from data on income correlations across generations?

Our empirical analysis shows that the intergenerational income elasticity (IGE), i.e. the log-log estimates for intergenerational income correlation[7], declines between cohorts born from 1957 to

[1] "*America has always been a land of opportunity, a land where, if you work hard, you can get ahead.*" B. Clinton, 1995. Typical answer recorded in the Economic Mobility Project (2009) when Americans were asked to explain what it mean to them "The American dream": "*Being able to succeed regardless of the economic circumstances in which you were born.*"

[2] The trust in American-style society is thus based on the effectiveness of the "prospect of upward mobility" (Benabou and Ok (2001)). This trust on educational and earning mobilities can explain the lack of Americans' support to redistributive policies, a rise of support would appear only that Americans perceived a low probability of the social mobility (Alesina, et al., 2018). This view then leads the lower income individuals to not ask for large redistributive policies because they expect that they or their children, climb the income ladder (Corak (2013)).

[3] Among Americans aged 25 to 29 in 1940, 5% of adults held a bachelor's degree or higher, while in 1976, 24 percent of these people had a bachelor's degree or higher. In 2015, this indicator rose to 36 percent (see Census).

[4] These findings are consistent with and extend for recent cohorts those of Hilger (2015) who estimates a strong increase in educational mobility from the 30s to 70s, and a slight decline after the 80s.

[5] The marginal impact to have a bachelor graduate parent accounts for 70% of the probability to be graduate for a child born between 1957 and 1964, but this contribution declines to less than 60% for those born between 1980 and 1984.

[6] The sum of all educational mobility (downward mobility-the probability for a youth of ending up without bachelor degree given that the parents were high educated-, and the upward mobility) has significantly progressed since the 60s.

[7] Intergenerational mobility can be measured in relative or absolute terms. According to Chetty et al. (2014) one relative mobility indicator is the elasticity of child income with respect to parent income, called the Intergenerational Income Elasticity (IGE). This indicator is obtained by running a regression of the logarithm of the income of the

1984, meaning that income mobility has increased. But, on the other side, the rank-rank correlation seems to be stable over cohorts.[8] Given that the IGE can be approximated by the product of the rank-rank correlation with the relative inequalities between children and parents, the constancy of the rank-rank correlation combined with the decrease of the IGE is thus consistent with the lower incerase of inequality among youth's incomes than among parents' incomes. As the rank-rank correlation can be view as the IGE estimates purged from shifts in relative inequalities of incomes between parents and children, its stability over cohorts shows that the U.S. mobility has not been reducing over time. This highlights that the rise in income inequality, largely documented for the U.S., have a direct impact on this intergenerational mobility measure. The IGE decreases if just the ratio of relative inequalities between the income of the parents and the youths decreases. We observe a strong decrease in this relative income inequalities indicator, driven by a decay in income inequalities among the youth probably explained by the rapid increase in their educational levels and a increase in the inequalities among parents' incomes, mainly driven by the financial revenues. This reduction in relative inequalities can thus lead to wrongly claim that the income mobility, measured by the IGE, has risen in the U.S., whereas it is stable when it is purged from the shifts in relative inequalities. Our results extend those of Chetty et al. (2014) which shows that the rank-rank intergenerational correlation has not changed between cohorts 1971-1993, whereas the IGE has decreased because of the increase in income inequality. Our paper provides prior birth cohorts and suggests as well rank-rank correlations have not varied significantly. Given that we only analyze the long run trend in intergeneraltional mobility, our analysis is robust to the criticisms of Lee and Solon (2009) who show that short run income used to proxy for long run income must be replaced by incomes over all the life-cycle in order to control for different profiles of life-cycle incomes.[9]

By coupling our analysis on intergeneational educational mobility with our analisis of the intergenerational income mobility, we show that the impact of the income rank of parents with no college degree is very low on the earnings rank of their children, the income differences between parents with no college degree being not relevant in explaining the income positions of their children. This suggests that the American system manages to give the same opportunities to all children of parents who have not graduated from college. For children of parents graduated from college, a high parental income enables them to be insured against intergenerational income fall, thus generating a correlation between the income of the parents and that of their children.

Finally, using matrices of mobility, we show that the probability to move from the bottom of the distribution to its top, i.e. the probability that a parent without college degree and with an income in the first quartile of the parents with no college degree could have a child with a college degree and an income in the top quartile of the college degree children, has increased from 0.91% in the NLSY79 to 3.16% in the NLSY97 survey. This underlines that the upward mobilities have rise over time. At the same time, the downward mobility have also declined: the probabilities to have a child without college degree and with earnings in the first quartile for a college degree parent in the fourth income quartile are respectively 5.63% and 4.61% for NLSY79 and NLSY97.

This paper is organized as follows. The related literature is summarized in the section 2. The section 3 presents data. The section 4 is devoted to the estimates of intergenerational educational

children on the logarithm of the income of their parents (log-log estimate).

[8]The measure in relative terms of the intergenerational income mobility is based on the correlation between the ranks of the child income and the rank of the parent income (Chetty et al., 2014). This is obtained by carrying out a regression of the percentile rank of the children in the income distribution of the children on the percentile rank of the parents in the income distribution of the parents. The slope associated to this regression allows to have the association between the positions of the income distributions of the children and their parents, respectively.

[9]While Lee and Solon (2009)'s criticism applies of our study, Chetty et al (2014) did not find significant variations using the alternative proxy of earning suggested by them.

mobility. The estimates of the intergenerational earnings mobility are presented in the section 5. An analysis based on matrices of mobility can be found in section 6. Finally, the section 7 concludes.

2 Related Literature

The understanding of the intergenerational mobility is crucial in the perception of inequalities.

Intergenerational Educational Mobility. Educational mobility in the United States is a result of the educational system, which has undergone a big transformation. American universities have opened up and the shares of students going to colleges have dramatically increased over the last century. Universities in the United States were initially conceived to preserve the values of the Protestantism and were marked by religious idealism, influencing the type of student profiles accepted to these colleges. In fact, the 300 students that attended Harvard during the administration of Dunster and Chauncy (1642-1672) were mainly English exiles or their sons, the sons of ministers and magistrates, the sons of gentry families or those of college educated fathers (Geiger, 2016). This situation remained unchanged through the late XIX and early XX century. During the 1950s the evolution of the American university system was probably influenced by the ideas of James Bryant Conant, who, citing Thomas Jefferson, made reference to the social mobility as an essential feature of a classless society and argued that the non existence of classes made it possible the intergenerational mobility in the United States. Conant pointed as well that the educational system was the motor that provides the opportunities for people to develop their skills and hence, improve their chances for social mobility Conant (1940).

The spread of these ideas together with the growth of the population and public reforms might explain the facts: among people aged 25 to 29 in 1940, 5% of adults held a bachelor's degree or higher, while in 1976, 24 percent of these people had a bachelor's degree or higher. In 2015, this indicator rose to 36 percent (see Census web site). This growing trend in educational attainment is the product of a strong upward mobility, the number of children with a bachelor being largely greater than the number of parents with a bachelor[10] But more than the progress in the opportunities given to children of parents without a university degree, the debate on educational mobility is often centered on the fact that children of parents with a university degree have a very low chance of not being graduates of a university, i.e. it could exist a "lack" of downward mobility. This perception is based on facts: *(i)* the children of parents who have graduated from universities have a good chance of being themselves university graduates, and *(ii)* the chances of entering and having a degree from a good university seems to be strongly correlated with parental income.[11]

[10] In all OECD countries, high parental educational attainment positively influences their children's likelihood of completing tertiary or an advanced research program. In OECD countries, the average of people who were born to parents with a tertiary degree are 55% more likely to also obtain tertiary degree (immobility at the top), this probability is 20% among those with parents without tertiary educational attainment (upward mobility). With comparable data, these measures of "immobility at the top" and "upward mobility" are respectively 55% and 25% in the US, 62% and 17% in France, 65% and 25% in the UK, and 60% and 33% in Norway. More precisely: the share of people aged between 30-44 years old that completed tertiary type A or advanced research program whose parents have both less than tertiary education attainment (2012, 2015) is 19 percent for the US, 16 percent for France, 25 % in the UK and 33 percent in Norway. On the other hand, the share of the population aged between 30-44 (2012 or 2015) years old that achieved a tertiary type A or advanced research program who have at least one parent who attained tertiary education is 56 percent for the United States, 62 percent for France, 64 percent for UK and 61 percent for Norway. (see OECD, 2017). The 30pp gap of chances in the US must then be compared to e.g. the 45pp French gap.

[11] See Chetty et al. (2020-QJE) for a detailed analysis on the intergenerational mobility across colleges in the U.S. for individual born between 1980 and 1982. The NYT web site gives a complete information on the correlation between the university of the child and parents incomes.

Intergenerational Earnings Mobility. Autor (2014) asks for studies measuring if mobility has appreciably changed between children born prior and after the historic rise of U.S. inequality. Indeed, "*we can measure [that] rising U.S. income inequality has not reduced intergenerational mobility so far*" (D. Autor (2014), p.848). Lee and Solon (2009) argue that there have not been major changes in intergenerational mobility and say that there are imprecise estimations because of an inefficient use of the data. Chetty et al. (2017) argue that the lack of data that establishes a link between the parents and their children prevents researchers from fully understanding the evolution on income mobility in the U.S..

Some theoretical insights also motivate us to provide empirical studies on the intergeneational eranings mobility. In particualar, Becker et al. (2018) propose a theoretical analysis on the interaction between social mobility and cross-sectional inequality. They show how the evolution of the economic status depends on the distributions of human capital and income. Assuming that all parents invest in their children and capital market are frictionless, parents choose to invest in education of their children up to the point the marginal return to these investments equal the return on capital. If the elasticity between parental and child human capital and the elasticity of children's earnings with respect to parental investments are high, the relationship between parents' and children's human capital will be convex, leading to high returns of human capital investments. These complementarities between parents' and children's human capital imply a string influence of parents on the human capital of their children. Conditioning on this convexity of the human capital transmission function, their theory implies as well, that societies develop an elite with high human capital, whose members have a high mobility but not "across the endogenously determined class boundaries." The initial position of a family has thus a strong impact on the welfare of future generations.

Ayasse et al. (2016) provide an analysis of the "American Dream" in the U.S., defined as the probability for a youth to end up in the national fifth quintile of the income distribution given that their parents were in the first national quintile of the income distribution. These probabilities are between 0.0408 for South Carolina from 0.19 for New Dakota. After three geenrations, these probabilities are between 0.123 in Georgia 0.344 in North Dakota. The Pew Charitable Trusts (2012) finds that most of the younger generations of Americans have higher earnings than their parents at the same age. However, there is persistence of the income position. Indeed, 43% of US adult children from parents whose family income was in the bottom quintile, remained in the bottom quintile of the income distribution; 40% of Americans whose parents were in the top quintile of the income distribution, remained in the top quintile of the income distribution. They also show that educational attaintement push out the immobility trap: 47% of adults without college degree whose parents were in the bottom quintile of the income distribution were at the bottom of the income distribution, whereas with a college degree, only 10% remain at the bottom of the income distribution. On the other side of the distribution, an adult child that earns a college degree and whose parents were in the top quintile of the income distribution has a larger chance to remain at the top quintile of the income distribution (51% against 25% for those without bachelor degree).[12] By using the different waves of the NLSY survey, our study provides an estimate of the long-term

[12]Stockhausen (2018) computed absolute and relative income mobility for youths born between 1955 and 1975 in West Germany and the U.S.. He finds that the share of youths earning more than their parents (absolute mobility) amounts to 67% in West Germany, which is higher than in the U.S., where similar computations yield a 60% share. In terms of relative income mobility, 66% of German youths with parents from the lowest quartile manage to end up in the highest quartile. This proportion is 50% in the U.S.. Germany exhibits a lower IGE estimate compared to the U.S., suggesting a higher income mobility in Germany (0.299 and 0.483 respectively). Combining the two measures, absolute and relative income mobility, Stockhausen (2018) shows that 56% of German youths that have higher income compared to their parents, were also able to end up, at least, in one higher income quartile. This share is 52 percent for the U.S..

evolution of intergenerational income mobility in the U.S..

3 Data for Measuring Trends in the U.S. Mobility

The National Longitudinal Survey of Youth (NLSY) is a panel that presents the evolution of different socioeconomic variables for youths aged between 14 and 22 years old in 1979 for the first survey (NLSY79), and youths are aged between 12 and 16 years old in 1997 for the second survey (NLSY97).[13] In our study, we characterize individuals by their educational attainments and their earnings 30 years after their birth, but also by information on educational attainment and income of their parents during the corresponding rounds of each version of the panel.[14]

3.1 Educational Attainment

We define a "skilled" individual, as a respondent with more than 15 years of schooling or more than three years of college, that corresponds to the number of years of schooling for obtaining a bachelor degree[15], and thus to an "unskilled" individual, as a respondent with a shorter schooling. If her mother or her father or both has a number of years of schooling corresponding to a bachelor degree in 1979 or 1997, then her parents are considered as skilled. For each youth of NLSY79, the educational attainment when their reach the age 30 is compared with the education of their parents. For the parents, we retain the information recorded in 1979 (the first year of NLSY79) because parents are more than 30 years old in 1979 and therefore, investment decisions in education are already done. Similar procedures are considered for youths of NLSY97, in this case, the educational attainment of the youths at age 30 is compared with that of their parents achieved before 1997.

Educational Attainment of Youths. We observe 30 years later after their births if they have number of year of schooling for obtaining a bachelor degree which lead us to define them as skilled children, or not (the unskilled children). For example, to carry out this computation for those born in 1957, we use responses of the following question: "What is the highest grade completed as of May of survey year *1987*" (variable labeled `R24454 HGCREV87`). Similar questions were asked in the different birth cohorts.[16] Answers to this questions go from zero to 20 years of schooling or 8 years of college or more. The respondent is skilled if she/he has more than 15 years of schooling or more than three years of college.

In the same manner, we identify the level of education of the youth in the NLSY97 (variables `cv_hgv_ever_edt_ year` for years 2010, 2011, 2013 and 2015). The information provided is similar to those presented in the NLSY79.[17]

Observe that we can only compute the education of the youth respondent in 1996, 2013 and 2015, instead of 1995, 2012 and 2014, respectively, because of data availability.

[13]Therefore, the birth cohorts goes from 1957 to 1964 in NLSY79, and from 1980 to 1984 in NLSY97. See Appendix A for more details on cohort distribution.

[14]See the age distribution of youths and of parents in Appendix A.

[15]Observe that we are unable to say if the individual obtained in fact the diploma. By abuse of language, but to facilitate the presentation, we will say subsequently that those having a number of years of study permitting to have a Bachelor at least, are at least graduated from a Bachelor.

[16]Using the NLSY79, we compute the education of the youth respondents in 1987,..,1994 and 1996 for the youths respondents that were born in 1957,..., 1964 and 1965, respectively. In the same manner, the NLSY97 allows us to compute the education of the youth respondents in 2010,..., 2013 and 2015 for youths that were born in 1980,..., 1983, and 1987, respectively.

[17]The NLSY97 allows us to compute the education of the youth respondents in 2010,..., 2013 and 2015 for youths that were born in 1980,..., 1983, and 1987, respectively.

Educational Attainment of Parents. The indicators on the education of the parents in NLSY79 is given by the number of years of education attained by the mother and the father of the respondent (variables `hgc_father_1979` and `hgc_mother_1979`). Corresponding responses go from zero years of schooling to 8 years of college. The father or the mother of the respondent is defined as a skilled parent if she/he has more than 15 years of schooling or more than three years of college. We proceed in the same way with NLSY97 (variables `cv_hgc_bio_dad_ 1997` and `cv_hgc_bio_mom_1997`) to obtain information on the level of attained education by the mother and the father.

3.2 Youths' Earnings and Parents' Income

The different earnings and incomes have been deflated with respect to 2010 dollar values using the information on Consumer Price Indexes retrieved from the IMF.[18]

Youths' Earnings. Regarding the earnings of the youths in NLSY79, we identify their pretax income from wages and salaries at 30 years old for each of the birth cohorts (variables `R35590, Q13-5 Trunc _ Revised _ year`).[19] It provides information on total pre-tax income from wages, salary commissions or tips from all jobs.

The NLYS97, we use information on the total pr-tax income from wages, salaries, commissions or tips from all jobs (variables labeled `T75456, YINC_ 1700 _ year`) for year is 2010, 2011, 2013 and 2015.[20]

Parents' Incomes. For the NLSY79, we use the Pre-Tax Total Net Family Income (variable `tnfi_trunc_1979`) as the proxy variable for the parents' income in 1979. The following corrections are made: *(i)* we restrict our data to those youths that were living in the parental household during the first round of the survey (1979) to avoid cases when the family income reported corresponds to the household of independent youth respondents, *(ii)* we identify the cases when the youth respondent was married or had a children and delete those observations from the sample, *(iii)* we extract from the Total Net Family Income variable the income of the youths in every survey, and *(iv)* we extract the governmental transfers received by the youth in every survey.[21] This leads to 8,838 youth respondents living in the parental household from 12,686 total respondents of NLSY79. We choose the youths whose parents used the questionnaire A that allows us to distinguish between the youth and parental incomes. In this case, the youth respondent reports her income using a reduced and limited questionnaire, whereas the income of the household is based on the information provided by the parents.[22] As mentioned above, we extracted as well from the net family income variable the income of the youths.[23] Finally, the parents' income is observed in 1979,...,1986, and

[18]The U.S. CPI used for the deflation of the income variables is presented in IMFdata

[19]Truncation is carried out at the top of the incomes, hence truncated values are equal to the average value of all respondents who are U.S. residents and who have values exceeding 100,001 USD.

[20]The truncations is applied to the top 2 percent of respondents with valid non missing values. Indeed, the website of the Bureau of the Labor Statistics indicates that "the lowest value for the top 2 percent of cases is used as the truncation level ($ 94,000) Values for all cases or over that level are averaged".

[21]These computations are made using the variable referenced as `R0173700`, and named `hhi-2` which is the "Version of Household Record from Screener".

[22]The youth respondent should report his/heir income using a more complex questionnaire when he/she is is 18 years old or greater, has a child, is enrolled in college, is married or is living outside their parents' home. According to the NLSY website: "Version A was completed by a parent of those respondents living in a parental household". For more information visit the Table 1 on the NLSY79's website.

[23]This computation is done with two types of variables: *(i)* the variable `R01554` named `S21Q02A` which is the total income of the youth from wages and salary in past calendar year if she has a child or is aged 18 or more or is currently enrolled in college, or does not live in the household of the parents, or is married or has served in the military services

for the youths, information is observed in 1987,...,1994, meaning that when youths are 22 years old.

For the NLSY97, we use information on the amount of parents own (pre-tax) income received in each corresponding year (variable labeled `R2399400` and named `HIU_2_1998`).[24] We observe the income of the youths in 2010 2011 2012 (We do not observe 2012 but the values 2011) and 2014 (we have no data for 2014 values, but we observe them in 2015). Information on parents' income is observed in 1997,..., 2000 when the youths are 18 years old.

Representativeness of the Data. We have implemented several restrictions to the NLSY data in order to generate our sample. This results in a reduction of the number of observations available for the empirical analysis. In order to check if our sample is representative of the U.S. population, we compare our observations with summary statistics computed using the Current Population Survey (CPS).

Variable		CPS 1987-1994	NLSY79 1987-1994	CPS 2010-2013	NLSY97 2010-2013
	Male	53.38	61.20	52.60	54.43
	Female	46.62	38.80	47.40	45.57
	Non Black	91.05	89.16	89.07	88.51
	Black	8.95	10.84	10.93	11.49
	L Educated	74.41	76.29	63.95	51.26
	H Educated	25.59	23.71	36.05	48.74
Income	Av	35,165.48	37,123.56	39,432.70	38,009.00
	P25	18,423.78	21,109.88	19,387.95	20,000.00
	P50	31,400.87	34,226.88	32,011.00	32,761.15
	P75	47,127.06	48,936.55	49,906.80	50,000.00
Obs		17,257	1,726	8,648	1,517

The results for NLSY are weighted.

Table 1: Youths' Characteristics and Earnings: Comparison Between CPS and NLSY Data

Table 1 shows that education and race are homogenized through the CPS and the NLSY, but a lower share of female youths in the NLSY79 compared to the CPS for corresponding years. The fraction of educated youths are similar between the NLSY79 and the CPS but quite different for NLSY97. There is however an increase in the proportion of educated people, but this increase is steeper in the NLSY97 than in the CPS. Finally, the earnings distribution of youths are close to the one of the CPS. Therefore, we conclude that our sample is representative of the youths with 30 years old in the U.S..[25]

Tables 2 and 3 provide comparison between the parents' income distributions of our sample extracted from NLY79 and NLSY97 and the CPS data. It appears that our data are representative of the U.S. population with the NLSY97 survey but not with the NLSY79 survey. These differences are not really a surprise: Jo (2009) has already shown that the NLSY97 and CPS don't represent the same population.[26]

in the past calendar year; *(ii)* the variable `R01691` named `INCOME-24` for the other youths, i.e. those that does not meet any of the previous criteria.

[24]The components used to create this variable are presented in Appendix F, for more information visit the NLSY website Income NLSY1997.

[25]See appendix XX for detailed statistic for each cohort of NLSY79 and NLSY97.

[26]In particular, the NLSY survey oversamples Hispanic and black people, who are relatively poor. This is not

	1987		1988		1988		1990		1991		1992		1993		1994	
	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY
Av.	42,709	66,504	40,647	62,439	39,972	63,358	41,114	64,860	42,294	68,901	42,715	58,124	43,660	70,403	44,825	69,131
SD	31,428	43,304	29,463	38,279	28,189	37,503	30,647	36,943	31,399	38,504	31,621	33,579	31,599	43,014	32,504	43,036
P25	20,310	30,045	19,580	33,808	19,185	35,972	19,432	40,447	19,992	39,407	20,973	33,269	20,831	40,543	21,501	37,798
P50	36,355	55,584	34,750	58,212	34,788	55,877	35,042	61,010	35,906	64,584	36,313	52,476	37,887	66,643	39,288	59,682
P75	57,687	94,643	54,574	82,027	54,474	81,538	55,372	79,087	56,256	96,110	56,884	74,620	59,193	95,276	60,080	90,517
Obs	19,113	189	23,037	225	23,141	225	21,405	252	21,839	233	22,236	208	23,137	206	23,497	188

Table 2: Parents' Income: Comparison Between CPS and NLSY79 Data

	2010		2011		2012		2013	
	CPS	NLSY	CPS	NLSY	CPS	NLSY	CPS	NLSY
Av.	48,882	47,049	50,173	51,542	51,296	47,402	50,137	48,688
SD	53,391	47,095	53,477	51,339	54,025	35,710	46,102	42,813
P25	21,735	16,301	22,733	21,403	23,562	24,052	22,851	23,806
P50	38,036	33,961	39,518	40,130	39,337	41,889	39,255	37,988
P75	59,082	63,847	60,546	64,209	62,474	65,452	62,333	63,314
Obs	25,716	408	25,528	345	26,046	390	26,441	374

Table 3: Parents' Income: Comparison Between CPS and NLSY97 Data

4 Intergenerational Educational Mobility

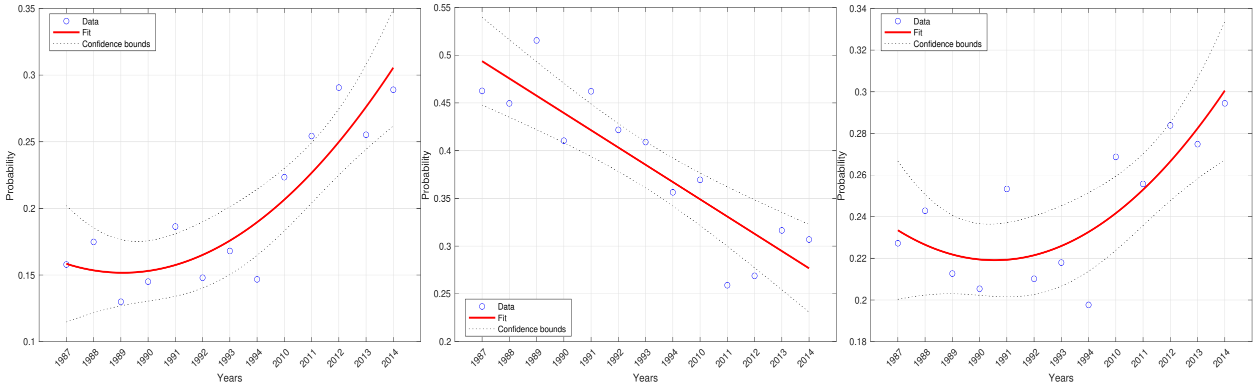
Stylized Facts. A first approach making it possible to quantify the evolution of educational mobility between the different cohorts consists in constructing mobility matrices between parents non-bachelor graduates and children bachelor graduates. These 2x2 matrices are then used to measure the evolution of the chances of obtaining a bachelor's degree.[27] The panel (a) of the Figure 1 shows the evolution of the probabilities of obtaining a bachelor's degree for a child with parents without a bachelor's degree. This upward mobility has clearly increased since the end of the 80s, the probability has been multiplied by more than 2 in 25 years. Panel (b) in Figure 1 shows that the chances of seeing their child not having a bachelor's degree for parents with a bachelor's degree or more have greatly diminished (divided by more than 2 in 25 years). Finally, the panel (c) of the Figure 1 shows that educational mobility (the share of upward and downward educational mobilities in all intergenerational transitions) has increasing in the U.S. since the end of the 80s. This last result underlines the strong force of the upward mobilities, that dominates the reduction of mobilities for the most educated population.

Econometric Approach. In order to distinguish between the trend increase in the opening of universities to the entire population and the more likely obtaining of a bachelor's degree (or more) linked to a favorable family context, we propose to perform the regression following for each cohort

$$Y_{i,j,k} = \alpha_{j,k} + \beta_{j,k} X_{i,j,k} + \varepsilon_{i,j,k} \quad (1)$$

sufficiently corrected by the weight matrix.

[27] The matrices of educational mobility are such that $\begin{bmatrix} N_{uu} & N_{us} \\ N_{su} & N_{ss} \end{bmatrix}$, where the entry N_{ij}, i corresponds to the parents and j to the children, and u denotes the state "unskilled" and s the state "skilled". Therefore, for example, the probabilities of obtaining a bachelor's degree for a child with parents without a bachelor's degree is $N_{us}/(N_{uu}+N_{us})$. In the same manner, the probability for a child to not be bachelor graduate given their parents have a bachelor degree or more is $N_{su}/(N_{su}+N_{ss})$. These figures are presented in figure 1 respectively.



(a) Upward mobility (b) Downward mobility (c) All Educational Mobility

Figure 1: **Mobilities in Educational attainment - 1987-2014.** x-axes: The children are observed 30 years after their date birth, leading the observations to be between 1987 and 2014. In the panels (a) and (c), the estimated equation is $\Pr_t = a + bt + ct^2 + \varepsilon_t$, whereas in panel (b) it is $\Pr_t = a + bt + \varepsilon_t$. The estimated coefficients are $\{0.1642^{***}; -0.009; 0.0015^{**}\}$ in the panel (a), $\{0.51^{***}; -0.018^{***}\}$ in the panel (b), and $\{0.24^{***}; -0.0103; 0.0011^{**}\}$ in the panel (c). * $p < 10\%$, ** $p < 5\%$ and *** $p < 10\%$ levels.

where $Y_{i,j,k}$ is a binary variable that is equal to 1 if the youth respondent i is high skilled (i.e. has a bachelor degree) 30 years after his birth cohort j for each NLSY versions $k \in \{NLSY79, NLSY97\}$, $X_{i,k}$ is a binary variable that is equal to 1 if either the mother or the father of the respondent i has a bachelor degree in the NLSY versions k, and $\varepsilon_{i,j,k}$ are the residuals. Therefore, $\alpha_{j,k}$ is the probability of becoming "skilled" for a youth born in year j, conditionally to have "unskilled" parents and $\alpha_{j,k} + \beta_{j,k}$ is the probability of becoming "skilled" for a youth born in year j, conditionally to have "skilled" parents. We deduce that $\beta_{j,k}$ gives the marginal increase of the probability for a youth born in j to become "skilled" induced by parents being "skilled".

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\beta_{j,k}$	0.379^{***}	0.376^{***}	0.355^{***}	0.445^{***}	0.351^{***}	0.430^{***}	0.423^{***}	0.497^{***}
	(0.0467)	(0.0437)	(0.0451)	(0.0421)	(0.0423)	(0.0404)	(0.0448)	(0.0433)
$\alpha_{j,k}$	0.158^{***}	0.175^{***}	0.130^{***}	0.145^{***}	0.186^{***}	0.148^{***}	0.168^{***}	0.147^{***}
	(0.0158)	(0.0166)	(0.0144)	(0.0147)	(0.0164)	(0.0143)	(0.0158)	(0.0162)
Observations	986	1030	1061	1144	1041	1084	1000	837
Adjusted R^2	0.136	0.133	0.129	0.186	0.114	0.175	0.154	0.231

Notes: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: **Education Transition for Different Birth Cohorts - NLSY79.**

Table 4 presents the estimates for Equation (1) for the different birth cohorts using the 1979 version of the NLSY.[28] For example, a child of unskilled parents born in 1958 has a probability of being "skilled" equal to 17.5% ($\alpha_{1958,NLSY79}$). The marginal impact of having parents skilled leads to a rise of this probability by 37.6pp ($\beta_{1958,NLSY79}$). Therefore, the probability of being high educated for those born in 1957, whatever the education of the parents, is $\alpha_{1957,NLSY79} + \beta_{1957,NLSY79} \times P_{s,p} = 26.88\%$ where $P_{s,p} = 24.963\%$ is the share of skilled individuals in the

[28] Estimation results are representative of the population as analytical weights have been implemented. The weights used in the estimations are those of the years when youths have 30 years old, e.g. 1987 for those born in 1957.

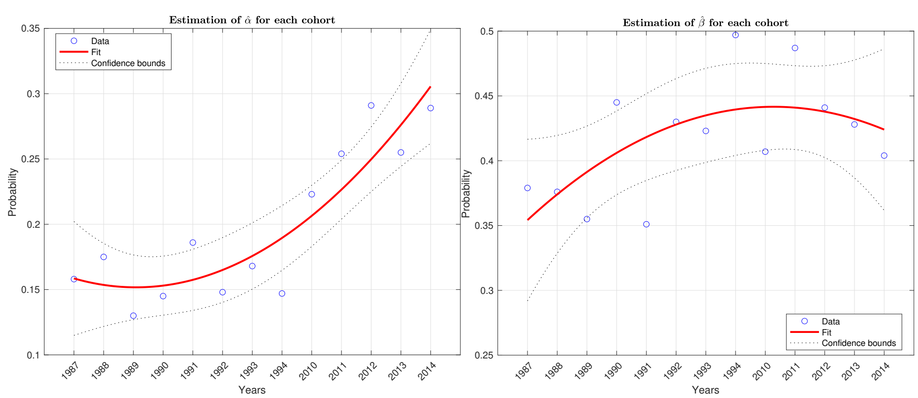
population of parents.[29]

Year of birth (j)	1980	1981	1982	1983	1984
$\beta_{j,k}$	0.407***	0.487***	0.441***	0.428***	0.404***
	(0.0394)	(0.0337)	(0.0348)	(0.0343)	(0.0357)
$\alpha_{j,k}$	0.223***	0.254***	0.291***	0.255***	0.289***
	(0.0190)	(0.0182)	(0.0193)	(0.0180)	(0.0188)
Observations	838	961	968	989	983
Adjusted R^2	0.155	0.209	0.169	0.167	0.142

Note: $k = NLSY97$. Robust standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: **Education Transition for Different Birth Cohorts - NLSY97.**

Table 5 presents estimates for transition probabilities of becoming high educated for the respondents of the NLSY97 (Equation (1)). Results show that the $\alpha_{j,k}$ are higher than those obtained in the 1979 version of the NLSY: the probability to becoming skilled for children with unskilled parents has significantly increased from 15.7% in average in the NLSY79 to 26.2% in the NLSY97. This can reflect among other factors, the increase in the opening of the U.S. universities during this period. For the marginal effect of having skilled parents on the probability, the gap between the averages of the estimates from NLSY79 and NLSY97 is not statistically different from zero (0.41 with the NLSY79 and 0.43 with the NLSY97).



(a) Skilled Child with Unskilled Parents (b) Skilled Child with Skilled Parents

Figure 2: **Mobilities in Educational attainment - 1987-2014.** The children are observed 30 years after their date birth, leading the observations to be between 1987 and 2014. In the panels (a) and (b), the estimated equation is $\theta_t = a + bt + ct^2 + \varepsilon_t$ for $\theta \in \{\alpha, \beta\}$. In the panel (a), the estimated coefficients are $\{0.166^{***}; -0.009; 0.0015^{**}\}$ and, in the panel (b), they are $\{0.331^{***}; 0.0236^{**}; -0.0012\}$. * $p < 10\%$, ** $p < 5\%$ and *** $p < 10\%$ levels.

Gathering the information provided by the previous two tables, we estimate the evolution over the time of the educational transition between youths and their parents. The panel (a) of the Figure 2 shows the large increase for a child born with unskilled parents of obtaining at least a bachelor degree. Hence, the upward educational mobility has largely increase in the U.S. at the end of the 80s. The panel (b) of the Figure 2 shows that the evolution of the marginal impact of having skilled parent to obtaining at least a bachelor degree has an U-inverted shape. For those born in 1958, the

[29]See the Appendix A for the evolution of the share of skilled individuals in the population of parents.

parents-children correlation is 0.36 and reaches a maximum for those born in 1965 (0.54) and then decline to 0.40 for those born in 1984, close to the initial correlation.

The statistics reported in Figure 2 suggest that after a significant decline of the intergenerational educational mobility, the access to the university degrees has significantly improved in the United States at the end of the 80s. This significant turning point of intergenerational educational mobility may result from changes in the United States educational system caused by the report entitled "A Nation at Risk" (1983), at end of the Ronald Reagan presidential term.

Robustness Check. Previous research have found the level of education of the mother plays a central stage in the educational attainment of their children, pointing to the need of carrying out an analysis of the transition of the education between mothers and their children at 30 years old. Therefore, we re-estimate Equation 1 using the variable X_{ik} which is now equal to 1 if the mother of the respondent i is high educated (a bachelor degree or more) for each survey version $k \in \{NLSY79, NLSY97\}$.

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\beta_{j,k}$	0.434***	0.327***	0.397***	0.472***	0.321***	0.453***	0.469***	0.532***
	(0.0634)	(0.0617)	(0.0638)	(0.0554)	(0.0602)	(0.0539)	(0.0594)	(0.0585)
$\alpha_{j,k}$	0.193***	0.218***	0.158***	0.177***	0.220***	0.182***	0.197***	0.200***
	(0.0157)	(0.0164)	(0.0142)	(0.0143)	(0.0155)	(0.0138)	(0.0152)	(0.0162)
Observations	1093	1125	1186	1296	1171	1238	1132	951
Adjusted R^2	0.096	0.055	0.079	0.124	0.049	0.107	0.107	0.131

Note: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6: **Education Transition (Youth-Mothers) for Different Birth Cohorts - NLSY79.**

The estimation results show that the *changes* between the cohorts of $\alpha_{j,k}$ and $\beta_{j,k}$ are identical to those obtained when we used the education of the parents in the previous estimates. Thus the increase in educational mobility between generations is robust to the way used to measure parents education.

Year of birth (j)	1980	1981	1982	1983	1984
$\beta_{j,k}$	0.402***	0.438***	0.417***	0.481***	0.393***
	(0.0452)	(0.0386)	(0.0379)	(0.0362)	(0.0397)
$\alpha_{j,k}$	0.265***	0.311***	0.337***	0.282***	0.330***
	(0.0194)	(0.0185)	(0.0194)	(0.0178)	(0.0189)
Observations	814	942	944	967	961
Adjusted R^2	0.119	0.134	0.127	0.174	0.109

Note: $k = NLSY97$. Robust standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: **Education Transition (Youth-Mothers) for Different Birth Cohorts - NLSY97.**

However, it can be noted that the only notable difference between estimates induced by the two measures of parental education is a systematically higher assessment of the probability of a child obtaining a bachelor's degree when her mother does not have one, than when her two parents haven't obtained a bachelor degree. This favors the view of an human capital as a family's asset.

Finally, wa have also check that Probit models instead of linear probability models provide similar results (See appendix C.

5 Intergenerational Earnings Mobility

5.1 Log-Log Correlations

To track the evolution of the income mobility in the U.S. between 1987 and 2015, we follow Solon (1999) by regressing the log income from wages and salaries ($Y_{i,j,k}$) of the youth i reported 30 years after his birth cohort (age j) on the log income of her/his parents ($X_{i,j,k}$) reported when the youth have 18 years old. This is done for each survey $k \in \{NLSY79, NLSY97\}$ and leads to an estimation of the intergenerational income elasticities (IGE): $\frac{d\mathbb{E}[\log(Y_{i,j,k})|X_{i,j,k}=x]}{d\log(x)}$. In order to estimate IGE, we use the following regression:

$$\log(Y_{i,j,k}) \quad = \quad \omega_{j,k} + \kappa_{j,k} \log(X_{i,j,k}) + e_{i,j,k} \tag{2}$$

where $\kappa_{j,k}$ is the IGE which gives a *relative mobility* measure by estimating the income gaps (in log) of children of high vs. low income parents. The constant $\omega_{j,k}$ may be interpreted as the "minimum income" because it is the children' income (in log) of those having parents with $1 incomes.

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\kappa_{j,k}$	0.263*	0.235	0.404**	0.171*	0.233***	0.170*	0.211	0.158
	(0.101)	(0.130)	(0.126)	(0.0824)	(0.0623)	(0.0713)	(0.125)	(0.0859)
$\omega_{j,k}$	7.286***	7.667***	5.882***	8.431***	7.675***	8.492***	7.959***	8.459***
	(1.110)	(1.417)	(1.412)	(0.896)	(0.670)	(0.759)	(1.377)	(0.929)
Observations	189	225	225	252	233	208	206	188
Adjusted R^2	0.034	0.021	0.067	0.017	0.041	0.013	0.026	0.013

Note: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: **IGE for Different Birth Cohorts - NLSY79**

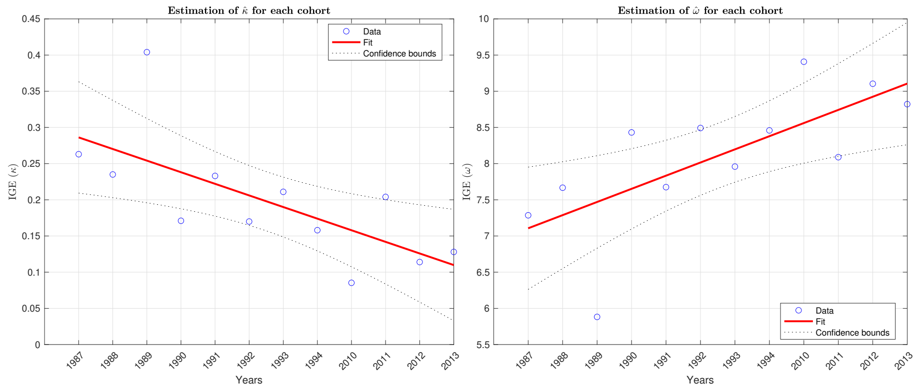
Year of birth (j)	1980	1981	1982	1983
$\kappa_{j,k}$	0.0853*	0.204***	0.114**	0.128**
	(0.0379)	(0.0541)	(0.0422)	(0.0458)
$\omega_{j,k}$	9.408***	8.089***	9.104***	8.822***
	(0.385)	(0.569)	(0.441)	(0.469)
Observations	408	345	390	374
Adjusted R^2	0.012	0.036	0.012	0.014

Note: $k = NLSY97$. Robust standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: **IGE for Different Birth Cohorts - NLSY97**

The Table 8 shows that the IGEs are between 0.158 and 0.404 for children born between 1957 and 1964, leading to an average of the estimators equal to 0.23. Hence, a 10% increase in the parents' incomes is associated to a rise in the children's income by 2.3% in average for the NLSY79. The Table 9 shows that the IGEs are lower for individual born between 1980 and 1983: they are between 0.085 and 0.204, leading to an average of the estimators equal to 0.13. Hence, a 10% increase in the parents' incomes is associated to a rise in the children's income by 1.3% in average for the NLSY97.

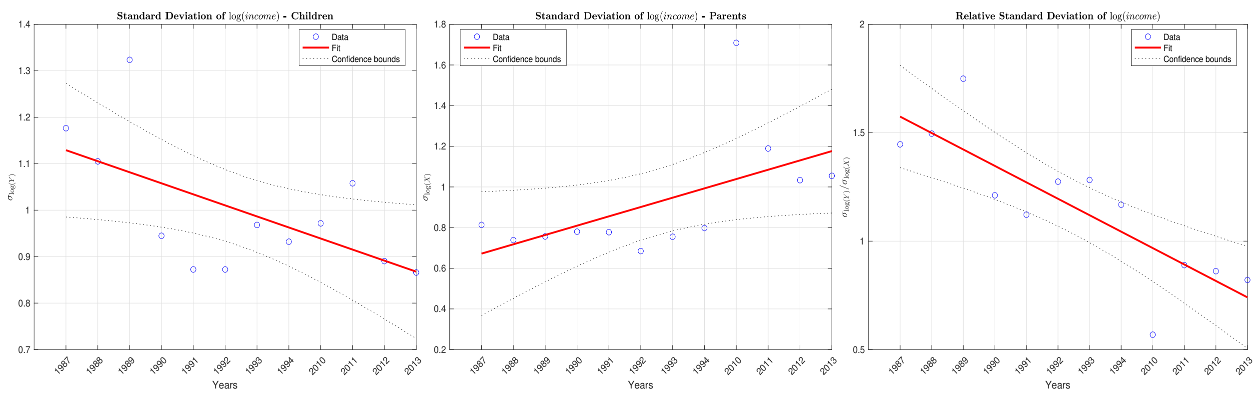
The evolution of these IGE across the cohorts give us an information on the trend in income mobility (see Figure 3). We observe a continuous decrease of the IGE: the estimated slopes of the IGEs' trend is negative. This means that the income mobility has been increasing between cohorts



(a) IGE (b) Minimum expected income

Figure 3: **Inter-Generational Elasticity (IGE).** The children's incomes are observed 30 years after their date birth (1957-1964 and 1980-1983), leading the observations to be between 1987 and 2013. In the panels (a) and (b), the estimated equations are $\theta_t = a + bt + \varepsilon_t$ for $\theta \in \{\kappa, \omega\}$. In the panels (a) and (b) the estimated coefficients are $\{0.3022^{***}; -0.0160^{**}\}$ and $\{6.924^{***}; 0.1817^{**}\}$ respectively. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

born in 1957 to 1984. These results are consistent with those found on the educational mobility which also shows a significant increase in upward mobilities.



(a) Inequalities: Children $\sigma_{\log(Y)}$ (b) Inequalities: Parents $\sigma_{\log(X)}$ (c) Relative Inequalities $\frac{\sigma_{\log(Y)}}{\sigma_{\log(X)}}$

Figure 4: **Income Inequalities - 1987-2014.** x-axes: The children are observed 30 years after their date birth, leading the observations to be between 1987 and 2014. In all panels, the estimated equation is $\theta_t = a + bt + \varepsilon_t$ for $\theta \in \left\{\sigma_{\log(Y)}, \sigma_{\log(X)}, \frac{\sigma_{\log(Y)}}{\sigma_{\log(X)}}\right\}$, The estimated coefficients are $\{1.152^{***}; -0.0237^{**}\}$, $\{0.6261^{***}; 0.045^{**}\}$ and $\{1.6501^{***}; -0.0757^{***}\}$ respectively. * $p < 10\%$, ** $p < 5\%$ and *** $p < 10\%$ levels.

As point out by Chetty et al (2014), the IGE depends on two components: an indicator of the mobility and a indicator of the relative income inequalities between youths and parents. More precisely, we have

$$IGE = \rho \frac{\sigma_{\log(Y)}}{\sigma_{\log(X)}} \quad \text{with } \rho = corr(\log(Y), \log(X))$$

showing that if the children's incomes inequalities ($\sigma_{\log(Y)}$) decreases relative to the ones among parents ($\sigma_{\log(X)}$), then the IGE declines, others things being equals. Therefore, the changes in income mobility measures can be affected by the changes in relative size of intergenerational inequalities.

The Figure 4 shows that *(i)* the income inequalities among youths have declined over the period (panel (a)), *(ii)* the income inequalities among parents have risen over the period (panel (b)), thus leading to a significant decline of the relative inequalities of incomes (panel (c)). Therefore, even if the correlation between the children' incomes and the parents' income (ρ) remains stable over the period, the IGE mechanically declines driven by the reduction in $\frac{\sigma_{\log(Y)}}{\sigma_{\log(X)}}$. This highlights that the rise in income inequality, largely documented for the U.S., have a direct impact on this intergenerational mobility measure. In particular, the IGE can support the view of a rise in income mobility in the U.S., whereas this result is only driven by the increase in parents' income inequalities. This increase in mobility is in fact misleading because it is only based on the fact that the growth of income disparities among parents, then leading them to be more and more distant from children' income disparities, thus generating greater income mobility, even if children and parents occupy the same position in the income distribution of their respective peers. This leads us to compute the rank correlation, that can isolate the income mobility from changes in income inequality.

5.2 Rank-Rank Correlations

An alternative way to analyze intergenerational income mobility consists in estimating the rank-rank correlation between parents' and children' incomes:

$$P^c_{i,j,k} = \widetilde{\omega}_{j,k} + \widetilde{\kappa}_{j,k} P^p_{i,j,k} + \varepsilon_{i,j,k} \tag{3}$$

where $P^c_{i,j,k}$ is the income percentile of children i born in j and registered in survey k, and $P^p_{i,j,k}$ the income percentile of her parents. In this case, $\widetilde{\kappa}$ is the slope coefficient of a regression of the children income percentiles on the parents' income percentiles for each birth cohort using each of the versions of the panel data set. Hence, $\widetilde{\kappa}$ is measuring the impact/correlation of the income position of the parents with respect to other parents of the same cohort, on the position of the youth with respect to other youths' incomes in the same cohort at 30 years old. Therefore, a strong association between the income position of the parents and the income position of the children, would suggest a low income mobility as the income position of the youth at age 30 is greatly determined by the income of the parents some years earlier.

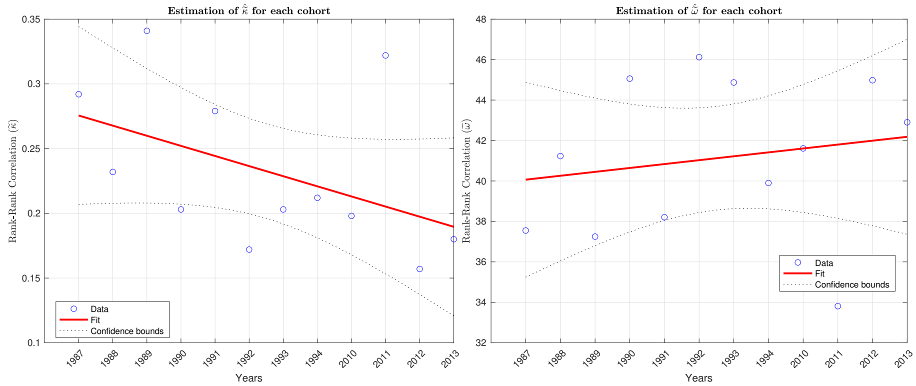
The link between the rank-rank correlation and the IGE comes from the fact that the rank-rank correlation, denoted ρ_r, is approximately proportional to $\rho = corr(\log(Y), \log(X))$, i.e. $\rho_r \approx \gamma\rho$, with γ a constant.[30] Hence, the IGE combines the rank-rank correlation with the ratio of standard deviations of income across generations, or in other words, the rank-rank correlation measures the intergenerational income mobility "purged" from the shifts in income inequalities measured by the standard deviations of the youths and parents' income distributions. Moreover, the rank-rank correlation is also sensitive to extreme values in the distribution, in particular at the bottom of the distribution where log magnify the shape.[31]

Figure 5 shows that rank-rank correlation slightly decreases in time, but this negative slope is significant at only 10%. This suggests that the impact of income position of the parents on the income position of the youths is remained broadly constant over time.

Tables 10 and 11 report estimates of the rank-rank correlation. Children of parents at the bottom of the income distribution have an income being in the mean 40th percentile ($\widetilde{\omega}$ in panel (b)), this rank being stable over time. The panel (a) shows that a one percentage point increase in parent rank is associated with a 0.24pp increase in the children's mean rank of the NLSY79 (in average over all the cohorts), and a 0.21pp increase in the children's mean rank of the NLSY97

[30] One can use this approximation when the parents and childs incomes follow a bivariate log normal distributions.

[31] See Chetty et al. (2014,a) for a discussion of this point.



(a) Marginal impact of Parents' incomes (b) Minimum percentile

Figure 5: **Rank Correlation.** The children's incomes are observed 30 years after their date birth (1957-1964 and 1980-1983), leading the observations to be between 1987 and 2013. In the panels (a) and (b), the estimated equations are $\theta_t = a + bt + \varepsilon_t$ for $\theta \in \{\widetilde{\kappa}, \widetilde{\omega}\}$. In the panels (a) and (b) the estimated coefficients are $\{0.2833^{***}; -0.0078^{+}\}$ and $\{39.872^{***}; 0.192\}$ respectively. $^{+}$ $p < 0.1$,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

(in average over all the cohorts). Given that the rank-rank correlation is a good approximation of the ρ coefficient of the IGE and it could be considered as constant, one can deduce that the shift in the IGE is driven by the changes in income inequalities, but not a change in the link between parents-children incomes.

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\widetilde{\kappa}_{j,k}$	0.292^{***}	0.232^{**}	0.341^{***}	0.203^{*}	0.279^{***}	0.172^{*}	0.203^{*}	0.212^{*}
	(0.0812)	(0.0835)	(0.0755)	(0.0802)	(0.0729)	(0.0787)	(0.0961)	(0.0823)
$\widetilde{\omega}_{j,k}$	37.55^{***}	41.23^{***}	37.25^{***}	45.06^{***}	38.21^{***}	46.12^{***}	44.87^{***}	39.90^{***}
	(5.081)	(5.115)	(5.284)	(4.984)	(4.657)	(4.777)	(5.765)	(4.954)
Observations	189	225	225	252	233	208	206	188
Adjusted R^2	0.075	0.044	0.101	0.029	0.066	0.022	0.030	0.036

Note: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: **Rank-Rank Correlations for Different Birth Cohorts - NLSY79**

The section on intergenerational educational mobility has showed that all children are increasingly likely to have a university degree, whether their parents have one or not. But the rise in intergenerational educational mobility can lead to different income mobilities depending on whether the parents have or not a college degree. To test this idea, we estimate the following model

$$Q^c_{i,j,k} = \widetilde{\omega}_{j,k} + \widetilde{\kappa}^{ls}_{j,k} Q^{p,ls}_{i,j,k} + \widetilde{\kappa}^{hs}_{j,k} Q^{p,hs}_{i,j,k} + \varepsilon_{i,j,k} \tag{4}$$

where $Q^c_{i,j,k}$ is the income quartile of children i born in j and registered in survey k, and $Q^p_{i,j,k}$ the income quartile of her parents' income in 1979 (NLSY79) or in 1997 (NLSY97).[32] The model (4) allows us to distinguish the impact of the parents' income rank on the children' income rank conditionally to the educational attainment of the parents.

Results are reported in Tables 12 and 13. Firstly, the estimates of $\widetilde{\omega}_{j,k}$ are consistent with those based on a ranking by percentiles (see Tables 10 and 11): the second quartile is the rank (stable

[32] We restrict our analysis to mobility measures across quartiles because the number of observation is too small to have a robust estimations based on percentiles.

Year of birth (j)	1980	1981	1982	1983
$\widetilde{\kappa}_{j,k}$	0.198***	0.322***	0.157**	0.180***
	(0.0522)	(0.0554)	(0.0538)	(0.0536)
$\widetilde{\omega}_{j,k}$	41.61***	33.81***	44.98***	42.90***
	(3.195)	(3.528)	(3.342)	(3.104)
Observations	408	345	390	374
Adjusted R^2	0.039	0.102	0.022	0.028

Note: $k = NLSY97$. Robus standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: **Rank-Rank Correlations for Different Birth Cohorts - NLSY97**

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\widetilde{\kappa}^{ls}_{j,k}$	0.200*	0.118	0.270***	0.0514	0.151	0.0752	0.00759	0.111
	(0.0841)	(0.0771)	(0.0777)	(0.0753)	(0.0784)	(0.0798)	(0.0822)	(0.0811)
$\widetilde{\kappa}^{hs}_{j,k}$	0.316**	0.272*	0.383***	0.177	0.364***	0.239*	0.285**	0.189
	(0.104)	(0.118)	(0.0895)	(0.0934)	(0.0803)	(0.0950)	(0.105)	(0.103)
$\widetilde{\omega}_{j,k}$	2.019***	2.237***	1.978***	2.530***	2.082***	2.356***	2.556***	2.158***
	(0.232)	(0.226)	(0.233)	(0.213)	(0.217)	(0.221)	(0.230)	(0.223)
Observations	189	225	225	252	233	208	206	188
Adjusted R^2	0.052	0.033	0.073	0.011	0.080	0.033	0.081	0.012

Note: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: **Impact of Parents' Educational Attainment on the Rank-Rank Correlations for Different Birth Cohorts - NLSY79**

Year of birth (j)	1980	1981	1982	1983
$\widetilde{\kappa}^{ls}_{j,k}$	0.176**	0.203***	0.0253	0.0345
	(0.0553)	(0.0593)	(0.0529)	(0.0557)
$\widetilde{\kappa}^{hs}_{j,k}$	0.236***	0.364***	0.154*	0.214***
	(0.0621)	(0.0548)	(0.0619)	(0.0645)
$\widetilde{\omega}_{j,k}$	2.076***	1.816***	2.438***	2.324***
	(0.151)	(0.154)	(0.148)	(0.145)
Observations	408	345	390	374
Adjusted R^2	0.040	0.105	0.024	0.050

Note: $k = NLSY97$. Robust standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13: **Impact of Parents' Educational Attainment on the Rank-Rank Correlations for Different Birth Cohorts - NLSY97**

over the time) of a child with parents in the first income quartile. Secondly, Tables 12 and 13 show that the impact of parents' incomes on children' earnings is lower when parents have not college degrees than when they are college graduated: over all cohorts, the average value for $\widetilde{\kappa}^{ls}$ is 0.118, whereas it reaches 0.266 for $\widetilde{\kappa}^{hs}$. This difference is statistically significant at 5% level. This result can be explained, firstly by the fact that for children, a college degree provides an opportunity for upward social mobility which decorrelates the child's income from that of her/his parents. Secondly, the impact of the income rank of parents without a college degree is very low on the income rank of their children also indicates that the differences between low parental incomes are not relevant in explaining the income positions of their children. This can be directly deduced from Table 14 showing that the chance of graduating does not depend on the parents' income quartile when they are not graduates from college. Moreover, the Table 15 shows that the chance of being in a high income quartile depends more on one's college graduation than on that of the parents.

		Parents without Bachelor				
		$Q1$	$Q2$	$Q3$	$Q4$	Total
Children	Without Bachelor	458	418	358	274	1508
		30.3%	27.71%	23.74%	18.16%	100%
	Bachelor and more	38	56	75	64	233
		16.3%	24.03%	32.18%	27.467%	100%

Note: values computed using observations from the NLSY 79.

Table 14: **Children' Education when Parents Haven't Bachelor Degrees**

		Children				
		$Q1$	$Q2$	$Q3$	$Q4$	Total
Children	Bachelor and more	52	58	131	201	442
		11.76%	13.12%	29.63%	45.47%	100%
	Without Bachelor	596	590	506	377	2069
		28.80%	28.51%	24.45%	18.22%	100%
Parents	Bachelor and more	66	63	111	144	384
		17.18%	16.40%	28.9%	37.5%	100%
	Without Bachelor	582	585	526	434	2127
		27.36%	27.50 %	24.74%	20.40%	100%

Note: computations done using the observations extracted from the NLSY 79.

Table 15: **Children' Incomes: Youth's Education vs. Parents Education**

If so, these results suggest that the American system manages to give the same opportunities to all children of parents who have not graduated from college. For children of parents with a college degree, a high parental income enables them to ensure them against intergenerational income fall, thus generating a correlation between the income of the parents and that of their children.

6 Analysis Based on Matrix of Mobility

A another way to measure if the "American dream" can be realized for a large fraction of the Americans is to compute the transition matrices describing the intergenerational mobility. We are interested by the combination of the educational and earnings mobilities. Hence, we combine the information of the educational attainment of the children, conditionally to the educational attainment of the parents, with information on earning mobility. We thus compute the earning quartiles for each educational attainment of the parents and the children. These information provide the probabilities for a child to be or not college graduate and to earn a salary of one of the 4 quartiles of his group of educational attainment, conditionally to the education attainment (college degree or not) and the income rank (one of the 4 quartiles) of her parent, i.e.:

$$p_{ij,i'j'} = \Pr(\text{Child: degree} = D_i \ \& \ \text{earning} = Q_j \mid \text{Parent: degree} = D_{i'} \ \& \ \text{earning} = Q_{j'})$$

where $D_x \in \{\text{College degree, No College degree}\}$ for $x = i, i'$ and $Q_y \in \{Q1, ..., Q4\}$ for $y = j, j'$. The Tables 16 and 17 gives the estimation of these Markov processes for NLSY79 and NLSY97.[33]

		Child No College				Child College			
		$Q1$	$Q2$	$Q3$	$Q4$	$Q1$	$Q2$	$Q3$	$Q4$
Parent	$Q1$	0.3273	0.2485	0.1667	0.1545	0.0606	0.0152	0.0182	0.0091
	$Q2$	0.2312	0.2601	0.2139	0.1705	0.0260	0.0376	0.0405	0.0202
No College	$Q3$	0.1667	0.2258	0.2151	0.2366	0.0430	0.0323	0.0457	0.0349
	$Q4$	0.1447	0.1500	0.2184	0.2684	0.0526	0.0684	0.0553	0.0421
Parent	$Q1$	0.1429	0.1169	0.1818	0.1818	0.0779	0.0649	0.0779	0.1558
	$Q2$	0.0541	0.0541	0.1622	0.2973	0.0946	0.1757	0.0811	0.0811
College	$Q3$	0.0658	0.1316	0.1053	0.1842	0.1184	0.1974	0.0921	0.1053
	$Q4$	0.0563	0.0423	0.1549	0.2113	0.0704	0.0845	0.1972	0.1831

Table 16: **Intergenerational Mobility — NLSY79**

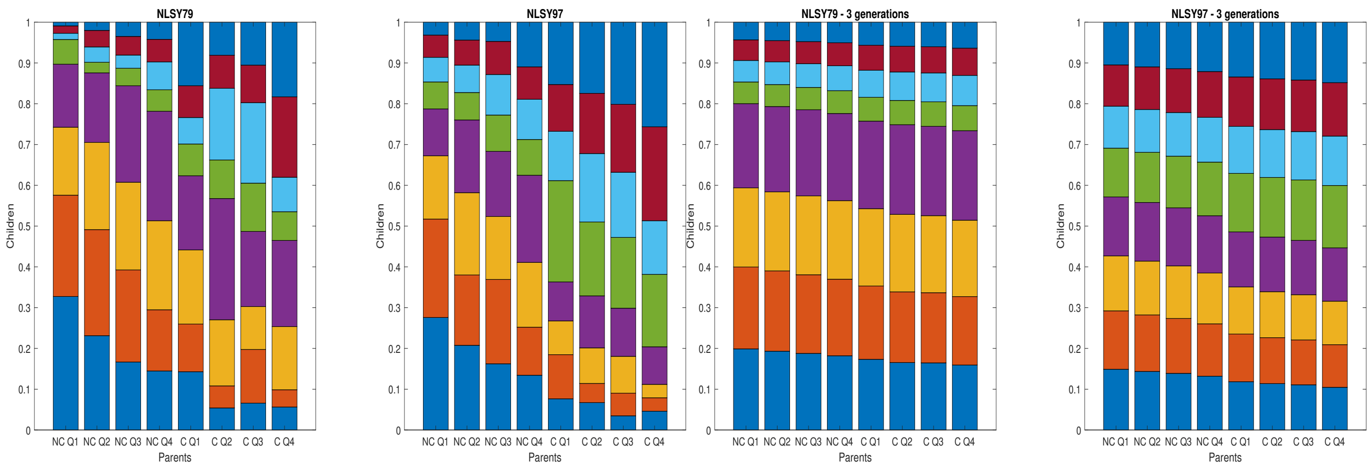
		Child No College				Child College			
		$Q1$	$Q2$	$Q3$	$Q4$	$Q1$	$Q2$	$Q3$	$Q4$
Parent	$Q1$	0.2759	0.2414	0.1552	0.1149	0.0661	0.0603	0.0546	0.0316
	$Q2$	0.2076	0.1725	0.2018	0.1784	0.0673	0.0673	0.0614	0.0439
No College	$Q3$	0.1623	0.2068	0.1545	0.1597	0.0890	0.0995	0.0812	0.0471
	$Q4$	0.1342	0.1178	0.1589	0.2137	0.0877	0.0986	0.0795	0.1096
Parent	$Q1$	0.0764	0.1083	0.0828	0.0955	0.2484	0.1210	0.1146	0.1529
	$Q2$	0.0671	0.0470	0.0872	0.1275	0.1812	0.1678	0.1477	0.1745
College	$Q3$	0.0347	0.0556	0.0903	0.1181	0.1736	0.1597	0.1667	0.2014
	$Q4$	0.0461	0.0329	0.0329	0.0921	0.1776	0.1316	0.2303	0.2566

Table 17: **Intergenerational Mobility — NLSY97**

It is particularly interesting to focus on the probability to move from the bottom of the distribution to its top, i.e. the probability that a parent without college degree and with an income in the first quartile of the parents with no college degree could have a child with a college degree and a earning in the top quartile of the college degree children. These probabilities are respectively 0.91% in the NLSY79 survey and 3.16% in the NLSY97 survey (see Tables 16 and 17). This clearly show that the upward mobilities have rise over time (they have been multiplied by more than 3). At the same time, one can remark that the downward mobility have also decline: the probabilities to have

[33] In order to have a robust information for each survey, we present results after aggregating all transitions for each survey. Therefore, the results for NLSY79 aggregate all transitions of children born between 1957 and 1964, whereas those for NLSY97 regroup all transitions of children born between 1980 and 1984.

a child without college degree and with an earning in the first quartile for a college degree parent in the fourth income quartile are respectively 5.63% and 4.61% for NLSY79 and NLSY97 (see Tables 16 and 17). The panel (a) of the Figure 6 compare the mobilities Parents-Children between 1979 and 1997 surveys. The upward mobility seems to be larger of cohort born after 1980 (NLSY97), mainly driven by the largest access to college degrees. The panel (a) of the Figure 6 also suggests that a large middle class appears in the NLSY97 (green bars in the NLSY97 figure), characterized by youths with college degree but the the bottom of the wage distribution of skilled young workers.



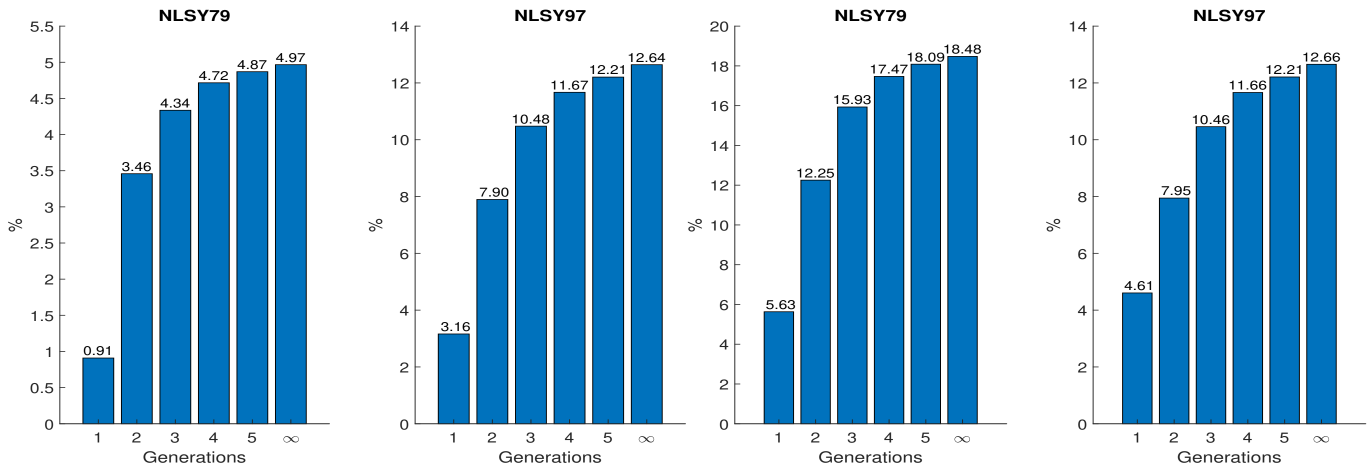
(a) Mobilities Parents-Children (1 generation) (b) Mobilities Parents-Great Grandchildren (3 generations)

Blue: No college degree and income in $Q1$; orange: No college degree and income in $Q2$; yellow: No college degree and income in $Q3$; purple: No college degree and income in $Q4$; green: College degree and income in $Q1$; sky blue: College degree and income in $Q2$; burgundy: College degree and income in $Q3$; dark blue: College degree and income in $Q4$. Source: NLSY79 & NLSY97.

Figure 6: **Intergenerational Mobilities: Education and Earnings.**

But the most important issue that can be analyzed through these matrices, is the speed with which this mobility occurs. This greater or lesser fluidity of society can be apprehended by iterating these matrices so that they indicate to us the necessary number of generations that a family must wait for the situation of the parents no longer to influence that of the children. The comparison of the panels (a) and (b) of the Figure 6 provides a first indication of the speed at which an individual may expect to escape from her initial family group.

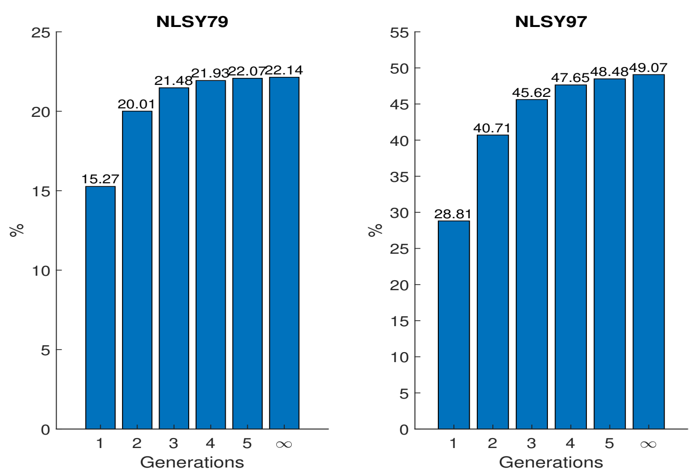
The Figure 8 focuses on "extreme" mobility: on the one hand, the probability that a parent without a college degree and at the bottom of the income distribution will have a descendant (child, grandchild, great-grandchild, etc. .) with a college degree and at the top of the earning distribution (*Upward Mobility*); and on the other hand, the probability that a parent with a college degree and at the top of the income distribution will have a descendant (child, grandchild, great-grandchild, etc. .) without college degree and at the bottom of the earning distribution (*Downward Mobility*). For the *Upward Mobility*, the panel (a) of the Figure 8 shows that the level of the probabilities are higher for those born after 1980 (NLSY97) than for those born between 1957 and 1964 (NLSY79). This panel also shows that growth rates of this probability toward its long run value are higher for those born after 1980 (NLSY97) than for those born between 1957 and 1964 (NLSY79), thus implying that a smaller number of generation will be needed to escape from the poorly initial condition. The panel (b) of the Figure shows that the stronger upward mobilities registered in the NLSY97 than those registered in the NLSY79 contrast with the lower downward mobilities between



(a) Upward Mobilities (b) Downward Mobilities

Upward Mobilities: Pr(Child with college degree & earning $= Q_4$ | Parent with no college degree & earning $= Q_1$).
Downward Mobilities: Pr(Child with no college degree & earning $= Q_1$ | Parent with college degree & earning $= Q_4$).
Source: NLSY79 & NLSY97.

Figure 7: **Mobilities from bottom to the top and from top to the bottom.**



Educational Mobilities: Pr(Child with college degree | Parent with no college degree). Source: NLSY79 & NLSY97.

Figure 8: **Educational Mobilities.**

these two surveys. The level of the downward mobilities are lower in the NLSY97, but also the growth rates toward long run values. This suggests that the largest access to university after the 80s, by ensuring high education to a large fraction of youths, has rise the upward mobility, but also has reduce the downward mobility. This large increase of the access to college degrees and the educational mobility that results, are illustrated by the Figure 8. It shows that the probability for a parent with no college degree to a have a child graduated has significantly rise between the two surveys and that the dependance to initial conditions are more rapidly forgotten.

7 Concluding Remarks

This paper provides new analysis on US intergenerational mobility since the 1960s. Firstly, we show that there is a significant rise in the upward educational mobility. This can result from the evolutions of the US educational system that manages to give the same opportunities to youths with different economic backgrounds. Future studies should test this causal relationship.

Secondly, we provide as well further insights into earnings intergenerational mobility. We show that the intergenerational correlation between the rank of the parents income and the rank the income of their children has remained stable over all this period. Therefore the increase of the earnings intergenerational mobility measured by the IGE is mainly due to the rise in income inequalities.

Thirdly, when we mix these two information on education and earning intergenerational mobilities, we find that parents with no college degree have no effect on the income rank of their children, whereas parents with a college degree insure their children against an income fall.

Finally, transition matrices provide support for increasing intergenerational mobility trends and show that steady state values are reached after 5 generations.

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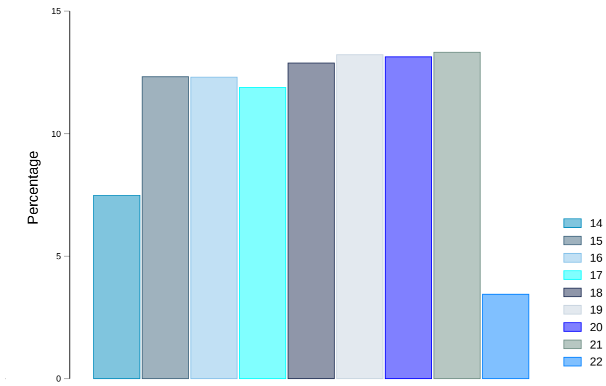
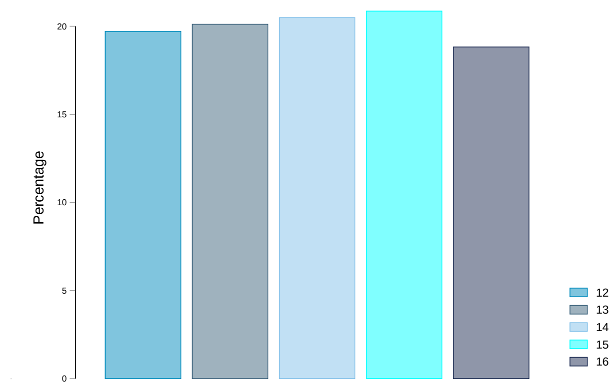
A Distributions of Ages for Children and Parents

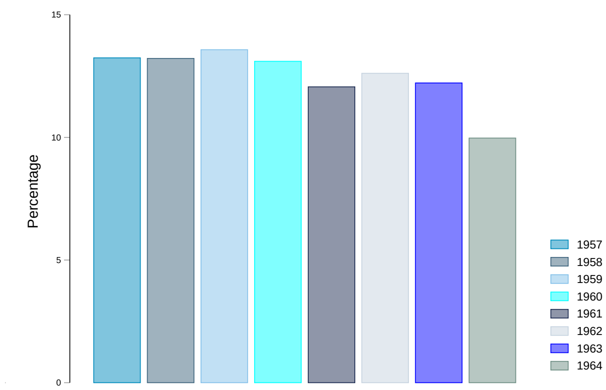
The distribution of the ages for the youths and their parents is presented in the Figures 9 and 10. The Figures point that the age of the youths is equally distributed through the two versions of the panels.



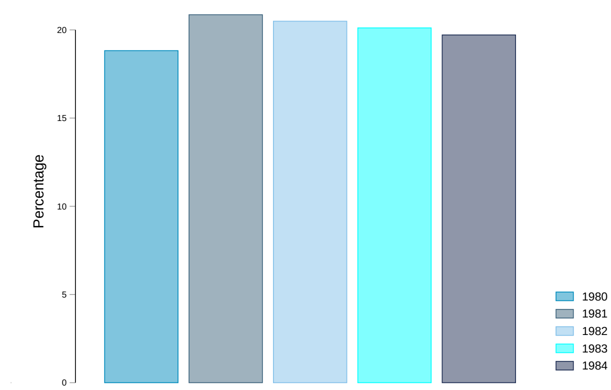
(a) Age in 1979



(b) Age in 1997

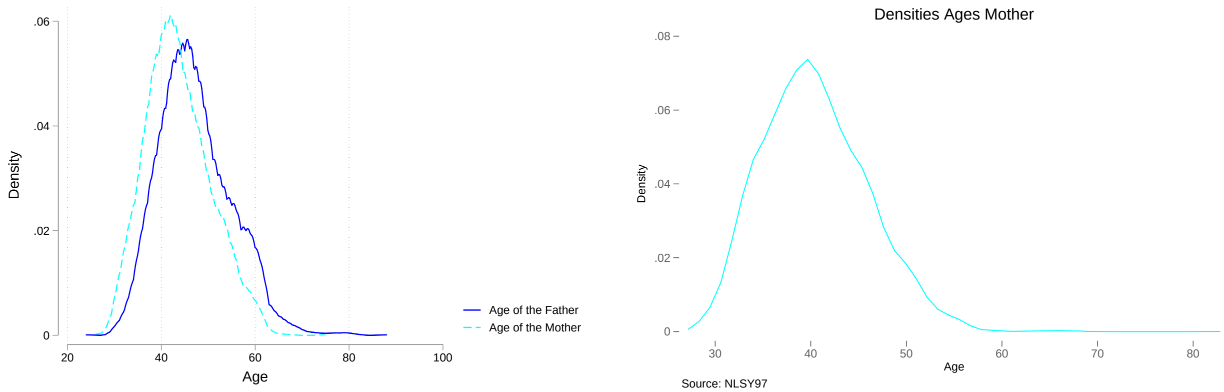


(c) Birth cohorts in 1979



(d) Birth cohorts in 1997

Figure 9: **Age and Birth Cohort Distribution Youths**. This figure presents the distribution of the ages (panels (a) & (b)) and for the birth cohorts (panel (c) & (d)) of the youth respondents for the National Longitudinal Survey of Youth 1979 & 1997. The bins in the graphs are slightly different. This is the information used to compute the educational mobility.



(a) Ages in 1979

(b) Age Mother in 1997

Figure 10: **Age Distribution Parents of the Youth Respondents**. This figure presents the Kernel densities of the ages of the parents of the youth respondents for the National Longitudinal Survey of Youth 1979 (panel a) and for the National Longitudinal Survey of Youth 1997 (panel b). The information presented in panel (a) is computed from the ages reported in 1987. Panel (b) presents information only for the mothers of the youths because of availability in the information. This variable is computed using the information reported in 1997 about the age of the mother during the birth of the youth respondent.

Year of birth	1957	1958	1959	1960	1961	1962	1963	1964	1965
NLSY79	21.425	24.963	22.600	21.340	22.105	24.950	22.761	23.924	27.170
Year of birth	1980	1981	1982	1983	1984				
NLSY97	34.983	40.436	42.791	39.239	41.176				

Table 18: **Share of Skilled Individuals in the Populations of Parents (%)**

B Educational Mobility - NLSY79: Same Sample than for Income Mobility

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\beta_{j,k}$	0.250**	0.291***	0.165*	0.391***	0.339***	0.315***	0.443***	0.257***
	(0.0800)	(0.0836)	(0.0718)	(0.0725)	(0.0738)	(0.0766)	(0.0800)	(0.0755)
$\alpha_{j,k}$	0.136***	0.172***	0.0918***	0.118***	0.141***	0.103***	0.133***	0.163***
	(0.0241)	(0.0261)	(0.0200)	(0.0210)	(0.0253)	(0.0221)	(0.0233)	(0.0274)
Observations	363	377	403	460	377	341	406	342
Adjusted R^2	0.064	0.069	0.034	0.149	0.116	0.115	0.170	0.062

Notes: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 19: **Education Transition for Different Birth Cohorts.**

Year of birth (j)	1957	1958	1959	1960	1961	1962	1963	1964
$\beta_{j,k}$	0.352**	0.229	0.190	0.326**	0.184	0.461***	0.479***	0.437***
	(0.123)	(0.130)	(0.122)	(0.115)	(0.0991)	(0.105)	(0.128)	(0.115)
$\alpha_{j,k}$	0.156***	0.207***	0.109***	0.167***	0.193***	0.123***	0.172***	0.186***
	(0.0245)	(0.0265)	(0.0206)	(0.0229)	(0.0272)	(0.0225)	(0.0246)	(0.0267)
Observations	362	377	402	460	376	340	404	339
Adjusted R^2	0.063	0.019	0.016	0.044	0.018	0.135	0.095	0.078

Note: $k = NLSY79$. Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 20: **Education Transition (Youth-Mothers) for Different Birth Cohorts.**

C Probit Models: Intergenerational Educational Mobility

Sometimes, it might be useful to estimate complementary models to support our results on intergenerational educational mobility. Indeed, linear probability models can yield probabilities outside the range between 0 and 1, which might be corrected using a probit/logit configuration. We performed such probit estimation defined as

$$P(Y_{i,j,k}|X_{i,j,k}) = \Phi(\psi_{j,k} + \tau_{j,k}X_{i,j,k}) \tag{5}$$

where $Y_{i,j,k}$ is a binary variable that is equal to 1 if the youth respondent i is high skilled (i.e. has a bachelor degree) 30 years after his birth cohort j for each NLSY versions $k \in \{NLSY79, NLSY97\}$, $X_{i,k}$ is a binary variable that is equal to 1 if either the mother or the father of the respondent i has a bachelor degree in the NLSY versions k, and Φ is the normal distribution. The predicted probability for a youth to be bachelor graduate given that his/her parents are bachelor graduated or more is:

$$P(Y_{i,j,k}|X_{i,j,k} = 1) = \Phi(\hat{\psi}_{j,k} + \hat{\tau}_{j,k})$$

The results depicted in tables 21 and 22, confirm our previous results of an increasing trend of the educational mobility. Estimates are significant but conditional on having parents not educated, has a negative effect on the probability of becoming high skilled as the constants through the different specifications have a negative sign. Figure 3 shows precisely the predicted probabilities derived from the Probit estimations. Panel (a) of figure 11 shows the upward educational mobility trend, which is positive and whose trend is statistically significant. Panel (b) of the figure 11 shows a positive increasing probability for the youths to be bachelor graduate given that his/her parents are bachelor graduated or more.

	1957-1987	1958-1988	1959-1989	1960-1990	1961-1991	1962-1992	1963-1993	1964-1994
Parents High Skilled	1.123***	1.041***	1.051***	1.326***	1.017***	1.231***	1.192***	1.465***
	(0.106)	(0.0983)	(0.107)	(0.107)	(0.105)	(0.104)	(0.112)	(0.119)
Constant	-0.872***	-0.919***	-1.153***	-1.197***	-1.011***	-1.117***	-1.076***	-1.142***
	(0.0511)	(0.0517)	(0.0544)	(0.0530)	(0.0520)	(0.0532)	(0.0538)	(0.0615)
Observations	986	1030	1061	1144	1041	1084	1000	837
Adjusted R^2								

Standard errors in parentheses

Note: Robust standard errors. No sample weights have been used. Source: NLSY79

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 21: Probit Education Transition Different Birth Cohorts – NLSY79

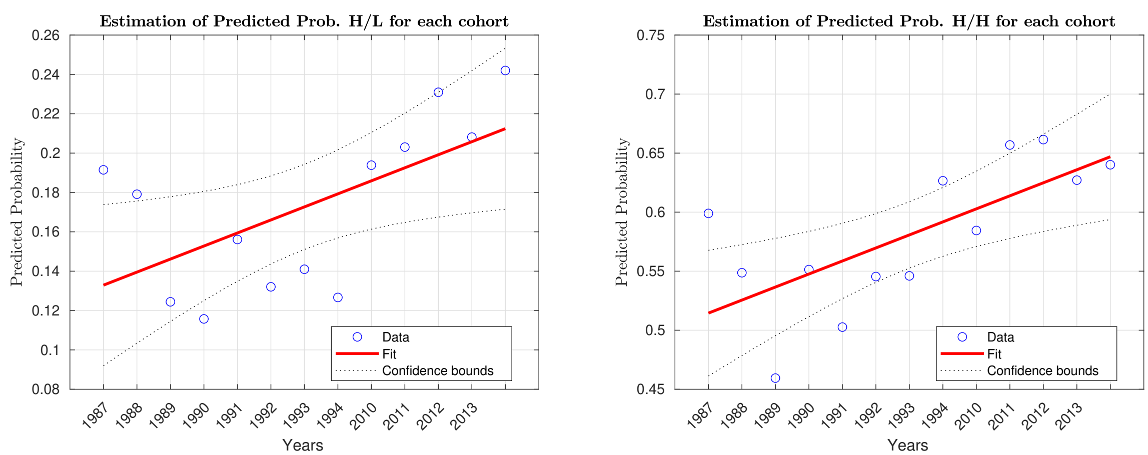
	1980-2010	1981-2011	1982-2012(13)	1983-2013	1984-2014
Parents High Skilled	1.077***	1.235***	1.152***	1.137***	1.059***
	(0.0867)	(0.0819)	(0.0843)	(0.0813)	(0.0841)
Constant	-0.864***	-0.831***	-0.736***	-0.813***	-0.700***
	(0.0460)	(0.0427)	(0.0431)	(0.0446)	(0.0428)
Observations	1276	1454	1354	1363	1343
Adjusted R^2					

Standard errors in parentheses

Note: We do not observe 2012 nor 2014 youth level of education,
we observe instead, 2013 and 2015. No sample weights have been used. Robust standard errors. Source: NLSY97

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 22: Education Transition Different Birth Cohorts (Probit Estimates)

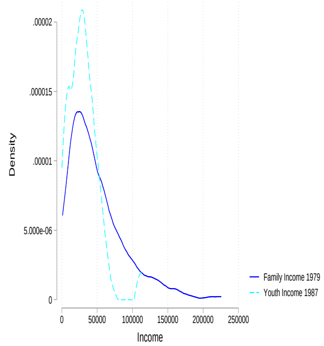


(a) Youth HS/Par LS

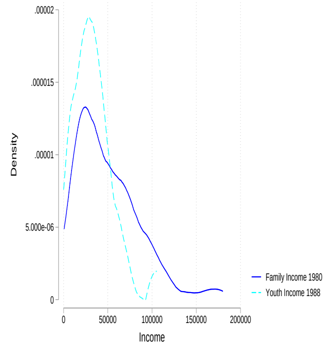
(b) Youth HS/Par HS

Figure 11: **Predicted Probabilities** Graphs present predicted probabilities issued from the probit estimation. In the panels (a) and (b), the estimated equations are $\theta_t = a + bt + \varepsilon_t$ for $\theta \in \{\psi, \tau\}$. In the panels (a) and (b) the estimated coefficients are $\{0.12627^{***}; 0.0066269^{**}\}$ and $\{0.50345^{***}; 0.011037^{**}\}$ respectively. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

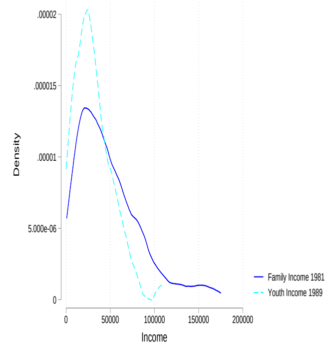
D Distributions of Incomes, by Cohorts: Children and Parents



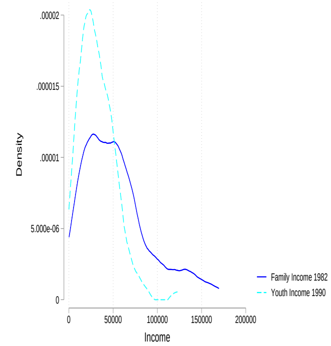
(a) Youths born in 1957



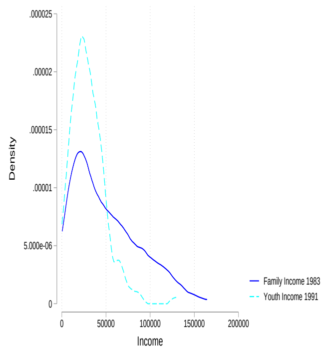
(b) Youths born in 1958



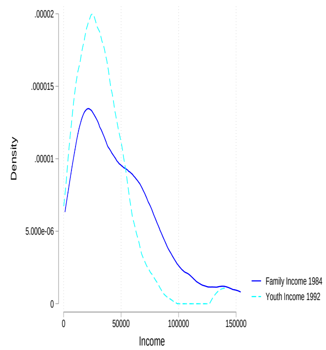
(c) Youths born in 1959



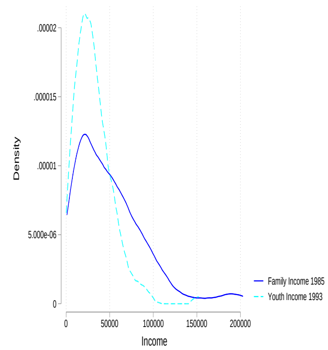
(d) Youths born in 1960



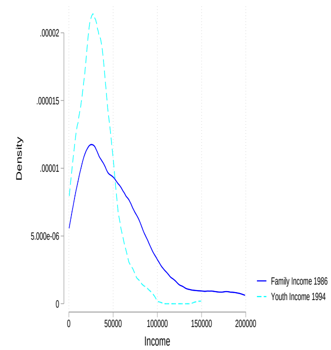
(e) Youths born in 1961



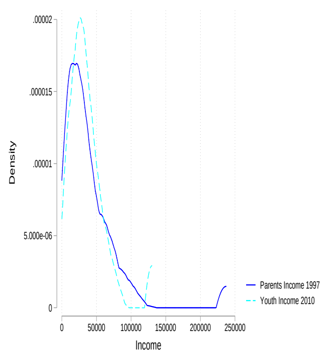
(f) Youths born in 1962



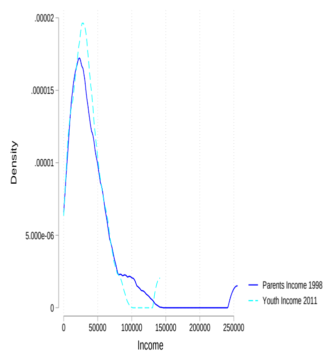
(g) Youths born in 1963



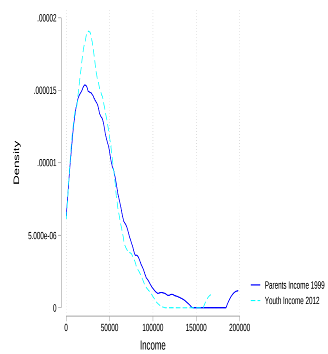
(h) Youths born in 1964



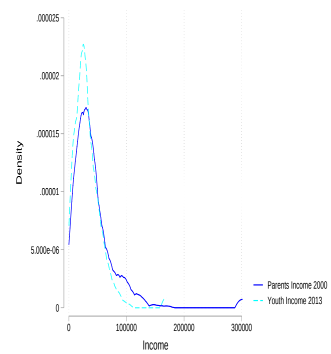
(i) Youths born in 1980



(j) Youths born in 1981



(k) Youths born in 1982



(l) Youths born in 1983

Figure 12: **Income distributions.** .