Online Appendix for "Earnings Dynamics and Its Intergenerational Transmission: Evidence from Norway"

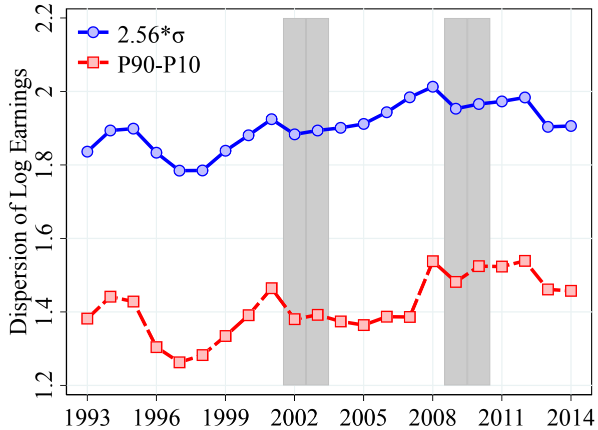
Elin Halvorsen[31] Serdar Ozkan[32] Sergio Salgado[33]

[31]Statistics Norway. Email: elin.halvorsen@ssb.no.
[32]University of Toronto. Email: serdar.ozkan@utoronto.ca; Web: www.serdarozkan.me.
[33]The Wharton School. Email: ssalgado@upenn.edu; Web: www.sergiosalgado.net.

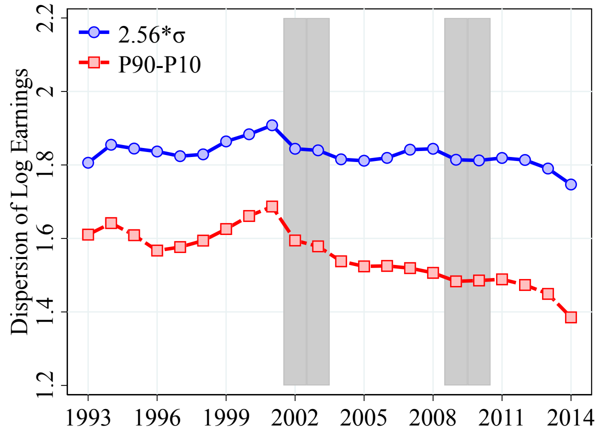
A Figures for Public and Private Sectors

Figure OA.I.1 – Income Inequality in Public and Private Sector

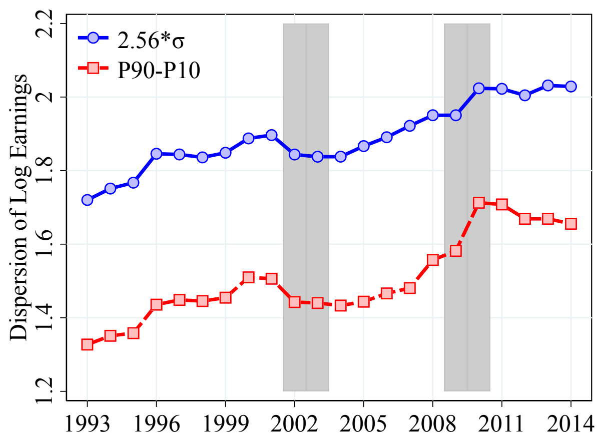
(a) Men Public Sector



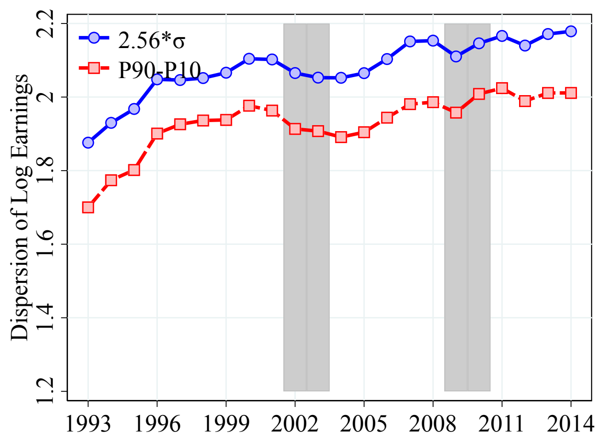
(b) Women: Public Sector



(c) Men: Private Sector

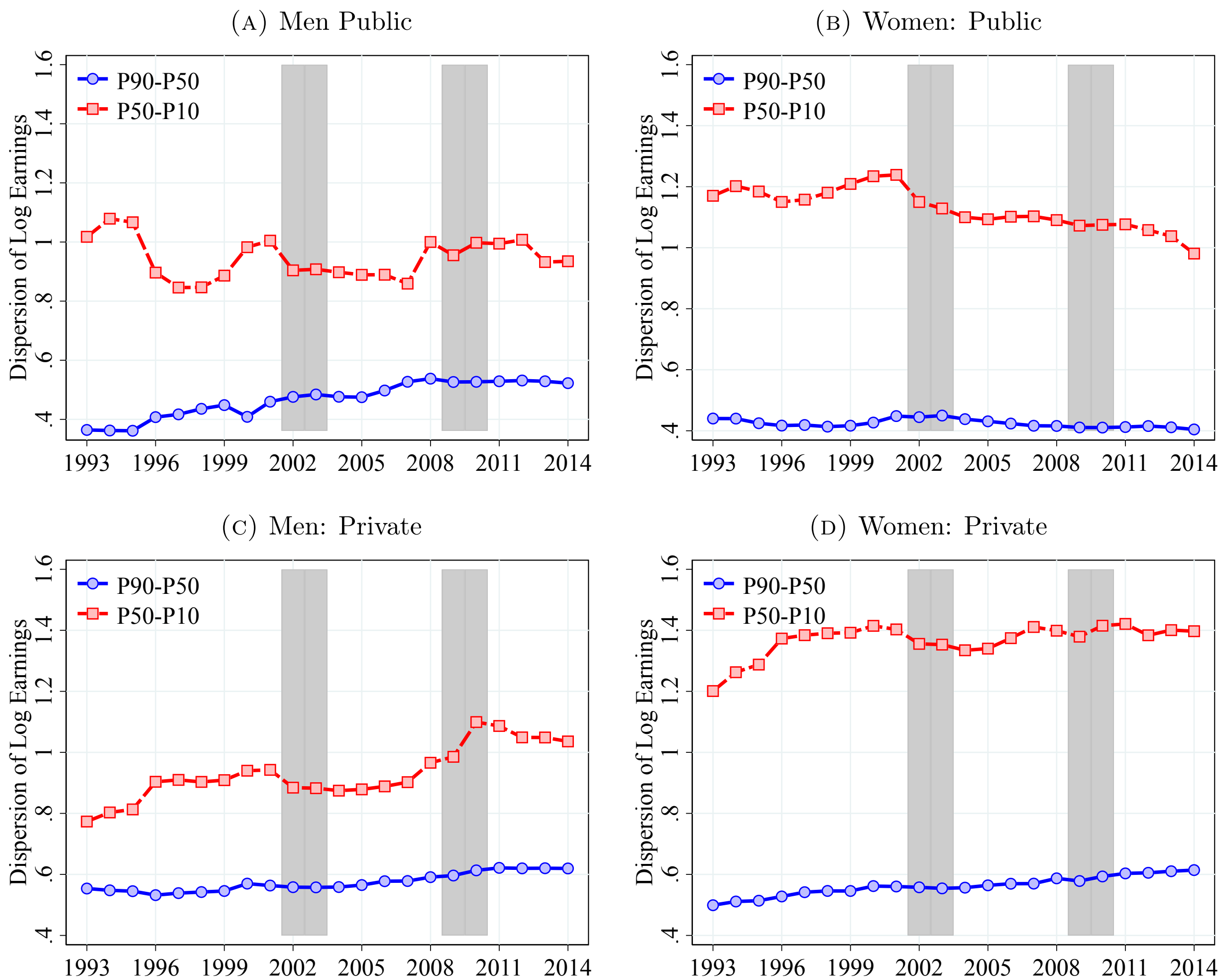


(d) Women: Private Sector



Notes: Figure OA.I.1 plot against time the following variables: (a and c) Men: P90-P10 and 2.56*SD of log income (b and d) Women: P90-P10 and 2.56*SD of log income. The value of 2.56*SD corresponds to the differential between the 10th and the 90th percentiles in a Normal distribution. Shaded areas represent recession years defined as years with unemployment rate growth 0.4 pp. or more, and an output gap of -0.5 or less. Results based on the CS sample. See Section 2 for sample selection and definitions. We have information on worker's sector only until 2014.

Figure OA.I.2 – Right- and Left-Tail Inequality for Public and Private Sector



Notes: Figure OA.I.2 plot against time the following variables: (a and c) Men: P90-P50 and P50-P10, (b and d) Women: P90-P50 and P50-P10. Shaded areas are recessions. The value of 2.56*SD corresponds to the differential between the 10th and the 90th percentiles in a Normal distribution. Shaded areas represent recession years defined as years with unemployment rate growth 0.4 pp. or more, and an output gap of -0.5 or less. Results based on the CS sample. See Section 2 for sample selection and definitions. We have information on worker's sector only until 2014.

B Earnings Mobility

We use a measure of "permanent income" to isolate the persistent component of earnings. This measure, however, is slightly different from the permanent income used in Section 3.2.3 (P_{it-1}). In particular, the new permanent income is estimated by averaging levels of earnings of a worker i between years t and $t-2$ to obtain $P^*_{it} = \frac{1}{3}\sum_{j=0}^{2} Y_{it-j}$. We compute this measure for workers who have at least one year of labor earnings above the minimum income threshold, Y_t^{min}. Unlike the permanent income measure in Section 3.2.3, we do not residualize P^*_{it} out of year and age effects. Instead, we rank workers within each year and age, which controls for age and time effects not only in means but also in other moments.

The top row of Table OA.II.1 shows the average permanent earnings in selected percentiles of P^*_{it} in 2015. We find substantial heterogeneity across the distribution. For example, for the middle 40% group, average permanent earnings are \$84,157 and \$60,381 per year for men and women, respectively. In the bottom decile of the P^*_{it} distribution, the average annual permanent earnings are less than \$12,000 (or less than \$1,000 per month). This sizable fraction of prime-age men with very little labor earnings raises the question of whether they have other sources of income such as self-employment income or social safety benefits. Our data from administrative sources allow us to investigate this question: The next two rows of Table OA.II.1 document average permanent self-employment income and permanent benefits in the same percentiles of the permanent income distribution.[34]

Indeed, workers at the lower end of the P^*_{it} distribution have substantial income from self-employment and from public benefits. For example, the average self-employment income of men in the bottom decile of P^*_{it} is higher than their permanent earnings (14,250 US\$ versus 11,149 US\$). However, self-employment income declines sharply to less than \$1,000 for workers above the 30th percentile. Public benefits are an even more important source of income throughout the P^*_{it} distribution, especially for women, ranging from almost \$29,000 in the bottom P^*_{it} decile to more than \$5,000 in the top decile.

[34] Benefits include unemployment benefits, sickness benefits, paid parental leave, remuneration for participation in various government activity programs, disability benefits, public pensions, and other social welfare payments. Self-employment income includes business income. We construct permanent self-employment income and permanent benefits in the same way we compute P^*_{it} (i.e., by averaging them between $t-2$ and t).

Table OA.II.1 – Permanent Earnings Distribution in 2015

Average Income (2018 US$) by Percentiles of P^*_{it}										
	Men					Women				
$P^*_{it} \rightarrow$	1-10	11-30	31-70	71-90	91-100	1-10	11-30	31-70	71-90	91-100
Earnings	11,149	48,636	84,157	124,065	205,345	7,657	32,054	60,381	87,184	134,858
SE Inc	14,257	3,322	648	401	526	4,198	1,552	460	260	312
Benefits	22,348	9,675	3,367	2,212	1,915	28,742	18,930	10,726	6,032	5,231

Notes: Table OA.II.1 shows the average permanent earnings, self-employment income (SE Inc), and benefits for individuals in selected quintiles of the permanent earnings (P^*_{it}) distribution in 2015. All nominal values are deflated to their 2018 real values using the Consumer Price Index in Norway. To make our results comparable across countries, we convert NOK values to US dollars using the 2018 exchange rate.

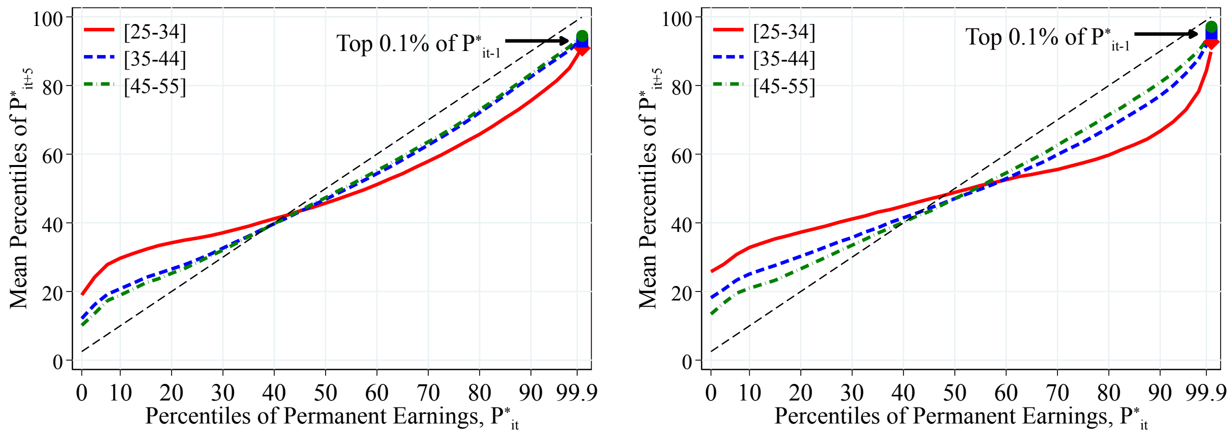
B.1 Average Rank-Rank Mobility

We calculate the average rank-rank mobility which shows the expected position of an individual in the income distribution in year $t+k$ conditional on the individual's position in year t. We rank workers into 40 quantiles in period t within each gender and age with respect to their permanent income, P^*_{it}, and we put the top 0.1% earners in a separate group. Then, for each income quantile, age, and gender, we calculate individuals' average rank (out of 100) in the future permanent income distribution in $t+k$.[35] In section 3.3, we present this average rank-rank mobility measure between t and $t+10$ (10-year mobility) and the results for 5-year mobility are presented below.

[35] In the analysis of mobility between t and $t+k$, our sample includes individuals who have non-missing observations of permanent income in both t and $t+k$.

Figure OA.II.1 – Income Mobility: Rank-Rank Measures by Age: Five-Years Change

(a) Men (b) Women



Notes: Figure OA.II.1 shows the average rank obtained by individuals in period $t+5$ in the distribution of (alternative) permanent earnings, P^*_{it+5}, within different percentiles of the distribution of (alternative) permanent earnings in period t, P^*_{it}. To construct this figure, we calculate the average rank in $t+5$ for each year in our sample between 1993 and 2007 (the last years in which a ten-year change can be calculated) for each age group. We then average across all years in our sample.

B.2 Income Transition Matrices

So far, our analysis has focused on the *average* rank-rank mobility of permanent earnings. To capture a more complete picture of workers' income transition dynamics, here we investigate where exactly individuals end up in the income distribution in year $t+k$, conditional on their rank in year t, by constructing first-order Markov transition matrices. In our analysis, we again use P^*_{it+k}, as our measure of income and rank workers within age and gender groups. We then define the following states in our transition matrices: the first four quintiles of the P^*_{it+k} distribution, the next 15 percentiles (81st-95th percentiles), the next 4 percentiles (96th-99th percentiles), the top 1% excluding the top 0.1%, and finally, the top 0.1% of the distribution. Furthermore, instead of dropping individuals who have no significant labor income three years in a row in $t+k$ (i.e., missing P^*_{it+k} observations) from our transition matrices, we explicitly investigate whether individuals have other sources of income. In particular, we add three more states that describe the status of individuals with missing P^*_{it+k} observations: self-employed workers (who have permanent self-employment income above the minimum income threshold Y^{min}_t), individuals with permanent public benefits greater than Y^{min}_t, and individuals who do not have any significant income (i.e., total permanent income less than Y^{min}_t).[36]

[36] In every year, 1.8% of individuals have missing income observations because of emigration or death.

Figure OA.II.2 – Permanent Earnings Mobility: Transition Matrix

(A) Men (B) Women

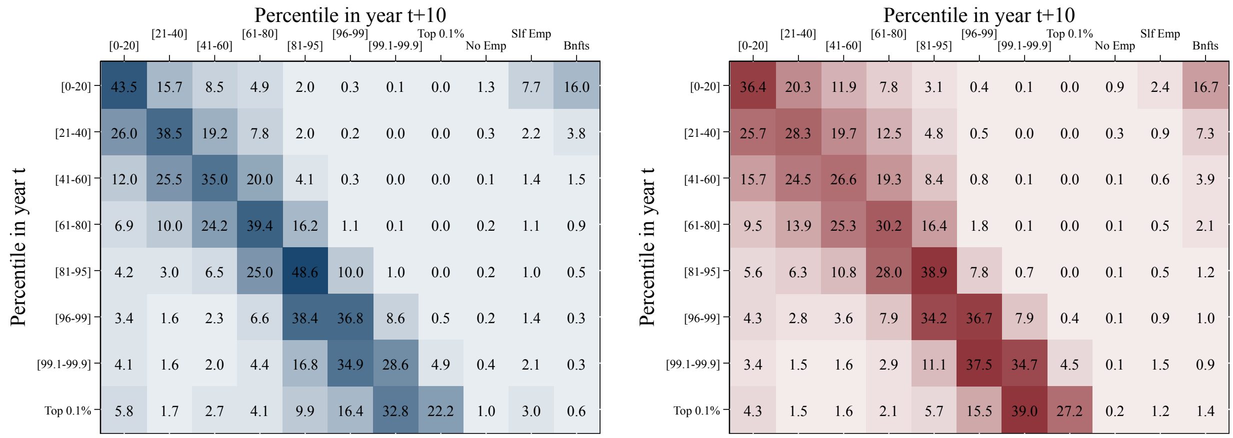


Figure OA.II.2 shows a first-order transition matrix of individuals' permanent earnings between periods t and $t+10$ for a sample of workers between 35 and 44 years old. To construct this figure, we calculate permanent earnings for workers between the years 1995 and 2007 (the first and last years for which we can calculate permanent earnings and 10-year changes). No Emp. corresponds to individuals whose permanent earnings is below the minimum income threshold and those who do not have significant self-employment income or social security benefits in period $t+10$. Slf Emp (Bnfts) corresponds to individuals whose permanent earnings are below the minimum income threshold but the average level of self-employment income (benefits) over the last three years is above the minimum income threshold. We then calculate the share of individuals transitioning between the predefined states for each year. Finally, we average the shares across all possible years.

Figure OA.II.2 presents 10-year transition matrices for men and women between 35 and 44 years old. To understand this figure, notice that the color intensity of each cell reflects the transition probability between the corresponding row and column shown in the cell. So, the darker the cell, the more likely the transition between two quantiles. For both men and women, the diagonal cells and their close neighbors are darker than the rest, indicating that most individuals remain in their original states even after 10 years, and if they move, they do not move far. This is especially true at the top and bottom of the distribution. For instance, among men, the probabilities in the diagonal cells (i.e., probability of staying the same state) decrease from 44% for the bottom quintile to 35% for the third quintile and then increase to 49% between the 81st and 95th percentiles. More broadly, remaining in the same state or transitioning into one of the neighboring states constitutes more than 60% of the cases. These findings suggest that individual rankings in the income distribution are quite persistent. These results hold for different age groups and different transition periods (see Figures OA.II.3 and OA.II.4).

Figure OA.II.3 – Permanent Earnings Mobility: Five-Year Transition Matrix

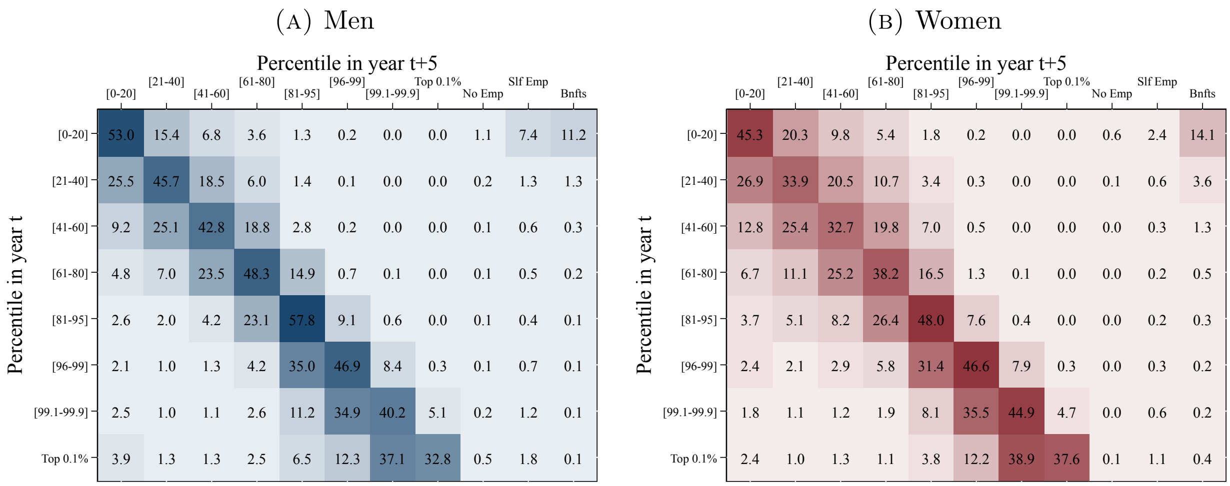


Figure OA.II.3 shows a first-order transition matrix of individuals' permanent earnings between periods t and $t+5$ for a sample of workers between 35 and 44 years old. To construct this figure we calculate permanent earnings for workers between years 1995 and 2007 (the first and last years for which we can calculate permanent earnings and 10-year changes). No Emp. correspond to individuals whose permanent earnings is below the minimum income threshold and do not have significant self employment income or social security benefits in period $t+10$. Slf Emp (Bnfts) corresponds to individuals whose permanent earnings are below the minimum income threshold but the average level of self employment income (benefits) over the last three years is above the minimum income threshold. We then calculate the share of individuals transitioning between the predefined states for each year. Finally, we average the shares across all possible years.

Figure OA.II.4 – Permanent Earnings Mobility: Fifteen-Year Transition Matrix

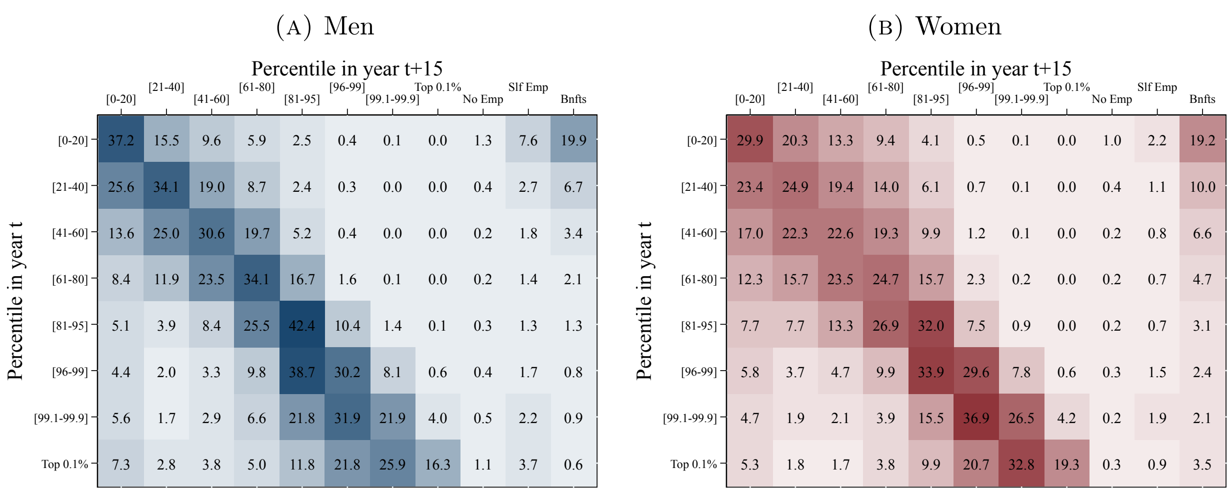


Figure OA.II.4 shows a first-order transition matrix of individuals' permanent earnings between periods t and $t+15$ for a sample of workers between 35 and 44 years old. To construct this figure we calculate permanent earnings for workers between years 1995 and 2007 (the first and last years for which we can calculate permanent earnings and 10-year changes). No Emp. correspond to individuals whose permanent earnings is below the minimum income threshold and do not have significant self employment income or social security benefits in period $t+10$. Slf Emp (Bnfts) corresponds to individuals whose permanent earnings are below the minimum income threshold but the average level of self employment income (benefits) over the last three years is above the minimum income threshold. We then calculate the share of individuals transitioning between the predefined states for each year. Finally, we average the shares across all possible years.

Zooming into the top 1% of the distribution, we find that persistence is even higher at the top of the income distribution. For example, 35.6% of male workers who are in the top 1% in year t appear again in the same income bracket after 10 years. More interestingly, there are very few transitions between the lower and top ends of the distribution and vice versa. For example, most (more than 99.5% of) workers in the top 0.1% of the distribution in year $t + 10$ were already in the top 5% in year t. Similarly, very few workers who are in the top 0.1% of the income distribution in year t end up outside of the top 5% in year $t + 10$. Specifically, less than 25% of the top 0.1% earners fell below the 95th percentile in year $t + 10$. This finding is inconsistent with calibrations of earnings processes with shocks that increase earnings to very high levels (e.g., the top 0.1%) but only temporarily (see Castaneda *et al.*, 2003). For women, top incomes are even more persistent, with a 42% probability of staying in the top 1% after 10 years.

When we say that 35.6% of workers appear again in the top 1% after 10 years we do not know whether this transition probability is the same for all workers just by looking at the results shown in Figure OA.II.5. For example, it may be that 35.6% of workers are always in the top income group and the rest temporarily appear in the top 1% only in year t, or that all top earners have the same probability of staying in the top 1%. These two different income dynamics have very different implications for consumption and saving decisions and portfolio allocation. To investigate the possible heterogeneity in the persistence of top incomes, we calculate the number of years a top earner in year t reappears in the top 1% over the next 10 years. In other words, we follow the top earners for the next 10 years and document the numbers of years they stay in the top 1%.

Our results, displayed in Figure OA.II.5, show that 12% of men at the top 1% of the permanent earnings distribution (Panel A) in year t do not appear at the top again over the next 10 years, whereas 11% will appear only one more time during the same period, and so on. Interestingly, around a quarter of the top 1% earners never leave that group over the next 10 years. The results are even more striking for women (Panel B): Almost one-third of the female top earners stay in the top 1% for 10 years in a row. This finding is consistent with our results from the transition matrices for women that show a higher probability of staying in the top 1%. Whether these findings are consistent with a simple first-order Markov process or whether there are ex ante differences in income dynamics among the top earners is an open question and beyond the scope of this paper.

When the top earners leave top 1% income group, where do they end up? How likely they never leave top 5% or top 10% income groups? Figure OA.II.6 shows the fraction of the top 1% of earners in year t that never leaves the top income groups (top 1%, 5%, and

FIGURE OA.II.5 – NUMBER OF YEARS STAYING AT THE TOP 1% OVER 10 YEARS

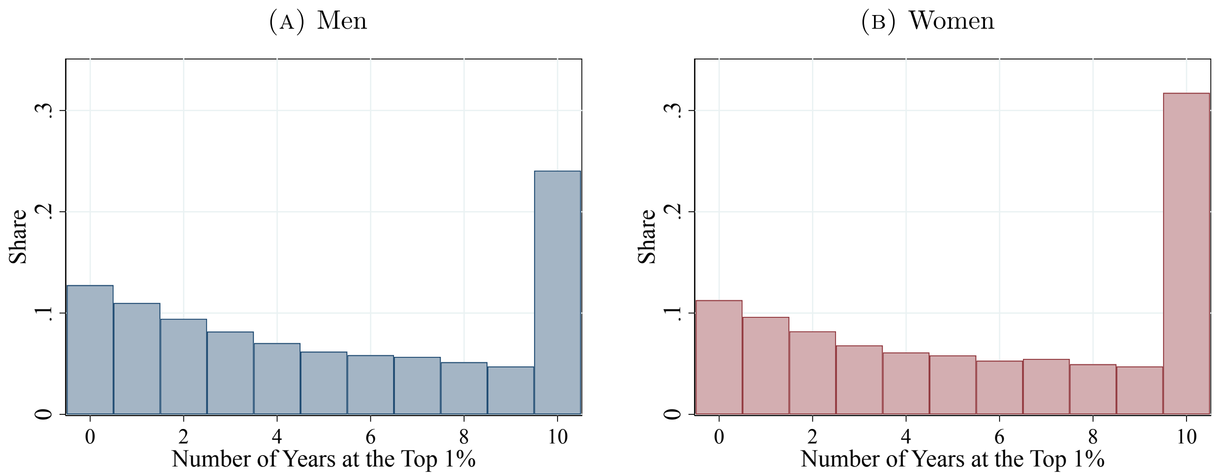


Figure OA.II.5 shows the fraction of top 1% workers in year t that appear in the same income group between $t+1$ and $t+10$ for 0 years, for 1 year, for 2 years, and so on. To construct this figure, we pool all observations between the years 1995 and 2007 (the first and last years for which we can calculate permanent earnings and 10-year changes).

10%) over the next ten years as well as those who never appear again in these percentiles during the same time period.

Our results show that around a quarter of the men in the top 1% the permanent earnings distribution in year t never leave that group over the next 10 years (Panel A). If we relax the definition of the top income group, then 60% and 75% of the top 1% earners never leave the top 5% and top 10% the income distribution, respectively. As for the opposite case, only 12% of the top 1% of earners do not appear at the top 1% again over the next 10 years. Almost all of them will appear again in the top 5% and top 10% the income distribution at least once during the same period.

Interestingly, the results are even more striking for women (Panel B): Almost one-third of the top earnings women stay in the top 1% for 10 years in a row. And around 75% and 85% of them never leave the top 5% and top 10% the income distribution, respectively. Whether these findings are consistent with a simple first-order Markov process or whether there are ex ante differences in income dynamics for the top earners is an interesting open question and beyond the scope of this paper.

Figure OA.II.6 – Number of Years Staying at the Top 1% over 10 Years

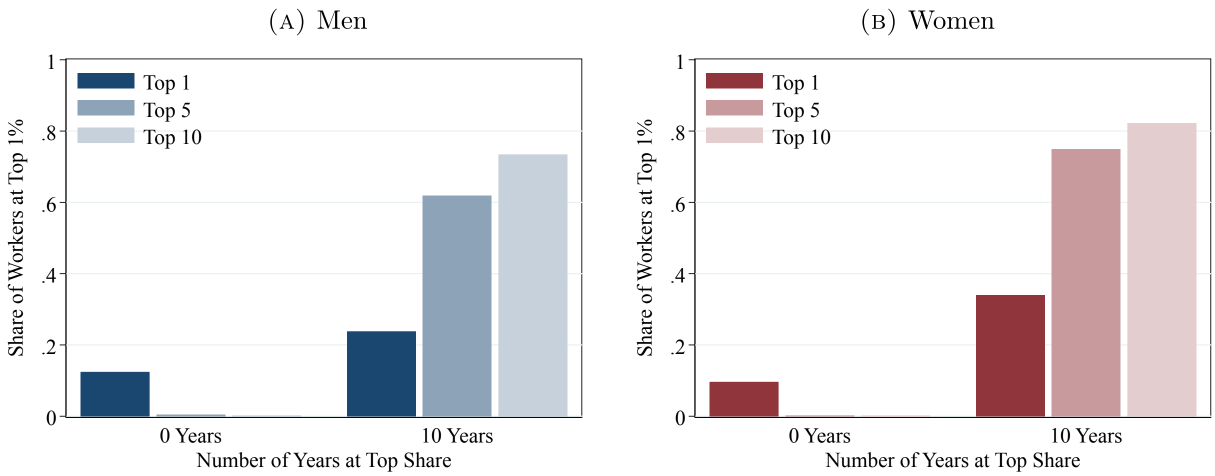
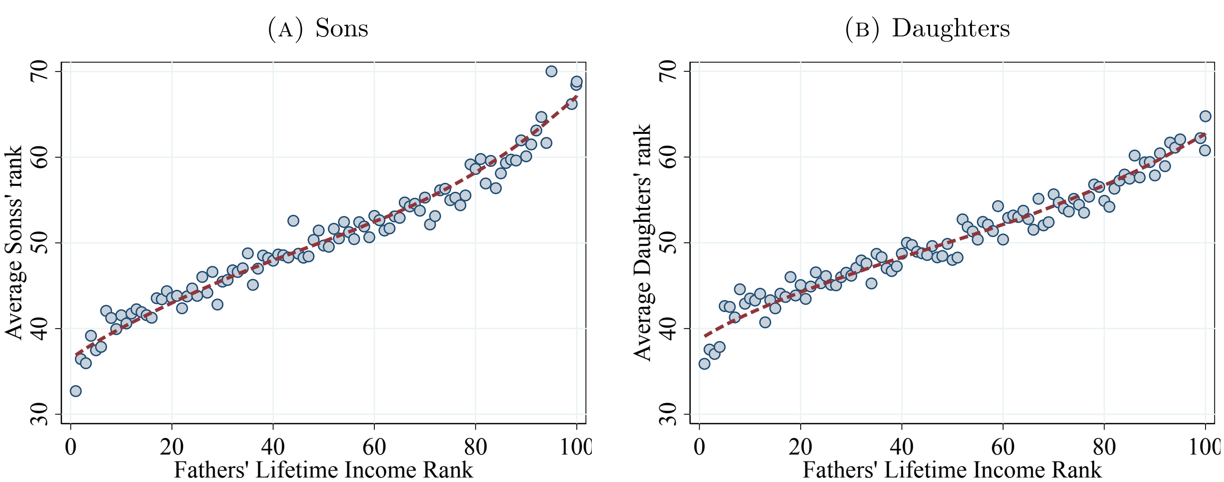


Figure OA.II.6 shows the fraction of top 1% workers in year t that appear in the same income group between years $t+1$ and $t+10$ for 0 years (i.e. they do not appear again in top group) or 10 years (they appear in top 1% in all years). To construct this figure, we pool all observations between the years 1995 and 2007 (the first and last years for which we can calculate permanent earnings and 10-year changes).

C Intergenerational Income Dynamics

C.1 Intergenerational Transition Matrices

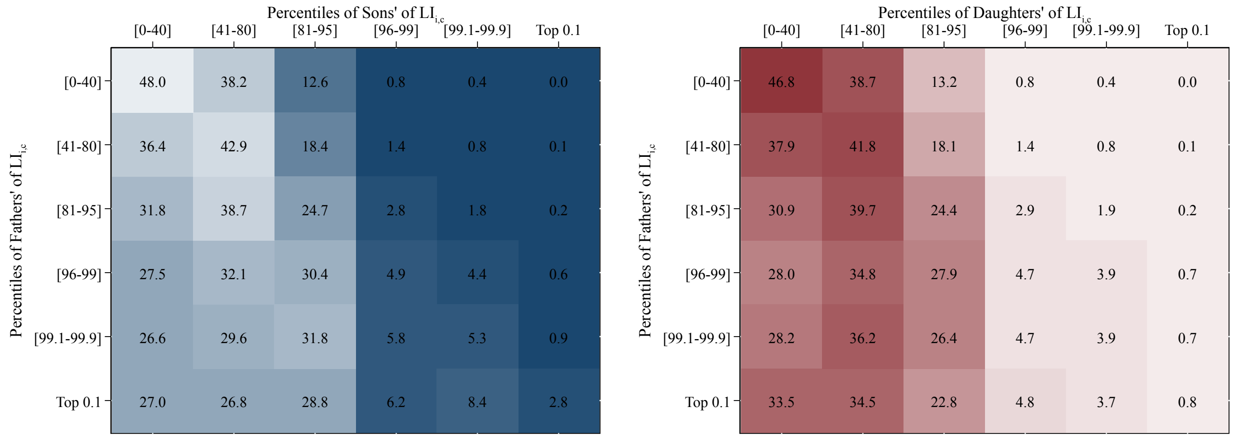
Figure OA.III.1 – Fathers and Children Rank-Rank Correlation



Notes: Figure OA.III.1 shows the average lifetime income rank of the children conditional on fathers' lifetime income rank.

Figure OA.III.2 – Intergenerational Lifetime Income Mobility

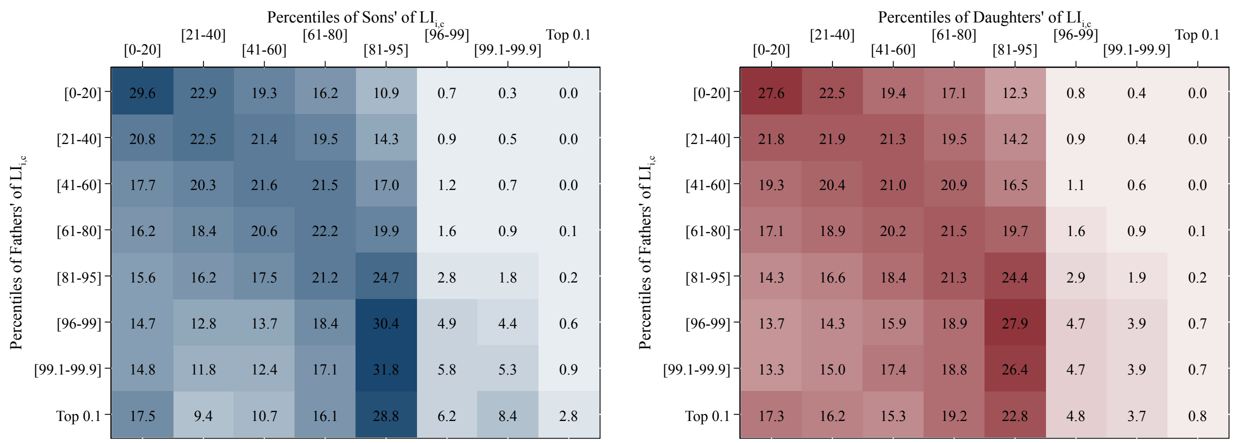
(a) Sons (b) Daughters



Notes: Figure OA.III.2 uses fathers' and children's income data for a pooled sample of individuals between 1967 and 2012. The matrix shows the transition probabilities between selected quantiles of fathers' lifetime incomes (rows) and children's lifetime incomes (columns) for men and women. Each row sums to 100%. To construct this figure, we rank fathers, sons, and daughters separately among their peers with respect to their lifetime incomes, $LI_{i,c}$.

Figure OA.III.3 – Intergenerational Lifetime Income Mobility

(a) Sons (b) Daughters

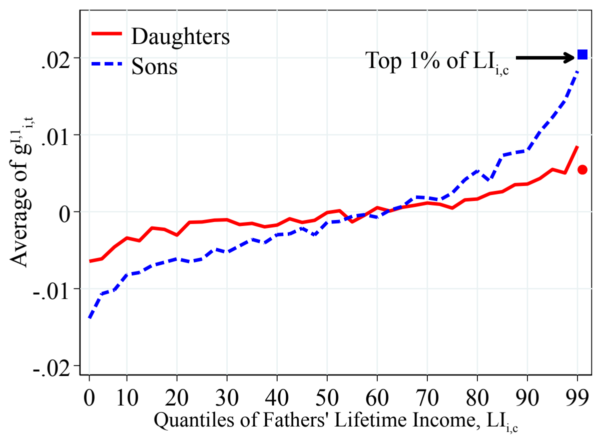


Notes: Figure OA.III.3 uses fathers' and children's income data for a pooled sample of individuals between 1967 and 2012. The matrix shows the transition probabilities between selected quantiles of fathers' lifetime incomes (rows) and children's lifetime incomes (columns) for men and women. Each row sums to 100%. To construct this figure, we rank fathers, sons, and daughters separately among their peers with respect to their lifetime incomes, $LI_{i,c}$.

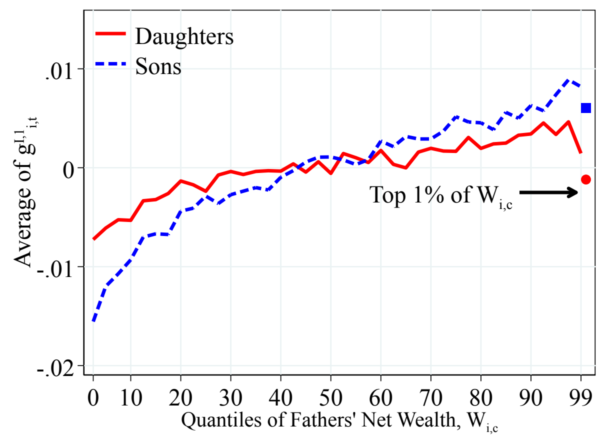
C.2 Fathers' Resources and Children's One-Year Income Growth

Figure OA.III.4 – Average Log Earnings Growth by Fathers' Resources

(a) By Lifetime Income



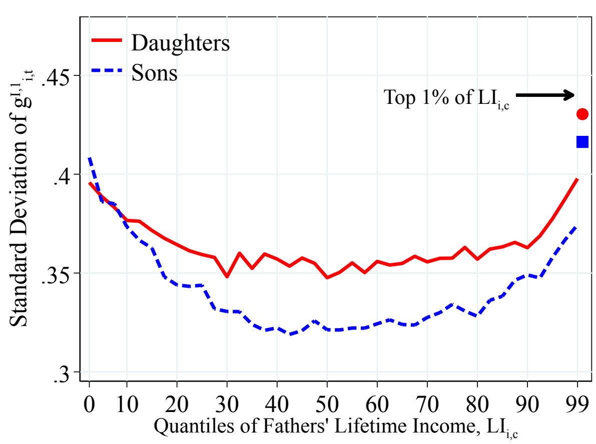
(b) By Net Wealth



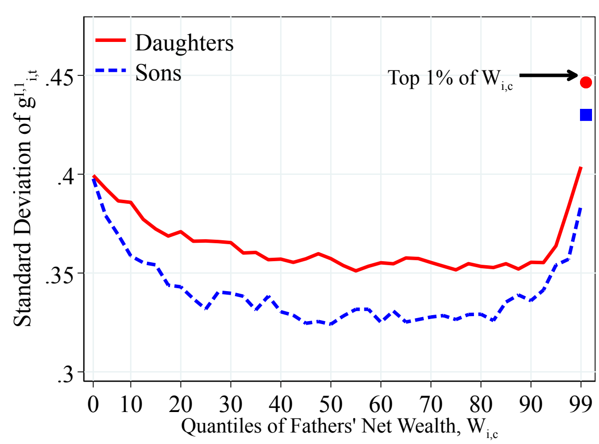
Notes: Figure OA.III.4 shows the average of one-year residual earnings growth for men and women within quantiles of fathers' lifetime income distribution (Panel A) and fathers' household net wealth distribution (Panel B) in 40 quantiles. Each line was been normalized to have a mean of 0. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th and 99th percentile and above) for a total of 41 quantiles. The markers identify the children of fathers at the top 1% of the lifetime income and wealth distributions. We show the average across annual moments between 1990 and 2012 as we require that individuals have non missing one- and five-year changes.

Figure OA.III.5 – Std. Dev. of Log Earnings Growth by Fathers' Resources

(a) By Lifetime Income



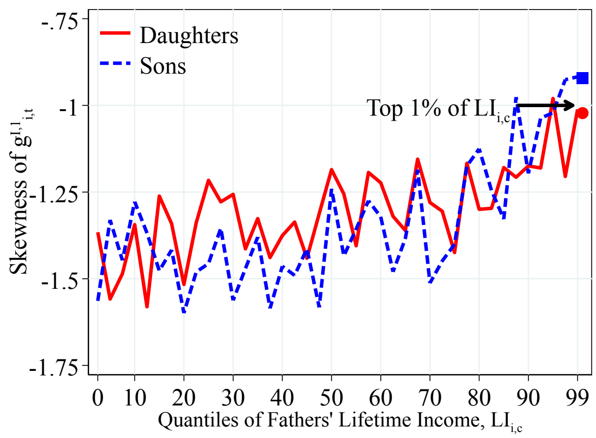
(b) By Net Wealth



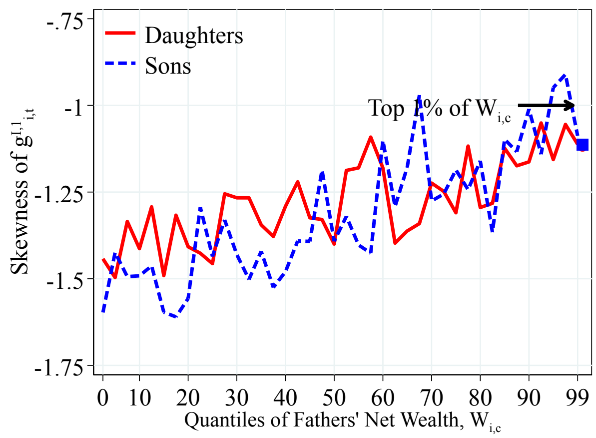
Notes: Figure OA.III.5 shows the standard deviation of one-year residual earnings growth for men and women within quantiles of fathers' lifetime income distribution (Panel A) and fathers' household net wealth distribution (Panel B) in 40 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th and 99th percentile and above) for a total of 41 quantiles. The markers identify the children of fathers at the top 1% of the lifetime income and wealth distributions. We show the average across annual moments between 1990 and 2012 as we require that individuals have non missing one- and five-year changes.

Figure OA.III.6 – Skewness of Log Earnings Growth by Fathers' Resources

(A) By Lifetime Income



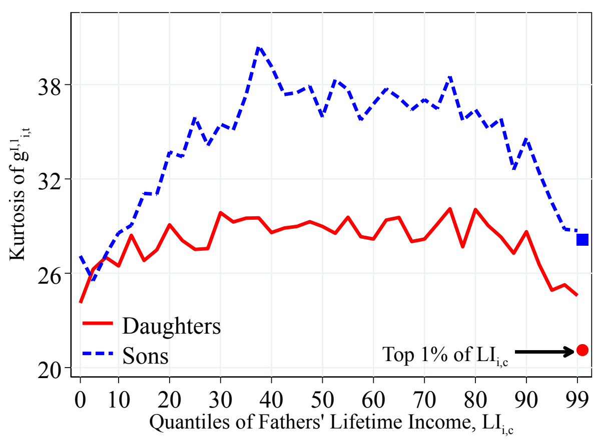
(B) By Net Wealth



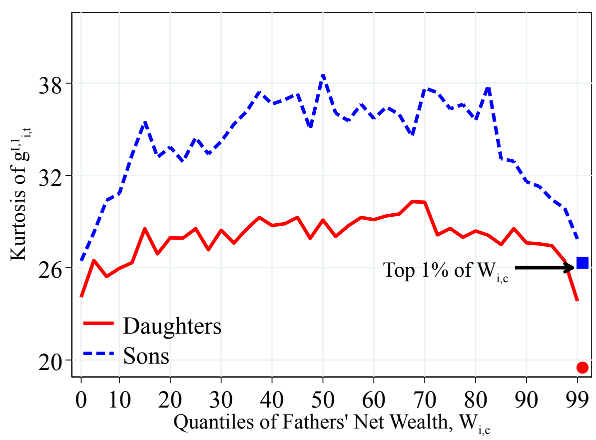
Notes: Figure OA.III.6 shows the third standardized moment of one-year residual earnings growth for men and women within quantiles of fathers' lifetime income distribution (Panel A) and fathers' household net wealth distribution (Panel B) in 40 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th and 99th percentile and above) for a total of 41 quantiles. The markers identify the children of fathers at the top 1% of the lifetime income and wealth distributions. We show the average across annual moments between 1990 and 2012 as we require that individuals have non missing one- and five-year changes.

Figure OA.III.7 – Kurtosis of Log Earnings Growth by Fathers' Resources

(A) By Father's Lifetime Income



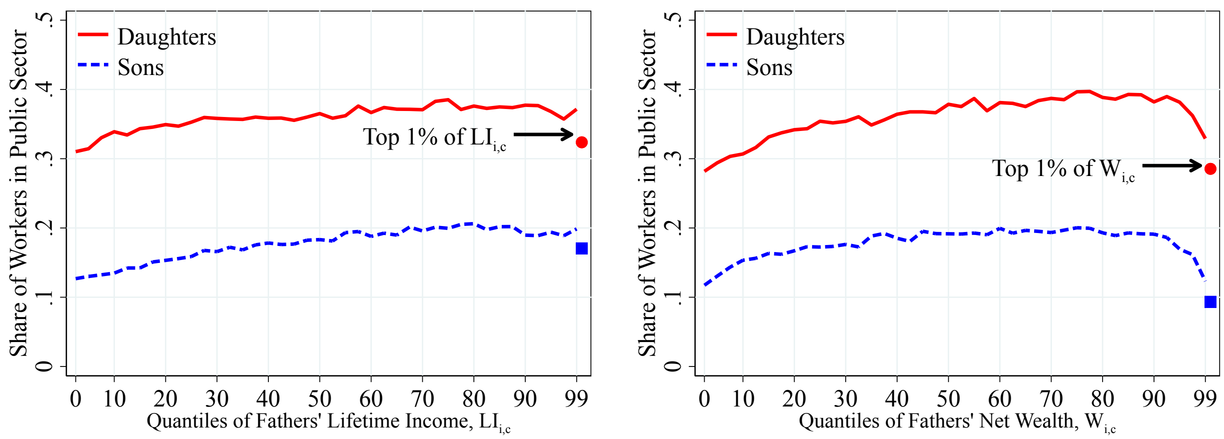
(B) By Father's Net Wealth



Notes: Figure OA.III.7 shows the excess kurtosis (the fourth standardized moment minus 3) of the one-year residual earnings growth for men and women within quantiles of fathers' lifetime income distribution (Panel A) and fathers' household net wealth distribution (Panel B) in 40 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th and 99th percentile and above) for a total of 41 quantiles. We show the average across annual moments between 1990 and 2017. Markers show the average for children whose parents were at the top 1% of the corresponding distribution.

Figure OA.III.8 – Share of Public Sector Workers by Fathers' Resources

(A) By Lifetime Income (B) By Net Wealth

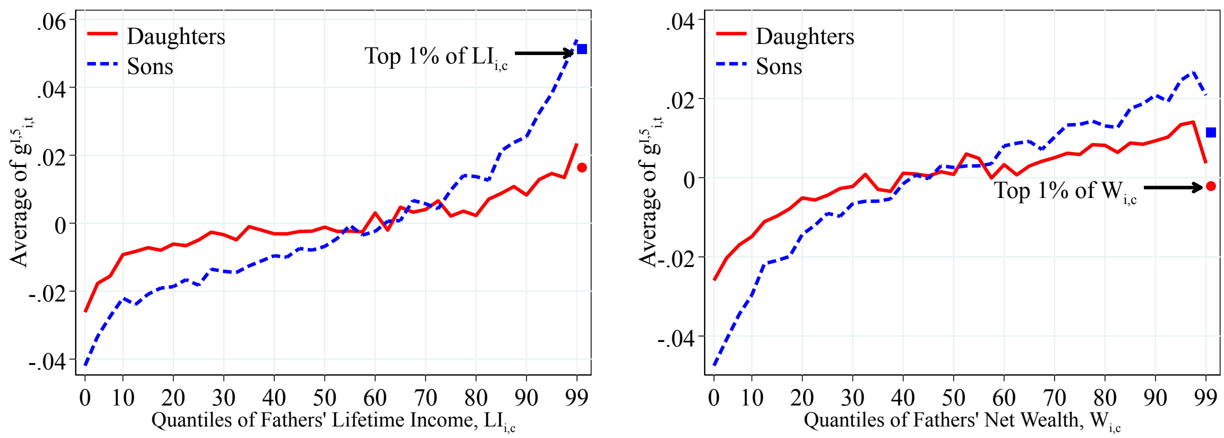


Notes: Figure OA.III.8 shows share of public sector workers for men and women within quantiles of fathers' lifetime income distribution (Panel A) and fathers' household net wealth distribution (Panel B) in 40 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th and 99th percentile and above) for a total of 41 quantiles. The markers identify the children of fathers at the top 1% of the lifetime income and wealth distributions. We show the average across annual moments between 1990 and 2012 as we require that individuals have non missing one- and five-year changes.

C.3 Parents and Children's Five-Year Income Growth Moments

Figure OA.III.9 – Mean 5-Year Log Earnings Growth by Fathers Resources

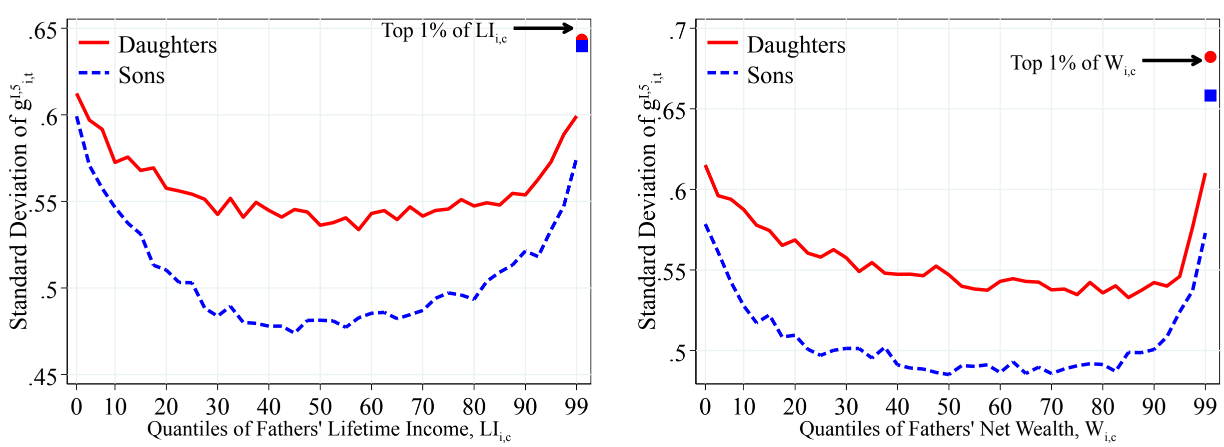
(A) By Lifetime Income (B) By Net Wealth



Notes: Figure OA.III.9 shows the average of the five-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.10 – Dispersion of 5-Year Log Earnings Growth by Fathers Resources

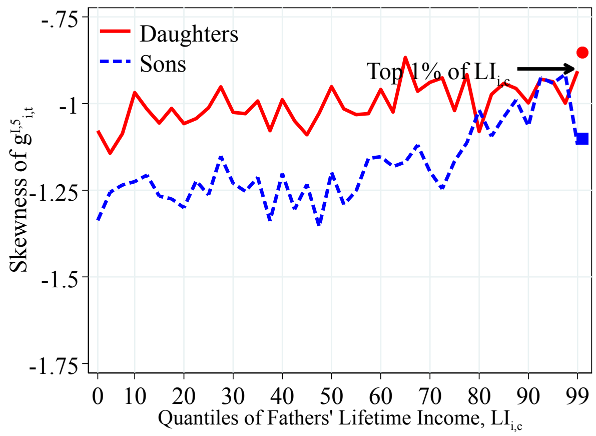
(A) By Lifetime Income (B) By Net Wealth



Notes: Figure OA.III.10 shows the standard of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.11 – Skewness of 5-Year Log Earnings Growth by Fathers Resources

(A) By Lifetime Income



(B) By Net Wealth

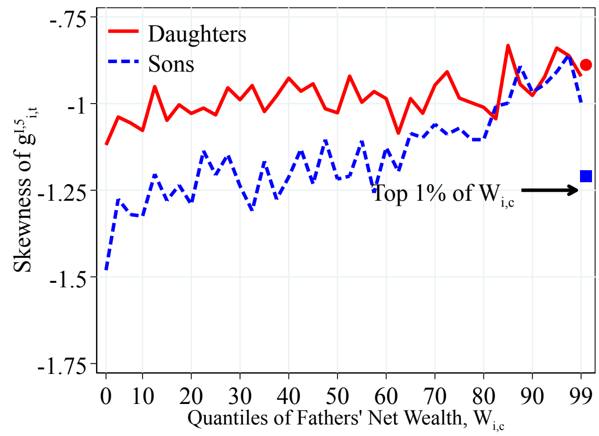
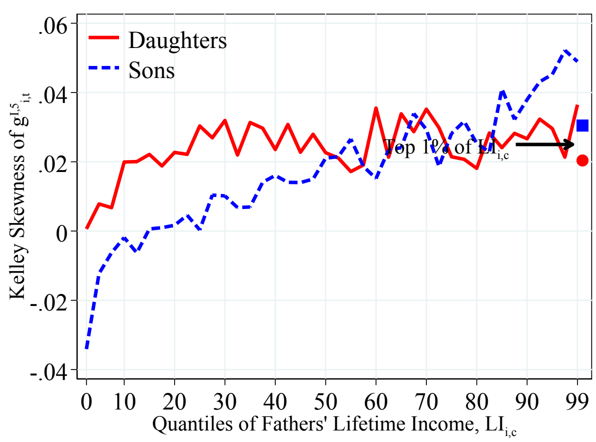


Figure OA.III.11 shows the skewness (third standardized moment) of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.12 – Kelley of 5-Year Log Earnings Growth by Fathers Resources

(A) By Lifetime Income



(B) By Net Wealth

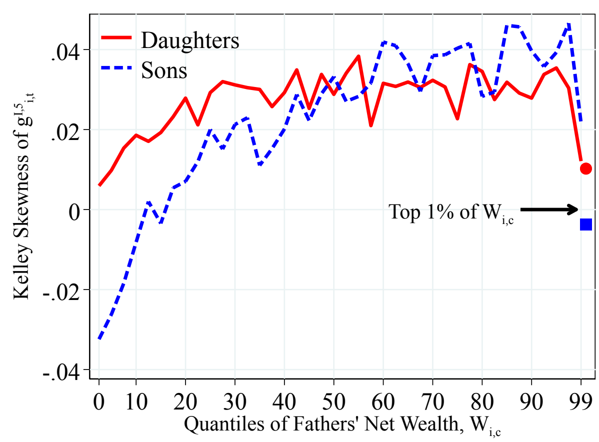


Figure OA.III.12 shows the Kelley skewness of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.13 – Left-Tail Dispersion of 5-Year Log Earnings Growth By Fathers Resources

(A) By Lifetime Income

(B) By Net Wealth

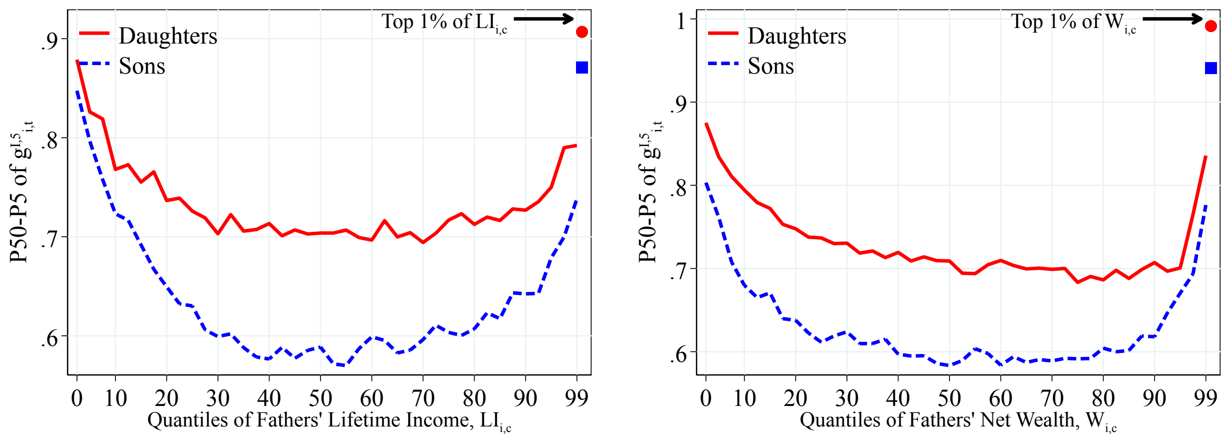


Figure OA.III.13 shows the P50-P5 percentiles differential of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.14 – Right-Tail Dispersion of 5-Year Log Earnings Growth by Fathers Income

(A) By Lifetime Income

(B) By Net Wealth

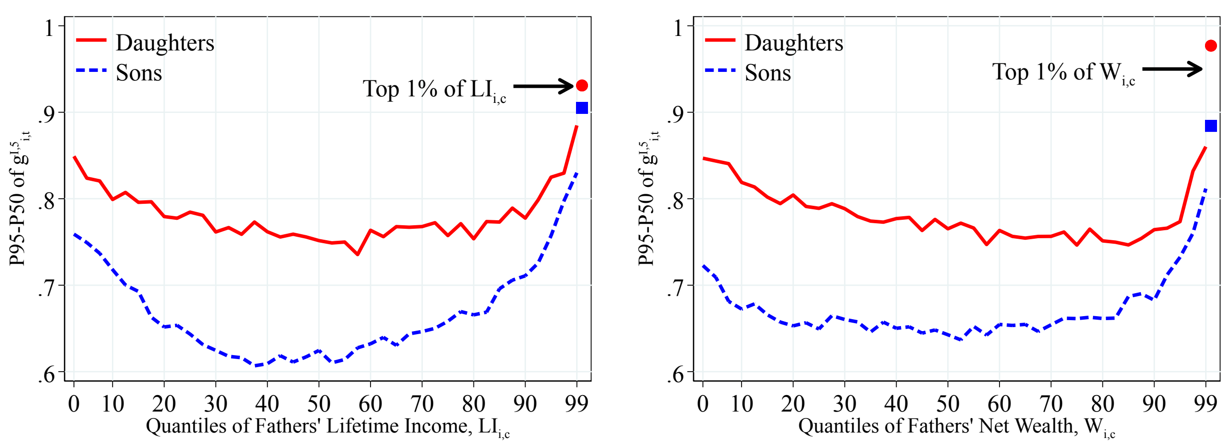
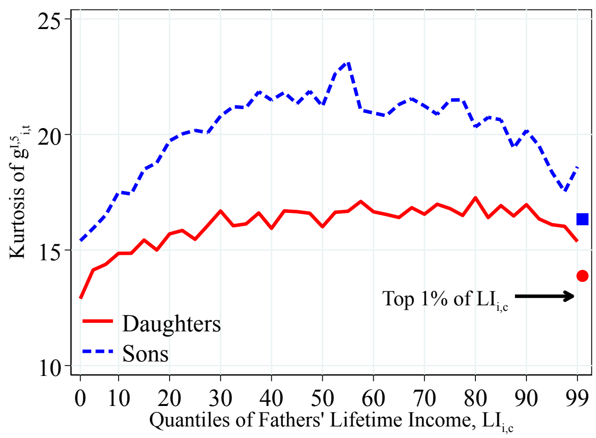


Figure OA.III.14 shows the P95-50 percentiles differential of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.15 – Kurtosis of 5-Year Log Earnings Growth by Fathers Income

(A) By Father's Lifetime Income



(B) By Father's Net Wealth

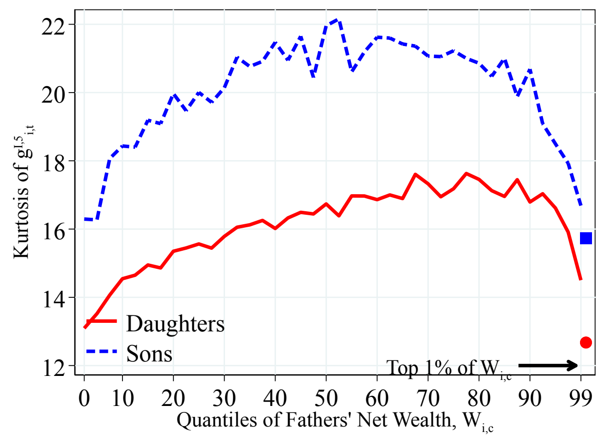
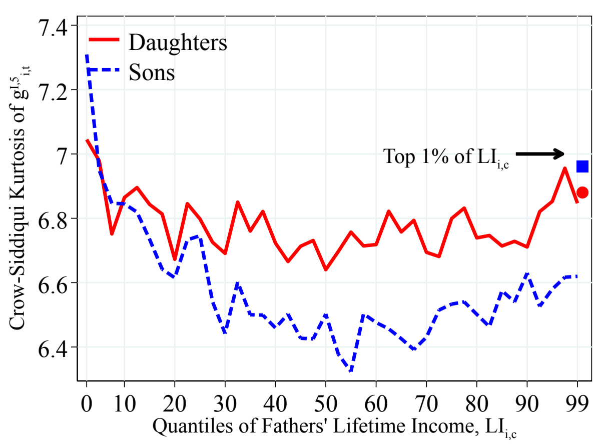


Figure OA.III.15 shows the kurtosis (fourth standardized moment) of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution . We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

Figure OA.III.16 – Crow-Siddiqui Kurtosis of 5-Year Log Earnings Growth by Fathers Income

(A) By Father's Lifetime Income



(B) By Father's Net Wealth

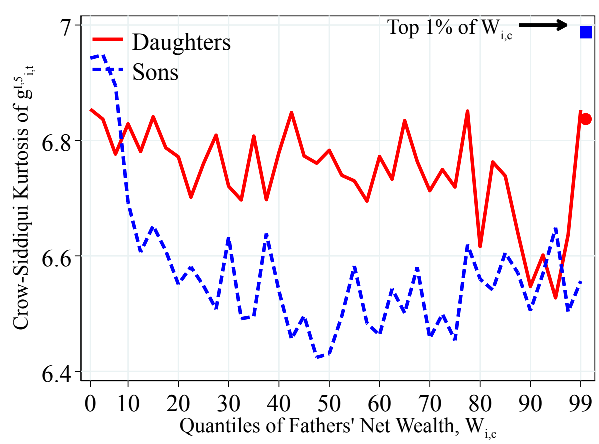
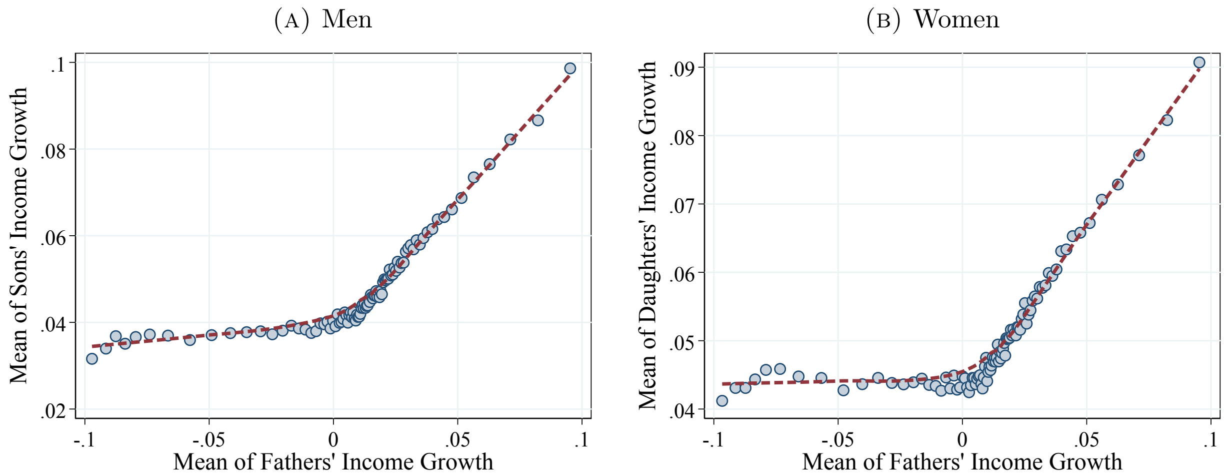


Figure OA.III.16 shows the Crow-Siddiqui kurtosis of the one-year residual earnings growth for men and women within quantiles of the father's lifetime income distribution (Panel A) and the fathers' households net wealth distribution (Panel B) for a total of 41 quantiles. The top 2.5% of the distribution is further separated in two groups (97.5th to 99th percentiles and 99th percentile and above). In each plot, the lines represent are the average across all years in the sample starting in 1990. The solid markers show the corresponding value among children whose parents were at the top 1% of the corresponding distribution. We estimate residual income growth as the growth rate of the residual of a year-by-year regression of log income on a set of age dummies. We run this regression separately for men and women.

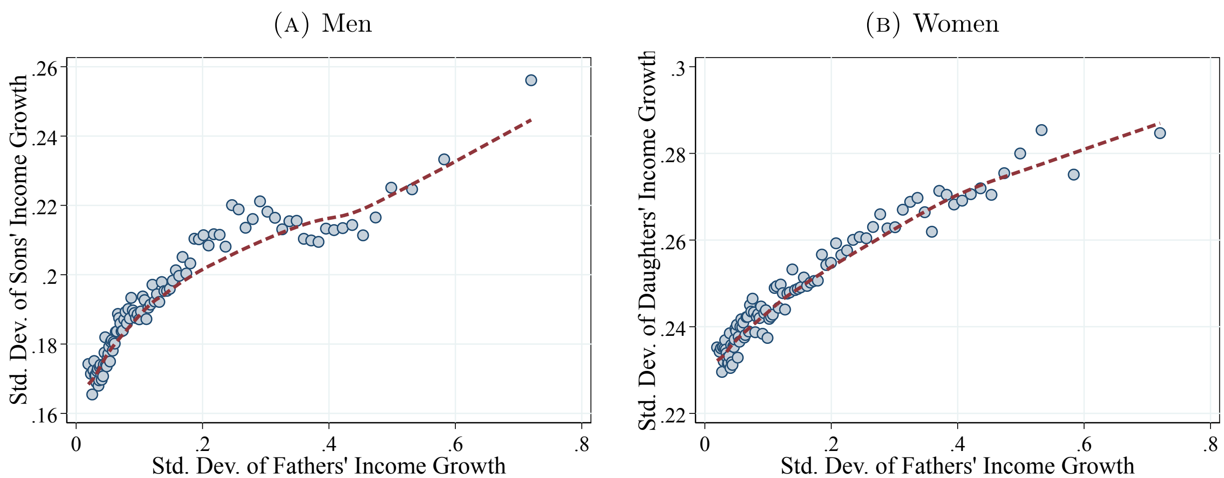
C.4 Fathers' and Children's Income Dynamics: Extra Results

Figure OA.III.17 – Average of Income Growth of Fathers and Children



Notes: Figure OA.III.17 shows a binned scatter plot of fathers and children mean income growth. The scatter plot is based on a sample of 494,514 fathers-sons pairs (left plot) and 471,229 fathers-daughters pairs (right plot). The sample is divided into 100 bins.

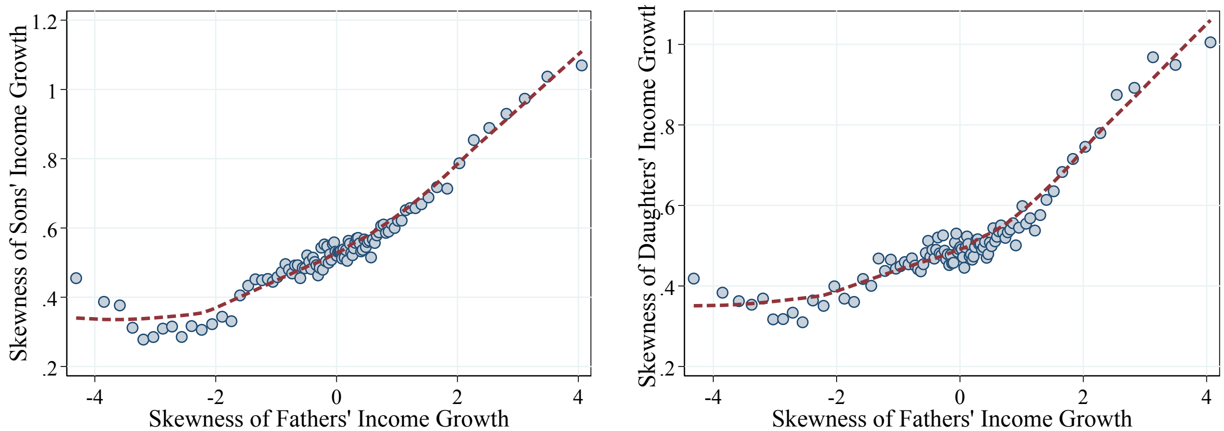
Figure OA.III.18 – Standard Deviation of Income Growth of Fathers and Children



Notes: Figure OA.III.18 shows a binned scatter plot of fathers and children income growth dispersion measured by the individual-level standard deviation. The scatter plot is based on a sample of 494,514 fathers-sons pairs (left plot) and 471,229 fathers-daughters pairs (right plot). The sample is divided into 100 bins.

Figure OA.III.19 – Skewness of Income Growth of Fathers and Children

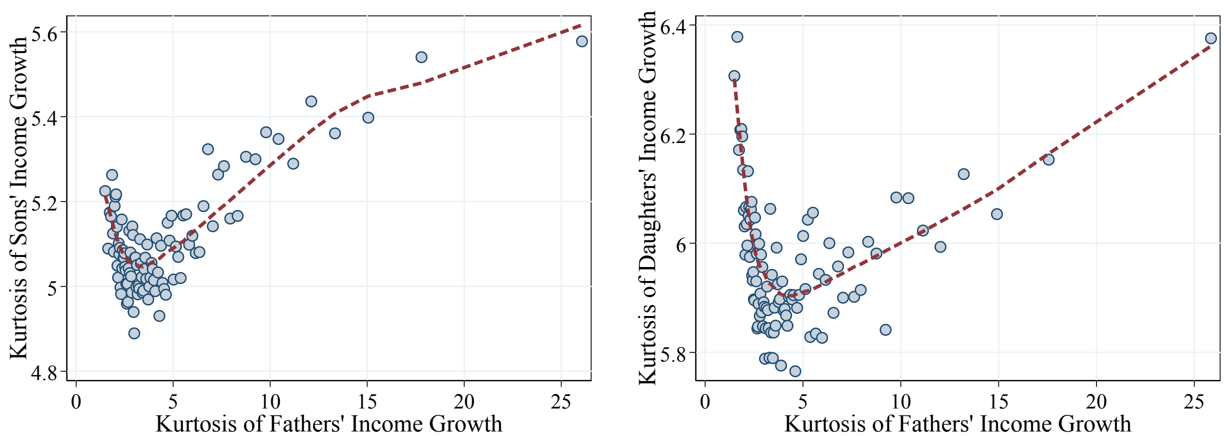
(a) Men (b) Women



Notes: Figure OA.III.19 shows a binned scatter plot of fathers and children income growth skewness measured by the individual-level third standardized moment. The scatter plot is based on a sample of 494,514 fathers-sons pairs (left plot) and 471,229 fathers-daughters pairs (right plot). The sample is divided into 100 bins.

Figure OA.III.20 – Crow-Siddiqui of Income Growth of Fathers and Children

(a) Men (b) Women

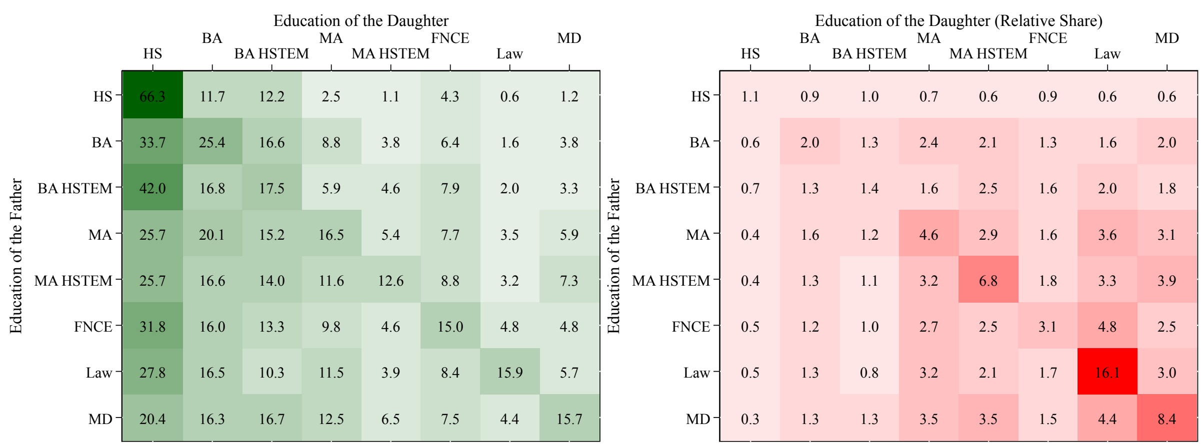


Notes: Figure OA.III.20 shows a binscatter plot of fathers and children income growth kurtosis measured by the individual-level Crow-Siddiqui kuetosis. The scatter plot is based on a sample of 494,514 fathers-sons pairs (left plot) and 471,229 fathers-daughters pairs (right plot). The sample is divided into 100 bins.

Figure OA.III.21 – Intergenerational Educational Mobility

(A) Sons

(B) Daughters



Notes: Figure OA.III.21 uses fathers' and children's income data for a pooled sample of individuals between 1967 and 2012. The matrix shows the transition between coarse education groups. The full set of education titles can be found in table OA.III.1.

Table OA.III.1 – Education Codes

Group	Education codes
Vocational, or less	1 = Primary school 2 = Lower secondary level (ages 13-16) Upper secondary school (211 to 27) 211 = general university admissions certification 22 = vocational training in finance and administration 23 = vocational training as electrician or machine technician 24 = vocational training in construction 25 = vocational training other crafts 26 = vocational training as health worker 27 = vocational training other
Bachelor	31 = Bachelor, humanities 32 = Bachelor, educational studies (teachers) 33 = Bachelor, social sciences 310 = Bachelor, other
Bachelor, health and STEM fields	36 = Bachelor, engineering 37 = Bachelor, technology and natural sciences 38 = Bachelor, nurses 39 = Bachelor, other health
Master	41 = Master, humanities 42 = Master, educational studies (teachers) 43 = Master, social sciences 410 = Master, other
Master, health and STEM fields	46 = Master, engineering 47 = Master, technology and natural sciences 491 = Master, other health
Finance	35 = Bachelor, finance and administration 45 = Master, finance and administration
Law	44 = Master, law
MD, Dentist	48 = Medical doctor 49 = Dentist

Table OA.III.2 – Determinants of Children's Income Dynamics: Using Standardized Moments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	σ	P90-P10	$P50_i^c$		P90-P10$_i^c$		$\mathcal{S}_{\mathcal{K}}{}_i^c$	
			Sons	Daughters	Sons	Daughters	Sons	Daughters
Mean$_i^f$	0.02	0.04	0.172***	0.145***				
			(0.002)	(0.002)				
SD$_i^f$	0.26	0.57			0.149***	0.094***		
					(0.002)	(0.002)		
SK_i^f	0.28	0.72					0.061***	0.053***
							(0.001)	(0.001)
$\log LI_i^c$	0.42	0.88	0.035***	0.021***	-0.140***	-0.170***	0.539***	0.518***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)
$\log LI_i^f$	0.36	0.83	0.004***	-0.001***	0.061***	0.045***	0.137***	0.036***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.005)	(0.006)
$\log W_i^f$	1.60	3.80	0.002***	0.000***	0.003***	0.001***	0.034***	0.012***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
R^2			0.145	0.057	0.182	0.047	0.057	0.047
N (000s)	465.1	443.2	465.1	443.2	465.1	443.2	465.1	443.2

Notes: Table OA.III.2 shows the coefficient of a cross-sectional regression of workers-level measures of average lifetime growth, standard deviation, and third standardized moment , with the superscript c denoting children and f denoting fathers. Income growth is measure as the one-year arc-percent change of a measure of permanent income, calculated as the average income of an individual between years t and $t-2$. In the sample, we consider fathers and children with more than 20 years of data. Lifetime income of fathers and children is calculated as in Equation 1. The measure of lifetime wealth is calculated as the fathers' average wealth between ages 45 and 55 (or the nearest age to this age range for individuals that are observed when they are too young (below 45) or too old (above 55).

Table OA.III.3 – Children's Income Dynamics: Controlling for Education and Public Sector Employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	σ	P90-P10	$P50_i^c$		P90-P10$_i^c$		${\mathcal{S}_{\mathcal{K}}}_i^c$	
			Sons	Daughters	Sons	Daughters	Sons	Daughters
$P50_i^f$	0.02	0.04	0.078***	0.059***				
			(0.002)	(0.002)				
P90-P10$_i^f$	0.26	0.57			0.141***	0.087***		
					(0.002)	(0.002)		
${\mathcal{S}_{\mathcal{K}}}_i^f$	0.28	0.72					0.046***	0.037***
							(0.001)	(0.002)
$\log LI_i^c$	0.42	0.88	0.008***	0.017***	-0.326***	-0.412***	0.046***	0.060***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\log LI_i^f$	0.36	0.83	-0.001***	-0.001***	0.070***	0.052***	-0.006***	0.000
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\log W_i^f$	1.60	3.80	-0.000***	0.000***	-0.001***	-0.004***	0.001***	-0.004***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2			0.205	0.088	0.289	0.342	0.123	0.176
N (000s)	465.1	443.2	465.1	443.2	465.1	443.2	465.1	443.2

Notes: Table OA.III.3 shows the coefficient of a cross-sectional regression of workers-level measures of median lifetime growth, P90-P10 differential, and Kelley Skewness (${\mathcal{S}_{\mathcal{K}}}_i$), with the superscript c denoting children and f denoting fathers. On top of the regressor shown in the table, we consider 47 education dummies and a dummy for public-sector workers. Income growth is measure as the one-year log change of a measure of permanent income, calculated as the average income of an individual between years t and $t-2$. In the sample, we consider fathers and children with more than 20 years of data. Lifetime income of fathers and children is calculated as in Equation 1. The measure of lifetime wealth is calculated as the fathers' average wealth between ages 45 and 55 (or the nearest age to this age range for individuals that are observed when they are too young (below 45) or too old (above 55).

Table OA.III.4 – Children's Income Dynamics: Controlling for Quadratic Terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	σ	P90-P10	$P50_i^c$		P90-P10$_i^c$		$\mathcal{S_K}_i^c$	
			Sons	Daughters	Sons	Daughters	Sons	Daughters
$P50_i^f$	0.02	0.04	0.090***	0.073***				
			(0.002)	(0.002)				
P90-P10$_i^f$	0.26	0.57			0.144***	0.102***		
					(0.002)	(0.002)		
$\mathcal{S_K}_i^f$	0.28	0.72					0.075***	0.061***
							(0.002)	(0.002)
$\log LI_i^c$	0.42	0.88	0.026***	0.013***	-0.289***	-0.444***	0.102***	0.121***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\log LI_i^f$	0.36	0.83	0.003***	0.001***	0.140***	0.120***	0.059***	0.017***
			(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
$\log W_i^f$	1.60	3.80	0.001***	0.0003***	0.009***	0.007***	0.008***	0.001*
			(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
$(\log LI_i^c)^2$			0.007***	0.00196***	0.010***	-0.087***	-0.004***	0.020***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\left(\log LI_i^f\right)^2$			0.003***	0.002***	0.068***	0.056***	0.026***	0.016***
			(0.000)	(0.000)	(0.001)	(0.0013)	(0.0014)	(0.001)
$\left(\log W_i^f\right)^2$			0.000*	0.000***	0.002***	0.0015***	-0.0001	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2			0.147	0.0461	0.197	0.284	0.046	0.034
N (000s)	465.1	443.2	465.1	443.2	465.1	443.2	465.1	443.2

Notes: Table OA.III.4 shows the coefficient of a cross-sectional regression of workers-level measures of median lifetime growth, P90-P10 differential, and Kelley Skewness ($\mathcal{S_K}_i$), with the superscript c denoting children and f denoting fathers. Income growth is measure as the one-year log change of a measure of permanent income, calculated as the average income of an individual between years t and $t-2$. In the sample, we consider fathers and children with more than 20 years of data. Lifetime income of fathers and children is calculated as in Equation 1. The measure of lifetime wealth is calculated as the fathers' average wealth between ages 45 and 55 (or the nearest age to this age range for individuals that are observed when they are too young (below 45) or too old (above 55).

Table OA.III.5 – Children's Income Dynamics: Including More Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	σ	P90-P10	$P50_i^c$		P90-P10$_i^c$		${\mathcal{S}_{\mathcal{K}}}_i^c$	
			Sons	Daughters	Sons	Daughters	Sons	Daughters
$P50_i^f$	0.02	0.04	0.079***	0.059***				
			(0.002)	(0.002)				
P90-P10$_i^f$	0.26	0.57			0.125***	0.076***		
					(0.002)	(0.002)		
${\mathcal{S}_{\mathcal{K}}}_i^f$	0.28	0.72					0.045***	0.037***
							(0.001)	(0.002)
$\log LI_i^c$	0.42	0.88	0.022***	0.009***	-0.339***	-0.515***	0.050***	0.056***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\log LI_i^f$	0.36	0.83	-0.002***	-0.001***	0.082***	0.069***	0.001	-0.005***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
$\log W_i^f$	1.60	3.80	0.0001	-0.0001**	0.003***	0.009*	0.001**	-0.005***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
R^2			0.218	0.088	0.292	0.371	0.177	0.123
N (000s)	465.1	443.2	465.1	443.2	465.1	443.2	465.1	443.2

Notes: Table OA.III.5 shows the coefficient of a cross-sectional regression of workers-level measures of median lifetime growth, P90-P10 differential, and Kelley Skewness (${\mathcal{S}_{\mathcal{K}}}_i$), with the superscript c denoting children and f denoting fathers. On top of the regressor shown in the table, we consider 47 education dummies, a dummy for public-sector workers, and quadratic terms for log-lifetime income of the children, log-lifetime income of the fathers, and log-lifetime wealth of the fathers. Income growth is measure as the one-year log change of a measure of permanent income, calculated as the average income of an individual between years t and $t-2$. In the sample, we consider fathers and children with more than 20 years of data. Lifetime income of fathers and children is calculated as in Equation 1. The measure of lifetime wealth is calculated as the fathers' average wealth between ages 45 and 55 (or the nearest age to this age range for individuals that are observed when they are too young (below 45) or too old (above 55).