Inequality in Lifetime Earnings, 1986-2012

Moshe Justman[a] and Hadas Stiassnie[b]

Abstract

We estimate yearly inequality in anticipated lifetime earnings—a lower bound on "true" inequality that would apply if earnings could be transferred freely over time—using a two-stage approach that first estimates the lifetime earnings of males born between 1942-87, from PSID data to 2018; and then measures inequality in these lifetime earnings estimates among males aged 25-59 in each year between 1986 and 2012. Comparing it to conventionally measured inequality in annual earnings, we find that yearly variances of log lifetime earnings are, on average, less than half the variances of log annual earnings, and much more stable, rising by only 11 percent throughout the period, where inequality in annual earnings increased by 46 percent after 1998, indicating a corresponding increase in intertemporal mobility. This dynamic pattern varies markedly from inequality in lifetime earnings measured within ten-year cohort-groups, which first rose by 40 percent from the earliest, 1942-51 cohort-group to the 1958-67 cohort-group, then declined by 26 percent for the youngest, 1978-87 cohort-group.

JEL codes: D31, I32

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[a] Department of Economics, Ben Gurion University, justman@bgu.ac.il; corresponding author.
[b] Department of Economics, Ben Gurion University, hadas.stia@gmail.com

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1. Introduction

"Snapshot" measures of inequality in annual earnings exaggerate the extent of "true" economic inequality to the extent that they ignore the ability of economic agents to attenuate the effect of annual fluctuations by transferring earnings over time.[1] Most studies that address this long-recognized issue gauge the extent of the disparity between snapshot inequality and its true measure by estimating the degree of intertemporal earnings mobility from short panels: as the ratio of inequality of earnings averaged over several years to a weighted average of annual inequality (Shorrocks, 1978); by decomposing the annual earnings variance into transitory and permanent components using error components models; as "within" variance in rolling multi-year windows; or as the variance of two-year log differences in earnings.[2]

An alternative, less traveled approach, on which we build in this paper, averages lifetime earnings from long panels of individual earnings histories drawn from consistent, longitudinal administrative datasets, and measures their inequality. This yields a loose lower bound on true inequality, as future earnings cannot be perfectly anticipated and intertemporal transfers are generally costly. Bjorklund's (1993) early contribution analyzed Swedish tax data from 1951-89 on the 1924-36 birth cohorts, and found the dispersion of lifetime earnings to be 35 to 40 percent lower than the dispersion of annual earnings. Aaberge and Mogstad (2015) calculated discounted sums of lifetime earnings for the 1942-1944 Norwegian birth cohorts observed in 1967-2006, and found that inequality in current earnings is greater than inequality

[1] We focus here on earnings, but our analysis applies similarly to income inequality.

[2] Early contributions include Shorrocks (1978), Lillard and Willis (1978), MaCurdy (1982), Gottschalk and Moffitt (1994) among others.

in lifetime earnings at young ages, and smaller at older ages. In the United States, Guvenen, Kaplan, Song and Weidner (2017) used Social Security data from 1957-2013 to directly calculate the lifetime earnings of commerce and industry workers born between 1932 and 1958, and measured their inequality within individual cohorts by gender, finding a rising trend in inequality separately for both males and females.[3]

The disadvantage of directly calculating lifetime earnings from full earnings histories is its limited application: it can only be applied to older cohorts, past or near the end of their working lives, for whom there are sufficiently long and consistent data series. In this paper, we substantially extend the scope of this approach by using richer, survey data to estimate anticipated lifetime earnings for a much wider range of birth cohorts, including younger cohorts with shorter earnings histories as well as older individuals observed only from mid-life. This allows us to measure inequality in lifetime earnings year-by-year, among males aged 25-59 and active in the work force in each year; compare it to inequality in annual earnings in that year; and derive from the comparison measures of intertemporal earnings volatility.[4]

We apply this approach to data from the Panel Study of Income Dynamics (PSID) to 2018, to estimate a Mincer-type earnings equation for male heads of household born between 1925 and 1987, regressing annual earnings on a cubic polynomial of age, and its interaction

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[3] Other studies have estimated inequality in consumption, as a measure of true inequality (e.g., Hall and Mishkin, 1982, Blundell and Preston, 1998, Fisher, Johnson and Smeeding, 2015).

[4] The first stage follows Justman and Stiassnie (2021) and Justman and Krush (2013). Coronado, Fullerton and Glass (2000) estimated a similar earnings equation from PSID data to construct synthetic earnings profiles, using it to assess the progressivity of Social Security. Blomquist (1981) simulated lifetime profiles from shorter panels of Swedish tax records, as did Bowlus and Robin (2004) from two-year panels drawn from the Current Population Survey.

with education and race indicators, and on individual random effects, and allowing coefficients to vary between older and younger cohorts. From this estimation, we take predicted earnings at age 40 as our proxy measure of anticipated average lifetime earnings. Testing its accuracy by comparing it to actual average lifetime earnings for a subset of males for whom we have longer earnings histories, we find a very close correspondence.

We then calculate year-by-year inequality in lifetime earnings among males aged 25-59 with earnings above a given threshold in each year, and compare it to inequality in annual earnings in the same population using several measures.[5] We find an average value of 0.26 for the yearly variance of log lifetime earnings, climbing very gradually from 0.25 to 0.28, an overall increase of 11 percent over 26 years. This average level is less than half the average corresponding measure for annual earnings, 0.57, which also ranges much more widely, from 0.48 to 0.73. Other measures—the Gini coefficient, the mean to median ratio, two Theil coefficients—exhibit similarly moderate increases in lifetime inequality. The moderate increase in inequality in lifetime earnings is driven by the upper half of the earnings distribution, a widening gap in the ratio of lifetime earnings at the 90th to the 50th percentile (the 90:50 ratio), while the 50:10 ratio fluctuated without a trend.

Comparing the dynamic patterns of inequality in lifetime and annual earnings, we find that while year-by-year inequality in lifetime earnings inched up very slowly through this period, inequality in annual earnings, while initially steady, rose by 46 percent after 1998. The divergence of yearly inequality in lifetime and annual earnings after 1998 is reflected in a marked increase in intertemporal mobility. Measuring it as one minus the ratio of standard

[5] The age range we chose follows Moffit (2020). Our earnings threshold, following Guvenen et al. (2017), equals half the minimum wage for ten hours a week, $1,950 at 2016 prices. Our main results are robust to setting other age-ranges and thresholds, as we show in Section 6.

deviations of lifetime to annual log earnings (following Shorrocks, 1978), we find an increase of 37 percent from 1998 to 2012. This broad measure of mobility includes both life-cycle variation in earnings, and transitory shocks. Separating the two components, we find that the variance of transitory shocks similarly increased after 1998 while life-cycle variation in earnings declined by 46 percent. Comparing these findings to short-panel measures of earnings volatility used widely in the literature, we find that the variance of the arc difference in earnings behaves similarly—initially flat and then increasing by 29 percent after 1998—while the 9-year "window averaging" method shows a steady climb in volatility from 1986 to 2012, increasing by 42 percent overall. These findings are generally consistent with previous estimates of earnings volatility drawn from the PSID for this period (Moffitt and Zhang, 2018).

Next, we compare these yearly trends to a corresponding set of cohort-based measures of inequality in lifetime earnings—the variance of log earnings, the Gini coefficient and the mean to median ratio—for rolling ten-year cohort groups born between 1942 and 1987. We find that while, overall, the average values are nearly identical to our yearly measures, they show a very different dynamic pattern. The variance of log lifetime earnings initially rises from a low of 0.22 for the oldest, 1942-51 cohort group to a high of 0.31 for the middle, 1958-67 cohort-group, and then declines to a level of 0.23 for the youngest cohort group, 1978-87. Our earlier birth cohort groups born between 1942 and 1958, and comprising eight ten-year cohort-groups, overlap with Guvenen et al.'s (2017) later cohorts. To allow a comparison, we average their single-cohort means and medians within our eight ten-year cohort groups, and calculate cohort-group mean to median ratios. The correlation between the two series is 0.89, with their measures 15 percent higher. on average. Comparing our findings to similarly estimated measures of inequality in lifetime earnings drawn from the 1979 National Labor Survey of Youth (NLSY79) for the 1957-64 cohorts, we find nearly identical values for the variance of log lifetime earnings and the Gini coefficient, while our mean to median ratios are slightly lower.

Finally, we present results that demonstrate the robustness of our findings, first to different sample selection criteria, varying our range of ages and earnings threshold, and then their dynamic consistency. To this end, we reproduce our analysis using only data to 2008, and show that the results this yields conform to our full data estimates for 1986-2002. This indicates that our current findings should hold up similarly well as new waves of data are added.

The structure of the paper is as follows. Section 2 estimates lifetime earnings; Section 3 uses these estimates to measure year-by-year inequality in lifetime earnings, and compares them to inequality in annual earnings; Section 4 derives measures of intertemporal mobility and volatility; Section 5 estimates inequality within cohort-groups; Section 6 presents robustness checks; and Section 7 concludes.

2 Estimating lifetime earnings

We begin by estimating lifetime earnings from the following Mincer-type equation with individual random effects:

$$(1)\quad Y_{it} = \Sigma_{c=1}^{2}\{\alpha_{0c}K_c + \Sigma_{j=1}^{3}\alpha_{1jc}age_{it}^{j}cogr_{ic} + \Sigma_{h=1}^{6}\Sigma_{j=1}^{3}\alpha_{2hjc}educ_{ih}age_{it}^{j}cogr_{ic}$$
$$+ \Sigma_{l=1}^{3}\Sigma_{j=1}^{3}\alpha_{3ljc}race_{il}age_{it}^{j}cogr_{ic}\} + \varepsilon_{it}$$

where Y_{it} is individual $i's$ earnings in year *t*; age_{it} is *i*'s age in year *t*; $\{educ_{ih}\}$, $\{race_{il}\}$ and $\{cogr_{ic}\}$ are categorical variables indicating $i's$ years of schooling, race and birth-cohort group; ε_{it} is an i.i.d. error term; and the α terms denote regression coefficients.[6] This estimation yields

[6] Education categories, by years of schooling, are: 8 or less, 9-10, 11-12, 13-15, 16, 17 or more; race categories are: white, Afro-American, Latino, other; birth-cohorts are: 1925-55, 1956-87.

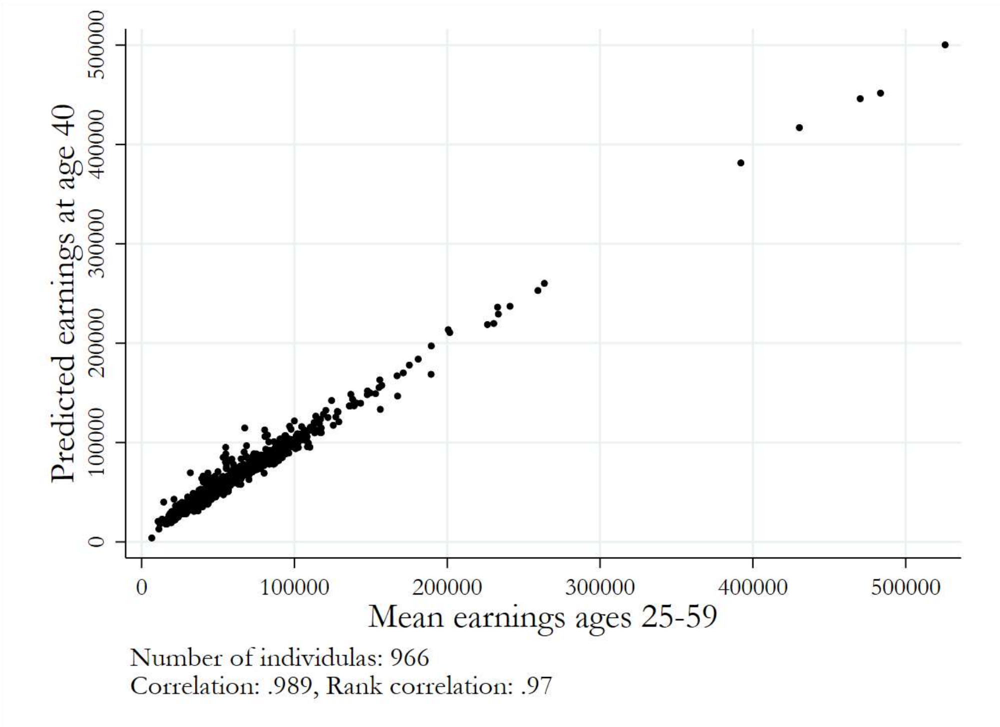
an age-earnings profile for each combination of schooling, race, and birth-cohort group; and with the individual random effects, predicted earnings for each individual i in each year t, which we denote $\hat{Y}_{it}$. Predicted earnings at age 40, $\hat{Y}_{i40}$, is our proxy for average lifetime earnings (following Haider and Solon, 2006; predicted earnings at age 45 produces identical results).

Our data source is the Panel Study of Income Dynamics (PSID), from the 1969 to the 2018 wave, with data collected annually until 1996 and bi-annually thereafter. We follow previous research in restricting our analysis to male household heads from the representative national sample drawn from the Survey Research Center (SRC); we do not include the over-sample of low-income families (SEO) or Latina families. "Earnings" is labor income, not including the labor component of farm and business income, as defined from 1993 and adjusted accordingly for previous years; and we adjust all earnings data to 2016 prices using the personal consumption expenditures (PCE) index. Following Guvenen et al. (2017), we include all earnings observations of at least $1,950 (2016 prices), equal to an average of ten working hours a week in the year at half the minimum wage of $7.50, but drop 332 annual observations for which the labor component of farm and business income is greater than our earnings variable (this has no effect on our results). Our base sample comprises 3,308 males born between 1925 and 1987 with reported race and years of schooling, and with at least three such observations of annual earnings between the ages 25-59, 46,396 annual earnings observations in all, 14 per person, on average. Average annual earnings in our sample are $64,394 (at 2016 PCE prices), and the average age at which earnings are observed is 39.1. Average schooling is 14 years; 89.9 percent of the sample is white; and 8.1 percent is Afro-American. Year-by-year summary statistics are presented in Appendix Table A1. The average age at which individuals' earnings are observed in each year ranges narrowly from 39 to 40.9, and average years of schooling rises steadily from 13.9 to 14.5.

Our estimation of equation (1) with individual random effects accounts for 0.521 of the overall variance in our earnings observations. (Detailed coefficient estimates are available on request.) The two panels of Appendix Figure A1 show two age-earnings profiles derived from this estimation for each birth-cohort group, highlighting the effect of education on the shape of the age-earnings profile, and the change in the shape of the curve for college graduates over time (the levels of the curves are determined by averaging individual random effects).

To gauge how well our lifetime earnings proxy, $\hat{Y}_{i4}$, approximates actual lifetime earnings averages, we compare it, in Figure 1, to actual average observed earnings for a subset of our sample with better data coverage: 966 males born between 1937 and 1957, and thus observed in their prime earning years, each with at least ten annual earnings observations of at least $1,950 in ages 25-59, 22.7 observations per person on average. Figure 1 highlights their close correspondence—their correlation is 0.989—indicating that they are a good measure of anticipated earnings. In Section 6 we show that reproducing these estimates with ten years less of data, for cohorts born up to 1977, produces similar results to the full data estimates.

Figure 1. *Predicted earnings at age 40 plotted against actual average reported earnings males born in 1937-57, with at least 10 annual observations over $1,950, 2016 PCE dollars.*



3 Annual inequality in lifetime and current earnings, 1986-2012

We now use these lifetime earnings proxies to measure inequality in lifetime earnings year by year and compare it to inequality in annual earnings. We first present year-by-year summary measures of inequality among males aged 25-59 from 1986 to 2012, and compare their level and trend to the level and trend of inequality in annual earnings. We then compare changes in annual and lifetime inequality at the top and bottom halves of the earnings distribution.

3.1 Year-by-year inequality in lifetime and annual earnings

Figure 2 plots three summary measures of year-by-year inequality in the lifetime and annual earnings of male heads of household, aged 25-59 reporting earnings of at least $1,950 (2016 prices) in each year, from 1986 to 2012: the variance of log earnings, the Gini coefficient, and the mean to median ratio. (See Appendix Table A2 for numerical values.) The variance of log lifetime earnings is, on average, less than half the variance of log annual earnings; the Gini coefficient is about a quarter lower than its value for annual earnings; and the lifetime mean to median ratio is 8 percent lower than for annual earnings. (Two Theil indexes describe similar patterns, shown in Appendix Figure A2.) Moreover, where the yearly variance of log lifetime earnings increases minimally but steadily over this period, the variance of log annual earnings is initially flat but then increases markedly after 1998, with similar though less pronounced increases in the other measures, implying a corresponding increase in intertemporal mobility, on which we elaborate in the next section. The top panel of Figure 2 also plots the year-by-year variance of the logarithm of predicted earnings, from equation (1), shedding further light on this divergence. In earlier years, it showed similar values to the variance of log annual earnings, but then declined sharply after 1995, suggesting the difference between predicted and lifetime earnings—life-cycle variation in earnings—has become a less important source of inequality in annual earnings than the difference between predicted and actual annual earnings.

Figure 2: Inequality in lifetime and annual earnings, male heads of household aged 25-59 and reporting annual earnings of at least $1,950 (2016 prices), 1986-2012

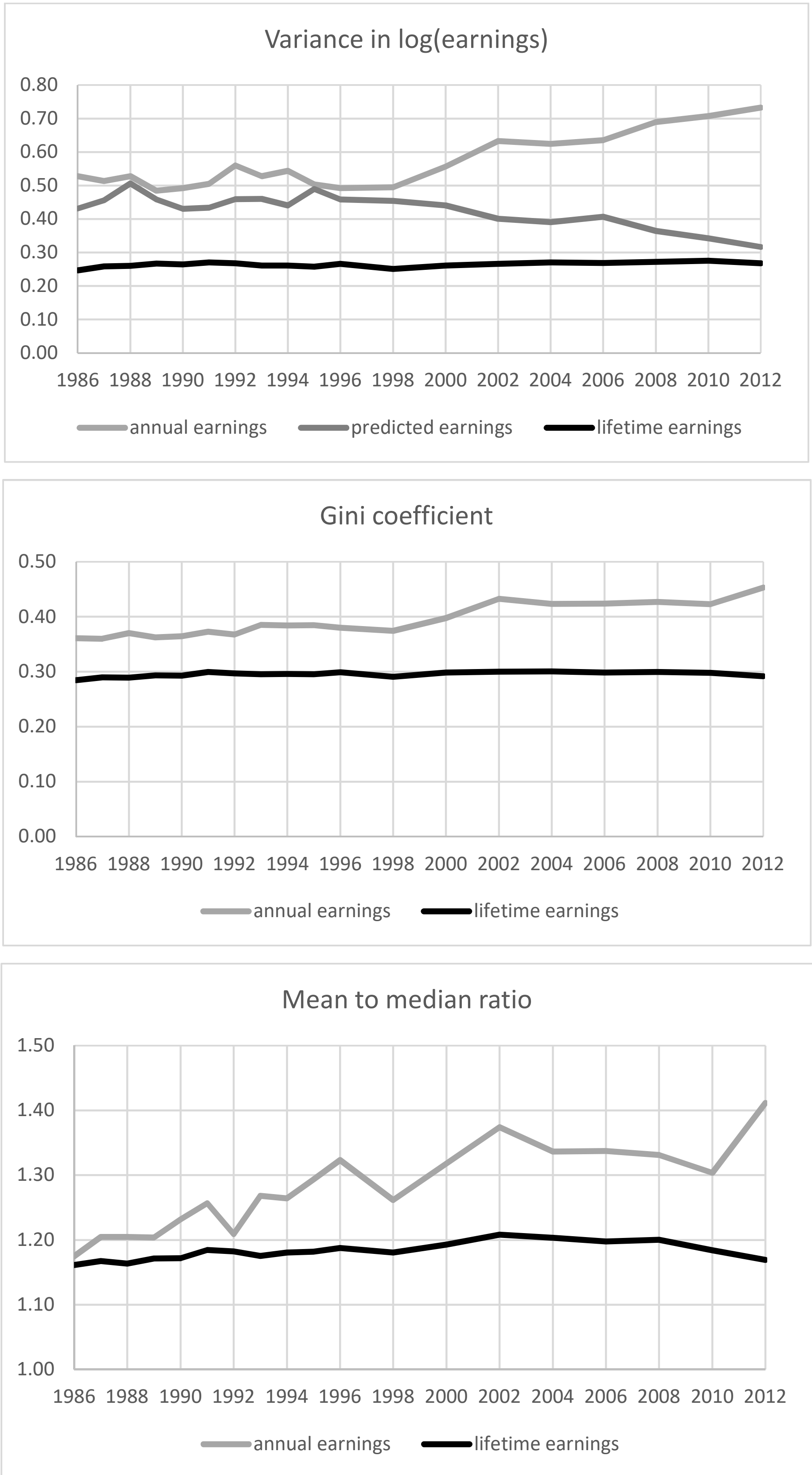
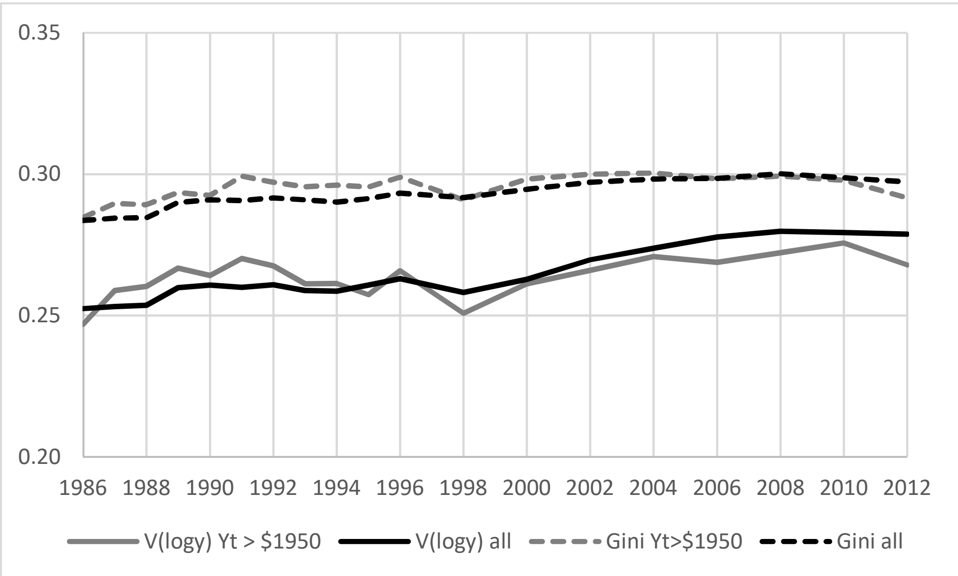


Figure 2 measures inequality in lifetime earnings in each calendar year among males with annual earnings above our threshold, allowing us to compare inequality in lifetime and annual earnings over the same population in each year. However, this introduces some year-to-year variation in the population under consideration due to changes in earnings (in addition to the effect of aging). Alternatively, we could track yearly inequality in lifetime earnings among the full base sample aged 25-59 in each year. Figure 3 compares the variance of log lifetime earnings and the Gini coefficient of lifetime earnings for the two populations, and finds little difference. (See Appendix Tables A1 and A2 for summary statistics and inequality values.)

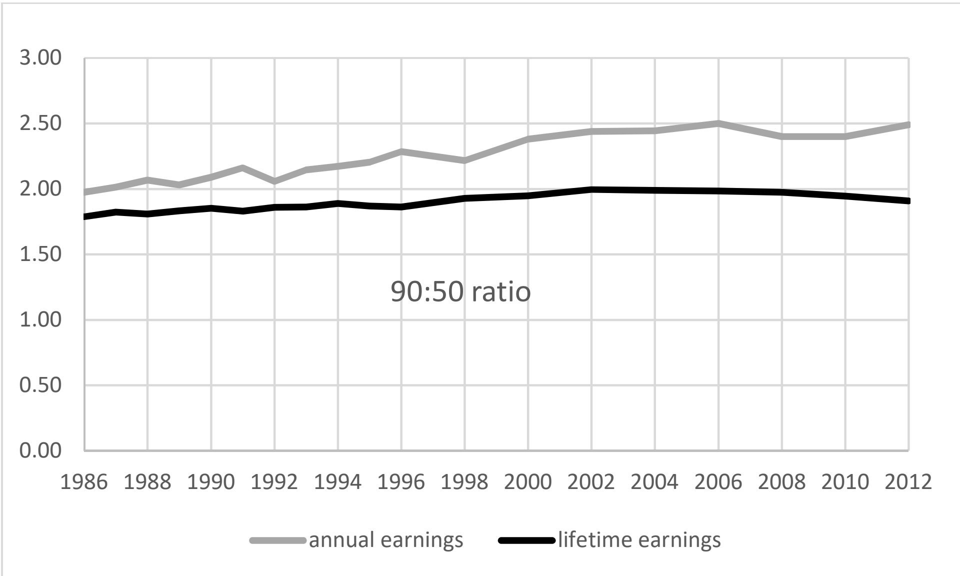
Figure 3. The variance of log lifetime earnings and the Gini coefficient, all males aged 25-59 in each year, and males aged 25-59 with annual earnings of at least $1,950

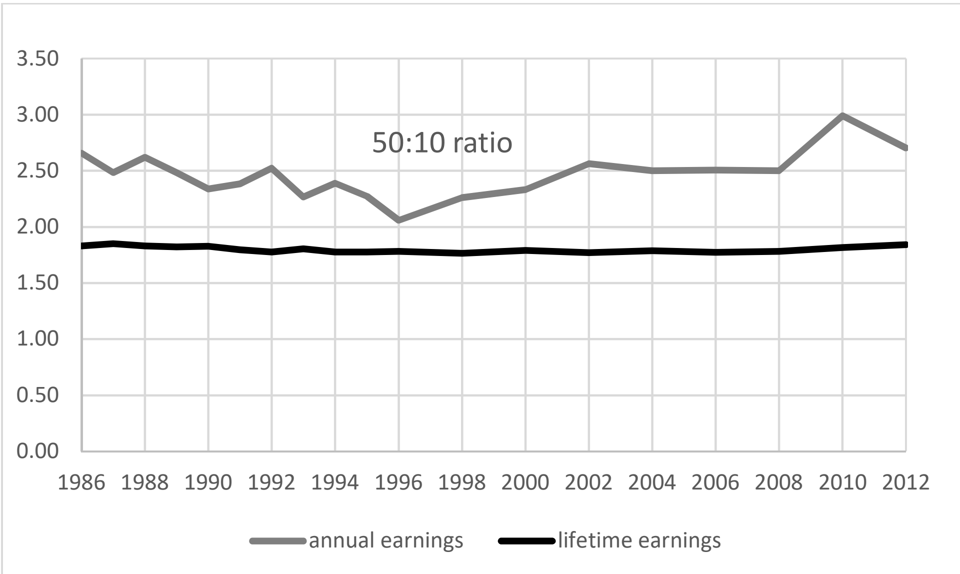


3.2 Inequality in the upper and lower halves of the earnings distribution

Figure 4 shows a moderately rising trend in the yearly ratio of lifetime earnings at the 90th to the 50th percentile (the 90:50 ratio; numerical values in Appendix Table A3), and no trend in the ratio of earnings in the 50:10 ratio, follows a U-shaped pattern. The rising trend in the 90:50 accords with findings that attribute rising inequality in annual earnings to widening gaps at the top of the earnings distribution. Appendix Figure A3 shows nearly identical patterns for lifetime earnings of all males in the sample. Appendix Figure A4 plots the 10th, 25th, 50th, 75th and 90th percentiles of annual and lifetime earnings, highlighting the greater compression of the distribution of lifetime earnings, compared to annual earnings; and the pulling up of the 90th percentile of annual earnings after 1998.

Figure 4. Annual and lifetime earnings ratios, 90th to the 50th percentiles and 50th to 10th percentiles, males aged 25-59 with annual earnings of $1,950





4 Volatility

The divergence of inequality in annual and lifetime earnings after 1998 implies an increase in intertemporal earnings mobility. In this section, we present several year-by-year measures of short-term earnings volatility, first by comparing inequality in lifetime and annual earnings inequality; and then by estimating two widely used volatility measures from shorter earnings histories. These two measures are: the variance of the two-year arc-difference in earnings (the difference in earnings as a percentage of their average); and the "within" variance of earnings in nine-year moving windows ("window averaging"). All measures relate to male heads of household aged 25-59 with earnings of at least $1,950 (2016 prices) in the year.

4.1 Volatility as the gap between lifetime and annual inequality

Figures 5 and 6 present measures of intertemporal mobility derived from the difference between inequality in lifetime and annual earnings. Figure 5 presents Shorrocks' (1978) mobility measure: one minus the ratio of the standard deviations of lifetime to annual earnings in each year. As Shorrocks (1978, Theorem 1) shows, mobility implies that inequality in average income is less than a weighted average of inequality in annual incomes. [7] Burkhauser and Poupore (1997) used this approach to compare mobility in the US and Germany; and Kopzcuk, Saez and Song (2010) used it to track short-term mobility from Social Security data. Our data indicate trendless fluctuations in mobility in the first decade followed by a steep rise after the mid-1990s (numerical values in Appendix Table A6).

[7] The effect of mobility on average inequality compared to *initial* inequality can go either way, depending on the incidence of income growth (Bourguignon, 2010; Fields, 2010).

Figure 5: Shorrocks' mobility index: One minus the ratio of standard deviations of lifetime and annual earnings

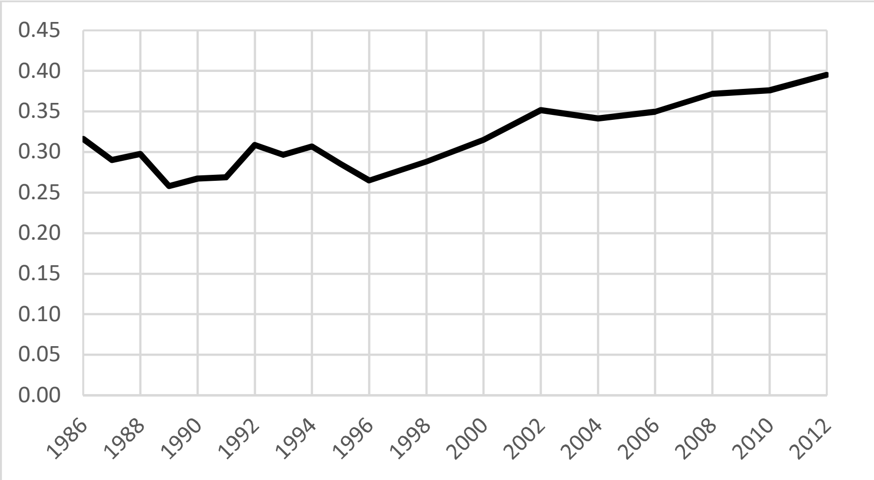
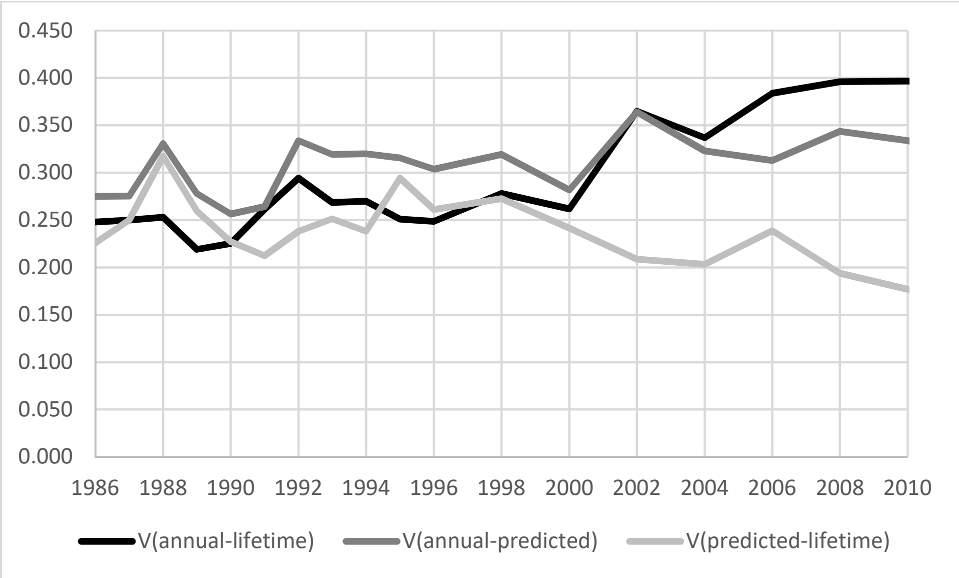


Figure 6 presents three volatility measures derived from residual, unpredicted earnings. The first, marked "V(annual-lifetime)", is the variance of $y_{it} - \hat{y}_{i40}$, the log difference between annual earnings and our average lifetime earnings proxy, predicted earnings at age 40. It is initially flat, and then climbs after 1996, similar to the Shorrocks mobility index in Figure 5; the correlation between the two is 0.93. The difference between log annual and lifetime earnings can be represented as the sum of life-cycle variation in earnings and transitory shocks:

$$(2)\quad y_{it} - \hat{y}_{i40} = (\hat{y}_{it} - \hat{y}_{i40}) + (y_{it} - \hat{y}_{it})$$

Their variances are also plotted in Figure 6, marked respectively V(predicted-lifetime) and V(annual-predicted). The three variances move in tandem until 1998, after which life-cycle variation in earnings, V(predicted-lifetime), declines, while V(annual-predicted) rises, further indicating that transitory shocks are coming to play a larger role in driving volatility in annual earnings than life-cycle earnings variation.

Figure 6: Residual variances



4.2 Direct measures of volatility from shorter earning histories

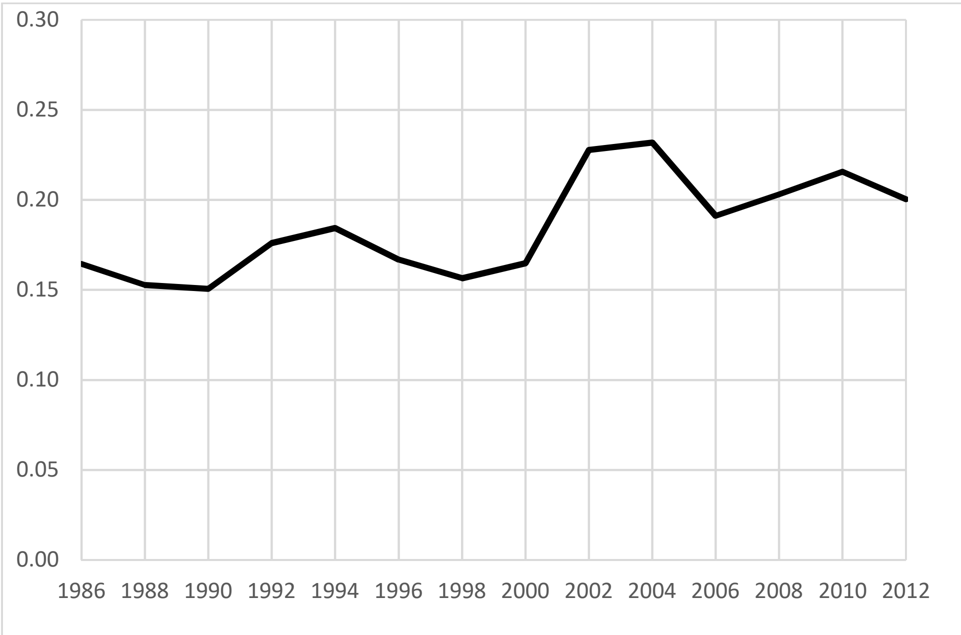
We now compare these measures to two direct measures of earnings volatility drawn from shorter earnings histories, used widely in the literature.[8] First, we track the variance of the two-year arc-difference in earnings—the two-year difference in earnings as a percentage of the two-year average—for males aged 25-59 in year *t*, with annual earnings over $1,950 in years *t* and *t* – 2, from 1986 to 2012, shown in Figure 7. (For numerical values see Appendix Table A6).[9] Moffitt and Zhang (2018) refer to this as "gross volatility" as it includes elements of both transient and permanent mobility. It shows an increase after 1998, with the general level of the variance higher in later years, though the difference is clearly less pronounced than in Figure 5. The increase in volatility, we find, beginning in the late 1990s is consistent with

[8] For further references, see surveys by Burkhouser and Couch (2009), Moffitt and Gottschalk (2009), Jännti and Jenkins (2013), Moffitt and Zhang (2018).

[9] Tracking the variance of the two-year difference in log earnings yields almost identical results. Moffit (2020) uses arc-differences in comparing earnings volatility in four data sets.

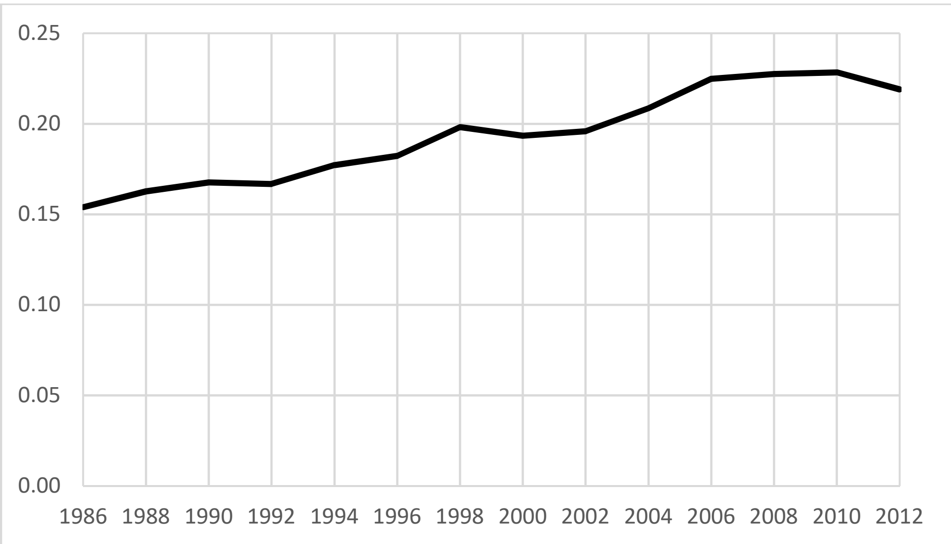
previous analyses of PSID data by Shin and Solon (2011), Moffitt and Gottschalk (2012), and Jensen and Shore (2015); and with Carr and Wiemer's (2018) comparative analysis of PSID and administrative SIPP GSF data. Moffitt (2020), noting the downturn in this measure after 2010, sees this rise as part of a cycle, leading him to conclude, from a comparison of six volatility estimates from four data sets data, that one cannot find a "significant long-term trend in male earnings volatility over the last 30 years."

Figure 7. Variance of the arc difference in earnings, 1986-2012



The second measure of earnings instability we estimate is the "window-averaging" (WA) measure, which, as Moffitt and Gottschalk (2012) show, produces patterns of transitory variances similar to the error components method. It estimates "within" earnings variances in rolling nine-year windows, each centered on a given year, in two-year intervals (and thus each including five annual earnings observations), which we track from 1986 to 2012, using earnings data from 1982 to 2016.[10] We include, in each window, all male heads of household aged 25-59 and with at least two earnings observations in the window of $1,950 or more, one of them in the central year. We first regress the log of annual earnings on a cubic polynomial in age and its interaction with education and race, over all observations in the window, and then calculate the variance of these residuals for each individual; transitory variance in the window is the average of the individual variances (Gottschalk and Moffitt, 1994, p.254; 2009, fn. 2). Tracking this measure in Figure 8, we find an increase of more than 40 percent over the entire period.[11] Moffitt and Zhang (2018, Figure 8) apply this measure to PSID data for a longer period, and with different sample selection criteria. They also find an increase over these years, though slightly larger than ours and differently shaped: flat until 2000 and then rising more steeply.

Figure 8. Window-averaging estimate of transitory variance, nine-year windows



[10] Though the PSID collected data annually until 1996, we limit our focus to even-numbered years throughout, to maintain a uniform number of observations per window.

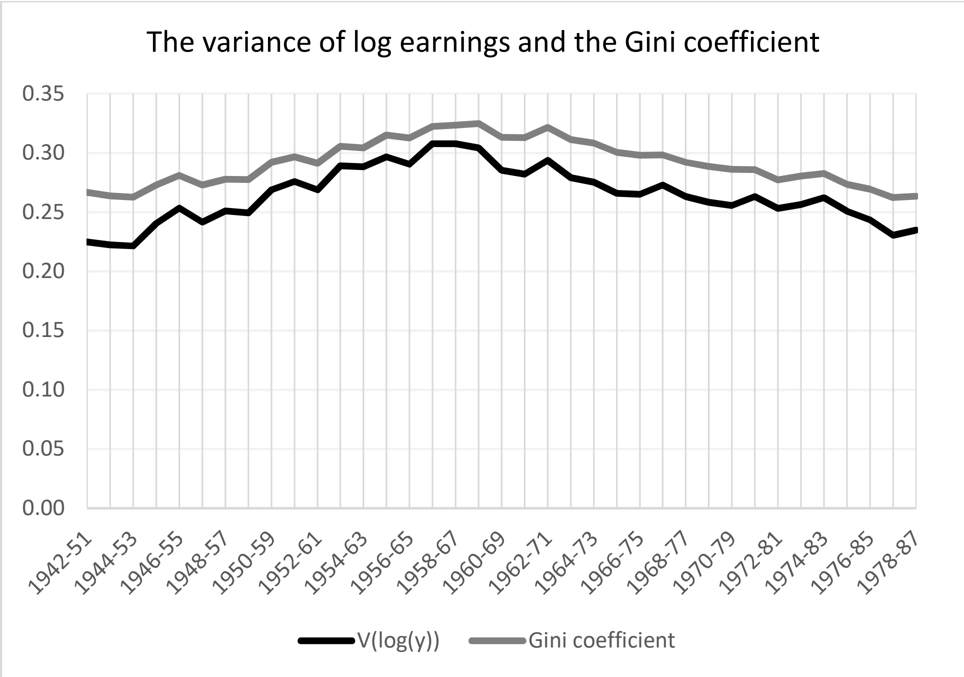
[11] Shorter windows yield slightly lower estimates and longer windows slightly higher estimates, all closely correlated over time.

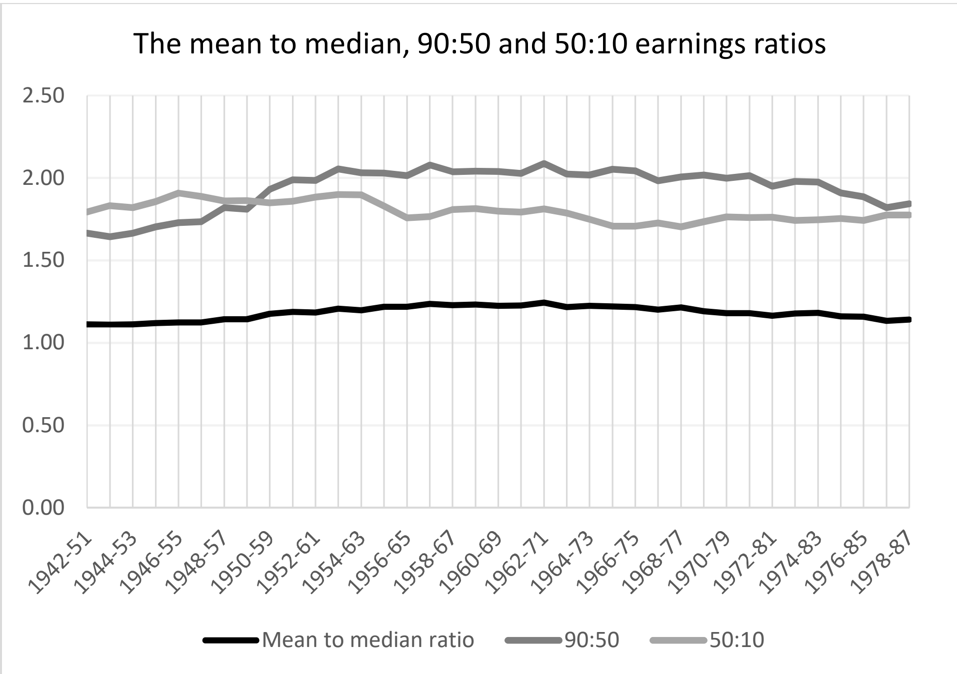
5 Inequality in lifetime earnings within cohort-groups

Cohort-groups are an alternative reference group for measuring inequality in lifetime earnings and tracking it over time.[12] Figure 9 tracks inequality in lifetime earnings in thirty-one rolling ten-year cohort-groups, the oldest born in 1942-51 and the youngest in 1978-87. The upper panel plots the variance of log(earnings) and the Gini coefficient; and the lower panel plots the mean to median earnings ratio, the 90:50 ratio and the 50:10 ratio (See Appendix Tables A4 and A5 for descriptive statistics and numerical values.) The average values are nearly identical to the average yearly values for lifetime earnings, but the cohort-group measures vary in a wider range than the yearly measures. Moreover, their dynamic patterns, though not directly comparable, are markedly different. Thus, where the yearly values of the variance of log lifetime earnings and the Gini coefficient increased minimally over the period studied (Figure 2), the corresponding cohort-group measures, shown in Figure 9, follow a pronounced convex pattern, with the variance of log lifetime earnings, for example, first rising by 40 percent, from the 1942-51 to the 1958-67 cohort-group, and then declining by 26 percent to the 1978-87 cohort group. Calendar-year and cohort-group measures of inequality in lifetime earnings thus provide very different answers to the question, has earnings inequality increased in recent year? The 90:50 and 50:10 ratios by cohort-group also show more variation than their yearl-by-year counterparts.

[12] Guvenen et al. (2017) track lifetime earnings inequality in individual cohorts, born in 1932-1958; we compare our findings to theirs immediately below. Haider (2001) compares 10-year earnings inequality in the 1925-39 and 1938-52 cohorts. Justman and Stiassnie (2021) track intergenerational mobility by cohort-groups.

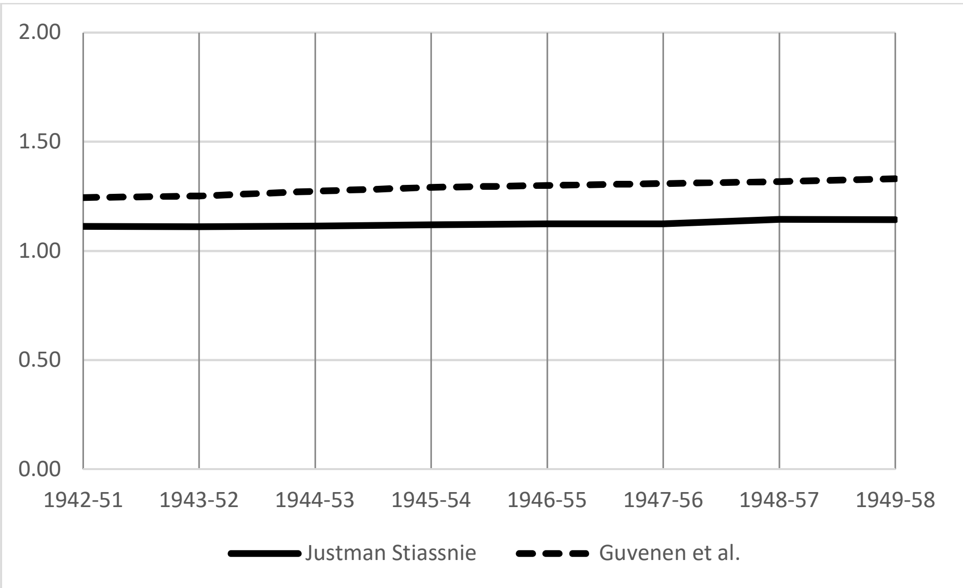
Figure 9. Inequality in lifetime earnings within 10-year cohort groups, 1942-87





Our cohort-group estimates of lifetime earnings inequality overlap Guvenen et al.'s (2017) estimates for the 1942-58 birth-cohorts. The estimates are not directly comparable as Guvenen et al. (2017) estimate inequality within very large single cohort samples from Social Security data on commerce and industry workers. Nonetheless, the trends appear similar in the overlapping period, which includes our first eight (ten-year) cohort-groups. Their Figure 11(a) shows a steady increase in the standard deviation of log lifetime earnings for males throughout the overlapping cohort birth years (represented there as entering the workforce at age 25 in 1967-83), which matches the steady increase in the variance of log lifetime earnings for the older cohorts in the upper panel of Figure 5. In addition, we average their single-cohort means within each of these ten-year cohort-groups and divide it by the median of their ten single-cohort medians, and compare this ratio to our corresponding mean to median ratio (in Figure 10), and find a similar moderately rising trend with a correlation of 0.89 between the two.

Figure 10. Mean to median ratios of lifetime earnings in ten-year cohort groups, 1942-51 to 1949-58, current estimates comapred to Guvenen et al. (2017, Table A1)



Note: Guvenen et al. means are averages of their yearly means; and Guvenen et al. medians are medians of their yearly medians. They identify their cohorts by the year they turn 25.

We also compare our cohort-group measures of inequality in lifetime earnings to corresponding measures similalry derived from a much larger sample, which we drew from the 1979 National Labor Survey of Youth (NLSY79), for the 1957-64 cohort group. Applying the same approach to NLSY79 data, we first estimate equation (1) and obtain age-earnings profiles similar to profiles obtained from our PSID data (Appendix Figure A5), using predicted earnings at age 40 as our proxy for lifetime earnings. Table 1 compares five measures of inequality in lifetime earnings derived from the two data sources and finds them very similar, as are the trend and level of ineqaulty in annual earnings shown in Appendix Figure A6.

Table 1. Measures of inequality in lifetime earnings, for the 1957-64 cohort-group, estimated from NLSY79 data, comapred to our PSID estimates

	N	Variance of log earnings	Gini coefficient	Mean to median ratio	90:50 ratio	50:10 ratio
NLSY79	4,979	0.30	0.31	1.19	2.07	1.94
PSID	467	0.32	0.33	1.23	2.07	1.84

6 Robustness

In this section, we first show that our inequality measures are robust to changes in our sample selection criteria: in the age range we use, and in our earnings threshold for attachment to the workforce. We then show that our estimates are dynamically robust, comparing them to estimates reproduced using only earlier data. Their close correspondence indicates that our current estimates should similarly accord with estimates using future waves of data.

6.1 Robustness to sample selection criteria

In our analysis we follow Guvenen et al. (2017) in setting an annual earnings threshold for attachment to the workforce equal to ten hours a week at half the minimum wage—$1,950 at 2016 prices. The choice of threshold has a marked effect on the variance of log annual earnings, but little effect on the variance in log lifetime earnings, or on the Gini coefficient, as we show in Appendix Figure A7, which compares this threshold to the minimal threshold of $195 annually, and to a six times higher threshold, $11,700, equal to 30 hours a week at the minimum wage. The lower the threshold the higher the variance in log annual earnings, but all three are substantially higher than the corresponding variances in log lifetime earnings, and all three series show steepening upward trends after 1998. Lowering the threshold to $195 has no effect on the variance of log lifetime earnings or on the lifetime or annual Gini coefficients. Raising the threshold to $11,700 slightly lowers all three measures but does not affect their shapes.

We follow Moffit (2020) and others in focusing on males aged 25-59 in each year. Appendix Figure A8 compares the variance in log earnings and the Gini coefficient, in annual and lifetime earnings, for two alternative age-ranges: 25-55 and 30-59. Both measures of inequality in annual earnings are virtually uneffected by these changes. Both measures of inequality in lifetime earnings are slightly higher and rise more steeply inequality when we use the 30-59 age range.

6.2 Dynamic consistency: robustness to the addition of new data

A key advantage of our two stage method is the ability to accurately anticipate lifetime earnings from the limited data available for younger birth cohorts, and thus track inequality in lifetime earnings for more recnt years, as Justman and Stiassnie (2021) show with regard to intergenerational income mobility. We demonstrate this here, by reproducing our results reprospectively using ten years (five waves) less of data, to 2008, to estimate year by year inequality in lifetime earnings to the year 2002 for males aged 25-59 in each year (and thus born until 1977), and comparing these estimates to the full-data estimates shown in previous sections, in four respects.

First, Appendix Figure A9 compares retrospective estimates, from data to 2008, of our lifetime earnings proxy for males born in 1942-77, to our full-data estimates, and finds a correlation of 0.96. Next, Table 2 compares three measures of lifetime earnings inequality, the variance of log lifetime earnings, the Gini coefficient and the mean to median ratio obtained from data restricted to 2006 to our full data estimates, for three birth-cohort groups: 1942-57, 1942-67, 1942-77. The estimates are nearly identical.

Table 2. Measures of inequality in lifetime earnings, for the 1942-57, 1942-67 and 1942-77 cohort-groups, using only data to 2008 and using all data to 2018

	Variance of log (earnings)	*Gini coefficient*	*Mean to median*
Data waves	1942-57 birth cohorts		
1969-2008	0.24	0.27	1.14
1969-2018	0.24	0.27	1.14
	1942-67 birth cohorts		
1969-2008	0.26	0.29	1.17
1969-2018	0.27	0.30	1.18
	1942-77 birth cohorts		
1969-2008	0.25	0.28	1.17
1969-2018	0.26	0.29	1.18

Figure 11 compares year-by-year estimates of inequality in lifetime earnings for 1986-2002 derived from data to 2008, to our full-data estimates. Levels of the restricted-data estimates of the variance of log lifetime earnings, the Gini coefficient (in Panel A) and the mean to median ratio (Panel B) are slightly lower than the full-data estimates, by 6 percent, 4 percent and 1 percent, respectively, and similarly vary in a narrow range. Differences increase over time, but at their greaest, in 2002, restricted-data estimates are only 10 percent, 6 percent and 1 percent lower than the full data estimates. Correlations are, respectively, 0.71, 0.56 and 0.98. Figure 12 similarly finds that the restricted data estimate of Shorrocks' mobility index, for 1986-2002, is only slightly lower than our full data estimates, with a correlation of 0.98 between the two series. Altogether, we find that the results we would have obtained for 1986-2002 had we performed the analysis ten years ago with the data available then, conform closely to the results we obtain with another ten years of data; this suggests that our current findings to 2012 should similarly hold up well when new waves of data are added.

Figure 11. Three measures of year-by-year inequality in lifetime earnings, 1986-2000, using only data to 2008 and using all data to 2018

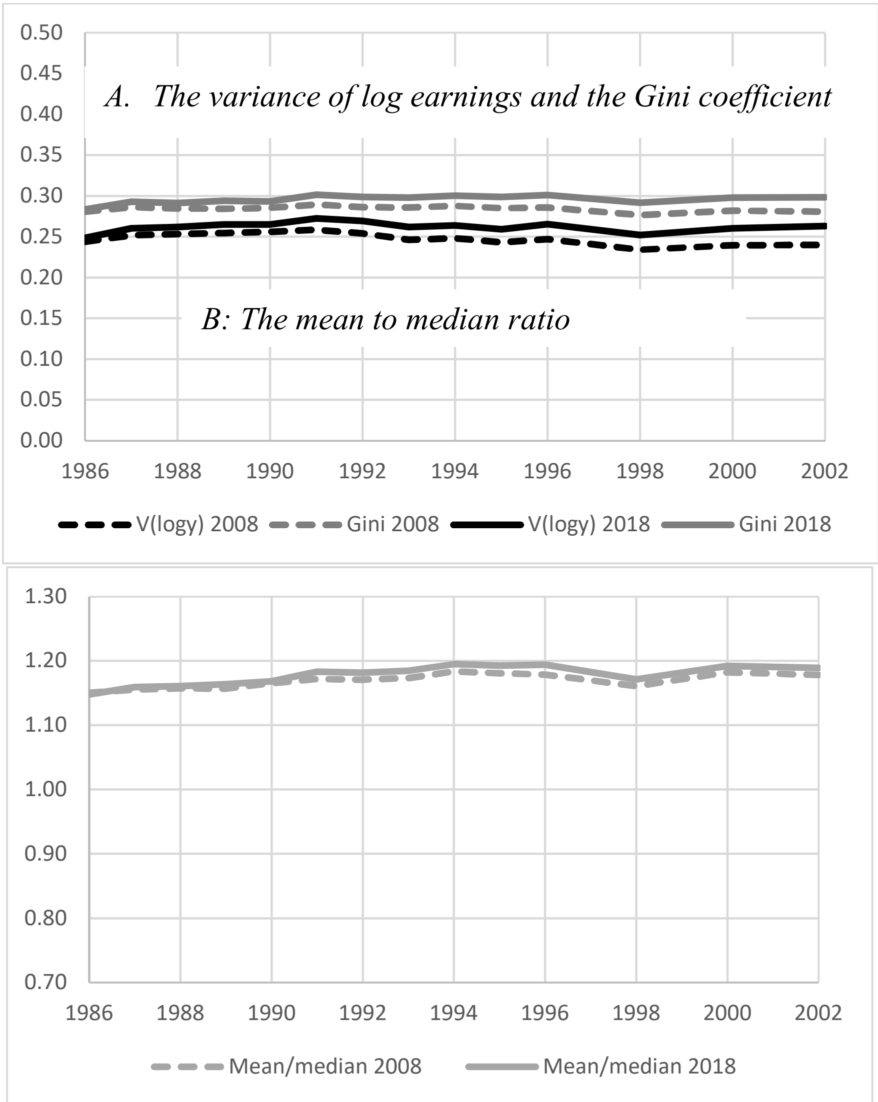
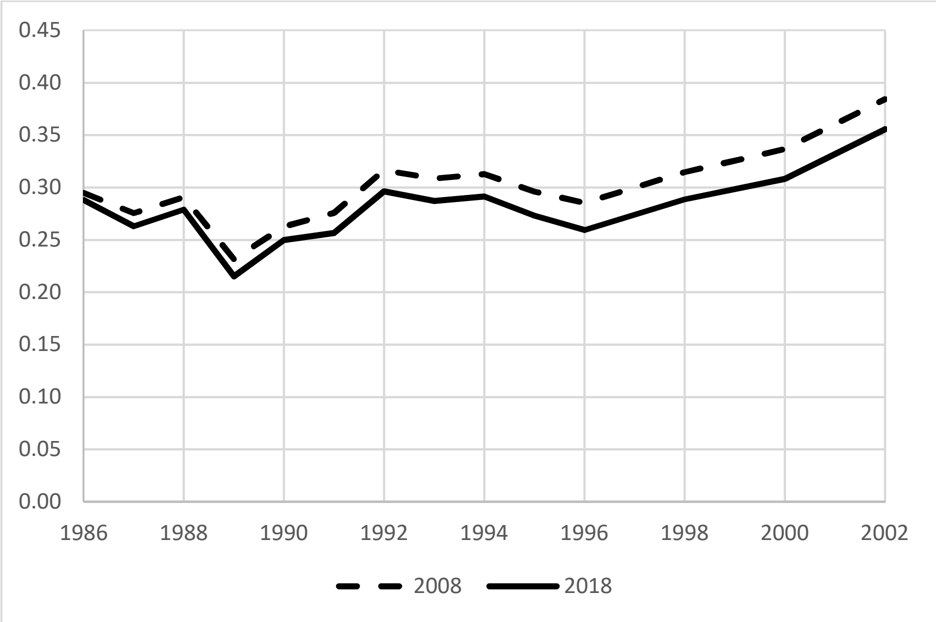


Figure 12. Shorrocks' mobility index, 1986-2002. using data to 2008 and all data to 2018



7 Conclusion

"Snapshots" of inequality in annual earnings represent an upper bound on what we understand intuitively as "true" earnings inequality, inasmuch as they ignore the ability of economic agents to transfer earnings over time. Previous approaches to addressing this issue either estimated transitory volatility by analyzing the structure and magnitude of earnings variability in short to medium data panels; or directly calculated permanent earnings by averaging actual lifetime earnings in long administrative data sets. The limitation of this latter approach is that it can only be applied to estimating historical inequality among populations near or past the end of their working lives and for whom consistent long-term earnings data is available. We adapt this approach to estimating lifetime earnings for younger cohorts, by using PSID data that combines annual earnings observations with data on age, race and education, in Mincer-type equations that yield reliable estimates of lifetime earnings from shorter earnings histories. We then use these estimates to measure yearly inequality in lifetime earnings among male heads of households born between 1942 and 1987, aged 25-59 and earning at least $1,950 (2016 PCE prices) in each year, and compare it to inequality in their annual earnings, in 1986-2012.

We find that year-by-year, the variance of log lifetime earnings is, on average, 40 percent lower than the variance of log annual earnings, with the Gini coefficient 25 percent lower and the mean to median ratio 8 percent lower for lifetime earnings than for annual earnings. Moreover, we find that inequality in lifetime earnings increased very little over this period, while inequality in annual earnings rose markedly after 1998. This indicates a substantial increase in earnings instability after 1998, which we also find in a direct analysis of transitory variance, measured as the variance of two-year arc-difference in earnings, and by an analysis of variance in rolling nine-year windows. Considering separately the upper and lower halves of the earnings distribution, we find that the 90:50 earnings ratios grew over this period, for both annual and lifetime earnings, but not the 50:10 ratio. Cohort-based measures of inequality in (anticipated) lifetime earnings, within ten-year birth-cohort-groups born between 1942 and 1987, followed a very different pattern, first increasing markedly and then declining, so that the variance of lifetime earnings within the youngest group, born in 1978-87, is 26 percent lower than within the cohort-group born twenty years earlier. Finally, we note that our findings are robust to variations in sample selection criteria; and are dynamically consistent, in the sense that reproducing our findings to the year 2002 without the last ten years of data yields similar results to our full-data estimates.

That inequality in lifetime earnings has not shown a similar rise to inequality in annual earnings, highlights the growing importance of being able to smooth over increasingly volatile short-term earnings by shifting resources over time.

Acknowledgments to be added.

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Appendix tables

Table A1. *Year-by-year summary statistics, all males in the base sample aged 25-59 each year; and those with annual earnings of $1,950 or more (2016 prices), 1986-2012*

	All males aged 25-59 in each year				*Males aged 25-59 with earnings of $1,950 or more in the year*				
Year	*Number of obs.*	*Mean age*	*Mean school years*	*Mean average lifetime earnings*	*Number of obs.*	*Mean age*	*Mean school years*	*Mean annual earnings*	*Mean average lifetime earnings*
1986	1,821	40.0	13.7	58,118	1,252	39.3	13.9	61,050	67,542
1987	1,847	40.1	13.7	58,430	1,261	39.0	13.9	61,211	67,938
1988	1,849	40.0	13.7	58,575	1,264	39.0	14.0	62,181	68,767
1989	1,851	40.1	13.8	59,705	1,262	39.1	14.0	61,540	69,337
1990	1,858	40.3	13.8	60,553	1,253	39.2	14.1	61,537	70,314
1991	1,855	40.6	13.8	61,321	1,238	39.4	14.1	61,952	71,190
1992	1,871	40.8	13.9	61,574	1,249	39.7	14.1	63,675	71,405
1993	1,872	41.1	13.9	62,575	1,316	40.1	14.2	65,164	71,448
1994	1,891	41.3	13.9	63,155	1,311	40.1	14.1	64,564	71,272
1995	1,921	41.6	13.9	63,794	1,312	40.3	14.2	65,610	72,398
1996	1,927	41.7	14.0	64,420	1,303	40.5	14.2	65,739	73,293
1998	1,965	42.0	14.0	65,162	1,331	40.8	14.3	69,596	73,538
2000	2,000	42.4	14.0	66,782	1,391	40.9	14.3	73,665	74,332
2002	2,030	42.6	14.1	68,128	1,433	40.9	14.3	72,609	75,855
2004	2,057	42.6	14.1	68,917	1,478	41.1	14.4	74,185	77,171
2006	2,070	42.6	14.2	69,406	1,473	40.7	14.4	74,328	78,616
2008	2,040	42.3	14.2	70,161	1,484	40.5	14.4	73,580	79,849
2010	2,030	42.4	14.2	71,408	1,388	40.4	14.5	70,922	82,480
2012	1,998	42.4	14.2	72,889	1380	40.1	14.5	74,959	82,973

Table A2. *Measures of year-by-year annual and lifetime earnings inequality, 1986-2012, males aged 30-59 with earnings > $1950 in the year (2016 PCE prices), and all males aged 25-59 in the year*

Year	*Variance of log (earnings)*				*Gini*			*Theil, α=0*			*Mean to median ratio*	
	annual earnings; y_{it}≥1950	*lifetime earnings; y_{it}≥1950*	*predicted earnings; y_{it}≥1950*	*lifetime earnings, all*	*annual earning; y_{it}≥1950*	*lifetime earnings; y_{it}≥1950*	*lifetime earnings, all*	*annual earnings; y_{it}≥1950*	*lifetime earnings; y_{it}≥1950*	*lifetime earnings, all*	*annual earnings; y_{it} ≥ 1950*	*lifetime earnings; y_{it}≥1950*
1986	0.528	0.247	0.431	0.252	0.361	0.285	0.284	0.250	0.137	0.136	1.175	1.161
1987	0.514	0.259	0.456	0.253	0.360	0.290	0.285	0.248	0.142	0.137	1.205	1.168
1988	0.528	0.260	0.507	0.254	0.370	0.289	0.285	0.260	0.142	0.137	1.205	1.163
1989	0.484	0.267	0.458	0.260	0.362	0.294	0.290	0.243	0.147	0.143	1.204	1.171
1990	0.492	0.264	0.430	0.261	0.365	0.293	0.291	0.244	0.145	0.143	1.232	1.172
1991	0.505	0.270	0.434	0.260	0.373	0.299	0.291	0.255	0.152	0.143	1.257	1.185
1992	0.560	0.268	0.460	0.261	0.368	0.297	0.292	0.259	0.150	0.144	1.209	1.182
1993	0.528	0.261	0.460	0.259	0.385	0.296	0.291	0.273	0.147	0.143	1.268	1.175
1994	0.544	0.261	0.441	0.259	0.384	0.296	0.290	0.273	0.147	0.142	1.264	1.180
1995	0.504	0.257	0.490	0.261	0.385	0.295	0.291	0.266	0.146	0.143	1.293	1.182
1996	0.492	0.266	0.459	0.263	0.380	0.299	0.293	0.257	0.150	0.145	1.323	1.187
1998	0.495	0.251	0.454	0.258	0.374	0.291	0.292	0.248	0.140	0.142	1.262	1.181
2000	0.557	0.261	0.440	0.263	0.398	0.298	0.295	0.284	0.147	0.144	1.318	1.193
2002	0.633	0.266	0.401	0.270	0.433	0.300	0.297	0.343	0.148	0.147	1.374	1.208
2004	0.624	0.271	0.391	0.274	0.423	0.300	0.298	0.326	0.149	0.147	1.337	1.203
2006	0.636	0.269	0.407	0.278	0.424	0.298	0.299	0.322	0.146	0.147	1.337	1.198
2008	0.690	0.272	0.365	0.280	0.427	0.299	0.300	0.339	0.147	0.148	1.331	1.200
2010	0.708	0.276	0.343	0.279	0.423	0.298	0.299	0.338	0.146	0.147	1.412	1.169
2012	0.733	0.268	0.317	0.279	0.453	0.292	0.297	0.387	0.140	0.145	1.279	1.182

Table A3. *Earnings inequality in the top and bottom halves of the earnings distribution, 1986-2012: in annual and lifetime earnings, males aged 25-59 with annual earnings > $1,950 (2016 prices); and in lifetime earnings all males aged 25-59.*

Year	*Annual earnings,* $y_{it} > \$1,950$		*Lifetime earnings,* $y_{it} > \$1,950$		*Lifetime earnings, all males 25-59*	
	90:50 *ratio*	50:10 *ratio*	90:50 *ratio*	50:10 *ratio*	90:50 *ratio*	50:10 *ratio*
1986	1.97	2.66	1.79	1.83	1.82	1.83
1987	2.01	2.48	1.82	1.85	1.82	1.84
1988	2.07	2.62	1.81	1.83	1.84	1.82
1989	2.03	2.48	1.83	1.82	1.83	1.83
1990	2.09	2.34	1.85	1.83	1.85	1.84
1991	2.16	2.38	1.83	1.80	1.86	1.82
1992	2.06	2.52	1.86	1.78	1.85	1.83
1993	2.15	2.27	1.86	1.81	1.85	1.83
1994	2.17	2.39	1.89	1.78	1.85	1.82
1995	2.20	2.27	1.87	1.78	1.86	1.81
1996	2.29	2.06	1.86	1.78	1.88	1.80
1998	2.22	2.26	1.93	1.77	1.92	1.79
2000	2.38	2.33	1.95	1.79	1.93	1.79
2002	2.44	2.56	2.00	1.77	1.94	1.80
2004	2.44	2.50	1.99	1.79	1.98	1.80
2006	2.50	2.51	1.99	1.77	2.01	1.81
2008	2.40	2.50	1.97	1.78	2.02	1.80
2010	2.40	2.99	1.94	1.82	2.02	1.82
2012	2.49	2.70	1.91	1.84	2.00	1.83

Table A4. *Descriptive statistics for ten-year cohort groups, 1942-87; the four disjoint cohort-groups are shaded*

Birth cohort	*N*	*Observations*	*Average annual earnings*	*Average lifetime earnings*	*Years of schooling*
1942-51	588	12,285	63,849	64,709	13.6
1943-52	607	12,431	63,601	64,461	13.6
1944-53	634	12,927	62,794	64,159	13.7
1945-54	650	13,062	63,015	63,603	13.7
1946-55	670	13,190	63,552	63,794	13.7
1947-56	675	12,905	62,308	63,088	13.6
1948-57	660	12,300	62,030	62,953	13.5
1949-58	644	11,707	61,920	63,345	13.5
1950-59	653	11,689	62,897	64,633	13.5
1951-60	664	11,677	62,672	65,026	13.5
1952-61	649	11,253	62,939	66,309	13.5
1953-62	645	10,885	64,388	68,537	13.5
1954-63	633	10,258	63,701	68,795	13.5
1955-64	606	9,654	66,238	72,132	13.5
1956-65	579	8,897	66,196	73,190	13.5
1957-66	549	8,295	67,267	74,715	13.5
1958-67	539	7,821	68,653	76,694	13.6
1959-68	522	7,324	68,429	76,626	13.6
1960-69	515	6,913	67,074	76,574	13.5
1961-70	498	6,225	67,938	78,498	13.6
1962-71	499	5,870	68,056	78,572	13.6
1963-72	494	5,494	66,618	78,166	13.6
1964-73	490	5,147	68,261	79,135	13.7
1965-74	501	4,944	65,979	78,149	13.6
1966-75	505	4,778	64,709	77,885	13.6
1967-76	526	4,751	65,863	79,556	13.7
1968-77	538	4,631	65,389	79,518	13.6
1969-78	561	4,626	65,730	80,856	13.7
1970-79	576	4,523	64,986	81,348	13.8
1971-80	575	4,335	64,023	81,175	13.7
1972-81	594	4,282	63,484	82,753	13.8
1973-82	585	4,032	63,432	83,360	13.8
1974-83	600	3,926	62,742	84,406	13.9
1975-84	603	3,747	61,277	85,053	13.9
1976-85	598	3,541	61,425	86,068	14.0
1977-86	591	3,316	59,245	85,734	14.0
1978-87	575	3,021	57,915	86,347	14.1

Table A5. *Inequality in lifetime earnings within rolling ten-year cohort groups, 1942-87; the four disjoint cohort-groups are shaded*

Birth cohorts	*N*	*Var* $(log(\hat{y}_{i40}))$	*Gini*	*Mean to median ratio*	*90:50 ratio*	*50:10 ratio*
1942-51	588	0.22	0.27	1.11	1.67	1.79
1943-52	607	0.22	0.26	1.11	1.64	1.83
1944-53	634	0.22	0.26	1.11	1.66	1.82
1945-54	650	0.24	0.27	1.12	1.70	1.86
1946-55	670	0.25	0.28	1.12	1.73	1.91
1947-56	675	0.24	0.27	1.12	1.73	1.89
1948-57	660	0.25	0.28	1.14	1.82	1.86
1949-58	644	0.25	0.28	1.14	1.81	1.86
1950-59	653	0.27	0.29	1.18	1.93	1.85
1951-60	664	0.28	0.30	1.19	1.99	1.86
1952-61	649	0.27	0.29	1.18	1.98	1.88
1953-62	645	0.29	0.31	1.21	2.06	1.90
1954-63	633	0.29	0.30	1.20	2.03	1.90
1955-64	606	0.30	0.32	1.22	2.03	1.83
1956-65	579	0.29	0.31	1.22	2.01	1.76
1957-66	549	0.31	0.32	1.24	2.08	1.77
1958-67	539	0.31	0.32	1.23	2.04	1.81
1959-68	522	0.30	0.32	1.23	2.04	1.82
1960-69	515	0.29	0.31	1.22	2.04	1.80
1961-70	498	0.28	0.31	1.23	2.03	1.79
1962-71	499	0.29	0.32	1.24	2.09	1.81
1963-72	494	0.28	0.31	1.22	2.03	1.79
1964-73	490	0.28	0.31	1.23	2.02	1.75
1965-74	501	0.27	0.30	1.22	2.05	1.71
1966-75	505	0.27	0.30	1.22	2.04	1.71
1967-76	526	0.27	0.30	1.20	1.98	1.73
1968-77	538	0.26	0.29	1.22	2.01	1.70
1969-78	561	0.26	0.29	1.19	2.02	1.73
1970-79	576	0.26	0.29	1.18	2.00	1.76
1971-80	575	0.26	0.29	1.18	2.02	1.76
1972-81	594	0.25	0.28	1.16	1.95	1.76
1973-82	585	0.26	0.28	1.18	1.98	1.74
1974-83	600	0.26	0.28	1.18	1.98	1.75
1975-84	603	0.25	0.27	1.16	1.91	1.75
1976-85	598	0.24	0.27	1.16	1.89	1.74
1977-86	591	0.23	0.26	1.13	1.82	1.78
1978-87	575	0.23	0.26	1.14	1.84	1.78

Table A6. *Mobility and volatility measures derived from comparing lifetime, predicted, and annual earnings year-by-year, 1986-2012*

year	*Shorrocks' mobility index*	$Var(y_{it} - \hat{y}_{it})$	$Var(y_{it} - \hat{y}_{i40})$	$Var(\hat{y}_{it} - \hat{y}_{i40})$
1986	0.316	0.275	0.248	0.226
1987	0.290	0.275	0.250	0.250
1988	0.298	0.331	0.253	0.317
1989	0.258	0.278	0.219	0.260
1990	0.267	0.256	0.225	0.227
1991	0.269	0.264	0.262	0.213
1992	0.309	0.334	0.294	0.238
1993	0.297	0.319	0.269	0.251
1994	0.307	0.320	0.270	0.238
1995	0.285	0.316	0.251	0.294
1996	0.265	0.304	0.249	0.261
1998	0.288	0.319	0.278	0.273
2000	0.315	0.282	0.262	0.242
2002	0.352	0.364	0.365	0.209
2004	0.341	0.323	0.337	0.203
2006	0.350	0.313	0.384	0.239
2008	0.372	0.344	0.396	0.194
2010	0.376	0.334	0.397	0.177
2012	0.395	0.317	0.392	0.149

Note: y_{it} *is the logarithm of annual earnings of individual i in year t;* $\hat{y}_{i40}$ *is the logarithm of his predicted earnings in that year, from equation (1);* $\hat{y}_{i40}$ *is predicted earnings at age 40, our proxy for lifetime earnings. Shorrocks' mobility index is* $1 - SD(\hat{y}_{i40})/SD(y_{it})$

Table A7. *Variance of the arc difference in earnings, and "within" variance in nine-year windows, 1986-2012*

Year	*Variance of* $2(Y_{it} - Y_{it-2})/ (Y_{it} + Y_{it-2})$	*"Within" variance of log earnings residuals in 9-year windows*
1986	0.164	0.154
1988	0.153	0.163
1990	0.151	0.168
1992	0.176	0.167
1994	0.184	0.177
1996	0.167	0.182
1998	0.157	0.198
2000	0.165	0.193
2002	0.228	0.196
2004	0.232	0.209
2006	0.191	0.225
2008	0.203	0.228
2010	0.216	0.228
2012	0.200	0.219

Appendix Figures

Figure A1. *PSID age-earnings profiles, by years of schooling, white males born in 1925-56 and 1957-87; derived from a regression of all earnings observations on a cubic polynomial in age and its interaction with education and race (equation 1). The height of each profile is the average of the constant term for the relevant population (white males, by years of schooling).*

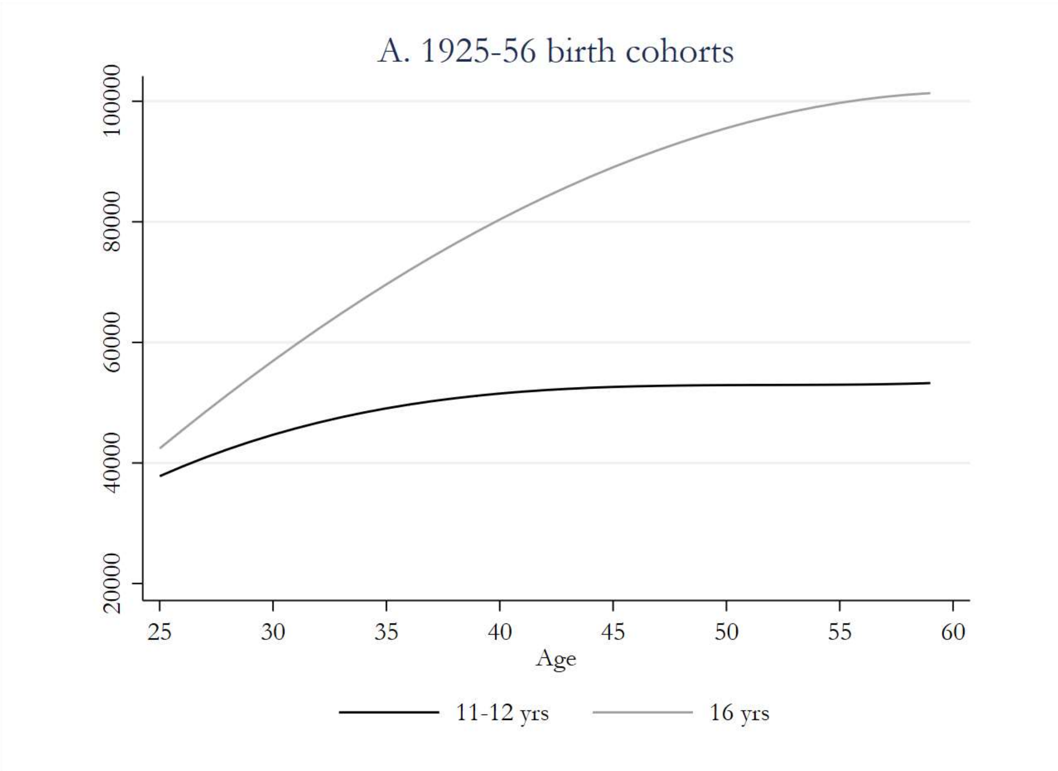
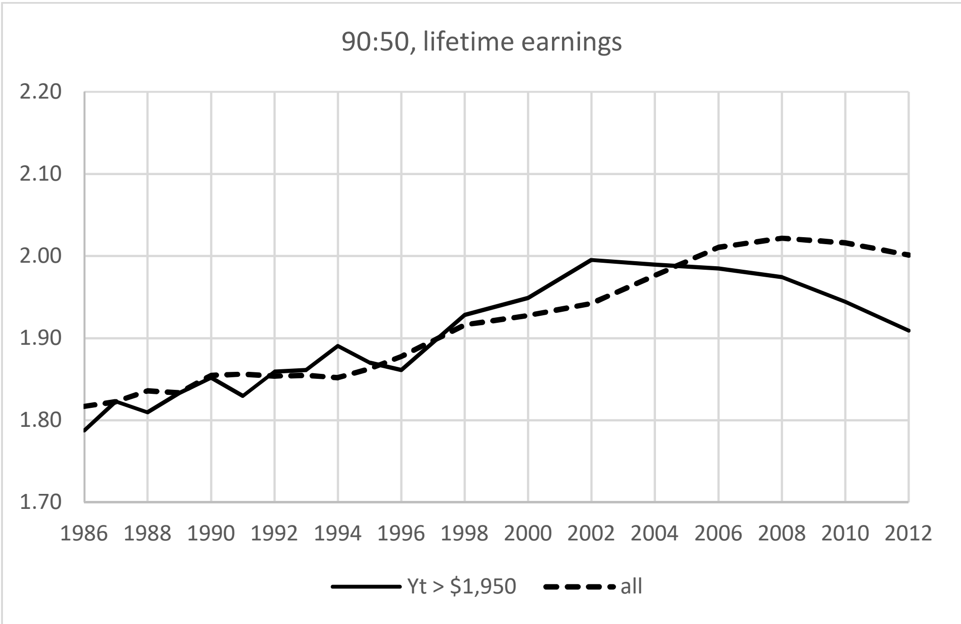


Figure A2. *Theil inequality indexes, alpha = 0,1, annual and lifetime earnings, 1986-2012*

Figure A3: *90:50 and 50:10 lifetime earnings ratio, for males aged 25-59, with annual earnings ≥ $1,950 (2016 prices), and for all males in the sample*



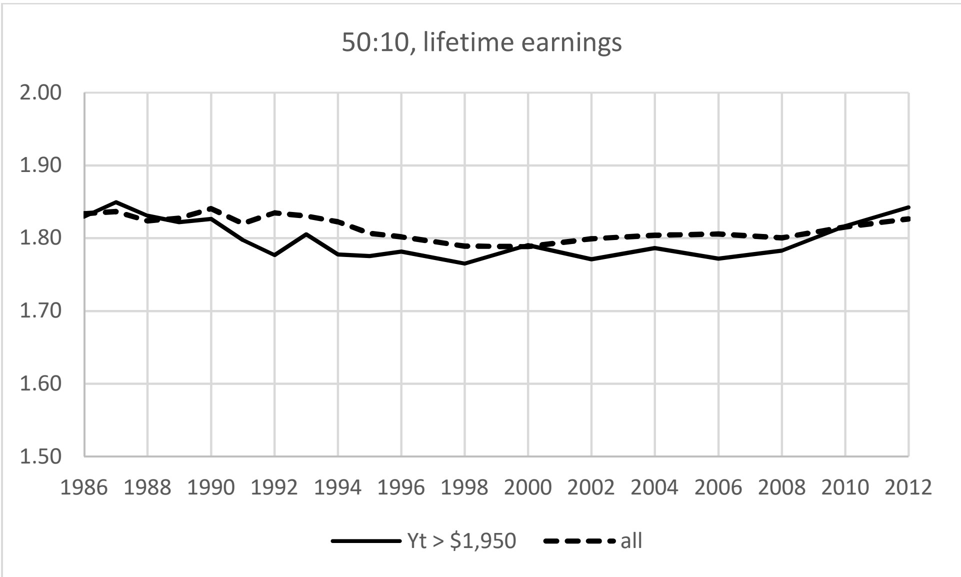
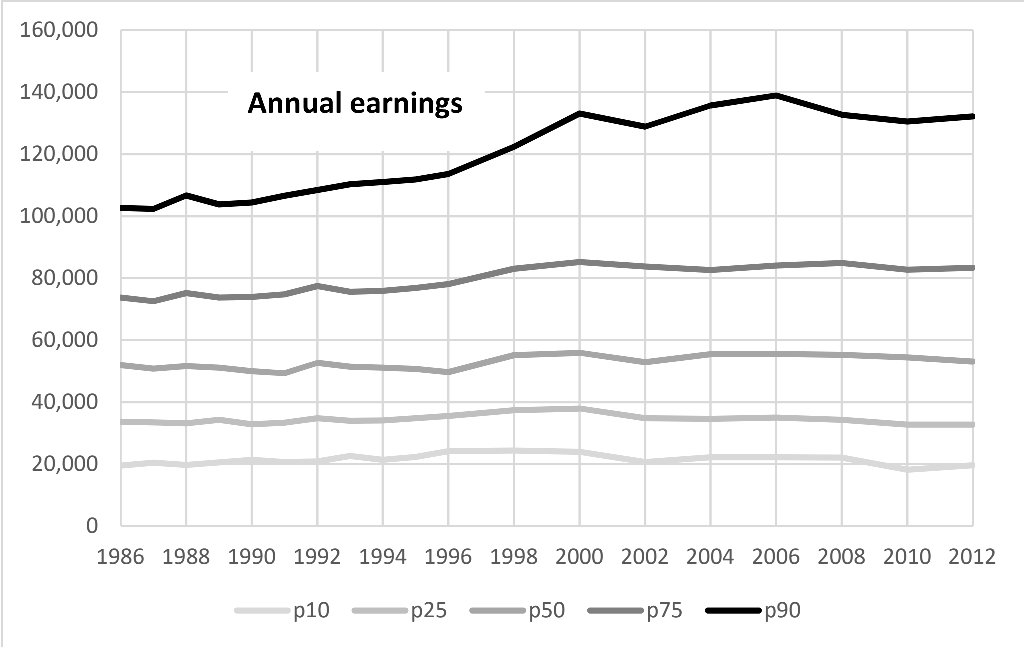


Figure A4. *Year-by-year distribution of annual and lifetime earnings, males aged 25-59, annual earnings ≥ \$1,950 (2016 prices), selected percentiles, 1986-2012*



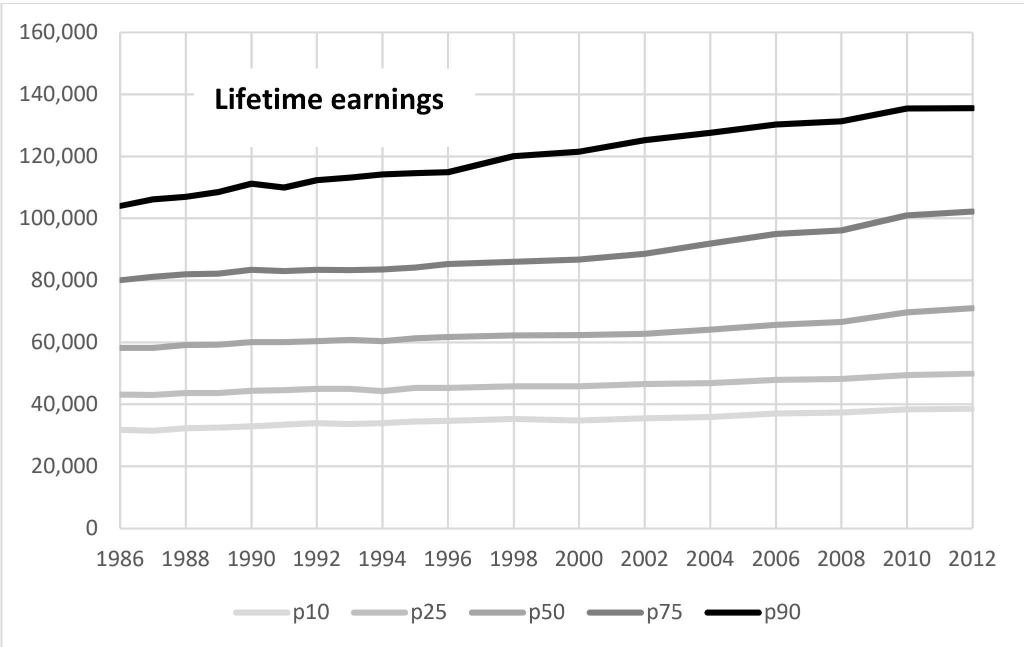
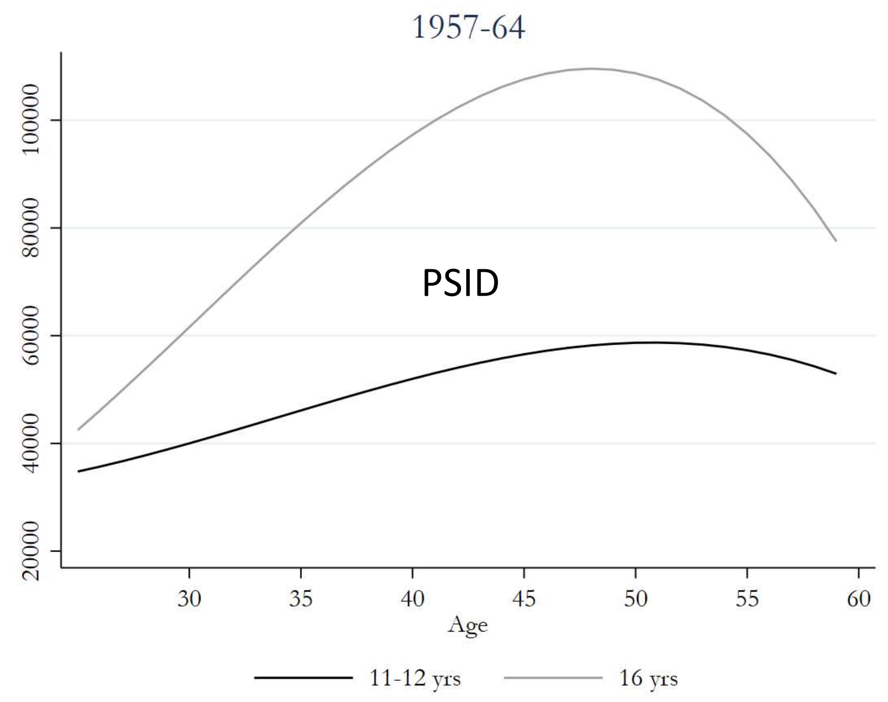


Figure A5. *PSID and NLSY age-earnings profiles, by years of schooling, white males born in 1957-64; derived from a regression of all earnings observations on a cubic polynomial in age and its interaction with education and race (equation 1). The height of each profile is the average of the constant term for the relevant population (white males, by years of schooling) in each data set.*



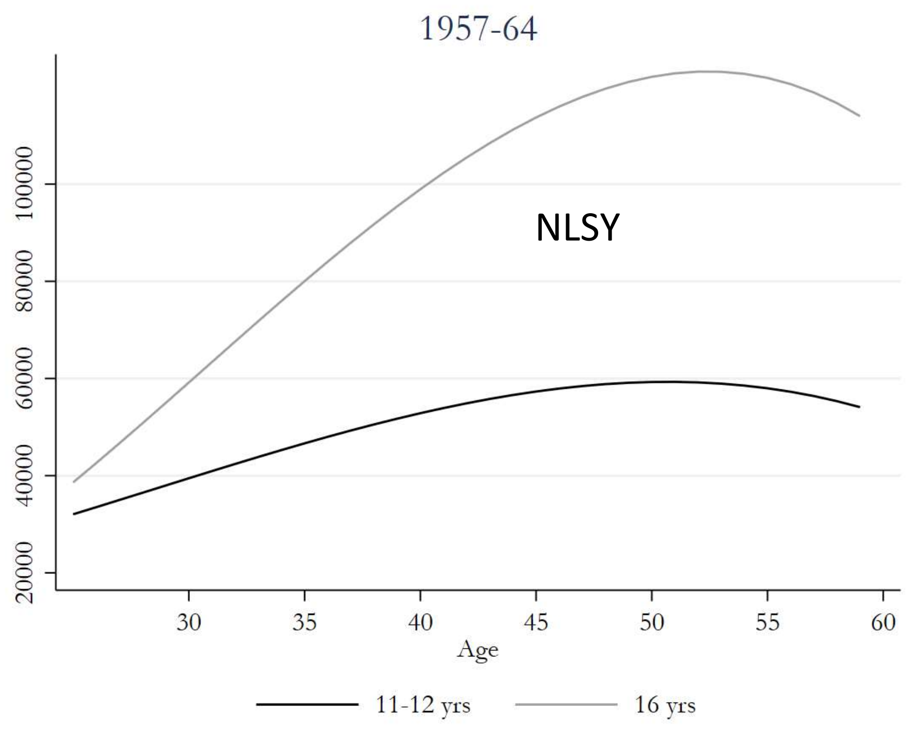
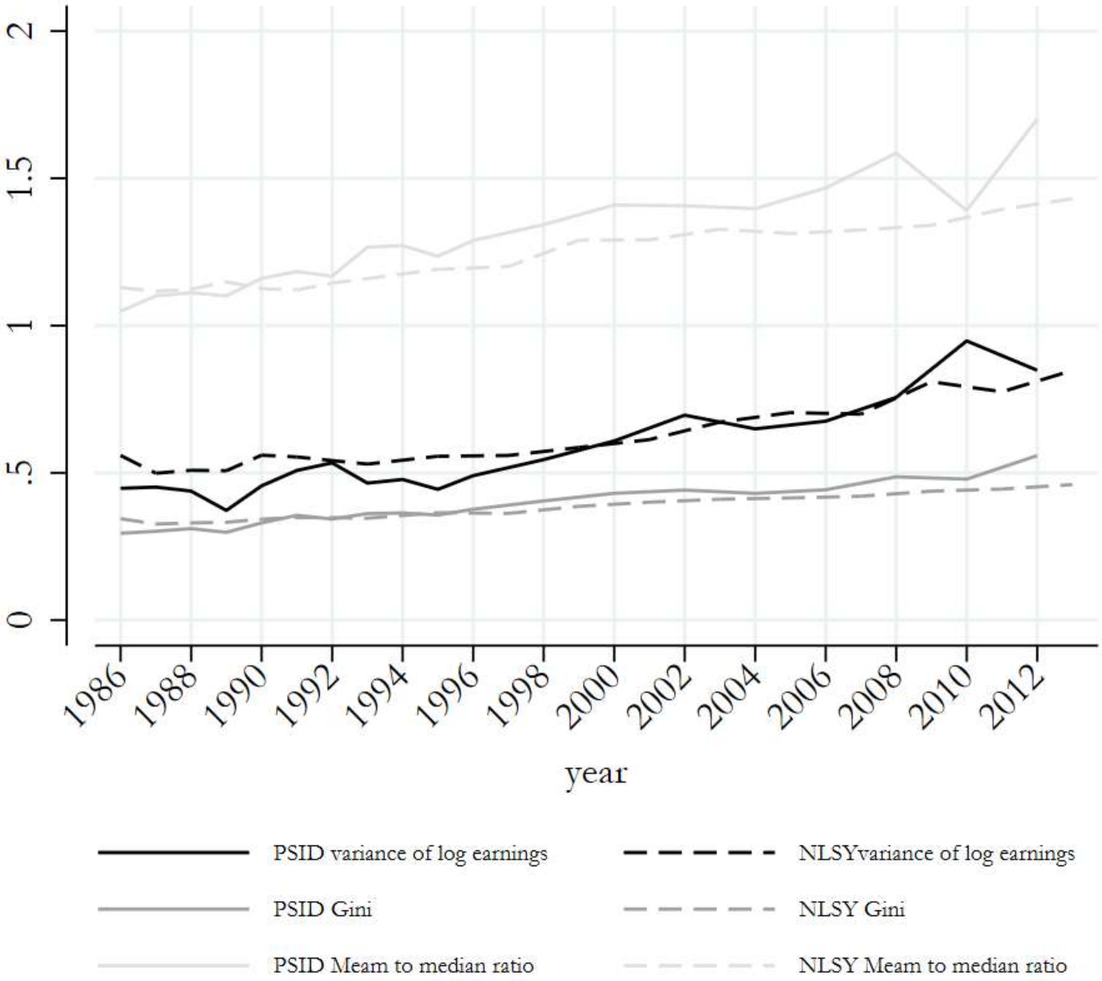
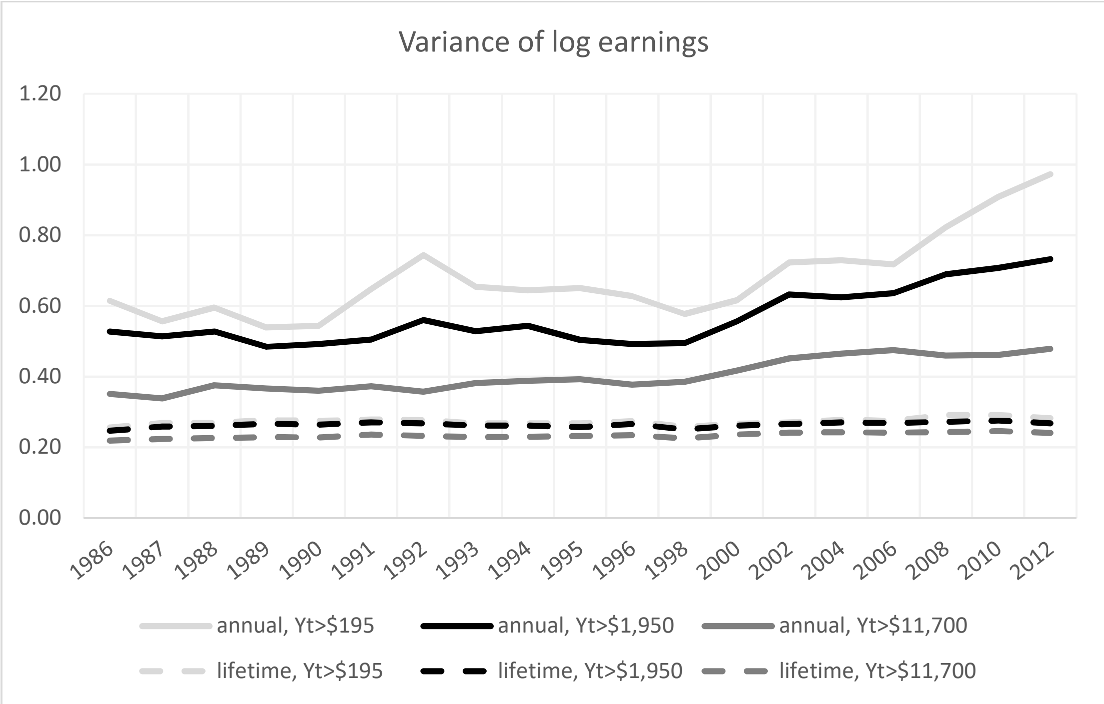


Figure A6. *PSID and NLSY inequality in annual earnings, males born in 1957-64, aged 25-59 and with earnings ≥ $1,950 (2016 prices) in each year*



Note: We use the 1978-2015 waves the of the NLSY79, collected annually to 1993 and biannually thereafter.

Figure A7. *Inequality in lifetime and annual earnings, male heads of household aged 25-59 and reporting annual earnings of at least \$195, \$1,950 and \$11,700 (2016 prices), 1986-2012*



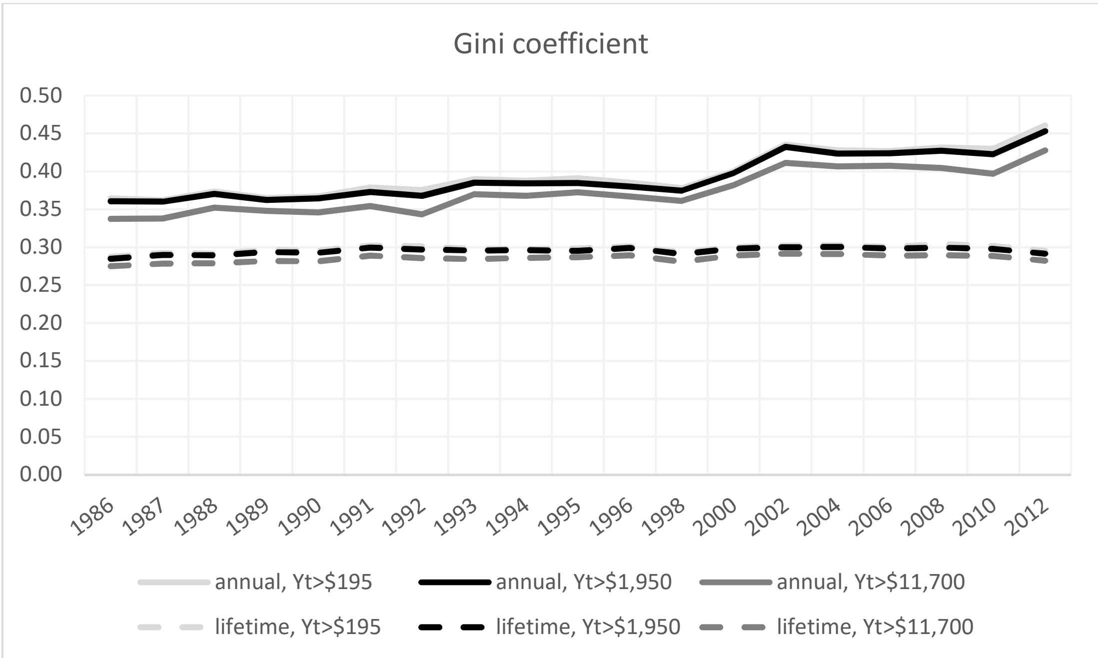
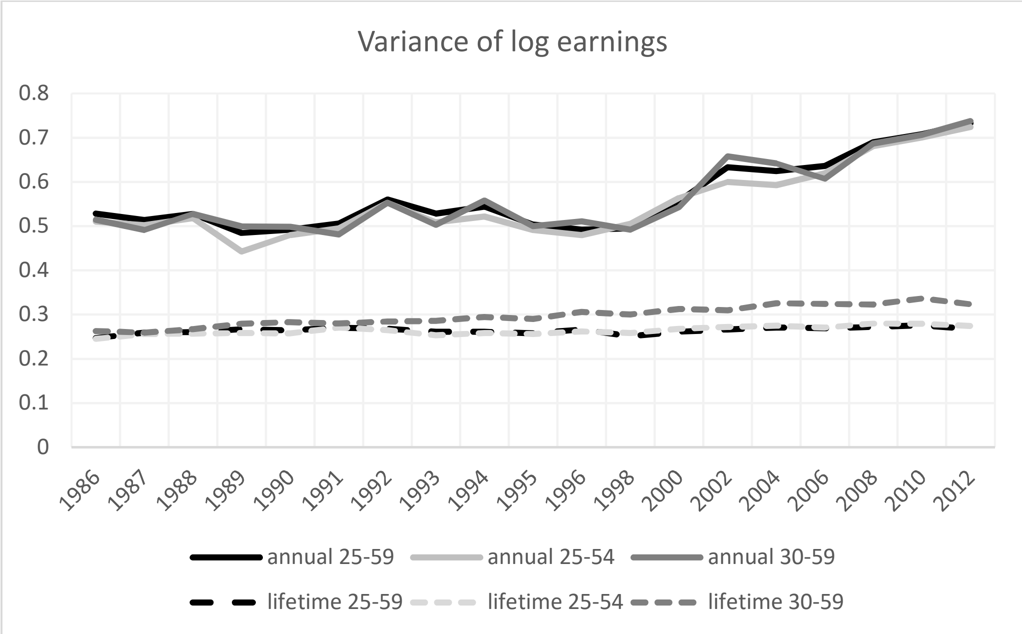
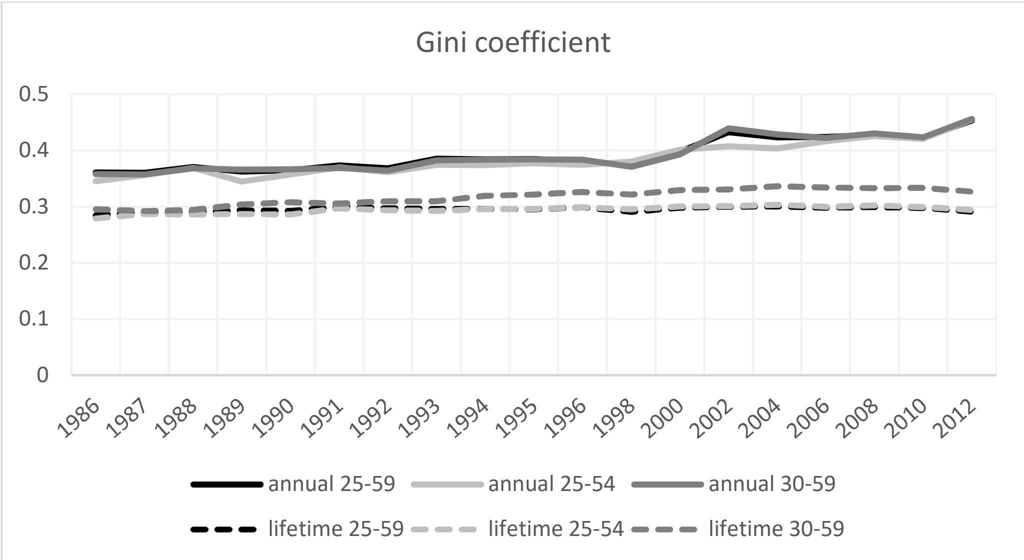


Figure A8. *Inequality in lifetime and annual earnings, male heads of household reporting annual earnings of at least $1,950 (2016 prices), by age range in each year, 1986-2012*





Note: When estimating inequality measures for 30-59 year-olds we omit the 1984-87 birth cohorts.

Figure A9. *Predicted lifetime earnings for the 1942-77 cohort-group using data up to 2008 plotted against full data estimates (2016 prices)*