WORKING PAPER · NO. 2021-60

Lifetime Earnings in the United States over Six Decades

Fatih Guvenen, Greg Kaplan, Jae Song, and Justin Weidner

MAY 2021

Becker Friedman Institute
FOR ECONOMICS AT UCHICAGO

5757 S. University Ave.
Chicago, IL 60637
Main: 773.702.5599
bfi.uchicago.edu

Lifetime Earnings in the United States over Six Decades[*]

Fatih Guvenen[†] Greg Kaplan[‡] Jae Song[§] Justin Weidner[¶]

May 6, 2021

Abstract

Using panel data on individual earnings histories from 1957 to 2013, we document empirical facts about the distribution of lifetime earnings in the United States. First, from the cohort that entered the labor market in 1957 to the cohort that entered in 1983, median lifetime earnings of men declined by 10%–19%. Moreover, there was little-to-no rise in the lower three-quarters of the male lifetime earnings distribution during this period. Accounting for rising employer-provided health and pension benefits partly mitigates these findings but does not alter the substantive conclusions. For women, median lifetime earnings increased by 22%–33% from the 1957 to the 1983 cohort, but these gains were relative to the very low median lifetime earnings for the early cohorts. Much of the difference between newer and older cohorts comes from differences in median earnings at the time of labor market entry. Second, inequality in lifetime earnings has increased significantly within each gender group, but the closing lifetime gender gap has kept overall lifetime inequality virtually flat over the entire period. The increase among men is largely attributable to subsequent cohorts entering the labor market with progressively higher levels of inequality, and not so much to faster inequality growth over the life cycle for newer cohorts. Partial life-cycle earnings data for younger cohorts indicate that both the stagnation of median lifetime earnings and the rise in lifetime inequality are likely to continue.

JEL Codes: E24, J24, J31.
Keywords: Lifetime income, earnings, lifetime inequality, wage stagnation, gender earnings gap.

[*]Special thanks to Gerald Ray at the Social Security Administration for his help and support. For helpful discussions, we thank David Autor, Richard Blundell, Chris Foote, Claudia Goldin, Nathan Hendren, Magne Mogstad, Jim Poterba, Chris Phelan, Jean-Marc Robin, and seminar and conference participants at various institutions. Conor Ryan and Cristian Aguilera Arellano provided outstanding research assistance. The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis, the Federal Reserve System or the Social Security Administration.

[†]University of Minnesota, Federal Reserve Bank of Minneapolis, and NBER; `guvenen@umn.edu`

[‡]University of Chicago and NBER; `gkaplan@uchicago.edu`

[§]Social Security Administration; `jae.song@ssa.gov`

[¶]Deutsche Bank; `jsweidner@gmail.com`

1 Introduction

Since the 1970s, two main trends have characterized the U.S. labor market: (i) stagnating average earnings and (ii) rising earnings inequality. These twin trends, which have shown remarkable resilience, have spurred both active academic research into their primary causes and heated public debate over the appropriate policy responses. Yet, despite this intense attention, the vast body of available empirical evidence pertains almost entirely to point-in-time measures of earnings, with little evidence on trends in lifetime earnings.[1] This dearth of evidence is not because of an oversight on the part of researchers. Going back at least to the 19th century (Farr (1853)), researchers have been well aware that for many questions in the social sciences, lifetime earnings is the most relevant concept because it provides a more complete picture of an individual's lifetime resources. Lifetime earnings accounts for the transitory nature of point-in-time (often annual) earnings and long-run economic mobility, as well as the extensive margin of participation in the labor market. For many questions, the difference between lifetime and point-in-time measures can matter greatly.[2]

Rather, the lack of a systematic analysis of the distribution of lifetime earnings in the United States is due to the scarcity of micro data sets with sufficiently long individual earnings histories. Thus, to shed light on this topic, this paper begins by constructing measures of lifetime earnings for millions of individuals, using a 57-year-long panel (covering the period 1957–2013) of individual earnings histories from U.S. Social Security Administration (SSA) records. Our baseline lifetime earnings measure is based on 31 potential working years between ages 25 and 55, which allows us to construct lifetime earnings statistics for 27 year-of-birth cohorts. The oldest cohort turned age 25 in 1957, and the youngest one turned age 55 in 2013, the last year of our sample. Throughout this paper, we refer to cohorts by the year in which they turned 25.[3] To our knowledge, this paper provides the first analysis of lifetime earnings distributions for a large number of cohorts in the United States.

[1]We discuss exceptions in the literature review below. Because of the nature of our data set (discussed in Section 2), in this paper we exclusively focus on labor (wage/salary) earnings. We use "earnings" and "earnings" interchangeably throughout the paper. See Lemieux (2008) and Acemoglu and Autor (2011) for thorough surveys of trends in inequality in annual earnings.

[2]For example, a 30-year-old medical intern who earns $40,000 is close to the median worker in that year but will likely end up in the top 5% of the lifetime earnings distribution. Similarly, a 22-year-old rookie NFL player who makes $400,000 will be in the top 1% of the earnings distribution that year but may easily be out of the top 10% of the lifetime earnings distribution.

[3]As we explain in Section 2, we exclude individuals who participated in the labor market for less than 16years so as to focus on individuals with a relatively strong lifetime labor market attachment. An individual is considered a nonparticipant if s/he has negligible labor earnings in that year, as defined in Section 2.

Our main contribution is to document counterparts to the twin trends, but using lifetime earnings rather than annual earnings. Specifically, we ask three related sets of questions. First, in Section 3, we ask how the lifetime earnings of the median worker has changed from the first cohort (hereafter, the 1957 cohort) to the last one (hereafter, the 1983 cohort) and, given the remarkable changes in women's roles in the labor market over this period, whether these trends differ by gender. We find that the lifetime earnings of the median male worker declined by 10% to 19% (depending on the price deflator we use), from the 1967 cohort to the 1983 cohort. Perhaps more strikingly, more than three-quarters of the distribution of men experienced no rise in their lifetime earnings across these cohorts—the only rise took place from the 1957 cohort to the 1966 cohort.

In contrast, subsequent cohorts of female workers have seen robust and steady gains, on the order of 22% to 33% for the median female worker. However, because these gains started from a very low level of median lifetime earnings for the 1957 cohort, they were not large enough at the aggregate level to offset the losses by men. An important related trend during this period was the rise of non-wage benefits, dominated by employer-provided health insurance and retirement benefits. Our data set does not contain individual-level information on non-wage benefits, but we use the national income and product accounts (NIPAs) to obtain an upper bound on the growth of such benefits. Incorporating the growth in these benefits mitigates but does not overturn these findings.

To appreciate the magnitude of these trends, some dollar figures can be useful. When nominal earnings are deflated by the personal consumption expenditure (PCE) deflator, the annualized value of median lifetime wage/salary earnings for male workers declined by \$4,400 per year from the 1967 cohort to the 1983 cohort, or \$136,400 over the 31-year working period. Adding in an upper bound estimate of growth in non-wage benefits reduces this loss to \$3,100 per year, or to \$96,100 over the working life. Using the consumer price index (CPI) to deflate nominal earnings reveals an even bleaker picture: a loss of \$9,150 per year, or \$7,850 when estimated non-wage benefits are included. The corresponding total lifetime loss is \$283,650 for wage/salary earnings and \$243,350 when estimated benefits are included.

Second, in Section 4, we ask how the shape of life-cycle earnings profiles changed across cohorts. The answer to this question helps to identify which phase of the life cycle is most responsible for the decline in lifetime earnings. For men, the largest difference is in the early working years: each subsequent cohort after 1967 faced a lower median initial earnings (i.e., at age 25) relative to previous cohorts, but did not experience faster earnings growth over their life cycle to make up for the lower earnings early on. For example, median initial earnings fell from $33,300 for the 1967 cohort to $29,000 for the 1983 cohort (PCE adjusted). The analogous figures at age 55 were $55,900 for the former cohort and $54,100 for the latter, a decline of $1,800, showing no sign of catch-up over the life cycle.[4]

Looking ahead to more recent cohort who are currently in the labor market does not reveal a more optimistic picture: median initial earnings for men was only $24,400 in 2011, virtually the same level as in 1957. An analysis of recent cohorts with at least 10 years of data suggests that median lifetime earnings for men is likely to continue to stagnate. In these recent cohorts, median initial earnings for women tracks the median for men more closely, but women have experienced somewhat faster earnings growth in the early years of the life cycle, partly compensating for the fall in initial earnings.

Third, in Section 5, we examine inequality in lifetime earnings. We ask whether lifetime inequality has also increased alongside the well-documented increase in cross-sectional inequality. For the pooled sample of men and women, we find only a small rise in lifetime inequality, and measures of inequality that are not dominated by the top percentiles reveal little-to-no rise in lifetime inequality across these cohorts. For example, both the interquartile range and the 50-10 ratio (i.e. the ratio between the 50th and 10th percentiles of the lifetime earnings distribution) of lifetime earnings shrunk over this period. This finding might seem surprising in light of substantial increases both in cross-sectional earnings inequality and in lifetime earnings inequality within each gender group. The missing piece is the lifetime gender gap, which has shrunk throughout this period and did so more strongly than its well-documented annual counterpart. This has kept overall inequality virtually flat despite the relatively large rise in lifetime inequality within each gender group.

Related Literature

One of the earliest attempts to construct a measure of lifetime earnings was made by statistician and epidemiologist William Farr (1853).[5] The impetus for Farr's work—a report commissioned by the British Parliament—was the belief that an equitable tax system can

[4]Although a full analysis of the root causes of these trends is beyond the scope of this paper, we conducted a state-level panel regression analysis to provide a broad sense of potential drivers. Our results indicate that the decline in median lifetime earnings is closely linked to size of the entry cohort, which is consistent with imperfect substitution in production between workers of different ages as proposed by Card and Lemieux (2001) to explain the behavior of the college premium since the 1970s. Here, we find that the resulting downward pressure on earnings are persistent enough to depress the *lifetime* earnings for the median worker in larger cohorts. Further details are discussed in Appendix A.

[5]Since Farr (1853), a long list of studies attempted to obtain better estimates of lifetime earnings. Among these, Walsh (1935), Houthakker (1959) and Miller (1960), focused on computing the lifetime

only be built with the knowledge of the lifetime resources of individuals. This perspective is just as relevant today. Similarly, many major lifecycle decisions—such as investment in education/human capital, occupational choice, and fertility—require knowledge (or expectations) of lifetime resources. Lifetime earnings plays a central role in human capital theory (e.g., Mincer (1958) and Becker (1962)), which spawned a sizable empirical literature that attempted to obtain empirical measures of it. Estimates of lifetime earnings are also key inputs in other fields, for calculating compensation in personal injury lawsuits, for estimating indirect costs of wars and disasters, and for assessing the progressivity or regressivity of cigarette and alcohol taxes, among others.

The vast majority of empirical studies before the 1970s had access only to cross-sectional data by socio-economic groups. Survey-based panel data sets started to become available in the 1970s, which has allowed researchers to incorporate earnings dynamics when estimating lifetime earnings. However, the short time spans and the small sample sizes of most survey data sets made it infeasible to compute the distribution of lifetime earnings using only actual earnings histories.

To overcome these challenges, one literature estimates parametric econometric models for earnings dynamics from panel data, which can then be simulated to obtain the distribution of lifetime earnings. For example, Bowlus and Robin (2004) fit a search model to the moments of 1-year changes in wages and employment status using the matched Current Population Survey (CPS), which they then simulate to obtain the distribution of lifetime earnings. Dearden et al. (2008) use similar approach to study higher education reform in England. A number of papers use this approach to obtain estimates of lifetime earnings for studying questions related to the US Social Security pension system. Among these, Brown et al. (2009) and Coronado et al. (2011) use the Panel Study of Earnings Dynamics (PSID) data in combination with simulation models, whereas Gustman and Steinmeier (2001) and Liebman (2002) use the Health and Retirement Survey (HRS) and the Survey of Earnings and Program Participation (SIPP)) that are matched with (capped) Social Security earnings records.

Our paper differs from this literature in three main ways. First, the long time span of SSA data allows us to use 31-year-long actual earnings histories for each individual to compute lifetime earnings and document empirical patterns with minimal assumptions. The parametric econometric models necessitated by short survey panels often miss important

benefits of education, whereas Clark (1937), Friedman and Kuznets (1954), Wilkinson (1966), and others, computed the average lifetime earnings of various socioeconomic or occupational groups.

nonlinearities in individual earnings dynamics.[6] Furthermore, these models are typically estimated by targeting moments of short-run dynamics, whereas long-run dynamics and mobility of earnings matter greatly for the distribution of lifetime earnings. In this paper, we are able to avoid these challenges. Second, with a few exceptions, earlier papers mostly focused on lifetime inequality at point in time, a focus dictated partly by the short time span of available data and partly by the questions those papers were interested in. In contrast, our main focus is on documenting trends in lifetime incomes. A notable exception is Bowlus and Robin (2004) who study the rise in U.S. lifetime inequality from 1977 to 1997 by simulating econometric models fitted to moments of 1-year changes from the matched CPS.[7] Third, earlier papers focused mainly on inequality in lifetime earnings, while ignoring trends in median lifetime earnings, which is a main focus of this paper.

A vast parallel literature studies differences between short- and long-run earnings mobility, which are closely to the related to the extent to which lifetime inequality deviates from annual earnings inequality. Among the recent and most closely related papers, Kopczuk et al. (2010) use the same data extract from the SSA that we use in this paper but over a different and longer period, from 1937 to 2004. They document how the patterns in long-run earnings mobility changed over this period. Because of their different focus, they restrict attention to earnings measures that are computed for 11-year periods over the life cycle. Furthermore, although mobility patterns certainly contain information about annual vs lifetime earnings, the link is not straightforward, and one cannot infer the statistics on one from the other except in special cases. In that sense, the contributions of the two papers on the distribution of lifetime earnings complement each other. Another important difference is the analysis of trends in median lifetime earnings, which is not studied in that paper.[8]

Finally, a few recent papers use administrative panel data to study lifetime inequality in Europe. Aaberge and Mogstad (2015) compare lifetime inequality and cross-sectional inequality in Norway using population data on earnings histories over individuals' working life. They do not examine trends over time. Bönke et al. (2015) study changes in lifetime inequality in Germany over 15 cohorts using career-long earnings histories.

[6]See Guvenen et al. (2015) and Arellano et al. (2017) for empirical evidence on these nonlinearities.

[7]Another interesting paper is by Bonhomme and Robin (2009) who study changes in lifetime inequality in France from 1990 to 2012 by modeling earnings dynamics with copulas fitted to earnings from 3-year panels.

[8]Some other papers used short averages of earnings (over 5 to 10 years) as a proxy for lifetime earnings, see, e.g., Aaronson (2002) and Leonesio and Del Bene (2011). These papers also focus on inequality and do not analyze the trends in median lifetime earnings.

2 Data

2.1 Data Sources

Our data come from the Continuous Work History Subsample (CWHS), which is a research extract from the U.S. Social Security Administration's (SSA) Master Earnings File (MEF). The CWHS is a 1% representative sample of U.S. workers whose jobs were covered by the Social Security system. The primary advantage of the CWHS is the long span of time covered, starting in 1957. For the 1957–2004 period, we use the sample constructed and cleaned by Kopczuk et al. (2010); further details can be found in that paper. We extend their sample to the years 2004–2013 by using the underlying data from the MEF for those years. Our final data set covers 57 years from 1957 to 2013, which allows us to compare lifetime earnings (31 years) for 27 birth cohorts.

During this period, the SSA has increased the set of industries that it covers, which poses a challenge for defining a sample whose representativeness is stable over time. We thus follow Kopczuk et al. (2010) by restricting our attention to workers employed in "commerce and industry," a group of sectors that was continuously covered by the SSA during this period.[9] Workers in commerce and industry accounted for approximately 70% of private sector employment in 2004. We have compared annual earnings in the Current Population Survey (CPS) for workers in all sectors with workers in commerce and industry. Figure D.5 in Appendix D shows that the level and time trends of median annual earnings at different ages are virtually identical for the two groups of workers. (In Appendix D.1, we provide a detailed comparison of our data set with the CPS). Further details on the CWHS can be found in Panis et al. (2000), and further details on its coverage can be found in Kopczuk et al. (2010).

The measure of labor earnings recorded in the CWHS is wage and salary earnings.[10] From 1957 to 1977, labor earnings data are from quarterly reports of wage and salary earnings supplied by employers to the SSA. From 1978 onward, labor earnings data come directly from individual W-2 forms (Box 1) and include wages and salaries, bonuses, and exercised stock options.[11] To avoid possible privacy issues, we do not report any statistics

[9]Following Kopczuk et al. (2010), we define "commerce and industry" workers to include all SIC codes, except for agriculture, forestry and fishing (01–09), hospitals (8060–8069), educational services (82), social service (83), religious organizations and non-classified membership organizations (8660–8699), private households (88), and public administration (91–97).

[10]From 1978, the CWHS also includes data on self-employment earnings from Schedule SE. We do not include it in our measure of earnings, since it is not available in earlier years and is top-coded until 1994.

[11]Quarterly compensation reports were subject to top-coding at the taxable ceiling for Social Security

for demographic cells (for example, a gender-year-earnings group) that contain fewer than 30 individuals. Because of the large size of the CWHS, such cells are rarely encountered. In addition to earnings, the CWHS contains information on date of birth and gender.

2.2 Adjusting for Inflation

In order to convert nominal earnings in the CWHS into real values, we need to choose an appropriate price index. Since our data span nearly six decades, this choice of price index matters. The two most commonly used price indexes are (i) the personal consumption expenditure (PCE) deflator from the Bureau of Economic Analysis (BEA) and (ii) the consumer price index (CPI) from the Bureau of Labor Statistics's (BLS). The (older) CPI and the (newer) PCE differ in several ways that are by now well understood.[12]

The PCE is generally accepted to be the superior index for measuring the *overall* price level and its evolution over the business cycle. It is thus the standard choice in aggregate (macro) economic analyses. However, for more micro work, such as the analyses in this paper, the CPI has some advantages. In particular, the CPI aims to capture the price level faced by the typical household for its *out-of-pocket* expenses and is thus based on a detailed survey of U.S. household expenditures, whereas the PCE is based on business surveys and also includes purchases made by others on behalf of households. Consequently, relative to the PCE, the CPI places a lower weight on health care prices (since a large fraction of total expenditures is paid by Medicare/Medicaid and insurance companies) and a much higher weight on housing and transportation. Because of this close connection to household living expenses, many government transfer programs (including the SSA pension and disability benefits systems) use the CPI to adjust for inflation. Existing academic studies of heterogeneity and inequality have used both series.[13]

In our empirical analysis, we choose the PCE as our baseline measure for deflating nominal earnings because it implies a lower cumulative inflation over this period than the CPI. We report all values in 2013 dollars. As we shall see in the next section, one of our main findings is a large slowdown in the growth rate of lifetime earnings, and this point is

contributions. Annual earnings above the taxable ceiling is imputed based on the pattern of quarterly earnings reports. For a detailed description of this imputation procedure, see Kopczuk et al. (2010). W-2 forms, which are the source of earnings data from 1978 onward, are not top-coded.

[12]For a comparison between the two indexes, see, for example, US Bureau of Labor Statistics (2011), McCully et al. (2012) and Furth (2017).

[13]For example, Card and Lemieux (2001); Lemieux (2006); Kopczuk et al. (2010); Aguiar and Hurst (2013); Aguiar and Bils (2015); Saez (2016) use the CPI, whereas Katz and Murphy (1992a); Autor et al. (2008) use the PCE.

made more forcefully with the conservative choice of the PCE. That said, we also report some key statistics using the CPI-adjusted figures, which, together with the PCE-adjusted figures, provides useful bounds on the effects of inflation adjustments for our findings.[14]

2.3 Baseline Sample

From the CWHS, we select a baseline sample of individuals based on their age and a measure of lifetime attachment to the workforce. An individual is included in the baseline sample if he or she: (i) was alive from ages 25 to 55 during the panel period (1957–2013); (ii) had earnings that is larger than a year-specific threshold-level earnings, denoted by $\underline{Y}_t$, in at least 15 years between the ages of 25 and 55; and (iii) had total lifetime earnings of at least $31 \times \underline{Y}$ where $\underline{Y}$ is the average level of $\underline{Y}_t$ for their cohort. The threshold, $\underline{Y}_t$, is the earnings level that corresponds to working at least 520 hours at one-half of the legal minimum wage for that year. For 2013, this threshold was $1,885. Imposing an annual minimum earnings threshold of this type is common practice in the literature on measuring annual earnings inequality and dynamics (see, e.g., Abowd and Card (1989), Meghir and Pistaferri (2004), and Storesletten et al. (2004)). Requiring that the minimum earnings threshold is met on average over the ages 25 to 55 (condition (iii)) is a natural extension of this criterion to a lifetime context. Requiring that an individual satisfies the annual minimum earnings threshold in at least half of their possible working years (condition (ii)) ensures that we restrict attention only to individuals who have had a relatively strong attachment to the labor market during their lives.[15]

2.4 Measure of Lifetime Earnings

We define annualized lifetime earnings as the sum of real annual labor earnings from ages 25 to 55, divided by 31:

$$\overline{Y}^i \equiv \frac{1}{31} \times \sum_{t=25}^{55} Y_t^i.$$

[14]We do not present results using the CPI-U-RS series becasuse it is only available from 1978 onwards, and is essentially identical to CPI-U after 2000. Appending CPI-U data before 1978, would generate estimates of lifetime earnings that lie in between our CPI and PCE estimates that we document. For a detailed discussion of the effects of these different price indexes on earnings trends, see Kaplan (2019).

[15]Because we are unable to distinguish between emigrants and individuals with zero earnings, and because our measure of earnings includes only earnings from commerce and industry, it is necessary to impose *some* minimum earnings criteria. We have experimented with varying these minimum earnings thresholds and minimum years of labor market participation. Doubling or halving the required minimum has little impact on our results. We have also analyzed alternative ages ranges (30–60, 20–55, and 25–60) and obtained similar results.

Since we have 57 years of earnings data, we can thus construct full lifetime earnings for 27 year-of-birth cohorts. We label these cohorts by the year they turned 25. The oldest cohort for which we have 31 years of data is the one that turned 25 in 1957; the youngest cohort is the one that turned 25 in 1983.

We do not discount future earnings when computing lifetime earnings. First, there is no single figure that is a natural choice as the appropriate discount rate for human capital. The rates of return used in the literature to discount future financial flows (dividends, profits, etc.) range from 1%–2% (often used for short-term risk-free assets) to 6%–8% (corresponding to long-term risky assets). Moreover, human capital is different from these financial assets because it is not tradable, so there are no market prices to discipline the discount rate used. It also has a risk structure that depends on many features of the institutional and redistributive environment, such as the tax and benefit system and the tightness of borrowing constraints, that can alleviate or amplify such risks. Proper discounting thus requires the use of an appropriate stochastic discount factor that accounts for these complex features of earnings dynamics and risk-sharing possibilities.[16]

Second, seemingly innocuous differences in the choice of interest rate can make a large difference in the level of lifetime inequality, how it evolves over time, and especially how it compares with cross-sectional inequality. This is because of the steep observed rise in both the level and dispersion of earnings in the first decade after a cohort enters the labor market. Higher interest rates effectively put more weight on earnings earned at younger ages. We prefer to treat earnings earned at all ages equally and focus on the most transparent possible measure of lifetime earnings. Furthermore, we note that most of the trends that we document are driven by changes across cohorts that have taken place at young ages so adopting a positive discount rate would only exacerbate these trends.

3 Trends in Average Lifetime Earnings

We begin by analyzing how average lifetime earnings has evolved across cohorts for males and females separately, and the extent to which these differential patterns were driven by changes in lifetime labor market participation versus earnings growth conditional on working. We then examine the impact that these differential trends have on the population

[16] For example, Huggett and Kaplan (2011) and Huggett and Kaplan (2016) show that in the presence of tight borrowing constraints, the average return on human capital implied by correctly computed discount factors can be very high early in the working life, often above 30% or 40%, but in the absence of borrowing constraints, discount factors are very close to the risk-free rate.

Table 1: Growth rates of cohort lifetime earnings, by gender

		Averages		Selected Percentiles							
Cohorts		Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
Males – PCE											
57–67	Cumulative	21.93	12.27	14.12	11.46	10.94	15.84	17.25	22.75	28.73	57.56
	Annualized	2.00	1.16	1.33	1.09	1.04	1.48	1.60	2.07	2.56	4.65
67–83	Cumulative	1.46	–10.34	–20.32	–19.77	–15.77	–1.33	2.29	9.98	13.22	17.48
	Annualized	0.09	–0.68	–1.41	–1.37	–1.07	–0.08	0.14	0.60	0.78	1.01
57–83	Cumulative	23.71	0.66	–9.07	–10.57	–6.55	14.29	19.93	35.00	45.76	85.11
	Annualized	0.82	0.03	–0.36	–0.43	–0.26	0.52	0.70	1.16	1.46	2.40
Males – CPI											
57–67	Cumulative	15.89	7.19	9.68	6.30	5.98	10.26	11.80	16.91	21.57	48.98
	Annualized	1.49	0.70	0.93	0.61	0.58	0.98	1.12	1.57	1.97	4.07
67–83	Cumulative	–7.54	–18.52	–27.46	–26.91	–23.58	–9.84	–6.61	0.06	3.56	6.99
	Annualized	–0.49	–1.27	–1.99	–1.94	–1.67	–0.65	–0.43	0.00	0.22	0.42
57–83	Cumulative	7.15	–12.65	–20.44	–22.31	–19.01	–0.58	4.40	16.98	25.90	59.40
	Annualized	0.27	–0.52	–0.88	–0.97	–0.81	–0.02	0.17	0.61	0.89	1.81
Females – PCE											
57–67	Cumulative	23.44	19.58	19.42	16.62	17.36	20.88	23.06	22.87	26.32	37.15
	Annualized	2.13	1.80	1.79	1.55	1.61	1.91	2.10	2.08	2.36	3.21
67–83	Cumulative	44.76	32.67	12.05	16.31	25.06	39.19	40.35	49.04	63.32	107.57
	Annualized	2.34	1.78	0.71	0.95	1.41	2.09	2.14	2.53	3.11	4.67
57–83	Cumulative	78.69	58.64	33.81	35.64	46.76	68.25	72.71	83.12	106.31	184.68
	Annualized	2.26	1.79	1.13	1.18	1.49	2.02	2.12	2.35	2.82	4.11
Females – CPI											
57–67	Cumulative	17.34	14.23	13.04	10.98	11.86	15.03	16.93	16.95	20.16	31.89
	Annualized	1.61	1.34	1.23	1.05	1.13	1.41	1.58	1.58	1.85	2.81
67–83	Cumulative	32.82	22.01	2.32	7.05	15.59	27.79	28.79	36.63	48.80	88.13
	Annualized	1.79	1.25	0.14	0.43	0.91	1.54	1.59	1.97	2.52	4.03
57–83	Cumulative	55.85	39.37	15.66	18.81	29.29	47.00	50.60	59.79	78.79	148.11
	Annualized	1.72	1.29	0.56	0.67	0.99	1.49	1.59	1.82	2.26	3.56

Notes: This table reports the cumulative growth and annualized growth rates in moments of the lifetime earnings distribution across cohorts for the baseline sample (see section 2.3). We report growth rates for the mean, median, and selected quantiles of the lifetime earnings distributions for men and women separately using both the PCE and CPI price deflators. For example, the top left cell indicates that the mean lifetime earnings of the the cohort of men that entered the workforce in 1967 was 21.93% greater than the cohort of men that entered the workforce in 1957.

as a whole.

3.1 Lifetime Earnings for Men and Women

From the 1957 to the 1983 cohort, annualized mean lifetime earnings ($\overline{Y}^i$) for men rose by around \$10,000, from \$42,200 to \$52,200. This rise corresponds to a cumulative increase of 23.7%, or an average increase of 0.82% between two consecutive cohorts—see the first data column in Table 1. However, the bulk of these gains—21.9% of the total 23.7%—accrued to only the first 10 or so cohorts. From the 1967 to the 1983 cohort, mean lifetime earnings increased by only 1.5% cumulatively.[17]

Median lifetime earnings for men has barely changed from the 1957 cohort to the 1983 cohort, increasing by only about \$250—or less than 1%. As with the mean, there are two distinct sub-periods: one from the 1957 to the 1967 cohort, where median lifetime earnings cumulatively rose by about 12.3%, and one from the 1967 to the 1983 cohort, where median lifetime earnings *fell* by over 10 percent. We will see that for almost all of the trends in lifetime earnings that we analyze, these two sub-periods—cohorts entering between 1957 and 1967 versus those entering between 1967 and 1983—represent two distinct phases. These findings for cumulative growth and average annualized growth in mean and median lifetime earnings are reported in the first panel of Table 1, along with the corresponding growth rates at selected percentiles of the lifetime distribution. We report lifetime earnings growth over the full period, as well as for the 1957 to 1967 cohorts and 1967 to 1983 cohorts separately.[18]

Table 1 shows that the stagnation of lifetime earnings for the cohorts since 1967 extends well beyond the median. Across almost the entire distribution of males, there have been either trivial, or even negative, gains in lifetime earnings. As far up the distribution as the 75th percentile, real lifetime earnings for males fell between the 1967 and 1983 cohorts. The only part of the distribution to see significant lifetime earnings gains was the top 10% of the distribution, and even for that part, growth was much faster over the first 10 cohorts as compared with the latter 16 cohorts. This paints a bleak picture of male lifetime earnings stagnation for the vast majority of the distribution.

Women, on the other hand, have seen increases in lifetime earnings throughout the entire distribution. Median lifetime earnings increased nearly monotonically from \$14,100 for the 1957 cohort to \$22,300 for the 1983 cohort. This steady increase in lifetime earnings

[17] In Section C.1 we compare growth in mean lifetime earnings with various measures of growth in mean cross-sectional earnings from the SSA data, the CPS and NIPA.

[18] In Table C.6 and Table C.7 in Appendix C, we report mean and median lifetime earnings, together with selected percentiles of the lifetime earnings distribution for each cohort separately, for males and females respectively.

for women has been broad-based, with all parts of the distribution experiencing consistent lifetime earnings growth across cohorts. Median lifetime earnings for women grew at an average rate of 1.8% per cohort for the 27 cohorts from 1957 to 1983, with almost the exact same annualized growth rates for the 10 cohorts from 1957 to 1967 and the 16 cohorts from 1967 to 1983. The 10th percentile of the lifetime earnings distribution grew only slightly slower over this period, at an average of 1.2% per cohort, while the 90th percentile grew slightly faster, at an average of 2.4% per cohort. At the very top of the distribution, lifetime earnings for women grew extremely fast – from the 1957 to 1983 cohorts, the 99th percentile nearly tripled (from $50,400 to $143,600), with an average increase of 4.1% per cohort.

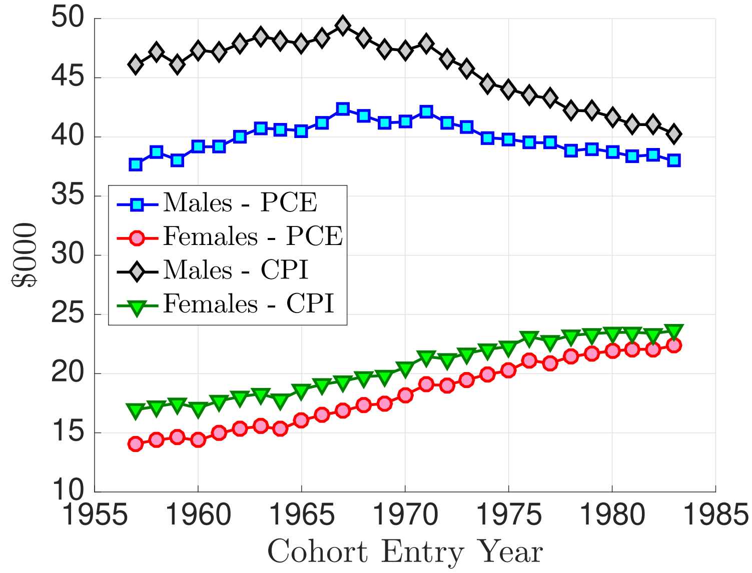
Using the CPI rather than the PCE to convert nominal earnings to 2013 dollars lowers lifetime earnings growth for both men and women. The blue and black lines in Figure 1 show median lifetime earnings for males by cohort using the PCE and the CPI respectively, while the red and green lines show analogous figures for women. Using the PCE shows that lifetime earnings for males increased up until about the 1967 cohort and then declined. However, with the CPI, median lifetime earnings is largely flat until the 1957 cohort and then begins a steep decline. The second panel of Table 1 presents the changes between males' lifetime earnings across cohorts after deflating with the CPI for the other percentiles of the distribution. As with the median, deflating with the CPI reduces the lifetime gains experienced by the first 10 cohorts, and exacerbates the lifetime earnings losses felt by the second set of cohorts across the distribution: even the 99th percentile of males experienced about half a percent of lifetime earnings growth by cohort. For women, deflating with the CPI reduces the growth rates but does not erase the broad gains in lifetime earnings.[19]

3.2 Extensive and Intensive Margins

Lifetime earnings growth from one cohort to another can come from either an increase in lifetime labor market participation (the extensive margin) or an increase in earnings while working (the intensive margin) or both. For women, the growth in lifetime earnings from the 1957 cohort to the 1983 cohort was driven by both margins. The changes in lifetime participation across these cohorts can be seen in Figure 3a, which displays the mean number of years worked for individuals in each cohort. Recall that an individual is included in the sample only if his/her annual earnings exceed $\underline{Y}_t$ in at least 15 of the 31 possible years; so, we are already conditioning on people with at least some attachment to the labor force. Even among these women who work at least 15 years, the average number of years worked

[19]Tables C.8 and C.9 in Appendix C show the selected moments of the lifetime earnings distribution by individual cohort for males and females, respectively, using the CPI.

Figure 1: Median Lifetime Earnings by Cohort and Gender



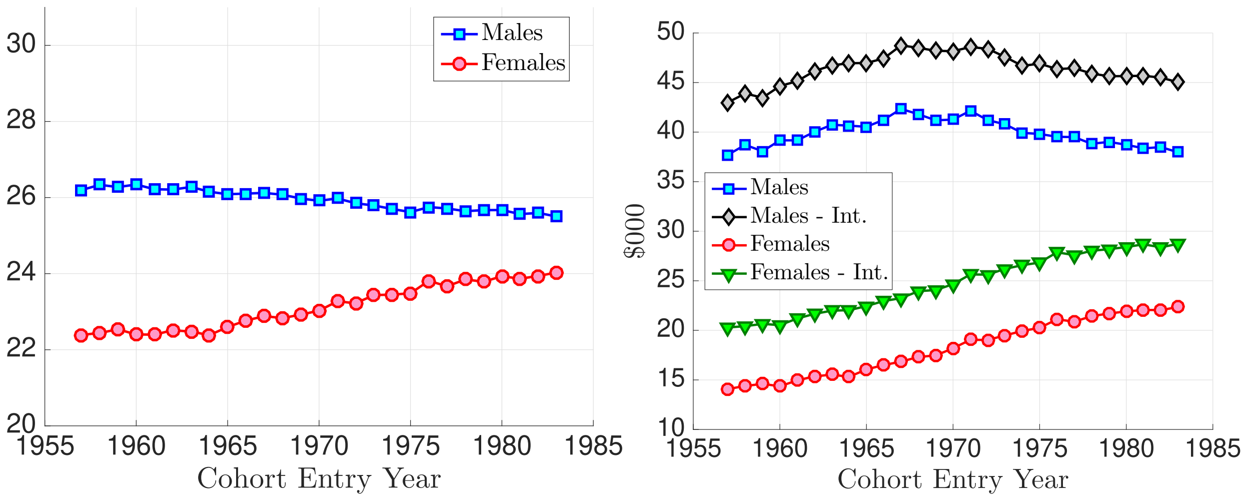
Notes: Each marker/observation represents the median lifetime earnings of a cohort that turned age 25 (entered the labor market) in the year indicated on the x-axis. Only individuals in the baseline sample (as defined in Section 2.3) are included. We separate each gender and show both the PCE and CPI price deflators. Values are displayed in thousands of 2013 US dollars.

between the 1957 and 1983 cohorts increased by about 1.6 years. Most of this increase comes from an increase in the number of years worked at young ages. From the 1957 to the 1983 cohorts, women in our sample worked an average of 1.8 additional years between the ages of 25 and 34, 0.2 additional years between the ages of 35 and 44, and 0.4 fewer years between the ages of 45 and 54.

Conditional on working, lifetime earnings for women also increased dramatically.[20] We measure the importance of this intensive margin by constructing an alternative measure of lifetime earnings in which we divide an individual's total earnings by the number of years in which he or she has earnings above the minimum threshold, rather than by 31. The median of the intensive margin of lifetime earnings for each cohort is shown by the black (diamond marker) and green (triangle) lines in Figure 3b. For comparison, the blue (square) and red (circle) lines in Figure 3b show overall median lifetime earnings by cohort.

[20]Since our data measure only annual earnings, we cannot measure workforce participation *within* a year. Changes in weeks or hours worked within a year are necessarily captured by the intensive margin in our data. We also cannot distinguish changes in average hours worked from changes in average wages per hour.

Figure 2: Lifetime Earnings by Cohort, Extensive and Intensive Margins



(a) Number of years worked by cohort and gender

(b) Median lifetime earnings by cohort and gender, extensive and intensive margins

Notes: Panel (a) displays the average number of years worked over the lifetime for a cohort of each gender that entered the labor market in a given year. Panel (b) displays the median lifetime earnings each gender-cohort as in Figure 1 (blue and red lines), as well as the median of the intensive margin of lifetime earnings for a gender-cohort that entered the labor market in a given year (blue and green lines). All statistics calculated using the baseline sample (see section 2.3). Values are displayed in thousands of 2013 US dollars and deflated using the PCE.

Median lifetime earnings conditional on working is mechanically higher than overall median lifetime earnings, by around $5,000 per year, and increases roughly in parallel to overall lifetime earnings. Expressed as growth rates, this finding implies that between the 1957 to 1983 cohorts of women, median lifetime earnings conditional on working grew by less (42%) than median total lifetime earnings (59%). The comparison between growth in the intensive margin versus the overall measures of lifetime earnings is similar in other parts of the distribution. These growth rates are reported in Table C.10 in Appendix C, which is analogous to Table 1 but is based only on earnings conditional on working. We also report mean and median lifetime earnings conditional on working, together with selected percentiles of the intensive margin of the lifetime earnings distribution, for each cohort individually in Table C.11 in Appendix C.

For men, the decline in lifetime earnings conditional on working is much more important than the decline in the number of years worked for explaining the stagnation of lifetime earnings since 1967. Figure 3a shows that the average number of years worked declined by less than half a year from the 1957 cohort to the 1983 cohort, while Figure 3b shows that for the cohorts since 1967, the decline in median lifetime earnings at the intensive margin is roughly similar to the overall decline in median lifetime earnings. From the 1967 to 1983 cohorts, median lifetime earnings declined by 10.3% (Table 1), while median lifetime earnings conditional on working declined by 7.2% (Table C.10 in Appendix C).

This decomposition of the decline in lifetime earnings for men is interesting in the context of the well-documented decline in male employment and labor force participation as documented, for example, by Aguiar et al. (2021). However, these recent findings mostly pertain to younger cohorts that do not overlap with the cohorts and time period covered by our data (for example, Aguiar et al. (2021) focus on 21 to 30 year-olds since 2001). Knowles (2013) documents trends in labor supply over the last half centure and finds that male hours were roughly constant from 1970 to the early 2000's.

3.3 Lifetime Earnings in the Overall Population

Looking at the population as a whole, we find that the trends for men and women combine in sometimes offsetting ways. As with men separately, we still see larger increases in the mean of lifetime earnings in the first sub-period, with nearly three-quarters of the lifetime earnings growth from the 1957 to 1983 cohorts occurring among the first 10 cohorts. These findings for cumulative growth and average annual growth in mean, median, and selected percentiles of lifetime earnings for the full period, as well as for the 1957 to 1967 cohorts and the 1967 to 1983 cohorts separately, are reported in Table 2. As seen here, the stagnation of lifetime earnings for the post-1967 cohorts extends up to the 75th percentile. Even at the 90th percentile, average growth was only around 0.59% per cohort, compared with growth of 1.49% per cohort for the preceding cohorts. For over three-quarters of the distribution, lifetime earnings growth was essentially flat or declining across these 17 cohorts.[21]

The general stagnation of lifetime earnings for the majority of the distribution results from a combination of the opposing trends for men and women, together with their general positions in the overall population's lifetime earnings distribution. Given that men largely experienced losses in lifetime earnings over this time period while women experienced large gains, there has been a narrowing of the lifetime earnings gap.

Comparing the median earnings of males and females from Figure 1, we see that the difference between the median male and female lifetime earnings has narrowed over time,

[21] In Table C.12 in Appendix C, we also report mean and median lifetime earnings, together with selected percentiles of the lifetime earnings distribution, for each cohort individually.

Table 2: Growth rates of cohort lifetime earnings

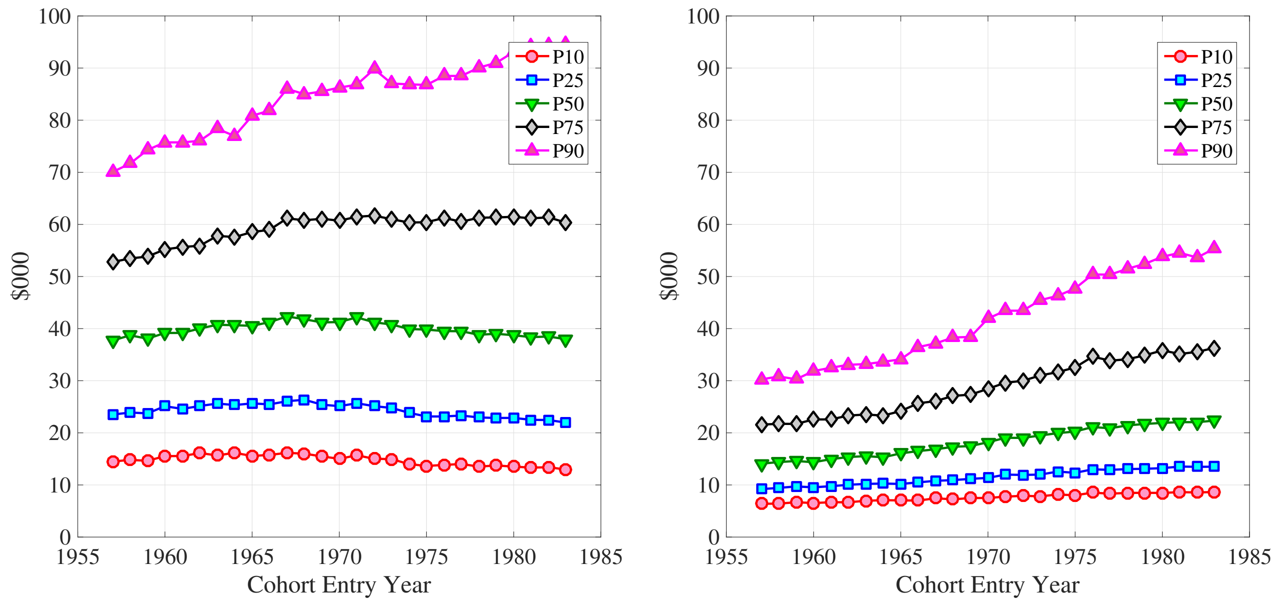
		Averages		Selected Percentiles							
Cohorts		Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
PCE											
57–67	Cumulative	17.90	9.02	13.62	11.81	10.20	11.56	12.25	15.98	21.33	51.91
	Annualized	1.66	0.87	1.29	1.12	0.98	1.10	1.16	1.49	1.95	4.27
67–83	Cumulative	6.53	0.12	2.01	3.73	2.10	–0.72	1.30	9.92	14.05	10.67
	Annualized	0.40	0.01	0.12	0.23	0.13	–0.04	0.08	0.59	0.83	0.64
57–83	Cumulative	25.60	9.15	15.90	15.98	12.51	10.76	13.71	27.49	38.37	68.12
	Annualized	0.88	0.34	0.57	0.57	0.45	0.39	0.50	0.94	1.26	2.02
CPI											
57–67	Cumulative	12.04	3.73	8.48	6.19	4.66	6.33	6.77	10.40	15.53	44.49
	Annualized	1.14	0.37	0.82	0.60	0.46	0.62	0.66	0.99	1.45	3.75
67–83	Cumulative	–2.78	–8.95	–6.49	–4.17	–6.34	–9.80	–7.77	0.08	3.95	0.57
	Annualized	–0.18	–0.58	–0.42	–0.27	–0.41	–0.64	–0.50	0.01	0.24	0.04
57–83	Cumulative	8.92	–5.56	1.44	1.77	–1.98	–4.10	–1.52	10.49	20.10	45.32
	Annualized	0.33	–0.22	0.05	0.07	–0.08	–0.16	–0.06	0.38	0.71	1.45

Notes: This table reports the cumulative growth and annualized growth rates in moments of the lifetime earnings distribution across cohorts for the baseline sample (see section 2.3). We report growth rates for the mean, median, and selected quantiles of the lifetime earnings distributions for total cohort population (men and women together) using both the PCE and CPI price deflators.

from the 1957 cohort in which the median female's earnings were 37% of the earnings of the median male, to the 1983 cohort in which the median female's earnings were almost 60% of the earnings of the median male. We see similar trends comparing other points of the gender-specific distributions over these cohorts. These comparisons can be seen in Figure 3. However, given that women started from such low levels of lifetime earnings (for example, almost 95% of females in the 1957 cohort earned less in lifetime earnings than the median male), gains in female lifetime earnings across cohorts largely serve to shore up the bottom of the distribution.

Using the CPI rather than the PCE to convert nominal earnings to 2013 dollars paints an even bleaker picture of lifetime earnings growth for the population as a whole. Figure 4 displays median lifetime earnings for each cohort using the two deflators. Whereas deflating with the PCE results in median lifetime earnings rising until around the 1967 cohort and remaining flat thereafter, deflating with the CPI results in median lifetime earnings being essentially flat even before 1967 and then declining by around 9% between the 1967 and 1983

Figure 3: Selected Percentiles of Lifetime Earnings, by Cohort and Gender



(a) Males

(b) Females

Notes: An observation represents a selected quantile of the lifetime earnings distribution of a cohort that entered the labor market in a given year for the baseline sample (see section 2.3). Panel (a) displays the distribution for men and panel (b) for women. Values are displayed in thousands of 2013 US dollars and deflated using the PCE.

cohorts. In the bottom panel of Table 2, we report cumulative lifetime earnings growth for the two sub-periods using the CPI at other percentiles of the lifetime earnings distribution. Real lifetime earnings deflated with the CPI declined between the 1967 and 1983 cohorts for nearly 90% of the distribution, with even the top decile of the distribution experiencing single-digit cumulative earnings gains over these 16 cohorts.

3.4 Non-wage Benefits from Employment

During the period studied in this paper, employer-provided health care and pension benefits have risen substantially. Thus, it is reasonable to ask whether this increase has partly offset the decline in wage and salary earnings documented above, in which case the trends in *total* employee compensation (i.e., wage plus non-wage) might look different from the trends in wage compensation.[22] Since the SSA data do not include non-wage benefits for

[22]Two related trends during this period could be offsetting these increasing benefits (or could perhaps be driving the increase). First, because life expectancy was rising during this period, an increase in pension

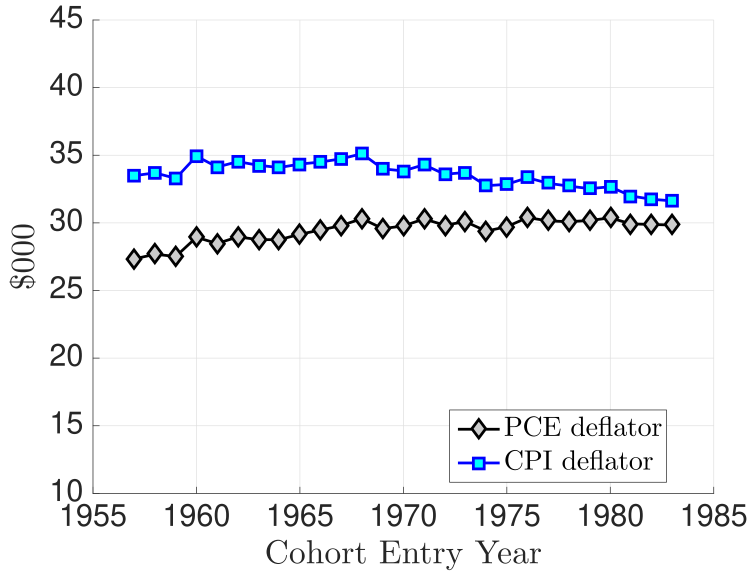


Figure 4: Median Lifetime Earnings by Cohort

Notes: Each observation represents the median lifetime earnings of a cohort (men and women together) that entered the labor market in a given year for the baseline sample (see section 2.3). Values are displayed in thousands of 2013 US dollars and deflated using both the PCE and CPI.

employees, we cannot undertake a full analysis of this question. Instead, we use aggregate data from the national income and product accounts (NIPAs) to estimate an upper bound on the effect of non-wage benefits for the trends we have documented for the median worker. Our approach is to measure the mean lifetime non-wage benefit per worker for each cohort over this period. A number of empirical studies have documented that *inequality* in non-wage benefits across employees has *increased* since at least the early 1980s, implying that the increase in mean benefits per worker is an upper bound for the increase in benefits for the median worker.[23]

benefits is necessary simply to prevent the consumption of retirees from declining. Second, some evidence suggests that, because of rising health care costs, the inflation rate is higher for the elderly than is implied by the CPI. Therefore, not all the rise in non-wage benefits constitute additional lifetime resources for newer cohorts as assumed in the calculations that follow.

[23] The rise in benefit inequality was partly systematic: benefits rose more for high-wage workers and less for low-wage workers, reinforcing the rise in inequality measured by only wages. See, for example, Pierce (2001) and Gruber and McKnight (2003). An important driver of this increase in inequality of non-wage benefits is the decline in the take-up rate of employer-provided insurance for low-earnings employees starting in the 1980s. One caveat is that these calculations exclude public insurance (medicare and medicaid). Burkhauser and Simon (2010) find that the latter actually mitigated the rise in inequality, though the effect they report is modest (see their Table 2B) and their analysis covers 1995 to 2008, so it is not clear how the effect would be for the longer period we study.

For comparability with our SSA baseline sample, which excludes public sector employees, we use data on health care and pension benefits provided by employers in private industries as reported in the NIPAs.[24] Since 1957 the relative benefit mix has shifted strongly toward health care, with its share rising from 15% of total employer-provided non-wage benefits in 1957 to 52% in 2013, and away from pension contributions whose share fell from about 70% to 40% during the same period.[25] The sum of these two components has consistently made up about 90% of total non-wage benefits, which suggests that our analysis based on these two components should provide a good benchmark for the effects of all non-wage benefits.

We compare lifetime average benefits across cohorts by computing average benefit amounts over the 31-year life cycle of each cohort, as measured by the NIPA variable "real employer contributions to employee pension funds and group health insurance for private industries" divided by the annual average number of private industry workers from the BLS Employment Situation. We find ifetime benefits have risen from about $3,300 per year for the 1957 cohort to about $5,800 per year for the 1983 cohort. The increase from the 1967 to 1983 cohorts was slower, from an annualized value of about $4,500 to $5,800 per worker, for a gain of approximately $1,200. A back-of-the-envelope calculation demonstrates that including the increase in non-wage benefits mitigates the decline in lifetime earnings but does not overturn the conclusions from the previous sections. Specifically, using the PCE-deflated earnings measures, the annualized value of median lifetime wage and salary earnings for male workers declined by $4,400 per year from the 1967 cohort to the 1983 one, equivalent to $136,400 over the 31-year working period (Table C.6). With our estimates of mean non-wage benefits included, this decline falls to $3,100 per year, equivalent to $96,100 over the 31-year working period.. Using the CPI-deflated measures reveals an even bleaker picture: a loss of $9,150 per year in wage and salary earnings (Table C.8), equivalent to $283,650 over the 31-year working period, or $7,850 when mean non-wage benefits are included, equivalent to $243,350. Recalling that the added benefit amount is likely to be an upper bound becuase of the increase in benefits inequalty noted above suggests that the true loss falls

[24] Since health care services have experienced faster inflation than the overall economy during this period, we would ideally deflate the health-care component of this series using a price deflator that is specific to health services. However, for private industries, NIPA reports only the combined value of both health care and pension benefits. We thus deflate the total value of benefits with a composite price deflator that is constructed as a weighted average of the PCE deflator and the health care price deflator, with weights that correspond to the relative shares of each component in total benefits (public sector plus private industries), with 2013 as the base year.

[25] Pension plans include both private and government employee pension plans. However, since we include only contributions from private industry employers, government employee pension plans are a very small component.

between these two values. Appendix C.2 contains further details of these calculations and figures illustrating these trends.

3.5 Comparison with Aggregate Earnings Growth

From 1957 to 2013, real US GDP grew by a factor of nearly five-and-a-half, and real aggregate wage and salary earnings recorded in NIPA grew by a factor of four. How can we reconcile this strong cumulative growth in aggregate earnings from 1957 to 2013 with the stagnant lifetime earnings for the cohorts of individuals who were in the labor market over this same period? In Appendix C.1we compare average earnings growth in our sample with publicly available data from NIPA and the CPS, and show that there is nothing particularly unusual about the time-series for our earnings measure or sample. Rather, it is the lifetime perspective that drives the different conclusion about earnings growth over this period. The growth in mean cross-sectional earnings masks large shifts in how earnings gains are split between people of different ages (and hence cohorts) and between people in different parts of the earnings distribution. Much of the increase in aggregate earnings has accrued to older workers in older cohorts. In the remaining three sections of the paper we delve into these distributional shifts in more detail.

4 Trends in Life-Cycle Earnings Profiles

The decline in lifetime earnings for recent cohorts of men documented in Section 3 could in principle be attributed to lower earnings at young ages, lower earnings at older ages, or both. Similarly, the rise in lifetime earnings for females may be attributed to higher earnings at young ages, higher earnings at older ages, or both. In order to dissect these changes, in this section we explore how life-cycle profiles of average earnings have changed over time.

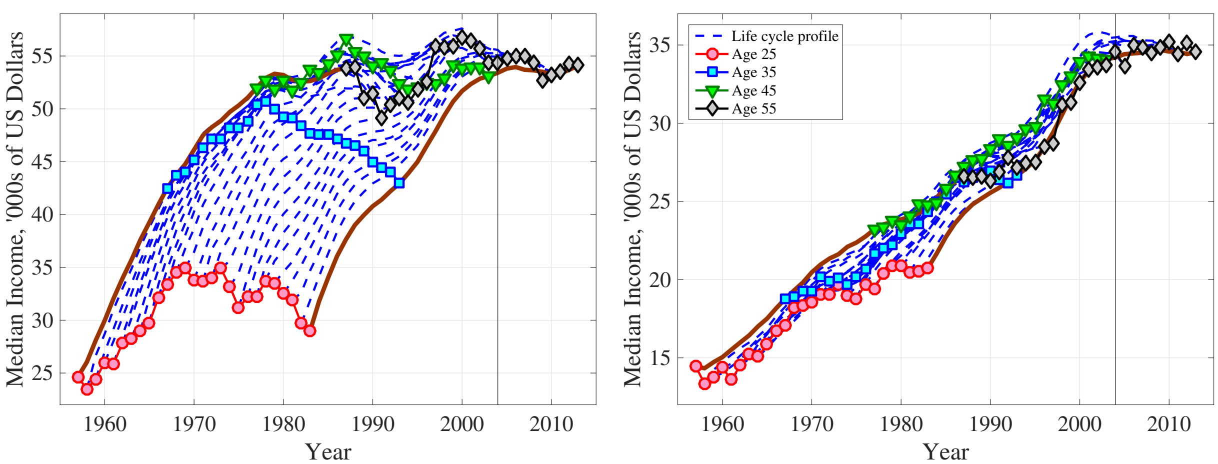
4.1 Changes in the Life-Cycle Profile of Earnings for Men

In Figure 5, we plot median earnings in each year for each of the 27 cohorts of workers, separately for males and females.[26] The colored dots connect earnings at common ages across cohorts, thus showing how the median earnings of particular age groups has changed over time. In Figure D.1 in Appendix D, we report analogous plots of the profiles of mean

[26]The life-cycle profiles of median earnings in Figure 5 and Figure 7 are not the same as the life-cycle profile of earnings for the individual at the median of the lifetime earnings distribution. In practice, however, the two are very similar.

Figure 5: Age Profiles of Median Earnings by Cohort

(a) Males (b) Females



Notes: Each observation represents the median earnings of men or women of a particular age in a particular year in the baseline sample (see section 2.3). For example, the 1957 cohort is represented by an Age 25 observation in 1957, an Age 35 observation in 1967, an Age 45 observation in 1977, and an Age 55 observation in 1987. The dotted lines (solid for the first and last cohort) connect all 30 age-year observations for each cohort. Panel (a) displays the age profiles of male cohorts, and Panel (b) displays the age profiles of female cohorts. All values are displayed in thousands of 2013 dollars and deflated using the PCE.

log earnings for each cohort.

For men, the general shape of the life-cycle profile is similar for all cohorts (Figure 5a). Median earnings start low and rise sharply from ages 25 to 45, and then remain roughly constant from ages 45 to 55. Remarkably, however, the magnitude of this increase in earnings between ages 25 and 45 has declined sharply for the post-1967 cohorts. There has been a steady decline in median earnings at ages 25 and 35 (see the path of red circles and blue squares), without any offsetting increase in median earnings at ages 45 and 55 (see the path of green triangles and gray diamonds). Thus, the decline in lifetime earnings for these recent cohorts is almost entirely attributed to earnings falling at young ages rather than at older ages. Moreover, the decline in median earnings at young ages was substantial. Using the PCE deflator, median earnings at age 25 has declined from $33,300 for the 1967 cohort to $29,000 for the 1983 cohort. At age 35, median earnings has dropped from $50,600 for the 1967 cohort to $42,400 for the 1983 cohort. Using the CPI as a measure of inflation, these declines are even larger.

Table D.1 in Appendix D reports the cumulative growth in median earnings between ages 25 and 35, 35 and 45, and 45 and 55 for each cohort. As Figure 5a suggests, the biggest changes in these growth rates were for the first 10 years in the labor market, from ages 25 to 35. For the 1957 cohort, cumulative growth in median earnings between ages 25 and 35 was 71%; for the 1967 cohort, cumulative growth was 52%; and for the 1983 cohort, it was 46%. The drop in earnings growth over this age range between the 1957 and 1967 cohorts (71% to 52%) was more than compensated for by the sharp rise in median earnings at age 25, so that lifetime earnings grew substantially between these two cohorts, as we have already seen. However, between the 1967 and 1983 cohorts, when median initial earnings was sharply declining, earnings growth during early years was also slowing down (from 52% to 46%). This combination of declining initial earnings and weak subsequent growth jointly account for the stagnation of median lifetime earnings for men since the 1967 cohort.[27]

One might have thought that the overall stagnation of lifetime earnings for men is simply a reflection of weak labor market conditions in the 2000s, since the post-1967 cohorts that experienced little or negative growth in lifetime earnings all have in common that they spent part of their working lives during the 2000s. It is well documented that aggregate earnings growth was anemic in the early 2000s and declined substantially in the wake of the Great Recession and subsequent slow recovery. But these changes in the life-cycle profile of median earnings suggest that the declining lifetime earnings for recent cohorts of males do not simply reflect the poor economic conditions in the 2000s.

4.2 Changes in the Life-Cycle Profile of Earnings for Women

For women, life-cycle profiles are more linear than for men, particularly for earlier cohorts who were in the labor market at a time when women's earnings was growing rapidly. For the 1957 cohort, for example, median earnings grew by 28% between ages 25 and 35 (from \$14,500 to \$18,500), by 25% between ages 35 and 45 (from \$18,500 to \$23,100), and by 15% between ages 45 and 55 (from \$23,100 to \$26,600). For later cohorts of women, the shape of the life-cycle profile looks more similar to the typical male profile, with a significant leveling off at older ages. For the 1983 cohort, median earnings also grew by 29% between ages 25 and 35 (from \$20,700 to \$26,700), by 29% between ages 35 and 45 (from \$26,700 to \$34,300), but by less than 1% between ages 45 and 55 (from \$34,300 to \$34,500). These growth rates are reported for all cohorts in Table D.1 in Appendix D. They show that while earnings growth at young ages has remained roughly constant for women, there has been

[27] In a precursor to our paper, Kambourov and Manovskii (2009) analyzed US survey data and found a flattening of lifecycle profiles for low-skill men, which is consistent with our finding. However, the smaller sample size required them to model lifecycle profiles parametrically, which did not allow them to distinguish which part of the lifecycle the flattening took place.

a steady decline in earnings growth at older ages, concentrated mostly among the cohorts entering from 1978 onward. This changing shape of the median life-cycle earnings profile for women can also be seen in Figure 5b by comparing the sustained earnings growth at ages 25 and 35 (see the path of red circles and blue squares) with the decelerating growth at ages 45 and 55 (see the path of green triangles and gray diamonds). For the youngest cohort of women for whom we have full data, the shape of the life-cycle profile closely resembles the profile for men, at a substantially lower level.

4.3 Looking Ahead to Recent Cohorts

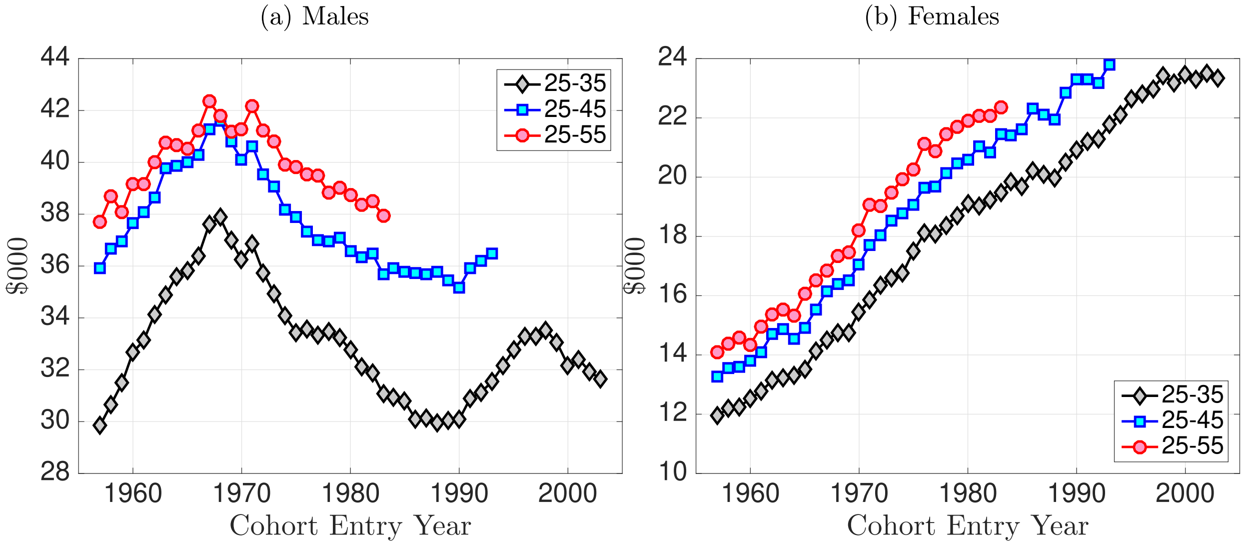
So far we have examined only those cohorts that are old enough for us to observe the full 31 years of earnings from ages 25 to 55. The recent picture we have painted for these cohorts is bleak: lifetime earnings have been stagnant for men, and lifetime earnings growth for women has slowed. Are these trends likely to reverse or to continue for younger cohorts of workers? The previous section argued that understanding earnings at young ages, between 25 and 35, is particularly important for understanding lifetime earnings. We can use this connection to gain insight into the likely path of lifetime earnings for future cohorts, by looking at the early labor market experience of younger cohorts for whom we cannot observe the full 31 years of earnings but can observe earnings at younger ages.

Figure 6 shows median total earnings over the 11 years from ages 25 to 35, the 21 years from ages 25 to 45, and the 31 years from ages 25 to 55 for each cohort from 1957 to 2003.[28] For the more recent cohorts, only the younger age ranges are available. For each age range, we annualize the earnings by dividing by the number of years in the age range; hence the 25- to 55-year measure is the same as in our baseline measure of lifetime earnings. For the cohorts where all three measures are available, the trends in median total earnings are very similar for all three age ranges.

For men, median total earnings earned in the 11 years from ages 25 to 35 follows a trend across cohorts that is similar to the trend in lifetime earnings, but is substantially more pronounced (Figure 6a). Between the 1957 and 1967 cohorts, median total earnings in these early labor market years increased by 26% (from $29,900 to $37,600), and then declined by 17% from the 1967 to 1983 cohorts (from $37,600 to $31,100). These swings

[28] When analyzing full cohorts, we restricted the sample to individuals that met the minimum earnings criteria in at least 15 of the 31 possible years. This is not possible when analyzing younger cohorts. In order to maintain comparability, we include an individual from one of the partial cohorts if he or she meets the minimum earnings criterion in at least half of the specified age range. For example, for the 25-35 age range, the sample is restricted to those that met the minimum earnings criterion in at least 6 of the 11 possible years.

Figure 6: Median Earnings by Cohort, Including Younger Cohorts



Notes: Each observation represents the median earnings of a cohort, measured over the first 10 years, first 20 years, or full 30 years of a cohort's working lifetime, for the year the cohort entered the labor market. Panel (a) displays the trends for male cohorts, and Panel (b) displays trends for female cohorts in the baseline sample (see section 2.3). Values are displayed in thousands of 2013 US dollars and deflated using the PCE.

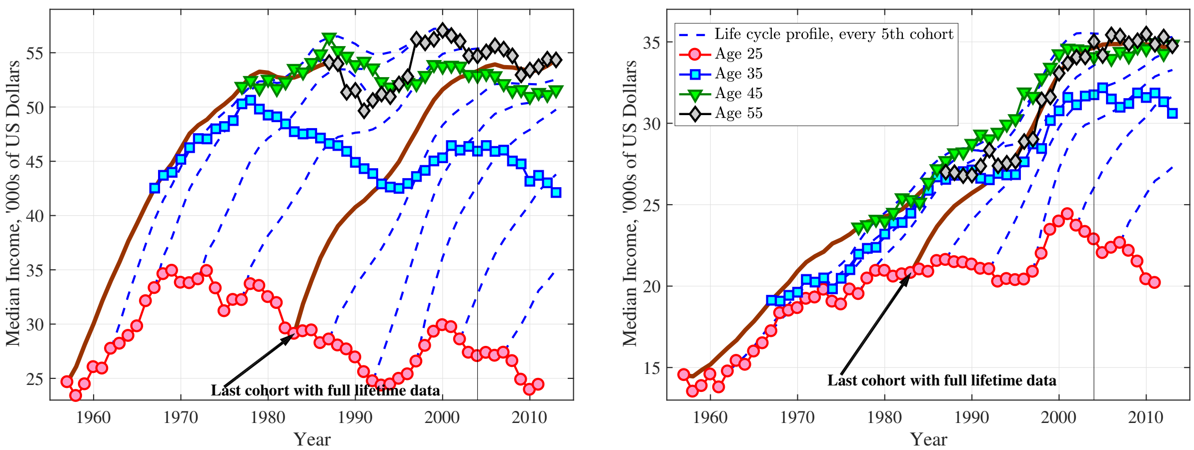
are consistent with the inference of the previous section that trends in earnings at young ages are particularly informative about trends in lifetime earnings. For more recent cohorts entering the labor market after 1983, the stagnation in earnings during the early labor market years has continued. Median total earnings from ages 25 to 35 hit a low of $29,900 for the 1988 cohort, after which time the trend started to reverse. However, the resurgence was cut short with the onset of the 2007-8 recession, and for the cohorts from 1998 onward, median total earnings over this age range has again been declining. For the 2003 cohort, which is the most recent cohort for which we have data, median total earnings over ages 25-35 is still 16% below the level of the 1967 cohort.

For women, Figure 6b shows that the approximately linear increase in lifetime earnings between the 1967 and 1983 cohorts is echoed in the average earnings earned between ages 25 and 35. This growth continued for more recent cohorts, up until the cohort entering in 1998, after which time the median early career earnings have flattened. It is difficult to know whether this flattening is part of a trend or is a temporary consequence of the 2008-9 recession and slow recovery.

In Figure D.2 in Appendix D, we report the mean, median, and selected percentiles of

Figure 7: Age Profiles of Median Earnings by Cohort

(a) Males (b) Females



Notes: Each observation represents the median earnings of men or women of a particular age in a particular year in the baseline sample (see section 2.3). For example, the 1957 cohort is represented by an Age 25 observation in 1957, an Age 35 observation in 1967, an Age 45 observation in 1977, and an Age 55 observation in 1987. The dotted lines (solid for the first and last cohort with full life cycle profiles) connect all available age-year observations for every fifth cohort. Panel (a) displays the age profiles of male cohorts, and Panel (b) displays the age profiles of female cohorts. All values are displayed in thousands of 2013 dollars and deflated using the PCE.

the distribution of total earnings over ages 25 to 35 for each cohort individually, for men and women, respectively. The stagnation of male earnings during the first decade in the labor market extends across the entire distribution. Lower down the distribution, the declines are even larger than at the median: the 25th percentile of the distribution of ages 25 to 35 earnings is 28% lower for the 2003 cohort than it was for the 1967 cohort. Further up the distribution, early career earnings has increased, although the gains have been modest: the 90th percentile of the distribution increased by 28% across these 36 cohorts, equivalent to an increase of just 0.70% per cohort.

We can obtain a more complete picture of median earnings growth at young ages by extending the median earnings profiles from Figure 5 to include all cohorts for whom we have any data. These profiles are shown in Figure 7a for men and in Figure 7b for women. In both figures, the most important features are the pattern of median earnings for young workers. For men, the decline in median earnings at age 25 continued until 1993, after which time there was a brief resurgence followed by another period of decline. In 2009, median earnings for 25 year old males was at its lowest point since 1958. For women, the median earnings at age 25 was essentially flat from 1979 until 1997, after which time it briefly increased but by 2011 had returned to its 1979 level.

We can obtain a more complete picture of median income at young ages by extending the median income profiles from Figure 5 to include all cohorts for whom we have any data. The profile for men in Figure 7a contains one of the most striking results of the paper: median earnings for a 25 year old men in 2011 was about \$10,500 lower than in 1969 cohort. This fall from \$34,900 to \$24,400 corresponds to a 30% decline during a 42 year period that saw growth in both GDP per capita and average real wages for the US economy. Put differently, median earnings for a 25 year old man was virtually the same in 2011 as it was 54 years earlier in 1957. Although there are some compensating factors that we discussed earlier, such as non-wage benefits, the magnitude of these gains for the median worker was not nearly large enough to compensate for the decline in earnings.

The picture is somewhat different for women. After rapid growth from 1957 to 1973, median entry earnings was roughly flat until 1997. Despite a brief surge in the late 1990's, median earnings for 25 year old women declined to its 1997 level (and hence 1973 level). Given the lack of an increase in entry earnings for for the post-1983 cohorts, what explains the continued growth in female median lifetime earnings that we saw in Figure 6b? Unlike for the pre-1983 cohorts, the key factor was the faster growth rates of median earnings over the life cycle, which made up for the stagnnating entry earnings. This can be seen by comparing the blue line with square markers (age 35) income for red life with circle markers (age 25) in Figure 7. Whereas the two lines are more or less parallel for men, the gap between the two lines starts to grow for women starting in the early 1990s. Part of this faster growth of female earnings in the 1990's is due to the well document trend of rising work hours for women.

4.4 Comparison with the CPS

The lifecycle profiles discussed in this section make only limited use of the panel dimension of the SSA data. Were it not for the the fact that our minimum earnings sample selection criterion is based on lifetime earnings rather than on annual earnings, it would be possible to produce analogues of these figures with only cross-sectional data, allowing a comparison of our SSA data with other sources of micro data on earnings. To this end, Appendix D.1 contains a detailed comparison of the results in this section with data from the Current Population Survey (CPS). The main findings are that (i) the restriction to Commerce and Industry Workers has a negligible effect; (ii) at older ages, the CPS and SSA data give near identical median earnings, provided the SSA data is treated cross-sectionally like the CPS; (ii) at younger ages, the CPS overstates median earnings relative to the SSA data, even when treated cross-sectionally; (iv) selecting individuals based on lifetime earnings leads to higher median earnings than selecting based on annual earnings. Despite these differences in levels, the trends are the same in the different data sets.

5 Trends in Lifetime Earnings Inequality

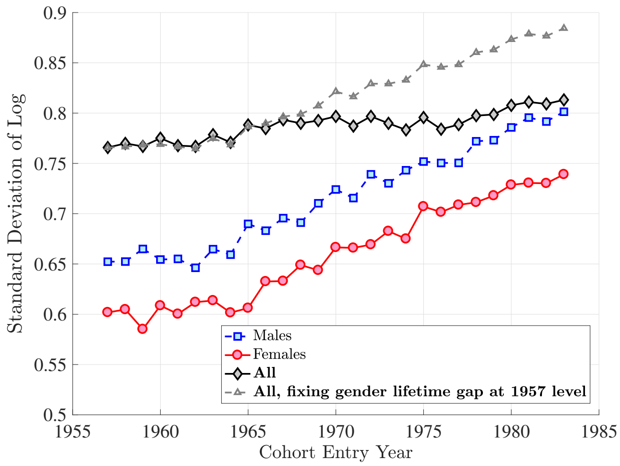
The second of the twin trends is an increase in cross-sectional earnings inequality. We now examine whether this trend extends to changes in lifetime earnings inequality across cohorts, and how lifetime inequality has changed within and across gender groups.

5.1 Lifetime Inequality across and within Genders

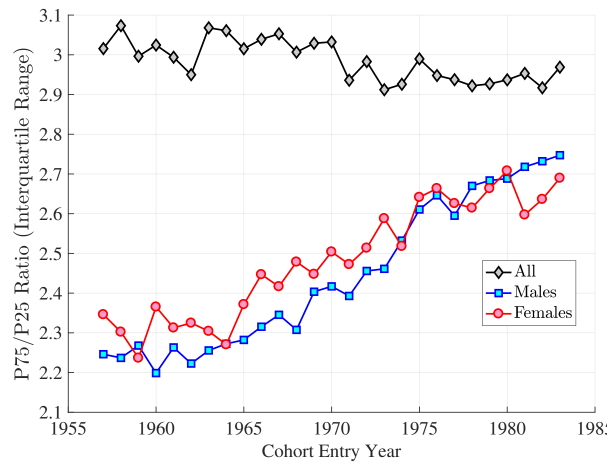
The top two panels of Figure 8 plot two common measures of lifetime inequality: the standard deviation of log lifetime earnings (8a) and the interquartile ratio (i.e., P75/P25, hereafter IQR) of lifetime earnings (8b) for each of the 27 cohorts. The blue lines marked with squares correspond to lifetime inequality among men, the red lines (circles) correspond to lifetime inequality among women, and the black lines (diamonds) correspond to the combined population of men and women.

The first observation is that lifetime earnings inequality – as measured by these two statistics – showed little to no rise in the whole population despite rising significantly *within* each gender group. Specifically, for the whole population, the standard deviation of lifetime earnings increased modestly, from about 0.77 to about 0.81 from the 1957 cohort to the 1983 cohort, whereas the IQR was mostly flat at a value of around 3. In contrast, inequality rose strongly within each gender group (and by very similar magnitudes): the standard deviation rose by about 15 log points within each gender group, and the IQR rose from about 2.3 to 2.7.

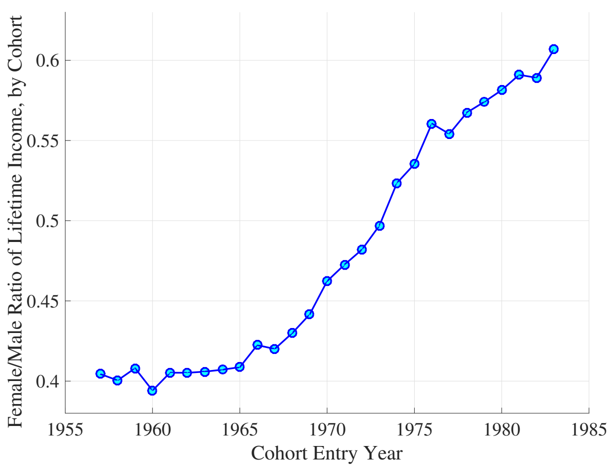
How do we reconcile these contrasting results? The answer lies in the closing of the gender gap in *lifetime* earnings. This can be seen in Figure 8c, which plots the ratio of the mean lifetime earnings of females to that of males for every cohort during this period. For entry cohorts before 1965, the gender gap was stable, with women in these cohorts earning on average 40% of the lifetime earnings of men. After 1965, the gap started to close quickly (showing an almost linear trend), and by the 1983 cohort, the lifetime earnings of women



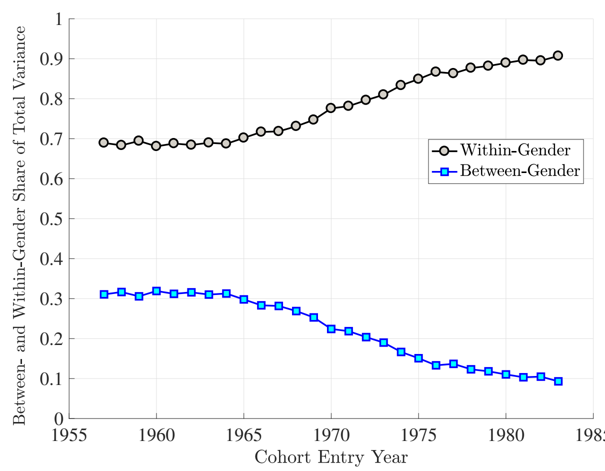
(a) Standard Deviation of Logs



(b) Inter-quartile Ratio



(c) Mean Gender Lifetime Earnings Gap (Ratio)



(d) Between- vs. Within- Gender Variance Share

Figure 8: Cohort Lifetime Inequality, Overall and by Gender

Note: This figure displays four measures of within-cohort inequality. Each observation represents the inequality in lifetime earnings among a cohort of workers that entered the labor market in a particular year in the baseline sample (see section 2.3). Panel (a) displays the standard deviation of the log lifetime earnings within each cohort, separated by male cohorts, female cohorts, and men and women combined. We additionally plot the trend in inequality in the total population holding the gender gap in lifetime earnings fixed at the level in 1957. Panel (b) displays the ratio of the 75th percentile to the 25th percentile of lifetime earnings within each cohort, separated by male cohorts, female cohorts, and men and women combined. Panel (c) displays the ratio of mean lifetime earnings of female cohorts to the mean lifetime earnings of the male cohort that entered the labor market in the same year. Panel (d) displays the result of decomposing the variance of within-cohort lifetime earnings into within-gender and between-gender components. Earnings is deflated using the PCE.

reached more than 60% of their male counterparts.[29]

To quantify the contribution of this trend to mitigating the rise in overall lifetime inequality, a simple variance decomposition is helpful. Let $\overline{y}_t^{i,g} = \ln \overline{Y}_t^{i,g}$ denote the log lifetime earnings of individual i of gender $g = m$ or f, and π_t^g denote each gender's population share in cohort t. We have

$$\text{var}(\overline{y}_t^i) = [\sum_{g=m,f} \pi_t^g \times \text{var}(\overline{y}_t^{i,g})] + [\sum_{g=m,f} \pi_t^g \times ((E(\overline{y}_t^{i,g}) - \overline{\overline{y}}_t)^2],$$

where $\overline{\overline{y}}_t$ is the average of $\overline{y}_t^{i,g}$ taken over the two gender groups. The first term is the average variance of log lifetime earnings within each gender group. This component has grown strongly, as seen in Figure 8. The second term captures the dispersion in the mean log lifetime earnings across gender groups, which has shrunk over time, as seen in Figure 8c, thereby offsetting the increase in the (within-gender group variance) terms in the first set of brackets.

The share of each of the two terms in the overall variance is plotted in the bottom right panel (Figure 8d): the lifetime gender gap was responsible for 31% of the total variance in the population for cohorts before 1965, but this fraction dropped to 9% by the 1983 cohort. In the top left panel (Figure 8a), we plot the counterfactual standard deviation for the whole population (gray dashed line marked with triangles) if the gender gap had remained at its 1957 level throughout the sample period. As seen here, the standard deviation would have risen by 12 log points rather than 4.7 points observed in the data.[30]

5.2 Lifetime Inequality: A Tale of Two Tails

The two broad statistics that we have focused on so far (the standard deviation of log and the IQR) measure inequality over the entire distribution, which can mask interesting patterns within different parts of the population. Delving deeper, Figure 9a plots the P90-P50 ratio, which measures inequality above the median. Figure 9b plots the P50-P10 ratio, which measures inequality below the median. Starting with the trends for the

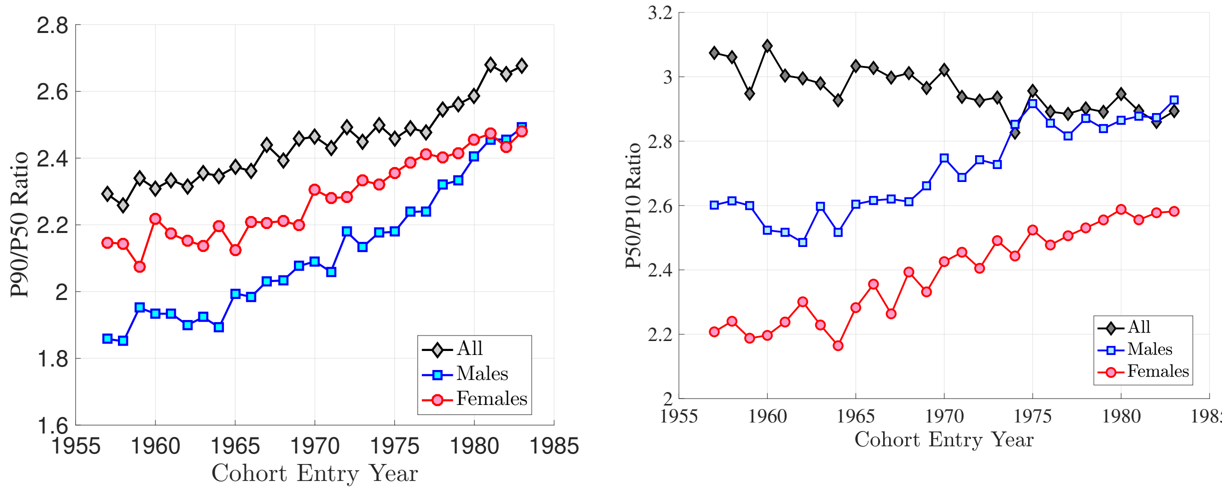
[29]Recall that our baseline sample only includes men and women who work at least 15 years during their lifetime, so the extensive margin of female employment has a more limited impact.

[30]Loosely speaking, changes in the gender gap in lifetime earnings stem from two sources: from changes in the gender gap in annual earnings and from changes in the number of years worked. Recall from Figure 3a that the average number of years worked was flat at 26 years (and slightly declining) for men and increasing from 22 to 24 years (or by 9%) for women. Consequently, the gap in lifetime earnings declined by more than its cross-sectional counterpart, which in turn mitigated the rise in lifetime inequality more so than what we see in the cross section. We return to this point in the Section 5.3.

Figure 9: Lifetime Inequality by Cohort

(a) P90/P50 ratio

(b) P50/P10 ratio



Note: This figure displays two measures of within-cohort inequality. Each observation represents the inequality in lifetime earnings among a cohort of workers that entered the labor market in a particular year in the baseline sample (see section 2.3). Panel (a) displays the ratio of the 90th percentile to the 50th percentile of lifetime earnings within each cohort, separated by male cohorts, female cohorts, and men and women combined. Panel (b) displays the ratio of the 50th percentile to the 10th percentile of lifetime earnings within each cohort, separated by male cohorts, female cohorts, and men and women combined. Earnings is deflated using the PCE.

whole population (gray line with diamonds), the P90-P50 ratio of the lifetime earnings distribution increased throughout the period, rising from 2.3 for the 1957 cohort to 2.7 for the 1983 cohort. In contrast, the P50-P10 ratio fell throughout the period, from 3.1 to 2.9. Hence, the relatively stable overall inequality in the whole population we saw in Figure 8 resulted from falling inequality in the bottom half of the distribution offsetting rising inequality in the top half.

Turning to inequality within gender groups, the P90-P50 ratio was higher for women than for men in the early cohorts, but lifetime inequality rose more among men, so that by the 1983 cohort, the P90-P50 ratio was the same (around 2.5) for both genders. At the bottom end, the P50-P10 ratio *rose* for both genders (despite the *fall* in the same statistic for the combined population—the gray line) and did so by similar magnitudes, but arguably slightly more for women than for men (from 2.2 to 2.6 for women and from 2.6 to 2.9 for men). These last two results are yet another manifestation of the empirical finding from Figure 3: the gender gap in lifetime earnings closed most strongly below the median (of the combined population), which in turn kept the P50-P10 ratio from rising in the whole population despite the strong rise within each gender group. The gender gap closed to a smaller extent above the median, so its effect on the P90-P50 ratio of the whole population was smaller.

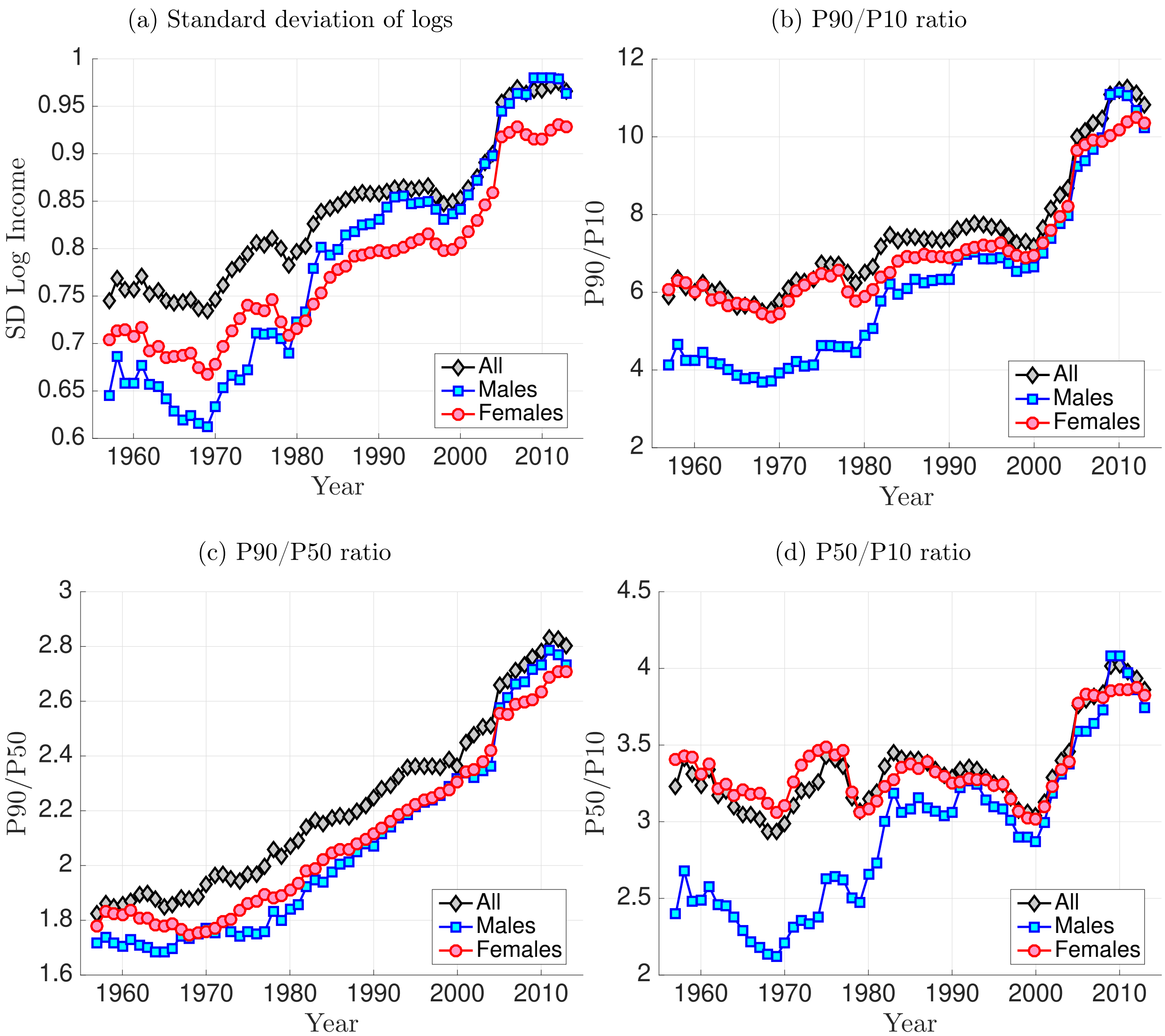
5.3 Trends in Lifetime Inequality versus Cross-Sectional Inequality

Before concluding this discussion, we compare the statistics on lifetime inequality with cross-sectional inequality to better understand some of the results we documented in previous sections. The comparison requires some care given that the two measures are conceptually different—one evolves from cohort to cohort whereas the other evolves from cross section (or year) to the next. With that caution, Figure 10 plots four measures of *cross-sectional* inequality analogous to those in Figures 8 and 9.

Two remarks are in order. First, notice that cross-sectional inequality in the whole population rises strongly throughout this period, unlike the flat trend in lifetime inequality, which suggests that the closing of the gender gap in cross-sectional earnings has a smaller impact than its lifetime counterpart. Second, notice the remarkable convergence after 1990 of two of the inequality measures—P90-P10 ratio and P50-P10 ratio—between the male and female populations. Further, the P90-P50 ratio for men (which measures in inequality in the top half of the distribution) almost perfectly overlaps with the P90-P50 ratio for women, thought the entire sample period. The standard deviation of annual earnings is also similar for men and women, but has increased by about 10 log points more for men than for women. This larger increase for men could be due to the faster increase in the thickness of the right tail of the earnings distribution for men than for women.[31]

[31] Bowlus and Robin (2004) studied the rise in lifetime earnings inequality by fitting a search model to the moments of 1-year changes (of wages and employment) from the matched CPS covering 1977 to 1997. Using data simulated from the estimated model, they concluded that while the *level* of lifetime inequality (as measured by the log 90-10 differential) is about 40% lower than its cross-sectional counterpart, both measures rose by similar amounts over the 20-year period they studied. The numbers we report here are not directly comparable to theirs because, as we noted at the beginning of this subsection, comparing lifetime and cross-sectional measures requires additional assumptions about the timing between cohorts lifetime earnings measured over 31 years and yearly cross sections. One option is to compare the average over 31 years of cross-sectional inequality to the lifetime inequality of the cohort who lived through the same period. Under that assumption, one can compare the average from 1957 to 2013 of cross-sectional P90/P10 reported in Figure 10b to the average of lifetime P90/P10 in Appendix Figure E.3 over the same period. Both measures are around 7, showing little difference between the two measures. This result depends a bit on selection criteria and time period. Table F.3 in Appendix F reports calculations with a slightly different sample for post-1978 cohorts and finds the P90/P10 of lifetime earnings to be 27% lower than its cross-sectional counterpart. Interestingly, all the difference is below the median: the P90-P50 is virtually identical for the two measures. Appendix F reports more detailed statistics for this post-1978 sample.

Figure 10: Cross-sectional Inequality over Time



Note: This figure displays four measures of cross-sectional inequality, across all individuals working in a given year. Each observation represents earnings inequality in a given year in the baseline sample (see section 2.3). Panel (a) displays the standard deviation of the log earnings in each year, separated by men, women, and both genders combined. Panel (b) displays the ratio of the 90th percentile to the 10th percentile of earnings in each year, separated by men, women, and both genders combined. Panel (c) and Panel (d) display the analogous trends in Panel (b) for the ratio of the 90th to the 50th percentile and the ratio of the 50th to the 10th percentile, respectively. Earnings is deflated using the PCE.

To sum up our findings so far, the stability of lifetime inequality over this period is a powerful manifestation of the closing *lifetime* gender earnings gap, which is more clearly evident than is revealed by cross-sectional analysis. At the same time, all measures of lifetime inequality have been increasing within both gender groups. Some of these trends look quite different from their cross-sectional counterparts, which show rising overall inequality in the population.

5.4 Dissecting the Rise in Lifetime Inequality

Why did lifetime inequality among men and among women increase across subsequent cohorts during this period? To shed light on this question, it is helpful to examine the timing of the rise in within-cohort cross-sectional inequality over the life-cycle of a cohort. To understand why this is useful, consider the following two hypothetical scenarios. In one case, each subsequent cohort enters the labor market (at age 25) with a progressively higher level of initial inequality, after which within-cohort inequality rises with age at the same rate as for previous cohorts. In the second case, the opposite happens: each subsequent cohort enters with the same level of inequality as previous ones, after which within-cohort inequality rises at progressively faster rates. Both scenarios would result in a rise in lifetime inequality across cohorts, but each points toward different underlying structural factors that might account for the changes. In Appendix E.1, we outline a simple statistical model to clarify this distinction. Of course, these two scenarios do not exhaust all the possible ways in which lifetime inequality might increase, but they provide useful benchmarks that turn out to be the most relevant cases, which we now document.

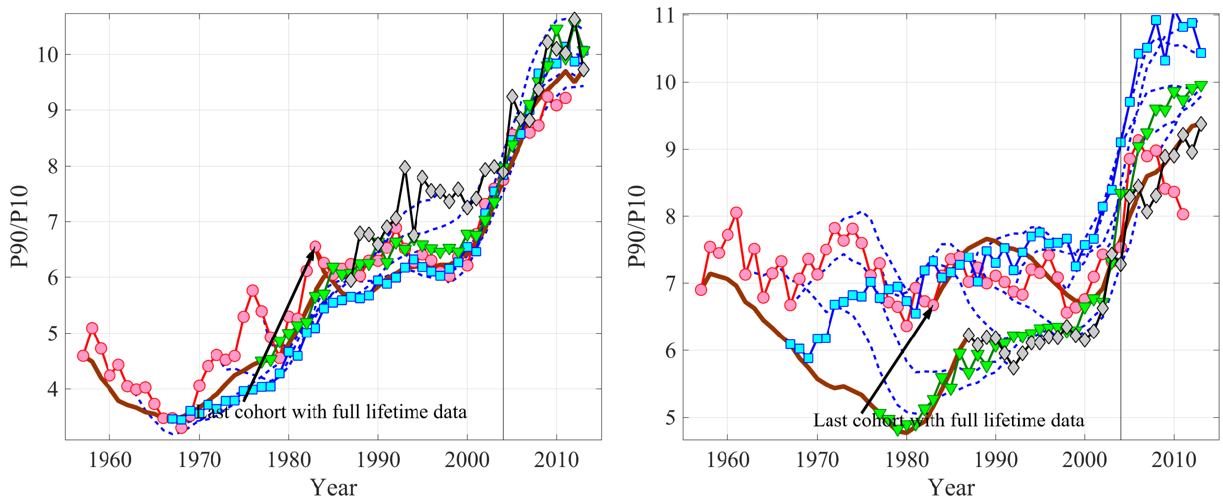
In Figure 11, plots the P90-P10 differential in log earnings separately by cohort in each year.[32] For readability, the figure only shows values at ages 25 (red circles), 35 (blue squares), 45 (green triangles), and 55 (gray diamond) for each cohort. Cohorts that entered after 1983 have only partial life-cycle data, so not all data points are available for them. For every fifth cohort, the figure also plots the entire age profile.

Figure 12a shows that initial inequality for men at age 25 has increased substantially from a value of P90-10 ratio of around 3.3 for the 1968 cohort to over 9 for the 2011 cohort. This is a 2.7-fold rise in the P90-P10 ratio, which is similar to the total rise in the cross-sectional P90-P10 ratio for men of all ages, which rose from 4 to 10, a 2.5-fold rise.[33] The

[32] Although the simple additive decomposition applies only to the variance, percentile ratios have other advantages, such as allowing us to focus on different parts of the distribution and having interpretations that are easy to understand. Figure E.2in Appendix E contains analogous figures for the cross-sectional standard deviation of log earnings by age from the 1957 cohort to the 2012 cohort, which tell a similar story.

[33] Clearly, the two numbers are not directly comparable as the cross-sectional dispersion is a mixture of 31 cohorts, so the P90-P10 ratio for all men in 2011 mixes up all cohorts from those who entered in 1981 to 2011.

Figure 11: Age Profiles of Cross-Sectional Inequality, by Cohort



(a) P90-10 ratio, Men (b) P90-10 ratio, Women

Notes: Each observation represents the earnings inequality within men or women of a particular age in a particular year in the baseline sample (see section 2.3). For example, the 1957 cohort is represented by an Age 25 observation in 1957, an Age 35 observation in 1967, an Age 45 observation in 1977, and an Age 55 observation in 1987. The dotted lines (solid for the first and last cohort with full life cycle profiles) connect all available age-year observations for every fifth cohort. Panel (a) displays the ratio of the 90th percentile to the 10th percentile of earnings for men within each age-year group. Panel (b) displays the same for women. Earnings is deflated using the PCE.

evolution of inequality at older ages coincides closely with initial inequality.

To understand what these patterns imply, observe that if the four lines that connected inequality points across cohorts (circles, squares, triangles, and diamonds) were parallel to each other throughout the period we analyze, this would imply that the rise in inequality *over the life* cycle did not change from cohort to cohort (the first scenario described above). Since this is indeed what we find, the patterns suggest that the increases in both lifetime inequality across cohorts and cross-sectional inequality over time stem from the rise in initial dispersion for newer cohorts . In other words, newer cohorts enter with much higher inequality than older cohorts, which is the main force behind rising earnings inequality.

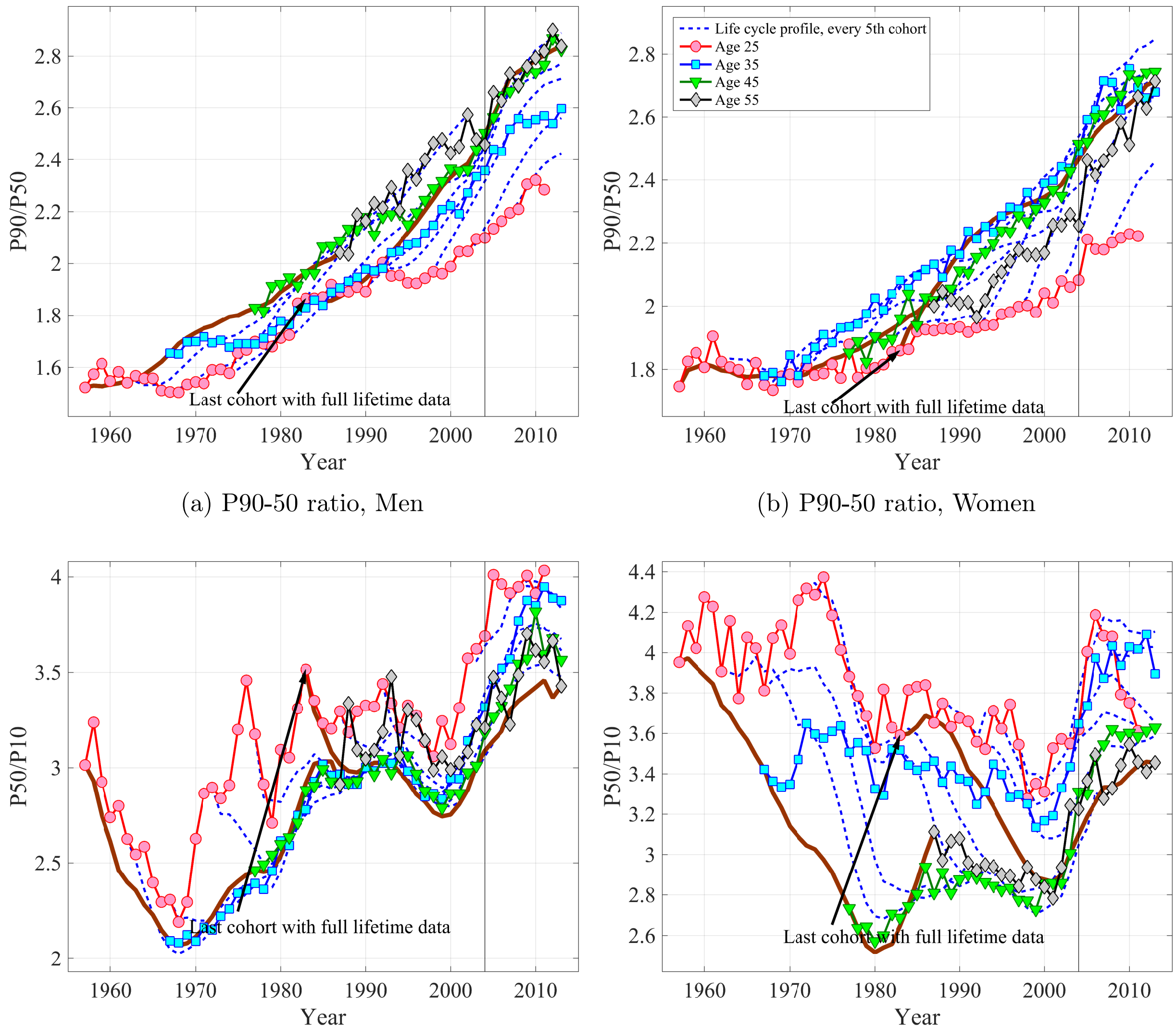
Our finding that cohort level factors play a dominant role in explaining the trend in cross-sectional inequality is consistent with the emphasis that Card and Lemieux (2001) place on the relative supplies of labor by age and skill in their study of the evolution of the skill premium. Our findings suggests that similar cohort-level supply forces might also play a role in explaining the broader notion of earnings inequality that we focus on this paper. To our knowledge, the fact that a substantial fraction of the rise in cross-sectional and lifetime inequality for men can be attributed to a rise in inequality at age 25 has not been emphasized in previous work and we think deserves a more central place in discussions of rising inequality in future week.

Turning to women, we see a very different pattern in Figure 12b. Inequality at age 25 is completely flat from the 1957 cohort to the 2000 cohort, and then rises briefly and falls in the 2000s. Furthermore, for the early cohorts, inequality falls strongly with age for the first 20 years or so of the life-cycle, is U-shaped for middle cohorts (falling for the first 10–15 years and then rising in the second half of the life-cycle), and only starts to rise after 2000—and does so strongly for age groups 35 and older. Therefore, for women the main driver of rising lifetime inequality is not the rise in age 25 dispersion but a much more complex pattern of life-cycle inequality profiles, which twist and change shape for subsequent cohorts. These different drivers of rising inequality are surprising in light of Figure 8, which revealed very similar patterns and magnitudes of rising lifetime inequality for both genders.

Digging deeper into these trends, in Figure 12 we plot analogous profiles for the P90-50 and and P50-10 ratios, which decompose the P90-P10 profile into measures of top- and bottom-end inequality. In the top panel, we see that the rise in inequality above the median, P90-P50, is actually quite similar for men and women. What is different is the change in the P50-P10 ratio, which measures inequality below the median. For men, inequality below the median rises for all ages but displays a more complicated pattern for women. Moreover, for both men and women, we a shrinking P50-P10 ratio over the life cycle for almost all cohorts. These differences between men and women in their life-cycle profiles of inequality, as well as how the differences vary from cohort to cohort, deserve a fuller analysis that is beyond the scope of this paper. We leave these topics for future research.

6 Conclusions

The analysis in this paper has revealed two main findings. First, the majority of US men who entered the US labor market since the late 1960s have seen little-to-no gains in lifetime earnings relative to earlier cohorts, despite the fact that the US economy has grown significantly during the same period. Accounting for rising employer-provided health and retirement benefits partly mitigates these findings but does not overturn them. Much of this stagnation for men can be traced to the conditions during the labor market entry of a cohort: newer cohorts of men faced declining or stagnant median initial earnings relative to previous cohorts and did not experience faster earnings growth over their lifecycle to make



(a) P90-50 ratio, Men

(b) P90-50 ratio, Women

(c) P50-10 ratio, Men

(d) P50-10 ratio, Women

Figure 12: Age Profiles of Inequality, by Cohort, Continued

Notes: Each observation represents the earnings inequality within men or women of a particular age in a particular year in the baseline sample (see section 2.3). For example, the 1957 cohort is represented by an Age 25 observation in 1957, an Age 35 observation in 1967, an Age 45 observation in 1977, and an Age 55 observation in 1987. The dotted lines (solid for the first and last cohort with full life cycle profiles) connect all available age-year observations for every fifth cohort. Panel (a) displays the ratio of the 90th percentile to the 50th percentile of earnings for men within each age-year group. Panel (b) displays the same for women. Panel (c) displays the ratio of the 50th percentile to the 10th percentile of earnings for men within each age-year group. Panel (d) displays the same for women. Earnings is deflated using the PCE.

up for the lower entry earnings. Women experienced a sustained in increase in median lifetime earnings from one cohort to the next, but starting from very low levels in the early cohorts.

The second finding is that since 1970, inequality in lifetime earnings increased significantly within each gender group but remained virtually flat in the combined population—thanks largely to the closing lifetime gender gap. The bulk of the rise in lifetime inequality among men was also driven by a substantial rise in initial inequality from one cohort to the next. For example, the P90/P10 ratio for 25 year old men rose from 3.3 in the 1969 cohort to 9 in the 2011 cohort. The slope of the lifecycle profile of inequality remained relatively unchanged across cohorts. We also analyzed the partial lifecycle data of more recent cohorts and found the similar patterns for both median earnings and earnings inequality during the period they are observed, suggesting that both the stagnation of median lifetime earnings and the rise in inequality is likely to continue.

An important substantive conclusion we draw from these findings is that newer cohorts were already different from older ones by age 25. Once in the labor market, the earnings distribution for these newer cohorts has evolved similarly to those of older cohorts. This finding is especially pertinent for men, which is interesting, given that earnings inequality among males has been extensively studied, yet this finding does not seem to have been previously emphasized. Our findings thus suggest that the sources of the dramatic changes we have witnessed in the U.S. earnings distribution over the last 50 years may be found in the experiences of newer cohorts during their youth (and possibly earlier), and how those experiences differed from those of older cohorts.[34]

References

Aaberge, Rolf and Magne Mogstad, "Inequality in current and lifetime income," *Social Choice and Welfare*, 2015, *44* (2), 217–230.

Aaronson, Stephanie, "The Rise in Lifetime Earnings Inequality Among Men," Working Paper, Board of Governors of the Federal Reserve System 2002.

[34]We provide additional statistics on lifetime earnings and how they are related to the number of unique jobs held by workers, by the state they live in, among other variables of interest. These statistics use a 10% extract from the MEF from 1978 to 2013, which covers all individuals in the economy and provides non-top coded earnings. These statistics are computed both for the baseline sample and for a broader sample that does not impose any minimum threshold for lifetime earnings. See Appendix F.

Abowd, John M and David Card, "On the Covariance Structure of Earnings and Hours Changes," *Econometrica*, March 1989, *57* (2), 411–45.

Acemoglu, Daron and David Autor, "Skills, Tasks and Technologies: Implications for Employment and Earnings," in "Handbook of Labor Economics, Vol 4B," Elsevier, 2011, chapter 12, pp. 1043–1166.

Aguiar, Mark and Erik Hurst, "Deconstructing Lifecycle Expenditure," *Journal of Political Economy*, 2013, *121* (3), 437–492.

_ **and Mark Bils**, "Has Consumption Inequality Mirrored Income Inequality," *American Economic Review*, 2015, *105* (9), 2725–2756.

_ **,** _ **, Kerwin Kofi Charles, and Erik Hurst**, "Leisure luxuries and the labor supply of young men," *Journal of Political Economy*, 2021, *129* (2), 000–000.

Arellano, Manuel, Richard Blundell, and Stephane Bonhomme, "Earnings and Consumption Dynamics: A Nonlinear Panel Data Framework," *Econometrica*, 2017, *85* (3), 693–734.

Autor, David, Lawrence Katz, and Melissa S. Kearney, "Trends in U.S. Wage Inequality: Revising the Revisionists," *Review of Economics and Statistics*, 2008, *90* (2), 300–23.

Becker, Gary S, "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, 1962, *70*, 9.

Bonhomme, S. and J-M. Robin, "Assessing the Equalizing Force of Mobility Using Short Panels: France, 1990 a 2000," *Review of Economic Studies*, 2009, *76* (1), 63–92.

Bönke, Timm, Giacomo Corneo, and Holger Lüthen, "Lifetime Earnings Inequality in Germany," *Journal of Labor Economics*, 2015, *33* (1), 171–208.

Bowlus, Audra J. and Jean-Marc Robin, "Twenty Years of Rising Inequality in U.S. Lifetime Labour Income Values," *Review of Economic Studies*, July 2004, *71* (3), 709–742.

Brown, Jeffrey R., Julia Lynn Coronado, and Don Fullerton, "Is Social Security Part of the Social Safety Net?," in Jeffrey Brown and James M. Poterba, eds., *Tax Policy and the Economy, Volume 23*, University Chicago Press, 2009.

Burkhauser, Richard and Kosali Simon, "Measuring the impact of health insurance on levels and trends in inequality," Working Paper 15811, National Bureau of Economic Research 2010.

Card, David and Thomas Lemieux, "Can Falling Supply Explain The Rising Return To College For Younger Men? A Cohort-Based Analysis," *Quarterly Journal of Economics*, May 2001, *116* (2), 705–746.

Clark, Harold F., *Life Earnings in Selected Occupations in the United States*, New York, NY: Harper and Brothers, 1937.

Coronado, Julia Lynn, Don Fullerton, and Thomas Glass, "The Progressivity of Social Security," *Bell Journal of Economic Analysis and Policy*, 2011, *11* (1), 70.

Dearden, Lorraine, Emla Fitzsimons, Alissa Goodman, and Greg Kaplan, "Higher education funding reforms in England: The distributional effects and the shifting balance of costs," *The Economic Journal*, 2008, *118* (526), F100–F125.

Farr, William, "The Income and Property Tax," *Journal of the Statistical Society of London*, March 1853, *16* (1), 1–44.

Friedman, Milton and Simon Kuznets, *Income from Independent Professional Practice*, New York, NY: NBER, 1954.

Furth, Salim, "Measuring Inflation Accurately," *Backgrounder*, 2017, (3213).

Gruber, Jonathan and Robin McKnight, "Why did employee health insurance contributions rise?," *Journal of Health Economics*, 2003, *22*, 1085–1104.

Gustman, Alan L. and Thomas L. Steinmeier, "How Effective is Redistribution Under the Social Security Benefit Formula?," *Journal of Public Economics*, 2001, *82* (1), 1–28.

Guvenen, Fatih, Fatih Karahan, Serdar Ozkan, and Jae Song, "What Do Data on Millions of U.S. Workers Say About Labor Income Risk?," Working Paper 20913, National Bureau of Economic Research 2015.

Hirsch, Barry T., David A. MacPherson, and Wayne G. Vroman, "Estimates of Union Density by State," *Monthly Labor Review*, 2001, *124* (7).

Houthakker, Hendrik S., "Education and Income," *Review of Economics and Statistics,*, February 1959, *41*, 24–28.

Huggett, Mark and Greg Kaplan, "Human capital values and returns: Bounds implied by earnings and asset returns data," *Journal of Economic Theory*, 2011, *146* (3), 897–919.

_ **and** _ , "How large is the stock component of human capital?," *Review of Economic Dynamics*, 2016, *22.*

Kambourov, Gueorgui and Iourii Manovskii, "Accounting for the Changing Life-Cycle Profile of Earnings," Working paper, University of Toronto 2009.

Kaplan, Greg, "Comment on "The lost ones: the opportunities and outcomes of non-college educated Americans born in the 1960s" by Borella, De Nardi and Yang," *NBER Macroeconomics Annual*, 2019.

Katz, Lawrence F and Kevin M Murphy, "Changes in Relative Wages, 1963-1987: Supply and Demand Factors," *The Quarterly Journal of Economics*, February 1992, *107* (1), 35–78.

_ **and** _ , "Changes in Relative Wages, 1963-1987: Supply and Demand Factors," *The Quarterly Journal of Economics*, February 1992, *107* (1), 35–78.

Knowles, John A, "Why are married men working so much? An aggregate analysis of intra-household bargaining and labour supply," *Review of Economic Studies*, 2013, *80* (3), 1055–1085.

Kopczuk, Wojciech, Emmanuel Saez, and Jae Song, "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data Since 1937," *Quarterly Journal of Economics*, 2010, *125* (1).

Lemieux, T., "Increasing residual wage inequality: Composition effects, noisy data, or rising demand for skill?," *American Economic Review*, 2006, *96* (3), 461–498.

Lemieux, Thomas, "The Changing Nature of Wage Inequality," *Journal of Population Economics*, 2008, *21*, 21–48.

Leonesio, Michael V. and Lisa Del Bene, "The Distribution of Annual and Long-Run US Earnings: 1981-2004," *Social Security Bulletin*, 2011, *71* (1), 17–33.

Liebman, Jeffrey B., "Redistribution in the Current U.S. Social Security System," in Martin Feldstein and Jeffrey B. Liebman, eds., *The Distributional Aspects of Social Security and Social Security Reform*, University Chicago Press, 2002.

McCully, Clinton P., Brian C. Moyer, and Kenneth J. Stewart, "A Reconciliation between the Consumer Price Index and the Personal Consumption Expenditures Price Index," Technical Report, Bureau of Economic Analysis 2012.

Meghir, Costas and Luigi Pistaferri, "Income Variance Dynamics and Heterogeneity," *Econometrica*, 2004, *72* (1), 1–32.

Miller, Herman P., "Annual and Lifetime Income in Relation to Education: 1939-1959," *The American Economic Review*, December 1960, *50* (5), 962–986.

Mincer, Jacob, "Investment in Human Capital and Personal Income Distribution," *Journal of Political Economy*, August 1958, *66*, 281–302.

Panis, Constantinjn, Ronald Euller, Cynthia Grant, Melissa Bradley, Christine E. Peterson, Randall Hirscher, and Paul Stinberg, *SSA Program Data User's Manual*, Baltimore, MD: Social Security Administration, 2000.

Pierce, Brooks, "Compensation Inequality," *Quarterly Journal of Economics*, 2001, *116* (4), 1493–1525.

Saez, Emmanuel, "Striking it Richer: The Evolution of Top Incomes in the United States (Updated with 2015 preliminary estimates)," Working Paper, University of California at Berkeley 2016.

Storesletten, Kjetil, Chris I. Telmer, and Amir Yaron, "Cyclical Dynamics in Idiosyncratic Labor Market Risk," *Journal of Political Economy*, June 2004, *112* (3), 695–717.

US Bureau of Labor Statistics, "Differences between the Consumer Price Index and the Personal Consumption Expenditures Price Index," *Focus on Prices and Spending*, 2011, *2* (3), 1–7.

Walsh, John R., "Capital Concept Applied to Man," *The Quarterly Journal of Economics*, February 1935, *49* (2), 255–285.

Wilkinson, B. W., "Present Values of Lifetime Earnings for Different Occupations," *Journal of Political Economy*, 1966, *74*, 556–672.

ONLINE APPENDIX

Not For Publication

A State-Level Panel Regressions

A.1 Overview and Summary

This paper was deliberately (and unapologetically) descriptive in its nature for the simple reason that we could not do justice to documenting the rich trends in the distribution of lifetime incomes in sufficient detail while simultaneously investigating their potential drivers. Understanding the forces behind these trends is the natural next step. So, we were curious to see if the data offered any useful clues about potential drivers that can guide future investigations. To this end, we ran various panel regressions exploiting cross-state variation in the evolution of the state/cohort-specific lifetime income distributions. This Appendix containts details of this analysis.

We first constructed the median lifetime income distribution for each state, by cohort and gender. We then regressed the median measure for men (since they were the ones experiencing the turning point around late 1970s and the decline thereafter) on a number of potential correlates measured at the state level: union coverage rate, measures of trade exposure, industry composition, educational attainment, age and gender composition of the workforce, among several others. The timing of the right-hand side variables was chosen to coincide with the entry year of the cohort used on the left-hand side.

Somewhat surprisingly (to us), many usual suspects—among them, unionization, trade, and industry composition—did not turn out to be robustly significant. However, two variables were consistently statistically significant and quantitatively large, and implied that: (i) cohorts that entered when the labor market had a large fraction of young workers (ages 25 to 35) experienced lower median lifetime incomes, and (ii) in entering cohorts that had a larger fraction of men relative to women in the workforce, men earned lower (median) lifetime incomes. Both effects are consistent with a simple demand side story with a production function where age and gender groups are imperfect substitutes. If the inputs are gross substitutes, a rise in the supply of younger workers or men depresses the wages of those groups. This is the same mechanism extensively studied to understand the trends in the college premium (e.g., Katz and Murphy (1992b)) as well as its different evolutions for different cohorts (Card and Lemieux (2001)).

We then repeated the same analysis for lifetime inequality, using the P90/P10 measure as the left-hand side variable. In contrast to the findings for the median, gender and age composition did not turn out to be significant. Instead, industry composition seems to matter: states where manufacturing share declined experienced a larger rise in lifetime inequality across cohorts compared with states where services share grew saw a smaller rise. These effects were more pronounced for inequality above the median (P90/P50) than below (P50/P10).

Overall, while no smoking gun emerged from this preliminary investigation, we found this exercise to be useful by showing that some of the most obvious explanations did not clearly emerge from the analysis. To the extent that they might have played a role, their effects might be more subtle than what this preliminary analysis was able to uncover. Clearly, these preliminary results are only suggestive at this point and invite more work on this topic.

Many of the usual suspects–increasing automation, outsourcing, declining union strength and coverage, among others–could be plausible explanations for the trends in lifetime earnings we document. We investigate the relationship between state-level lifetime earnings trends and trade exposure, union coverage, industry composition of the workforce, and demographic composition during the year that a cohort enters the labor force. We find the growth in the share of young working age individuals in a state and the growth in the share of those young workers that are men to have a negative association with the growth in median lifetime earnings for men. While other variables, most notably race and college attainment, turn significant in some specifications, this does not seem robust.[35] We also find that the growth in employment in the manufacturing and services sectors have negative associations with growth in lifetime inequality. While we don't find associations with our measures of union coverage or trade exposure, they may explain some of the association with employment in the manufacturing sector.

A.2 Details of the Regression Analysis

We conduct a series of panel regressions on state-level variables to see if there are robust relationships between union coverage, trade exposure, industry composition, or demographic composition, and the trends in lifetime earnings that we document. Our dependent variables are state-level log change in median lifetime earnings and the log of the 90-10, 90-50, and 50-10 lifetime earnings ratios (by gender group).

Our independent variables come from several data sources. We use the union coverage series from Hirsch et al. (2001) which starts in 1964. We calculate trade exposure as the portion of state-level GDP that comes from manufacturing, agriculture, or mining using the Regional Economic Accounts maintained by the Bureau of Economic Analysis. For the industry and demographic composition of the workforce, we use two sources of data. We use the Annual Social and Economic Supplement of Current Population Survey (CPS) for annual state-level data beginning in 1967. However, the CPS groups many small states together in clusters that change between 1967 and 1983, which limits usable cross-state variation. As an alternative, we also use the 1960, 1970, and 1980 Censuses to use in decade-difference regressions.

We regress our dependent variable on state-level variables from the year that the cohort entered the labor market. In our baseline specification, our independent variables include the change in union coverage; the change in trade exposure; the change in the employment share in manufacturing, agriculture, and service industries; the change in the percent of the state population that is married, white, or aged 25 to 35; and the change in the percent of young people (aged 25-35) that are male or college educated.

In the annual regressions using the CPS, all changes are computed annually. We have 304 region-year observations between 1967 and 1983, where a region is either a large state or a regional group of small states. In our baseline specifications, we use region and year fixed effects. In the decade regressions using the Census, we compute ten-year changes in all variables. We have two observations per state, from 1960 to 1970 and 1970 to 1980. However, because of sample size censoring, we do not have lifetime earnings measures for all states in each year. As a result, we have 55 state-decade observations. We use neither state nor decade fixed effects in the decade regressions.

[35] While we find significant relationships between the share of individuals aged 25 to 35 that are men and median lifetime earnings, we do not find any similar association with the share of *working* young people that are men.

In addition to our baseline specifications, we also explore using levels instead of differenced dependent and independent variables. We experimented with toggling time and regional fixed effects. We added variables focusing on the labor market composition of the older generation of workers rather than the younger generation. Our baseline specification is not weighted, but we did run several specifications using weighted OLS as well. We also ran similar panel regressions using cross-sectional measures of earnings and inequality from the CPS rather than lifetime earnings measures.

In the decade regressions, we find a relatively robust relationship between the declining manufacturing share of the labor force and increases in earnings inequality, with the strongest association with 90-10 inequality. We also find evidence that growth in the share of the labor force working in the services industry has a negative association with growth in inequality.

Some of the demographic variables have relatively robust relationships. In the annual regressions, an increase in the share of 25 to 35 year olds that have a college education is positively associated with growth in the median lifetime earnings. We also find that an increase in the share of state that is white is negatively associated with median lifetime earnings and positive associated with 90-50 earnings inequality. In the decade regressions, we find the same relationship in the college share of young people. We also find the opposite relationship between the white share of a state and both median lifetime earnings and earnings inequality. We find that an increase in the share of the state aged 25-35 and the share of those young people that are men are negatively associated with male median lifetime earnings. These findings are consistent with a substitutable labor within cohorts, in which states with a greater labor supply drive lower wages in a manner that is persistent throughout the lifecycle of a cohort. When conditioning on the working population of young people, we do not find a significant association between the share of men and male median lifetime earnings.

A.3 State-Level Percentiles of the Lifetime Earnings Distribution

Table A.1: Decade Differences of Median Lifetime Earnings

VARIABLES	(1) Δ Med Lifetime Inc	(2) Δ Med	(3) Δ Med	(4) Δ Med
Δ Union Cov	-0.00218		-0.00454	
	(0.00560)		(0.00603)	
Δ %GDP Trade	0.00205		-0.000645	
	(0.00493)		(0.00541)	
Δ % Male of 25-35	-2.760	-3.072*	-2.824	-3.418**
	(1.756)	(1.604)	(1.874)	(1.717)
Δ % Married	-1.348		-1.982	
	(1.982)		(2.111)	
Δ % Coll. of 25-35	1.429	1.526	2.064	2.092*
	(1.043)	(0.958)	(1.277)	(1.130)
Δ % White	2.499**	1.935***	2.486*	1.655
	(1.244)	(0.727)	(1.510)	(1.060)
Δ % Aged 25-35	-2.413**	-2.691***	-2.531	-2.952***
	(1.078)	(0.708)	(1.551)	(0.977)
Δ % Manuf			1.101	0.798
			(1.027)	(0.946)
Δ % Services			-0.492	-0.437
			(1.522)	(1.305)
Δ % Agricult			0.557	0.425
			(1.298)	(1.339)
Constant	-0.0200	-0.0189	-0.0212	-0.00905
	(0.0538)	(0.0487)	(0.0790)	(0.0703)
Observations	55	55	55	55
R-squared	0.489	0.480	0.518	0.501
State Fixed Effects	N	N	N	N
Year Fixed Effects	N	N	N	N

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: These are the baseline specifications. The dependent variable is the change in median lifetime earnings (from SSA) from the 1960 to 1970 cohorts and 1970 to 1980 cohorts, in every state for which the 1% sample exceeds 100. Independent variables are the same ten-year changes in demographic and economic variables (from Census) in the year the cohorts enter the labor market. Variables include union coverage; percent of GDP in trade-exposed industries; percent of 25-35 year olds that are male or college educated; percent of total population that is aged 25-35, white, or married; and the percent of the working population employed the manufacturing, services, or agriculture.

Table A.2: Decade Differences in 90-10 Lifetime Earnings Inequality

VARIABLES	(1) Δ p90/p10	(2)	(3)	(4)
Δ Union Cov	-0.00449		-0.00401	
	(0.0118)		(0.0125)	
Δ %GDP Trade	0.000356		0.00691	
	(0.00820)		(0.00775)	
Δ % Male of 25-35	-0.373	-1.604	-4.500	-4.151
	(4.861)	(4.606)	(4.826)	(4.398)
Δ % Married	-3.935		-0.0207	
	(4.257)		(4.948)	
Δ % Coll. of 25-35	-0.144	0.309	1.060	0.947
	(2.614)	(2.439)	(2.369)	(2.167)
Δ % White	-0.605	-2.213*	-1.275	-1.456
	(1.947)	(1.303)	(2.376)	(1.778)
Δ % Aged 25-35	1.289	0.191	-3.662	-3.185*
	(2.733)	(1.754)	(3.042)	(1.895)
Δ % Manuf			-4.759**	-4.334**
			(2.024)	(1.760)
Δ % Services			-6.216**	-6.093**
			(2.913)	(2.703)
Δ % Agricult			-0.988	-0.723
			(2.481)	(2.321)
Constant	0.122	0.133	0.345***	0.338***
	(0.116)	(0.117)	(0.130)	(0.119)
Observations	55	55	55	55
R-squared	0.123	0.107	0.325	0.312
State Fixed Effects	N	N	N	N
Year Fixed Effects	N	N	N	N

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: These are the baseline specifications. The dependent variable is the change in the p90/p10 ratio (from SSA) from the 1960 to 1970 cohorts and 1970 to 1980 cohorts, in every state for which the 1% sample exceeds 100. Independent variables are the same ten-year changes in demographic and economic variables (from Census) in the year the cohorts enter the labor market. Variables include union coverage; percent of GDP in trade-exposed industries; percent of 25-35 year olds that are male or college educated; percent of total population that is aged 25-35, white, or married; and the percent of the working population employed the manufacturing, services, or agriculture.

Table A.3: 90th Percentile of the Lifetime Earnings Distribution for Men, by State and Cohort

	Cohort					
	1957	1962	1967	1972	1977	1983
AL	63.55	58.50	77.14	82.06	85.03	81.39
AR	60.97	68.88	75.73	73.85	76.14	77.18
AZ						100.29
CA	87.66	86.21	102.40	101.57	93.73	101.99
CO					89.41	103.18
CT				98.69	103.97	124.51
FL			87.66	86.45	85.73	100.30
GA	62.35	61.84	71.14	76.44	81.91	83.26
IA	84.12	73.55	84.39	86.81	91.91	73.83
IL	82.58	91.14	107.07	105.07	95.41	103.22
IN	77.41	75.99	86.40	81.53	88.35	84.25
KS				80.30	100.07	88.59
KY	62.08	66.02	78.94	77.74	69.68	77.19
LA		74.58	75.66	76.01	84.80	86.44
MA	75.11	89.86	106.87	108.54	104.70	117.93
MD			70.69	106.47	91.66	103.71
MI	78.84	86.47	93.96	95.06	91.53	100.99
MN	74.89	79.79	88.18	88.42	89.46	100.33
MO	65.76	72.20	88.65	103.80	91.55	93.26
MS	55.22	66.64	63.51	71.23	76.52	76.02
NC	56.30	61.46	69.02	71.46	73.35	81.32
NE					101.67	
NJ	75.59	94.25	106.13	123.12	112.20	120.91
NY	93.38	113.84	114.32	123.11	125.39	122.53
OH	71.22	76.58	90.14	104.25	90.60	93.03
OK	69.60	87.61	85.76	81.17	85.77	91.55
OR					91.14	82.35
PA	73.34	79.48	88.10	93.05	95.78	106.34
SC		54.59	69.78	72.24	84.24	71.40
TN	61.95	73.46	77.94	75.05	76.12	83.15
TX	67.28	77.74	92.29	89.01	89.78	90.22
VA	53.25	67.09	69.22	76.76	84.63	94.97
WA				92.84	82.59	93.28
WI	78.12	77.97	90.24	108.23	88.03	91.66
WV	66.40	67.67	69.69	76.28	70.44	76.10

Notes: This table displays the 90th percentile of lifetime earnings for men by state and cohort. Values are displayed in thousands of 2013 dollars and deflated using the PCE. An empty cell indicates that the sample size for that state/cohort combination is too small to report.

Table A.4: Median of the Lifetime Earnings Distribution for Men, by State and Cohort

	Cohort					
	1957	1962	1967	1972	1977	1983
AL	31.28	34.47	38.69	37.38	37.59	34.24
AR	31.49	36.17	37.22	37.77	37.22	33.92
AZ						34.75
CA	47.63	45.98	49.16	44.19	43.63	41.21
CO					37.84	44.95
CT				48.20	51.56	51.94
FL			39.85	31.26	35.96	33.83
GA	34.02	32.88	37.34	36.33	37.78	31.89
IA	44.09	36.37	49.02	48.06	41.37	33.89
IL	46.61	49.79	52.72	51.26	45.18	44.76
IN	40.55	43.07	51.60	46.65	44.85	38.56
KS				44.67	42.46	44.41
KY	39.02	36.56	41.36	41.36	33.97	34.47
LA		36.56	42.19	42.50	41.16	35.18
MA	41.78	48.13	46.47	45.95	50.40	44.39
MD			41.28	50.68	42.71	39.66
MI	46.37	47.03	52.64	52.18	45.05	43.25
MN	45.13	44.04	53.54	44.69	42.31	43.36
MO	37.56	43.83	44.67	45.15	42.28	35.43
MS	31.74	33.43	35.43	32.18	31.98	28.58
NC	30.38	33.52	35.32	34.18	35.65	31.23
NE					41.77	
NJ	44.29	54.25	52.60	52.27	51.57	52.42
NY	47.91	50.34	51.72	52.11	47.27	45.40
OH	44.17	46.43	46.55	48.22	41.21	39.88
OK	37.35	39.32	37.95	38.30	34.75	38.44
OR					42.39	37.48
PA	40.75	45.05	47.33	46.84	43.38	43.01
SC		30.76	37.61	38.51	35.23	29.41
TN	32.63	36.05	34.67	35.63	38.94	34.65
TX	36.70	42.54	40.83	39.87	39.53	36.00
VA	32.45	33.65	35.08	37.77	35.39	37.03
WA				49.10	44.01	46.13
WI	42.08	47.04	49.33	47.32	46.12	42.25
WV	40.64	38.02	35.87	41.22	39.20	36.66

Notes: This table displays the median of lifetime earnings for men by state and cohort. Values are displayed in thousands of 2013 dollars and deflated using the PCE. An empty cell indicates that the sample size for that state/cohort combination is too small to report.

Table A.5: 10th Percentile of the Lifetime Earnings Distribution for Men, by State and Cohort

	Cohort					
	1957	1962	1967	1972	1977	1983
AL	11.96	13.39	15.96	14.25	10.80	11.04
AR	13.05	12.94	14.31	15.74	13.98	12.65
AZ						14.45
CA	20.81	18.44	18.90	14.80	16.67	12.90
CO					16.56	15.07
CT				15.48	18.16	15.80
FL			13.82	10.71	13.64	13.12
GA	12.11	13.78	13.02	11.98	11.41	10.42
IA	19.87	15.28	22.21	16.97	17.28	17.22
IL	17.63	19.90	23.04	19.87	17.13	13.90
IN	16.71	15.30	26.69	18.23	18.20	15.05
KS				20.31	15.27	14.62
KY	17.33	16.63	16.59	14.20	12.87	10.92
LA		14.43	17.50	15.68	12.41	10.72
MA	15.55	19.45	17.50	17.31	18.28	15.86
MD			15.42	18.14	15.81	14.19
MI	21.14	20.17	20.83	18.37	16.33	15.83
MN	22.12	20.34	21.33	18.27	17.18	14.84
MO	13.82	22.36	17.81	13.60	14.69	12.54
MS	11.26	15.10	11.20	11.85	12.04	9.30
NC	12.54	14.05	13.44	12.62	14.01	11.81
NE					18.42	
NJ	19.48	20.88	21.92	19.71	15.16	17.22
NY	20.21	21.33	22.03	19.77	16.10	14.90
OH	20.21	19.43	19.98	18.74	15.24	14.22
OK	16.88	17.85	13.85	14.66	14.02	11.24
OR					15.23	12.92
PA	18.28	19.60	19.70	18.23	17.38	14.55
SC		13.14	15.74	15.38	12.50	9.87
TN	9.82	15.77	13.28	15.46	13.23	12.72
TX	14.01	16.19	14.82	16.39	13.99	11.91
VA	14.82	11.62	15.01	12.63	13.12	13.56
WA				17.13	17.65	16.60
WI	21.86	21.15	23.95	20.57	18.34	18.46
WV	16.56	18.11	13.97	17.30	13.89	14.44

Notes: This table displays the 10th percentile of lifetime earnings for men by state and cohort. Values are displayed in thousands of 2013 dollars and deflated using the PCE. An empty cell indicates that the sample size for that state/cohort combination is too small to report.

B Trends in the Share of the Pie

In this Appendix, we offer an alternative perspective on trends in lifetime earnings inequality by examining how the aggregate lifetime earnings of each cohort—the pie, so to speak—is divided between males and females, and between individuals in different parts of the lifetime earnings distribution. So far, our analysis has documented very different trends in lifetime earnings for different groups in the population—men versus women, early versus late cohorts, low versus high earners. This section offers a way to quantify the differences in these trends by analyzing changes in how the lifetime earnings pie is shared across these groups.

B.1 Share of the Pie by Gender

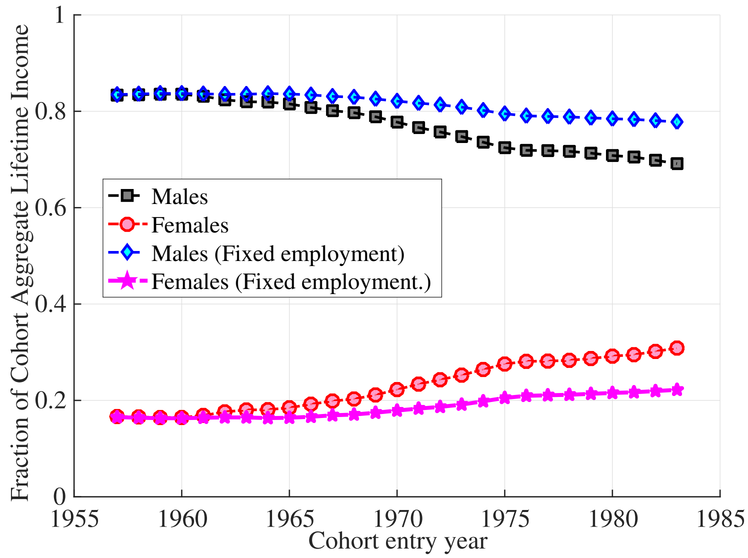
We begin with a comparison between men and women and ask how much of the pie was earned by each gender group in each cohort. In Figure B.1, each black square marker shows the share of the pie that accrued to the men in that cohort, and each red circle shows the same for women; so, the two lines always add up to 1 for each cohort. For the 1957 cohort, men collectively earned about 83.5% of the cohort's aggregate earnings, but this share has declined monotonically, at first slowly and then more rapidly, so that by the 1983 cohort, men's share had fallen to 69.1%, for a total decline of 14.4% percentage points. Of course, the mirror image has been experienced by women, whose share has almost doubled across these same cohorts, from 16.5% to 30.9% of the 1983 cohort's aggregate earnings.

An important point to note is that this rising share for women (and decline for men) is due to the closing gender gap in: (i) annual earnings, (ii) the number of years worked (conditional on having worked at least 15 years), and (iii) the fraction of the population (women vs. men) that satisfies the baseline sample criteria, which depends on the rising attachment of women to the labor force relative to that of men (as well as changing population ratios, which is a smaller concern). To see how much each channel contributes to these shifting shares, we construct an alternative statistic that isolates the first trend by controlling for (ii) and (iii). We do this by fixing the lifetime employment share of each gender (aggregate lifetime years worked for all women as a fraction of cohort total) at its value for the first cohort (1957) and tracking the shares that would have resulted if women's years of work (above 15 years) relative to men remained the same over time. These adjusted shares are shown with blue diamond markers for men and magenta star markers for women. As expected, for men, the employment-adjusted share declines more slowly than the unadjusted share (from 83.5% to 78%, compared with 83.5% to 69%). For women, the employment-adjusted share increases from 16.5% to 22.2% (compared with 16.5% to 30.5%).[36]

Thus, over the course of a generation (27 cohorts), the share of aggregate lifetime earnings accruing to women nearly doubled, and a large part of the increase is attributed to women becoming more strongly attached to the labor force.

[36]Because our selection criteria omits those who work less than 15 years, our measure of earnings shares misses earnings accruing to those that work few years. For example, if there was an increase in the average number of years worked by females who only worked for between 1 and 10 years, this should result in an increase in the earnings share accruing to women. Given our sample selection, this would be missed. Figure E.5 in Appendix E shows a version of Figure B.1 in which earnings shares are calculated without imposing any minimum earnings or years worked selection criterion. The results are similar to those in Figure B.1.

Figure B.1: Share of Cohort Aggregate Earnings Going to Each Gender Group



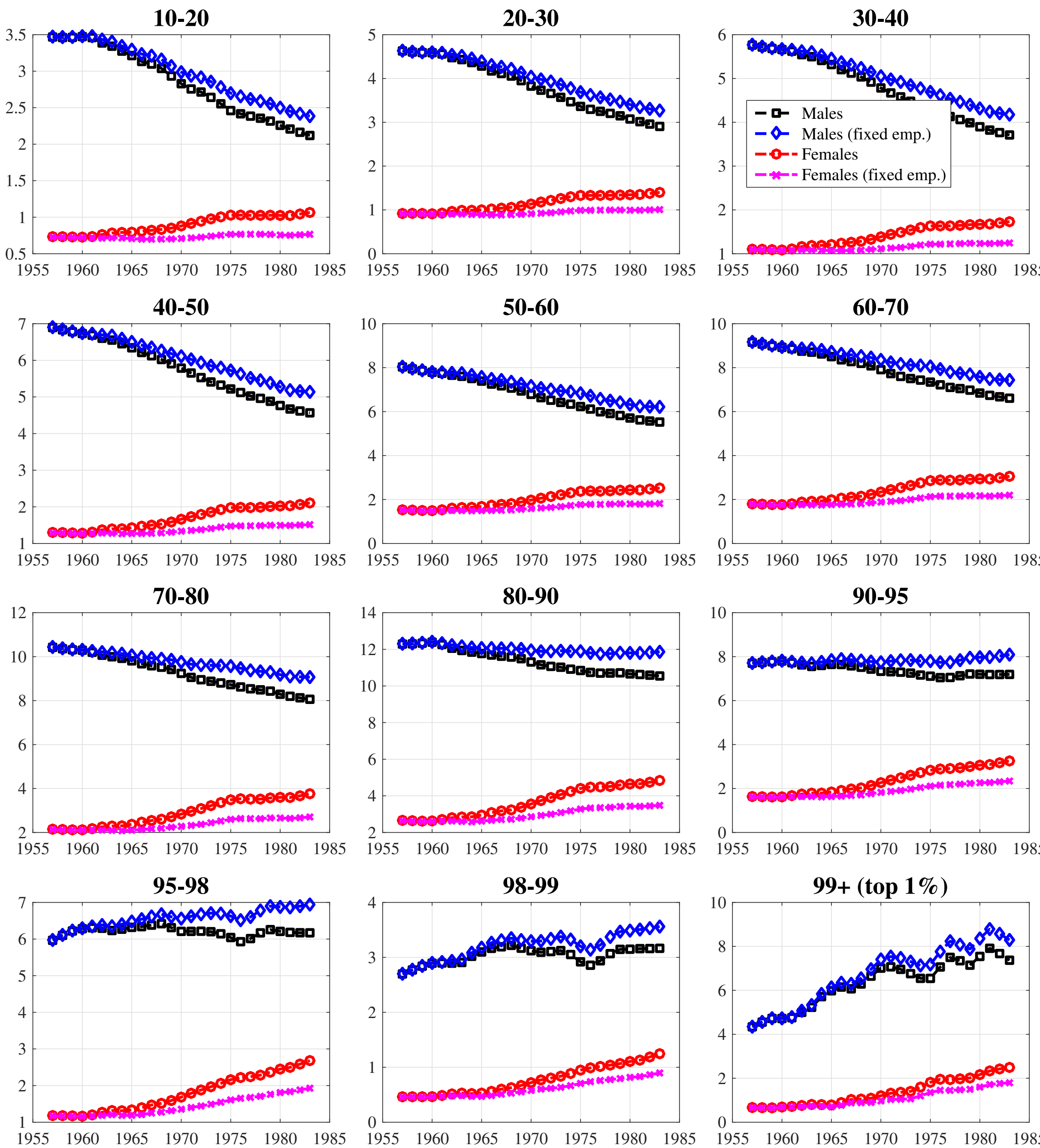
Notes: Each observation represents the share of aggregate lifetime earnings of each cohort that was earned by a particular gender in the baseline sample (see section 2.3). The figures shows the trends for men and women, plotted by the year each cohort entered the labor market, as well as counterfactual trends for men and women assuming that the gender gap in lifetime years worked remained fixed at the 1957 level. Male and female shares for the actual and counterfactual trends add to one in each year. Earnings is deflated using the PCE.

B.2 Share of the Pie by Gender and Lifetime Earnings Percentiles

We now delve one level deeper and ask within each gender group, which lifetime earnings percentile group has seen its share of the pie rise or fall, and by how much? To answer this question, Figure B.2 plots the share of each cohort's aggregate lifetime earnings accruing to men (black line with square markers) and women (red line with circles) in different parts of their gender-specific lifetime earnings distributions. For example, the 1957 point for men in the top left panel represents the fraction of the pie produced by the 1957 cohort that accrues to men in the 11th to 20th percentiles of the male lifetime earnings distribution in that cohort. The figures show both the raw shares and the employment-adjusted shares. We focus our discussion on the employment-adjusted shares, with the understanding that the raw earnings shares show even steeper declines for men and steeper increases for women.

One of the immediate findings revealed in this figure is the steadily declining fortunes (share of the pie) of the bottom 90% of men in each cohort. Even for men between the 91st and 95th percentiles, the share of the pie has been more or less flat. In fact, only men in the top 5% (of their lifetime earnings distribution) have seen a noticeable increase in their share of the pie, and this increase is really only significant for the top 1% of men: their share has almost doubled, from 4% to nearly 8% from the 1957 to 1983 cohorts. Women, on the other hand, have experienced an increase in their share of aggregate cohort earnings in all parts of the distribution. Noticeably,

Figure B.2: Share of Cohort Lifetime Earnings Going to Each Gender / Percentile Groups (indicated by the lower and upper end of percentile thresholds)



Notes: Each observation represents the share of aggregate lifetime earnings of a cohort that was earned by a particular gender and earnings percentile group in the baseline sample (see section 2.3). Each panel displays the analogous trends to Figure B.1 for a particular earnings group defined by the earnings percentiles above each panel. For example, the top left panel displays the share of aggregate lifetime earnings of each cohort earned by men and women between the 10th and 20th percentile of the lifetime earnings distribution for each cohort (as well as the counterfactual fixed employment trends). Earnings is deflated using the PCE.

the shares accruing to women in the bottom percentiles of the lifetime earnings distribution have grown more slowly than the shares accruing to women in the top percentiles.[37]

C Additional Tables and Figures for Section 3

[37]Figure E.6 in Appendix E is a version of Figure B.2 in which earnings shares are calculated without imposing any minimum earnings or years worked selection criterion. The results are similar to those in Figure B.2.

Table C.6: Distribution of Lifetime Incomes by Cohort, Males (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	42.21	37.71	10.58	14.50	23.50	52.79	56.90	70.06	88.28	156.75
1958	43.40	38.71	10.84	14.81	23.90	53.46	57.39	71.67	89.20	164.79
1959	43.86	38.07	10.65	14.64	23.74	53.83	58.16	74.29	94.19	179.16
1960	44.96	39.17	11.04	15.52	25.11	55.21	60.44	75.74	93.89	179.76
1961	45.33	39.17	11.64	15.56	24.59	55.66	60.13	75.74	96.94	184.10
1962	46.03	40.02	12.10	16.10	25.15	55.91	60.33	76.04	98.91	182.93
1963	47.41	40.74	11.66	15.68	25.62	57.79	62.49	78.35	100.36	196.22
1964	47.18	40.65	11.74	16.15	25.34	57.57	61.75	76.96	101.00	197.83
1965	49.22	40.53	11.32	15.57	25.65	58.54	63.46	80.85	108.00	230.73
1966	48.98	41.25	11.46	15.77	25.46	58.96	63.85	81.85	107.79	220.73
1967	51.47	42.34	12.08	16.16	26.07	61.15	66.71	86.00	113.65	246.98
1968	50.94	41.80	11.91	16.01	26.35	60.80	65.81	84.99	113.99	236.71
1969	51.08	41.19	11.53	15.48	25.41	61.08	66.45	85.52	112.13	249.65
1970	51.44	41.26	11.00	15.02	25.12	60.71	66.50	86.26	112.33	263.86
1971	52.27	42.15	11.48	15.69	25.68	61.46	67.13	86.81	116.77	260.52
1972	52.40	41.21	10.71	15.03	25.12	61.68	67.74	89.80	119.42	261.78
1973	51.50	40.79	11.00	14.95	24.78	60.99	67.08	87.03	116.46	270.30
1974	50.59	39.92	10.61	14.00	23.84	60.36	66.67	86.88	116.32	257.37
1975	50.22	39.81	10.17	13.65	23.14	60.42	66.30	86.76	115.90	238.90
1976	50.85	39.53	10.34	13.84	23.14	61.24	68.03	88.48	115.76	234.39
1977	51.85	39.49	10.42	14.02	23.32	60.52	66.86	88.49	118.50	249.74
1978	51.90	38.82	10.00	13.52	22.95	61.29	68.25	90.09	122.82	264.46
1979	51.56	39.01	9.89	13.74	22.85	61.33	67.88	91.01	124.27	271.17
1980	52.82	38.73	9.93	13.52	22.86	61.46	68.44	93.09	126.77	281.16
1981	53.17	38.36	9.70	13.33	22.50	61.16	68.77	94.24	127.75	294.04
1982	52.78	38.49	9.92	13.39	22.46	61.35	69.04	94.50	127.84	293.90
1983	52.22	37.96	9.62	12.96	21.96	60.33	68.24	94.58	128.68	290.16

Table C.7: Distribution of Lifetime Incomes by Cohort, Females (in Thousands of 2013 US $)

	Averages			Selected Percentiles							
Cohort	Mean	Median		p5	p10	p25	p75	p80	p90	p95	p99
1957	16.71	14.09	0.37	5.00	6.38	9.20	21.58	23.66	30.25	35.88	50.44
1958	16.93	14.39	0.37	5.28	6.42	9.44	21.73	24.12	30.82	37.18	51.00
1959	17.09	14.60	0.38	5.43	6.68	9.71	21.71	24.27	30.28	36.32	50.33
1960	17.33	14.36	0.37	5.25	6.54	9.54	22.57	24.82	31.86	38.02	51.65
1961	17.81	14.95	0.38	5.63	6.68	9.76	22.58	25.39	32.50	38.11	56.21
1962	18.22	15.36	0.38	5.36	6.68	10.03	23.32	25.75	33.06	40.55	57.57
1963	18.60	15.53	0.38	5.52	6.97	10.20	23.51	25.97	33.19	40.76	59.09
1964	18.56	15.31	0.38	5.75	7.08	10.27	23.32	25.87	33.64	41.67	59.41
1965	18.74	16.06	0.40	5.64	7.04	10.20	24.18	26.59	34.12	41.02	55.31
1966	19.88	16.50	0.40	5.57	7.00	10.49	25.67	28.45	36.46	43.96	62.80
1967	20.62	16.84	0.40	5.97	7.44	10.80	26.09	29.12	37.17	45.32	69.18
1968	21.09	17.32	0.41	5.82	7.24	10.93	27.10	29.97	38.29	47.43	73.96
1969	21.23	17.46	0.42	5.93	7.49	11.17	27.33	30.32	38.41	47.90	73.46
1970	22.52	18.20	0.44	5.96	7.50	11.36	28.45	31.94	41.94	51.52	83.66
1971	23.46	19.05	0.45	6.20	7.76	11.99	29.63	32.83	43.43	53.24	86.45
1972	23.70	19.03	0.46	6.31	7.91	11.92	29.97	33.74	43.44	54.29	90.08
1973	24.33	19.49	0.48	6.19	7.82	11.99	31.03	34.77	45.46	56.68	88.54
1974	24.87	19.94	0.50	6.38	8.16	12.57	31.64	35.27	46.29	57.93	96.75
1975	25.95	20.25	0.51	6.16	8.02	12.33	32.56	36.35	47.72	59.96	101.07
1976	27.15	21.11	0.53	6.59	8.52	13.00	34.63	38.25	50.39	63.63	112.28
1977	27.11	20.88	0.53	6.54	8.33	12.89	33.86	38.06	50.36	64.16	118.53
1978	27.59	21.43	0.55	6.47	8.47	13.05	34.11	38.59	51.49	64.94	121.29
1979	28.14	21.70	0.56	6.49	8.49	13.10	34.89	39.37	52.43	67.62	119.76
1980	28.76	21.91	0.57	6.55	8.47	13.22	35.81	40.24	53.80	69.32	124.78
1981	29.35	22.05	0.57	6.69	8.63	13.53	35.14	39.65	54.54	71.39	134.93
1982	29.27	22.05	0.57	6.57	8.56	13.48	35.54	39.92	53.64	71.55	128.08
1983	29.85	22.35	0.59	6.69	8.66	13.50	36.31	40.87	55.40	74.02	143.61

Table C.8: Distribution of Lifetime Incomes by Cohort, Males; Deflated with CPI (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	51.38	46.08	12.99	17.91	28.83	64.24	69.06	85.16	106.94	188.93
1958	52.59	47.17	13.45	18.16	29.26	64.91	69.55	86.85	108.00	193.95
1959	52.92	46.12	13.05	17.93	28.97	65.02	70.25	89.40	112.81	210.88
1960	54.00	47.34	13.46	18.89	30.55	66.32	72.61	90.66	112.28	209.89
1961	54.20	47.13	14.13	18.88	29.76	66.61	71.93	90.47	115.07	218.15
1962	54.77	47.87	14.63	19.51	30.46	66.56	72.06	90.23	117.24	214.62
1963	56.10	48.50	14.09	18.84	30.79	68.43	73.85	92.58	117.65	226.43
1964	55.59	48.17	14.09	19.39	30.31	67.89	72.63	90.32	117.45	228.05
1965	57.60	47.87	13.65	18.44	30.44	68.52	74.28	94.40	124.70	266.21
1966	57.04	48.38	13.66	18.71	30.20	68.66	74.41	95.34	124.42	254.00
1967	59.54	49.40	14.25	19.04	30.56	70.83	77.21	99.56	130.00	281.47
1968	58.61	48.39	13.96	18.74	30.71	70.09	75.85	97.51	129.43	267.51
1969	58.36	47.46	13.34	17.96	29.59	69.91	75.94	97.37	127.17	278.48
1970	58.36	47.31	12.64	17.30	28.89	69.12	75.56	97.79	126.26	292.87
1971	58.94	47.89	13.14	17.98	29.33	69.52	75.72	97.67	130.59	290.96
1972	58.70	46.64	12.32	17.10	28.51	69.29	76.07	100.56	132.58	287.89
1973	57.35	45.81	12.44	16.95	27.82	68.17	74.83	96.66	128.30	300.02
1974	56.02	44.53	11.86	15.73	26.72	66.93	73.95	95.98	128.11	279.78
1975	55.26	44.06	11.33	15.18	25.79	66.65	73.14	95.31	126.76	256.09
1976	55.60	43.52	11.42	15.41	25.67	67.19	74.32	96.37	126.10	251.53
1977	56.30	43.25	11.55	15.38	25.56	65.91	72.73	95.88	128.51	265.19
1978	56.06	42.24	10.90	14.74	25.12	66.43	73.75	96.81	131.78	279.78
1979	55.40	42.19	10.76	14.89	24.76	66.22	73.07	97.89	132.50	285.64
1980	56.44	41.68	10.67	14.65	24.71	65.85	73.31	99.33	134.63	294.02
1981	56.52	41.05	10.52	14.32	24.10	65.16	73.29	100.20	135.31	307.08
1982	55.85	41.03	10.65	14.40	23.92	65.26	73.26	99.79	134.61	305.62
1983	55.05	40.25	10.34	13.92	23.35	63.86	72.10	99.62	134.64	301.15

Table C.9: Distribution of Lifetime Incomes by Cohort, Females; Deflated with CPI (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	20.20	16.96	6.12	7.71	11.08	26.12	28.63	36.59	43.40	60.53
1958	20.38	17.23	6.36	7.71	11.29	26.22	29.08	37.09	44.61	61.84
1959	20.48	17.51	6.55	7.99	11.62	25.92	29.01	36.22	43.61	61.22
1960	20.66	17.08	6.25	7.85	11.37	26.96	29.60	38.01	45.65	61.67
1961	21.12	17.68	6.68	7.98	11.60	26.84	30.17	38.74	45.39	66.09
1962	21.49	18.04	6.36	7.90	11.80	27.50	30.36	39.09	47.69	67.06
1963	21.82	18.29	6.51	8.20	11.91	27.59	30.27	39.03	47.88	69.36
1964	21.66	17.81	6.77	8.27	12.01	27.15	30.27	39.26	48.40	69.15
1965	21.78	18.66	6.54	8.17	11.90	28.03	30.95	39.68	47.72	64.31
1966	22.97	19.09	6.45	8.13	12.17	29.67	32.88	42.22	51.12	72.94
1967	23.71	19.37	6.91	8.56	12.39	30.04	33.48	42.80	52.15	79.82
1968	24.09	19.74	6.68	8.32	12.54	30.85	34.15	43.90	53.90	84.25
1969	24.13	19.85	6.73	8.56	12.67	31.09	34.35	43.77	54.43	82.68
1970	25.43	20.53	6.81	8.53	12.87	32.14	36.03	47.28	57.91	93.47
1971	26.34	21.45	7.03	8.75	13.44	33.33	36.87	48.94	59.93	96.72
1972	26.47	21.24	7.09	8.85	13.41	33.47	37.60	48.46	60.73	98.53
1973	27.01	21.72	6.92	8.72	13.31	34.51	38.70	50.57	62.68	97.25
1974	27.47	22.06	7.04	9.03	13.91	35.03	39.08	50.99	63.67	105.71
1975	28.48	22.28	6.82	8.83	13.58	35.82	39.96	52.33	65.79	109.32
1976	29.63	23.12	7.23	9.29	14.24	37.74	41.80	55.26	69.30	121.97
1977	29.43	22.76	7.12	9.10	14.03	36.81	41.43	54.54	69.56	128.16
1978	29.77	23.22	7.05	9.17	14.13	36.81	41.72	55.63	69.75	128.39
1979	30.21	23.38	7.06	9.22	14.12	37.63	42.27	56.35	72.24	127.22
1980	30.73	23.47	7.09	9.09	14.23	38.30	43.17	57.54	74.02	131.99
1981	31.19	23.50	7.22	9.23	14.43	37.42	42.08	57.95	75.58	144.23
1982	30.97	23.39	7.01	9.13	14.35	37.55	42.34	56.89	75.70	133.99
1983	31.49	23.63	7.07	9.16	14.32	38.39	43.12	58.47	77.60	150.17

Table C.10: Growth Rates of Cohort Lifetime Earnings, Intensive Margin

		Averages		Selected Percentiles							
Cohorts		Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
						Males – PCE					
57–68	Cumulative	21.46	12.80	11.59	9.70	9.31	16.89	17.97	24.35	32.86	55.20
	Annualized	1.78	1.10	1.00	0.85	0.81	1.43	1.51	2.00	2.62	4.08
68–83	Cumulative	3.61	–7.16	–17.37	–16.84	–14.07	3.42	7.20	11.54	12.91	17.41
	Annualized	0.24	–0.49	–1.26	–1.22	–1.01	0.22	0.46	0.73	0.81	1.08
57–83	Cumulative	25.84	4.73	–7.79	–8.77	–6.07	20.89	26.47	38.71	50.00	82.23
	Annualized	0.89	0.18	–0.31	–0.35	–0.24	0.73	0.91	1.27	1.57	2.33
						Males – CPI					
57–68	Cumulative	14.83	7.12	6.12	3.76	3.66	10.88	11.62	17.25	25.27	43.18
	Annualized	1.26	0.63	0.54	0.34	0.33	0.94	1.00	1.46	2.07	3.32
68–83	Cumulative	–5.11	–15.13	–24.60	–24.32	–21.35	–5.55	–1.95	2.22	3.58	8.12
	Annualized	–0.35	–1.09	–1.86	–1.84	–1.59	–0.38	–0.13	0.15	0.23	0.52
57–83	Cumulative	8.96	–9.08	–19.98	–21.48	–18.48	4.73	9.45	19.85	29.75	54.80
	Annualized	0.33	–0.37	–0.85	–0.93	–0.78	0.18	0.35	0.70	1.01	1.69
						Females – PCE					
57–68	Cumulative	24.02	18.02	11.43	11.26	14.80	23.11	24.28	27.76	37.48	35.51
	Annualized	1.98	1.52	0.99	0.97	1.26	1.91	2.00	2.25	2.94	2.80
68–83	Cumulative	33.56	19.97	12.29	12.54	16.70	28.34	32.21	44.40	51.60	92.81
	Annualized	1.95	1.22	0.78	0.79	1.03	1.68	1.88	2.48	2.81	4.47
57–83	Cumulative	65.63	41.58	25.12	25.22	33.97	57.99	64.31	84.49	108.42	161.27
	Annualized	1.96	1.35	0.87	0.87	1.13	1.77	1.93	2.38	2.86	3.76
						Females – CPI					
57–68	Cumulative	17.16	11.78	5.13	4.83	8.40	16.71	17.63	20.97	29.35	30.03
	Annualized	1.45	1.02	0.46	0.43	0.74	1.41	1.49	1.75	2.37	2.42
68–83	Cumulative	23.45	10.92	3.61	4.28	8.05	18.61	21.95	32.96	40.26	73.75
	Annualized	1.41	0.69	0.24	0.28	0.52	1.14	1.33	1.92	2.28	3.75
57–83	Cumulative	44.64	23.98	8.92	9.32	17.13	38.43	43.45	60.85	81.42	125.91
	Annualized	1.43	0.83	0.33	0.34	0.61	1.26	1.40	1.84	2.32	3.18

Table C.11: Distribution of Lifetime Incomes by Cohort, Adjusted for Years Worked (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	39.87	34.19	11.37	14.24	21.50	49.76	53.66	66.78	83.64	157.19
1958	40.59	34.38	11.41	14.50	21.50	50.60	54.67	66.68	84.05	164.34
1959	41.04	34.33	11.77	14.56	21.56	50.22	54.66	68.85	88.17	175.91
1960	42.22	35.74	11.83	14.68	22.25	51.89	56.47	71.27	89.72	176.38
1961	42.59	35.41	12.04	14.92	22.31	52.18	56.94	71.72	92.51	176.71
1962	43.01	35.80	12.23	15.25	22.82	52.78	56.99	71.89	90.64	180.17
1963	43.88	35.95	12.23	15.34	22.41	53.54	58.36	73.58	94.25	186.19
1964	44.06	36.09	12.27	15.25	22.88	53.94	58.50	73.26	93.42	196.08
1965	45.42	36.15	12.17	15.10	22.86	54.23	59.27	75.38	100.19	216.48
1966	45.27	36.50	12.08	15.22	22.86	54.65	59.54	75.85	98.70	210.42
1967	47.28	37.32	12.60	15.63	23.27	56.36	61.63	79.16	104.84	243.38
1968	47.18	37.62	12.42	15.67	23.67	56.40	62.03	79.81	104.46	228.76
1969	47.04	36.92	12.45	15.72	23.39	55.98	61.62	79.68	102.62	231.33
1970	47.77	37.09	12.42	15.66	23.29	56.59	62.02	80.64	106.14	236.64
1971	48.41	37.69	12.76	16.11	24.03	56.96	62.39	81.01	107.08	227.62
1972	48.43	37.26	12.62	15.85	23.69	56.82	62.61	81.60	110.17	244.52
1973	48.24	37.32	12.69	15.97	23.75	56.43	62.54	81.57	107.86	245.61
1974	47.63	37.01	12.90	16.03	23.74	55.73	61.62	81.31	107.09	231.55
1975	47.89	36.75	12.53	15.79	23.47	56.64	62.43	81.12	107.63	227.84
1976	48.42	37.30	12.85	16.21	23.91	57.06	63.09	83.32	109.81	225.08
1977	48.93	37.06	12.84	16.14	23.91	57.11	63.47	83.39	110.39	238.23
1978	49.51	37.25	12.86	16.01	23.97	57.16	63.57	84.51	113.67	255.77
1979	49.55	37.25	12.97	16.15	24.01	57.59	64.18	85.86	114.91	258.92
1980	50.56	37.38	12.65	15.94	23.96	57.79	64.74	87.64	117.13	256.90
1981	51.06	37.10	12.78	16.06	23.88	57.79	64.63	88.57	119.07	266.42
1982	50.68	37.18	12.86	16.10	23.80	57.84	64.89	88.14	118.52	274.71
1983	50.48	36.70	12.66	15.97	23.49	57.72	64.64	89.33	120.49	264.22

Table C.12: Distribution of Lifetime Incomes by Cohort (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	33.70	27.34	6.77	8.89	14.97	45.14	49.82	62.65	78.26	135.71
1958	34.40	27.68	6.86	9.04	15.12	46.46	50.59	62.48	78.39	137.50
1959	34.80	27.52	6.99	9.33	15.22	45.61	50.35	64.40	82.14	149.87
1960	35.83	28.93	6.99	9.35	15.57	47.10	51.93	66.78	83.40	152.91
1961	35.89	28.47	7.25	9.48	15.67	46.91	52.02	66.48	84.00	160.22
1962	36.28	28.96	7.16	9.67	16.08	47.43	52.29	67.01	83.68	158.54
1963	36.95	28.76	7.40	9.65	15.81	48.50	53.25	67.73	86.13	162.67
1964	36.88	28.76	7.41	9.82	15.88	48.59	53.45	67.49	85.10	164.11
1965	38.10	29.16	7.38	9.61	16.01	48.27	53.59	69.22	90.73	188.18
1966	37.97	29.47	7.34	9.73	16.11	48.95	54.06	69.60	90.03	179.25
1967	39.73	29.80	7.69	9.94	16.50	50.36	55.93	72.66	94.95	206.15
1968	39.62	30.32	7.46	10.07	16.72	50.26	55.66	72.52	93.94	196.80
1969	39.42	29.57	7.58	9.97	16.48	49.91	55.55	72.66	92.36	194.33
1970	39.97	29.77	7.48	9.85	16.53	50.14	55.80	73.36	94.40	193.71
1971	40.58	30.29	7.74	10.31	17.13	50.30	56.02	73.63	95.18	198.50
1972	40.46	29.83	7.70	10.19	16.75	49.97	55.90	74.30	99.00	207.48
1973	40.25	30.09	7.72	10.25	17.06	49.68	55.60	73.68	95.10	199.67
1974	39.71	29.39	7.83	10.40	16.83	49.24	54.85	73.48	95.22	193.76
1975	39.90	29.72	7.57	10.05	16.60	49.62	55.72	73.03	95.58	192.54
1976	40.68	30.39	7.89	10.51	17.03	50.19	56.18	75.68	98.24	192.24
1977	40.96	30.15	7.86	10.45	16.98	49.88	56.09	74.67	97.45	204.65
1978	41.50	30.09	7.81	10.37	17.22	50.33	56.72	76.59	101.32	216.74
1979	41.54	30.18	7.91	10.44	17.24	50.45	56.71	77.29	102.85	222.90
1980	42.50	30.37	7.71	10.31	17.28	50.76	57.04	78.56	105.67	226.71
1981	42.80	29.93	7.85	10.34	17.11	50.53	56.87	80.17	106.64	226.90
1982	42.58	29.88	7.82	10.45	17.28	50.40	56.74	79.24	106.48	234.37
1983	42.33	29.84	7.85	10.31	16.84	50.00	56.66	79.87	108.29	228.15

Table C.13: Distribution of Lifetime Incomes by Cohort, Deflated with CPI (in Thousands of 2013 US $)

	Averages		Selected Percentiles							
Cohort	Mean	Median	p5	p10	p25	p75	p80	p90	p95	p99
1957	40.98	33.49	8.25	10.81	18.29	55.08	60.74	76.20	94.67	163.50
1958	41.64	33.70	8.34	10.99	18.35	56.24	61.50	75.66	94.80	164.15
1959	41.95	33.29	8.51	11.25	18.42	55.20	60.88	77.49	98.39	178.19
1960	42.99	34.94	8.43	11.13	18.76	56.56	62.37	80.06	99.77	182.27
1961	42.84	34.13	8.67	11.34	18.77	56.27	62.26	79.13	100.20	187.86
1962	43.11	34.53	8.47	11.46	19.18	56.59	62.32	79.39	98.83	184.54
1963	43.65	34.26	8.77	11.38	18.74	57.47	63.02	80.08	101.10	190.47
1964	43.38	34.09	8.70	11.60	18.75	57.32	63.09	79.33	99.90	191.10
1965	44.53	34.35	8.64	11.30	18.84	56.74	62.94	81.10	105.50	214.90
1966	44.15	34.50	8.60	11.35	18.90	57.19	63.18	80.80	104.06	203.75
1967	45.91	34.74	8.95	11.48	19.15	58.57	64.85	84.12	109.37	236.24
1968	45.52	35.11	8.64	11.61	19.31	58.05	64.37	83.22	107.05	221.26
1969	44.99	34.00	8.68	11.45	18.92	57.28	63.76	82.90	104.72	217.94
1970	45.30	33.84	8.53	11.27	18.84	57.15	63.47	83.21	106.74	215.71
1971	45.71	34.30	8.75	11.65	19.43	56.93	63.45	83.07	106.67	222.02
1972	45.29	33.59	8.61	11.47	18.86	56.14	62.81	83.17	110.08	229.35
1973	44.79	33.73	8.59	11.50	19.04	55.68	62.09	82.05	105.52	216.37
1974	43.94	32.75	8.68	11.53	18.70	54.66	60.94	81.17	105.02	211.29
1975	43.87	32.85	8.36	11.10	18.37	54.77	61.33	80.28	104.78	209.50
1976	44.46	33.34	8.70	11.56	18.73	55.07	61.65	82.64	106.85	207.69
1977	44.49	32.93	8.60	11.47	18.54	54.42	61.11	81.20	105.32	219.64
1978	44.81	32.72	8.50	11.28	18.69	54.62	61.40	82.73	109.20	231.77
1979	44.63	32.53	8.54	11.30	18.63	54.46	61.17	82.99	110.37	237.47
1980	45.41	32.67	8.34	11.10	18.60	54.44	61.07	83.89	112.74	239.34
1981	45.50	31.99	8.40	11.10	18.31	53.91	60.68	85.26	112.85	239.38
1982	45.06	31.74	8.34	11.18	18.42	53.50	60.32	83.91	112.72	245.03
1983	44.63	31.63	8.37	11.00	17.93	52.82	59.81	84.19	113.69	237.59

C.1 Comparison with Aggregate Earnings Growth

We compare average earnings growth in our sample with publicly available data from NIPA and the CPS. From 1957 to 2013, real GDP (shown by the dashed green line in Figure C.3a) grew by a factor of nearly five-and-a-half, while real wage and salary earnings recorded in NIPA (shown by the solid green line in Figure C.3a) grew by a factor of four – with most of the difference in growth between the two series taking place since 2000.

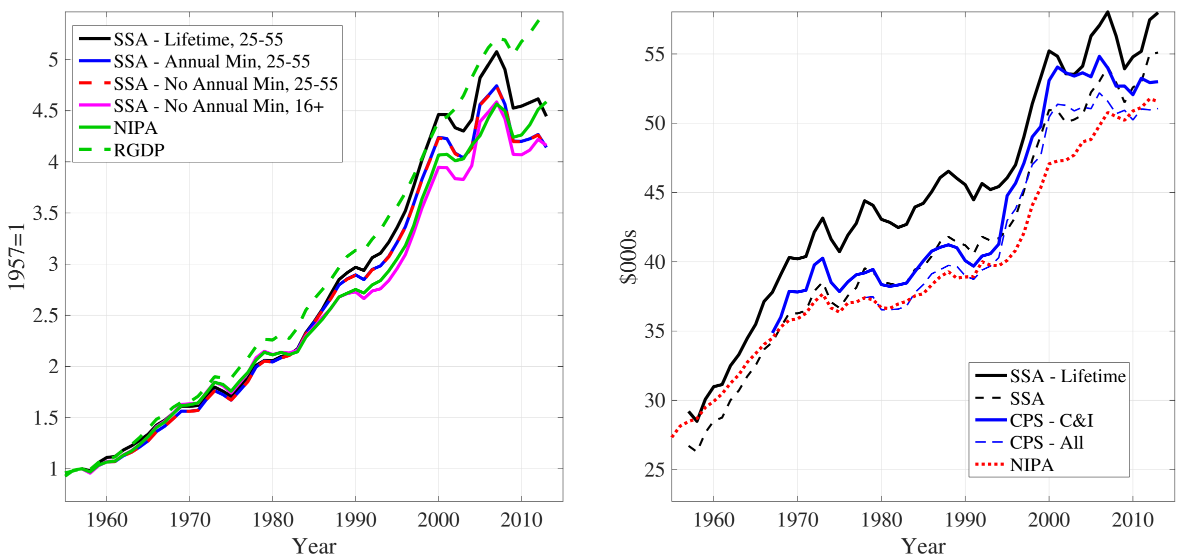
Given this large growth in aggregate earnings, one might be concerned that the stagnation in lifetime earnings that we have documented for the cohorts in the labor market during this period is a peculiarity of the measure of earnings that our lifetime statistics are based on—W2 earnings for 25 to 55 year old workers in commerce and industry sectors who satisfy minimum lifetime earnings criteria. But the black line in Figure C.3a shows that the growth in the total earnings accrued by individuals in our baseline sample is essentially the same as the growth in wage and salary earnings from NIPA. Hence the stagnation in lifetime earnings we document is not because we chose a measure of earnings, or sample of individuals, that showed little total growth over the period. To further underscore this point, the blue, red and pink lines show that when we broaden the sample to include individuals that (i) do not meet the lifetime minimum earnings requirement, (ii) do not meet the annual minimum earnings requirement, and (iii) are outside the 25-55 age range, the total earnings growth in our sample lines up even more closely with the NIPA wage and salary measure.

Figure C.3b shows how mean annual earnings in our baseline SSA sample (black solid line) compares with mean annual earnings for individuals aged 25 to 55 from other data sources and samples, over the period 1957 to 2013. First, the black dashed line shows mean annual earnings when individuals are selected based on an annual earnings criterion, rather than a lifetime criterion. Average earnings are higher with the lifetime selection criterion but the overall earnings growth over the period is essentially the same. Second, the blue solid line plots mean annual earnings for Commerce and Industry workers in the CPS (applying the same selection criteria as in the SSA data); comparing this line with the black dashed line shows the effect of measuring annual earnings in the SSA data versus the CPS. Third, the blue dashed line shows mean annual earnings in the CPS for all workers, not just those in Commerce and Industry sectors; comparing this line with the blue solid line shows the effect of focusing only on Commerce and Industry workers. Fourth, the red dashed line is mean wage and salary earnings per person aged 25 to 55 from NIPA. Overall, we see that aggregate growth in mean earnings has been, if anything, larger in our baseline SSA sample than implied by NIPA over this period.

How then can we reconcile with the growth in aggregate earnings from 1957 to 2013 with the stagnant lifetime earnings for the cohorts of individuals who were in the labor market over this same period? The key takeaway from Figure C.3 is that there is nothing particularly unusual about the time-series for our earnings measure or sample. Rather, it is the lifetime perspective that drives the different conclusion about earnings growth over this period. The growth in mean cross-sectional earnings masks large shifts in how earnings gains are split between people of different ages (and hence cohorts) and between people in different parts of the earnings distribution. Much of the increase in earnings in Figure C.3 has accrued to older workers in older cohorts.

Figure C.3: Comparison with Alternative Data Sources

(a) Aggregate Earnings Growth, Various Sources (b) Mean Earnings per Worker, Various Sources



Notes: Panel (a) displays the trend in annual aggregate earnings in the baseline SSA sample, three progressively broader samples of SSA data, the NIPA wage and salary measure, and real GDP. The aggregate earnings trend is indexed to the level in 1957 in each data sample. Panel (b) displays the trend in average earnings per worker in 5 data series: the baseline sample (SSA - lifetime), an SSA sample selected on annual earnings rather than lifetime earnings (SSA), Commerce and Industry workers in the CPS (CPS - C&I), all workers in the CPS (CPS - All), and the mean earnings per person aged 25 to 55 from NIPA (NIPA). All values are deflated using the PCE and value in Panel (b) are displayed in thousands of 2013 US dollars.

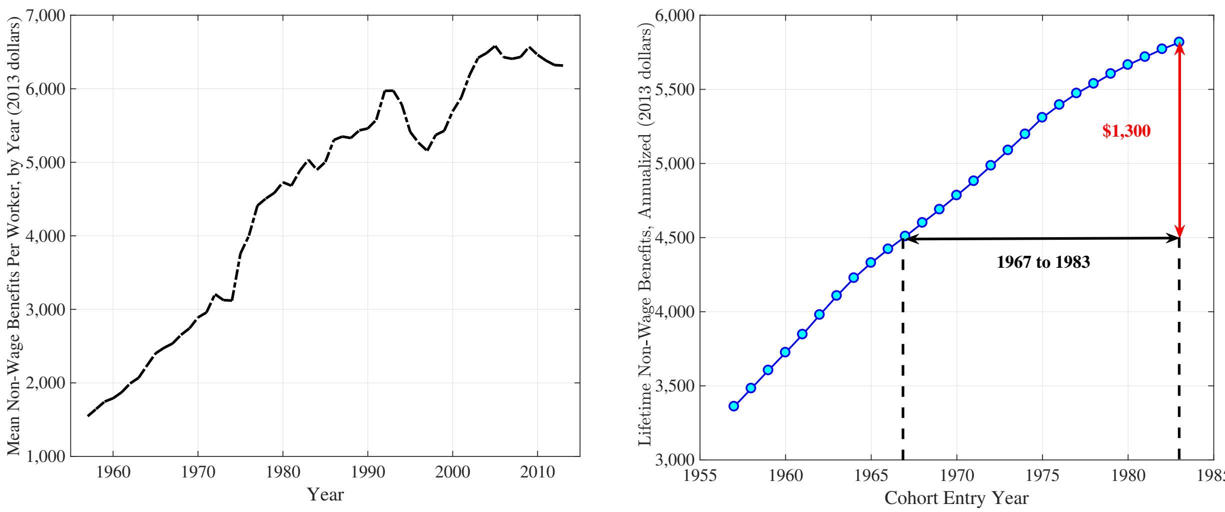
C.2 Furter Details on Calculation of Non-Wage Benefits

Figure C.4a plots "real employer contributions to employee pension funds and group health insurance for private industries" divided by the annual average number of private industry workers from the BLS Employment Situation. Non-wage compensation per worker has grown from $1,500 per worker in 1957 to about $6,300 per worker in 2013. The growth in non-wage benefits was faster from 1957 to the early 1990s, followed by a U-shape in the 1990s and a significant slowdown since the early 2000s. We compare lifetime average benefits across cohorts by computing average benefit amounts over the 31-year life cycle of each cohort. These are displayed in Figure C.4b. For example, the data point corresponding to the year 1957 is the average annual employer contributions per worker from 1957 to 1987. Lifetime benefits have risen from about $3,300 per year for the 1957 cohort to about $5,800 per year for the 1983 cohort. The increase from the 1967 to 1983 cohorts was slower, from an annualized value of about $4,500 to $5,800 per worker, for a gain of approximately $1,200. Given the increase in benefits inequality noted above, this average increase is a reasonable upper bound for the increase in benefits for the median worker.

Figure C.4: Employer-provided Benefits per Worker

(a) Real employer contributions to pension and group health insurance per worker

(b) Real lifetime value non-wage benefits, annualized, by cohort



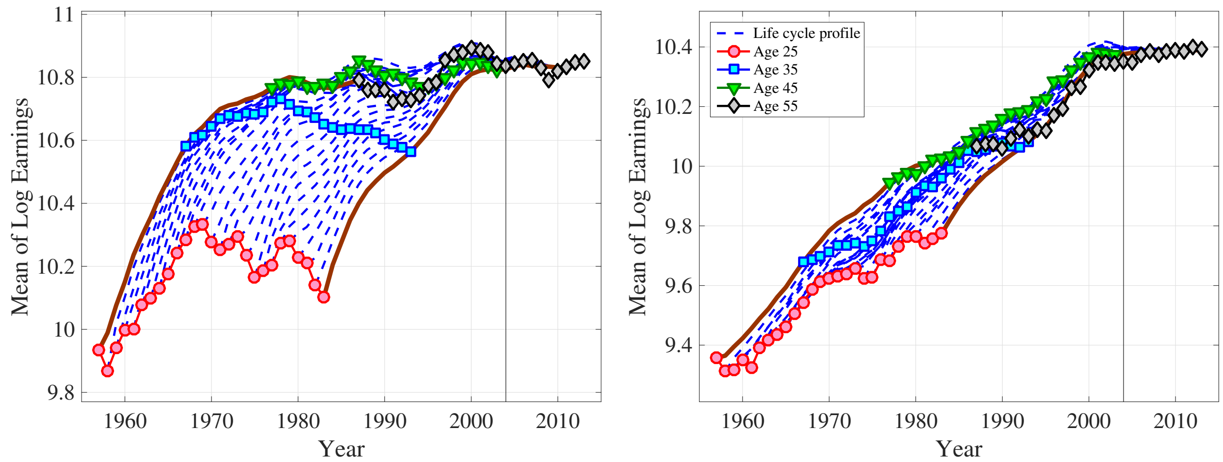
Notes: Panel (a) displays the real employer benefits (pensions and group health insurance) per worker, calculated using data from NIPA and BLS. Panel (b) displays the lifetime average of real employer benefits per worker for each cohort entering the labor market. For example, the data point corresponding to the 1957 cohort displays the average employer benefits per worker from 1957 through 1987. All values are displayed in 2013 US dollars and deflated using a weighted average of the PCE and the health care price deflator.

D Additional Tables and Figures for Section 4

D.1 Comparison with the CPS

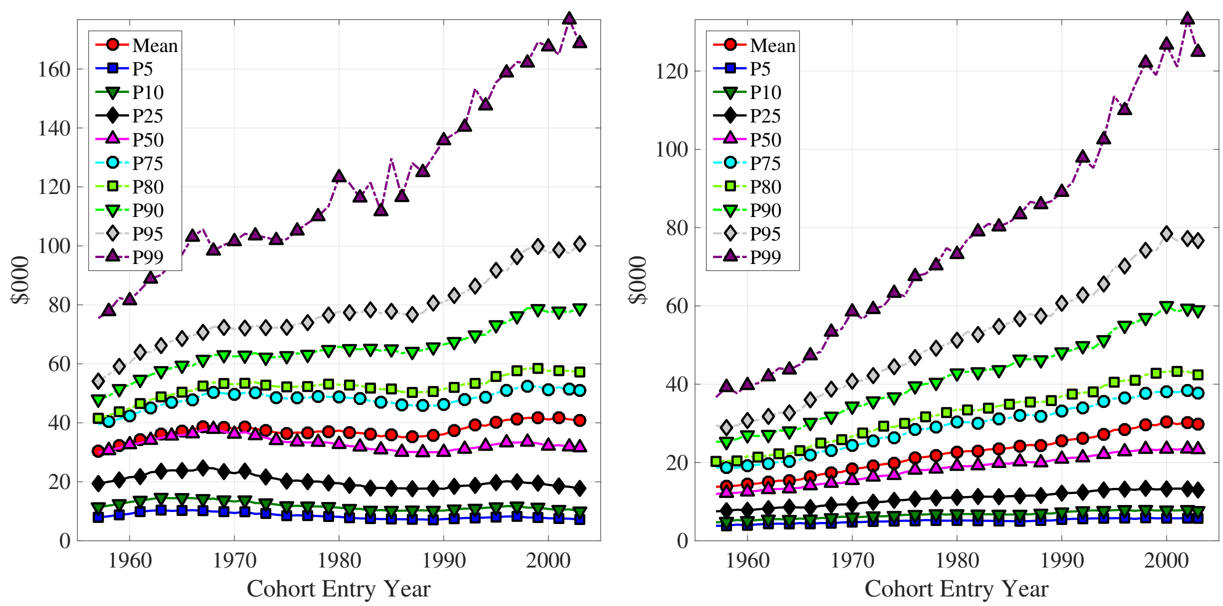
The life-cycle profiles for median earnings in Figures 5 and 7 make only limited use of the panel dimension of the SSA data. Were it not for the fact that our minimum earnings sample selection criterion is based on lifetime earnings rather than on annual earnings, it would be possible to produce analogues of these figures with only cross-sectional data. In Figure D.3, we compare the trends in median earnings at age 25 and age 45 from the CPS (red lines), with two versions of these trends from the SSA data (Figure D.4 in Appendix D shows the analogous plots for ages 35 and 55). The green lines show median earnings in the SSA data as reported in Figure 5 and Figure 7, that is, using the lifetime earnings selection criterion. The blue lines show median earnings in the SSA data but imposing the same annual minimum earnings criterion as for the CPS, that is, treating the SSA data as a cross-sectional survey.

For earnings at age 45 (dashed lines), the CPS and SSA produce very similar paths for median earnings when the SSA is treated as a cross-sectional survey like the CPS, with the caveat that in recent years, median earnings in the SSA are a little below those in the CPS, particularly for women. Both data sets yield substantially lower levels of median earnings than when individuals are selected based on lifetime earnings (green lines). The is because a nontrivial fraction of individuals



(a) Males (b) Females

Figure D.1: Age profiles of mean log earnings by cohort



(a) Males (b) Females

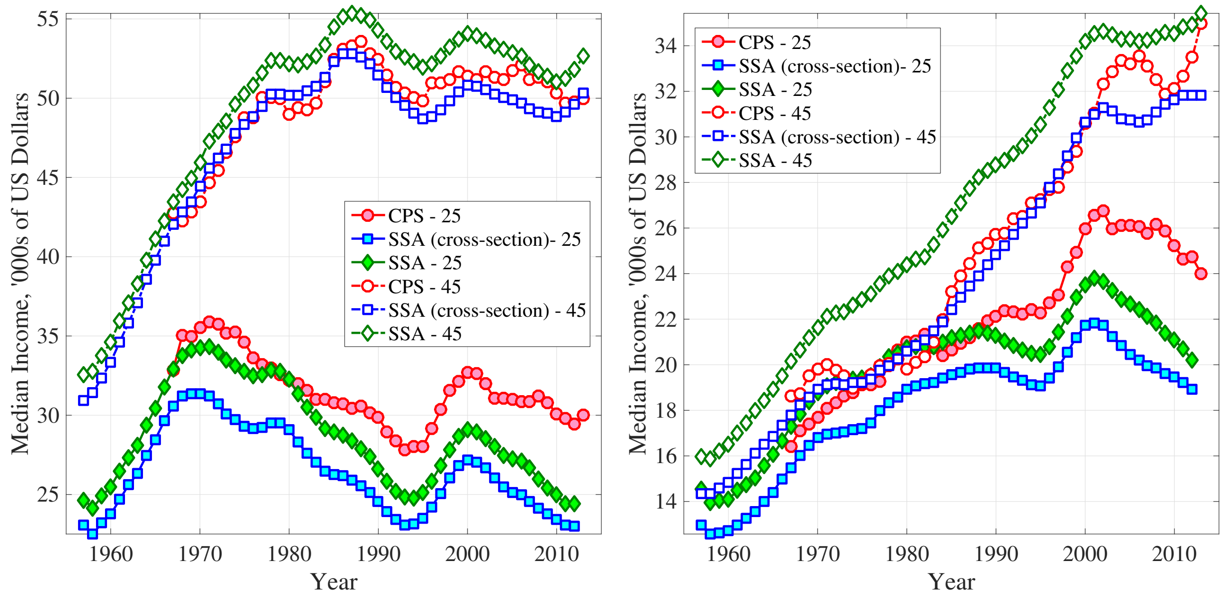
Figure D.2: Distribution of Age 25–35 Total Incomes by cohort (in Thousands of 2013 US $)

have no earnings in a single year, even though they are sufficiently attached to the labor market over their lifetime to meet our lifetime selection criteria (at least 15 years with earnings above an annual earnings threshold and total lifetime earnings above a lifetime earnings threshold). Since the cross-sectional perspective ignores these individuals, median earnings is understated relative to the lifetime perspective. As expected, this distinction is more important for women than for men.

Table D.1: Cumulative percent change in age specific median earnings, by cohort

	Male			Female			All		
	25-35	35-45	45-55	25-35	35-45	45-55	25-35	35-45	45-55
1957	71.37	23.65	3.13	28.27	24.82	15.06	63.10	14.15	3.51
1958	86.26	22.65	0.61	45.20	21.65	12.48	77.03	13.34	0.80
1959	84.35	17.13	-3.37	42.68	24.42	8.80	71.41	9.10	-0.79
1960	71.58	17.70	-2.17	32.29	22.31	13.05	61.72	9.68	-0.59
1961	75.91	13.23	-4.70	46.65	19.99	12.45	65.02	7.05	-0.99
1962	71.40	7.71	-1.99	38.30	21.95	13.66	62.99	0.23	2.34
1963	72.89	8.44	-3.66	36.14	19.02	9.82	63.27	-0.35	-1.90
1964	65.39	12.84	-6.53	28.17	28.92	10.17	52.50	6.44	-2.32
1965	56.84	16.36	-4.51	23.00	31.66	7.00	42.95	11.60	-1.44
1966	51.42	13.77	-5.03	22.84	31.61	5.46	39.50	10.06	-1.60
1967	51.82	13.22	-2.41	25.63	28.11	4.47	39.38	8.42	-1.42
1968	49.55	8.45	-0.29	23.35	24.00	12.01	37.44	5.61	3.73
1969	46.16	8.21	1.35	25.05	22.03	11.79	35.11	4.60	5.40
1970	44.90	9.31	6.03	22.94	24.50	14.95	33.87	8.61	9.64
1971	45.06	9.99	4.94	22.57	22.81	16.50	35.16	7.61	9.22
1972	39.38	13.20	3.74	22.83	22.68	16.95	31.37	10.71	10.13
1973	34.36	11.56	3.82	23.45	19.38	16.26	28.20	10.65	8.78
1974	45.19	7.70	4.70	32.27	18.09	16.37	39.85	8.15	8.62
1975	53.31	8.60	5.44	35.74	16.21	13.45	44.80	9.57	8.73
1976	47.09	9.90	5.75	35.05	17.08	12.36	42.93	10.80	8.57
1977	46.86	10.15	5.49	36.49	17.60	11.88	44.05	11.04	7.08
1978	39.75	13.31	1.79	32.22	21.01	5.76	37.37	15.63	1.69
1979	38.53	17.83	-3.69	27.66	25.84	3.95	35.10	17.86	-0.78
1980	38.32	21.42	-2.50	28.87	27.17	3.00	37.04	22.12	-1.29
1981	38.31	23.04	-1.40	28.14	31.64	-0.38	35.15	26.31	-1.17
1982	49.52	21.69	0.40	29.11	30.07	1.97	41.93	23.58	1.64
1983	46.07	25.10	1.98	28.67	28.53	0.74	39.79	26.49	0.54

For earnings at age 25 (solid lines), the distinction between the cross-sectional perspective and the lifetime perspective is also important, since this is also an age during which some individuals have very low earnings, even though they will go on to be substantially attached to the labor market over the remainder of the lifetime. Hence, the green lines are above the blue lines for both men and women. However, unlike at age 45, at age 25 there is a large difference between median earnings as measured in the CPS (red lines) compared with median earnings in the SSA when treated as a cross



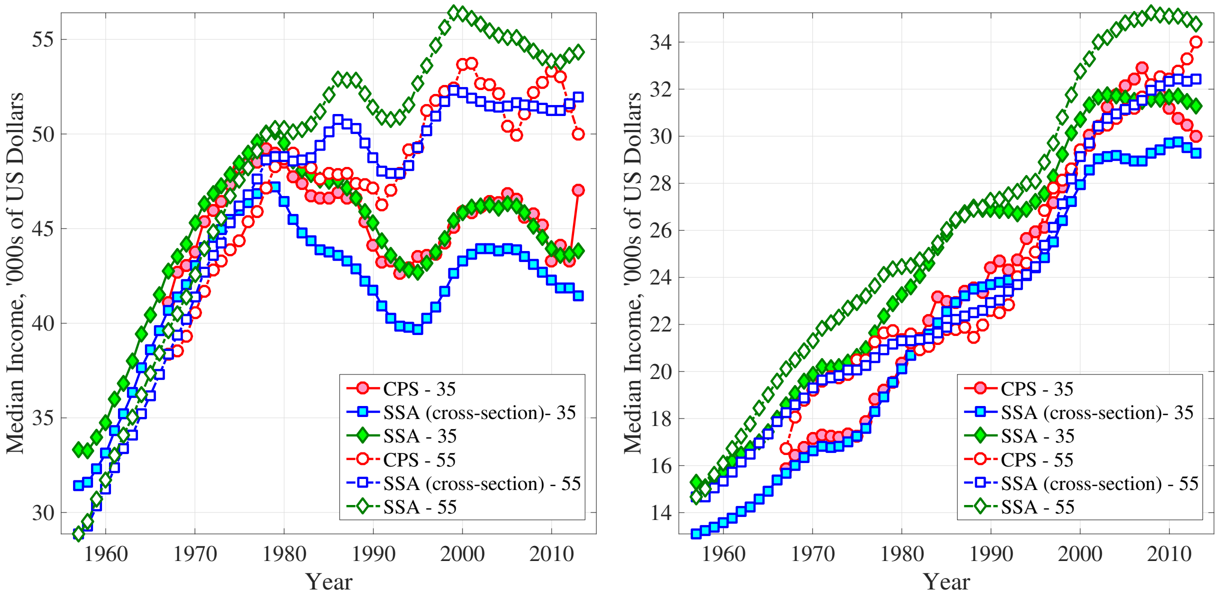
(a) Males

(b) Females

Figure D.3: Median Earnings by Age and Cohort, SSA vs CPS

section (blue line), possibly because of earnings overstatement among low-earnings households in the CPS. Despite these differences in levels, the general trends are the same in the three data sets.

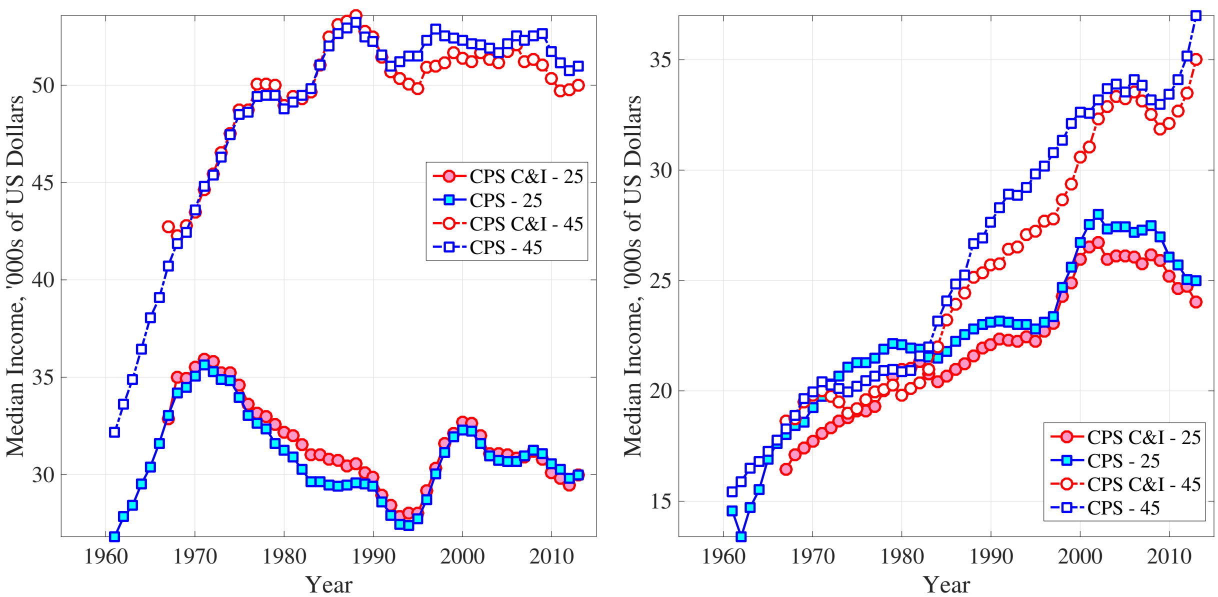
The sample for the CPS data is selected to be as similar as possible to the SSA sample, but with a minimum earnings selection criterion based on annual earnings. Our measure of earnings from the CPS is wages and salaries. We include only "commerce and industry workers" by omitting workers with industry codes corresponding to agriculture, forestry, fisheries, hospitals, education services, welfare services, nonprofits, private households, and public administration. Unlike in the SSA data, in the CPS it is possible to compute analogous statistics for workers in industries other than commerce and industry. Figure D.5 plots the analogous trends in median earnings at different ages with and without this restriction. The trends look virtually identical.



(a) Males

(b) Females

Figure D.4: Median earnings by age and cohort, SSA vs CPS, (in Thousands of 2013 US $)



(a) Males

(b) Females

Figure D.5: Median earnings by age and cohort, CPS – Commerce and Industry vs all workers (in Thousands of 2013 US $)

E Additional Tables and Figures for Section 5

E.1 Two Views of Increasing Lifetime Inequality

Why did lifetime inequality among men and among women increase across subsequent cohorts during this period? To shed light on this question, it is helpful to first examine the timing of the rise in within-cohort cross-sectional inequality over the life-cycle of a cohort. To illustrate some of the main ideas, consider the two possible scenarios shown in Figure E.1. In Figure E.1a, starting with the 1960 cohort, we plot the 90th percentile (the solid, upwardly sloping blue line) and the 10th percentile (the dashed blue line, which the smaller slope) of the age-specific earnings distribution at every age as the cohort gets older. The P90-P10 ratio at age 25 is marked with a dashed line to highlight how much earnings inequality that cohort had when those workers entered the labor market.

The first scenario (illustrated in E.1a) considers one possibility: each subsequent cohort enter the labor market with a higher initial inequality—shown with the larger P90-P10 ratio at age 25—but newer cohorts display the same rise in inequality over the life cycle as older cohorts, indicated by the fact that the P90 and P10 lines are parallel for every cohort. In this scenario, newer cohorts have higher lifetime inequality because they had higher inequality at all ages, starting at age 25. The second scenario (illustrated in E.1b) is that newer cohorts enter with the same initial inequality as older cohorts but display a faster rise in inequality with age, which in turn leads to higher level lifetime inequality.

These two scenarios can be examined through the lens of a simple stochastic process that underlies a lot of empirical work on earnings dynamics. Let the log earnings of individual i at age h, in year-of-birth cohort c be given by [38]

$$\begin{aligned} y_h^{i,c} &= \alpha^{i,c} + z_h^{i,c} \\ z_h^{i,c} &= z_{h-1}^{i,c} + \eta_h^{i,c}, \end{aligned}$$

where $\alpha^{i,c} \sim F(0, \sigma^2_{\alpha,c})$ is the individual-specific fixed effect, z_h is a random walk process with mean zero innovations $\eta^{i,c} \sim F(0, \sigma^2_{\eta,c})$, and $z_0^i \equiv 0$. Notice that the two variances are allowed to vary across cohorts but not with time (or age). Now define the lifetime average of log annual earnings[39] as

$$\overline{y}^{i,c} \equiv \frac{1}{31} \times \sum_{h=1}^{31} y_h^{i,c} = \alpha^{i,c} + \frac{1}{31} \times \sum_{h=1}^{31} \sum_{s=1}^{h} \eta_s^{i,c}.$$

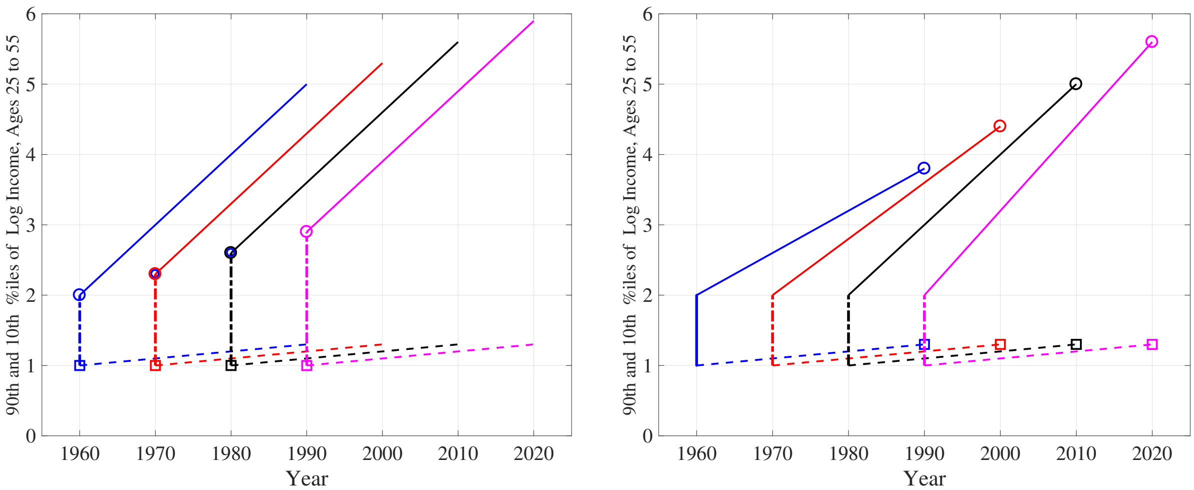
[38] Year-of-birth cohort $c \equiv (t - 1957) - (h - 24)$. So the cohort that turned age 25 in year 1957 has $c = 1$ and each subsequent cohort is indexed sequentially. This process can be generalized by adding a purely transitory component or allowing for shocks that are less than permanent.

[39] This measure of lifetime earnings is related to the lifetime earnings measure we analyze in this paper but differs from it by a Jensen's inequality term. This measure is analytically more convenient for the purposes of this discussion.

Figure E.1: Two Basic Ways Inequality Can Change from Cohort to Cohort

(a) New cohorts may be be entering with higher initial (age 25) earnings dispersion

(b) Newer cohorts may be experiencing faster rise in earnings dispersion with age



With this earnings process, the variance of the lifetime average of log earnings is given by

$$\operatorname{var}(\overline{y}^{i,c}) = \operatorname{var}(\alpha^{i,c}) + \frac{1}{31^2} \times \sum_{h=1}^{31} \sum_{s=1}^{h} \operatorname{var}\left(\eta_s^{i,c}\right) = \sigma^2_{\alpha,c} + \frac{16 \times 21}{31} \times \sigma^2_{\eta,c}. \tag{1}$$

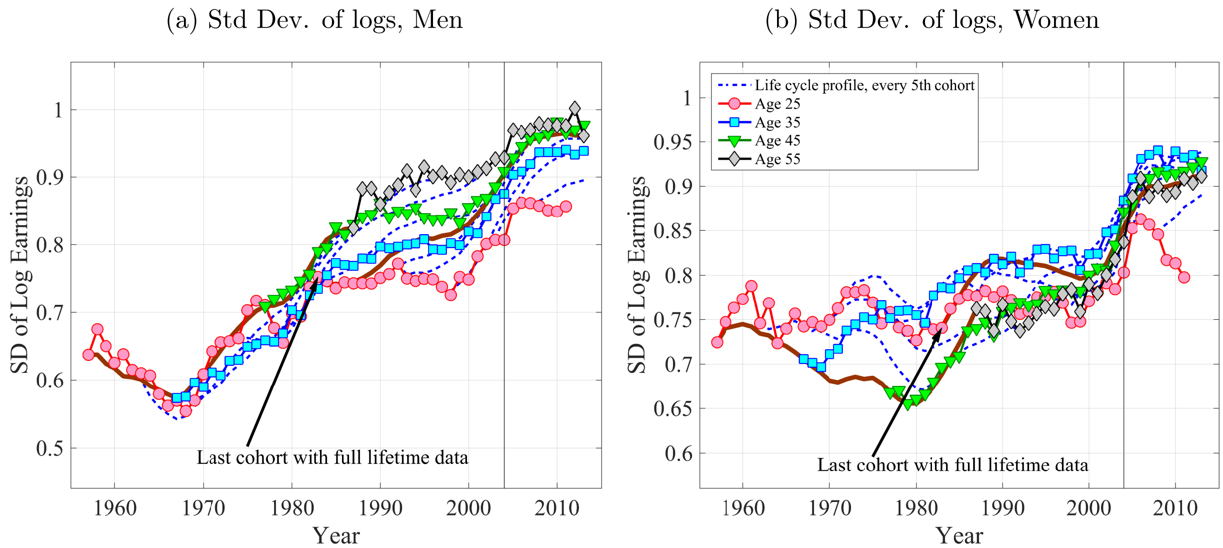
This expression shows that in this simple framework, lifetime earnings inequality of a cohort is determined by the two components discussed in the scenarios of Figure E.1: (i) initial inequality (at age 25) of the cohort, $\sigma^2_{\alpha,c}$, and (ii) the variance of earnings shocks, $\sigma^2_{\eta,c}$, which determines the rate at which inequality rises over the life-cycle of the cohort.

But how do we determine which one of these two components changed more from one cohort to the next and therefore contributed more to the rise in lifetime inequality in subsequent cohorts? To answer this question, notice that the same two variances in equation (1) also determine the *cross-sectional* variance of log earnings at different ages for a given cohort:

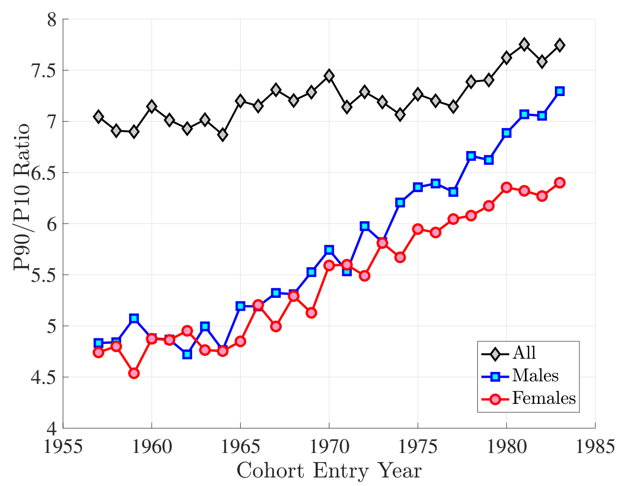
$$\operatorname{var}(y_h^{i,c}) = \operatorname{var}(\alpha^{i,c}) + \sum_{s=1}^{h} \operatorname{var}(\eta_s^{i,c}) = \sigma^2_{\alpha,c} + h \times \sigma^2_{\eta,c}. \tag{2}$$

This relationship suggests that we can learn about the contribution of each component to rising lifetime inequality by analyzing the evolution of cross-sectional inequality *over the life cycle* of each of the 27 cohorts.

Figure E.2: Age Profiles of SD of Log Earnings, by Cohort



Notes: Each observation represents the earnings inequality within men or women of a particular age in a particular year in the baseline sample (see section 2.3). For example, the 1957 cohort is represented by an Age 25 observation in 1957, an Age 35 observation in 1967, an Age 45 observation in 1977, and an Age 55 observation in 1987. The dotted lines (solid for the first and last cohort with full life cycle profiles) connect all available age-year observations for every fifth cohort. Panel (a) displays the standard deviation of log-earnings for men within each age-year group. Panel (b) displays the same for women. Earnings is deflated using the PCE.

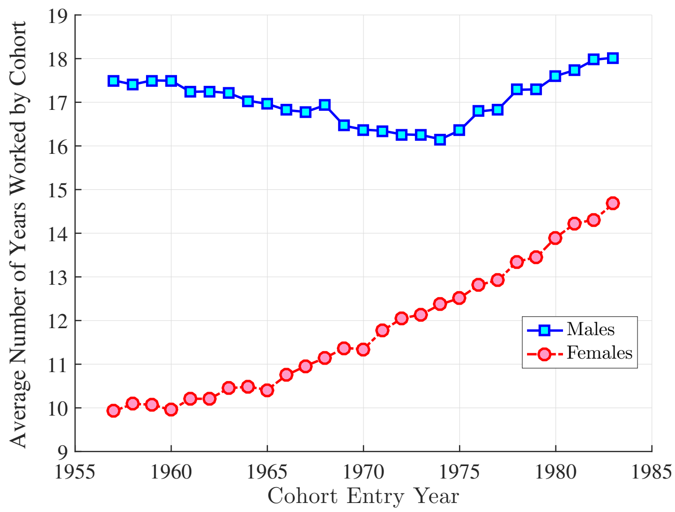


(a) P90/P10

Figure E.3: Cohort Lifetime Inequality (P90/P10), Overall and by Gender

Note: This figure displays P90/P10 of lifetime earnings distribution to complement Figure 8 in Section 5.

Figure E.4: Average Lifetime Years Worked by Cohort, *Sample 0*



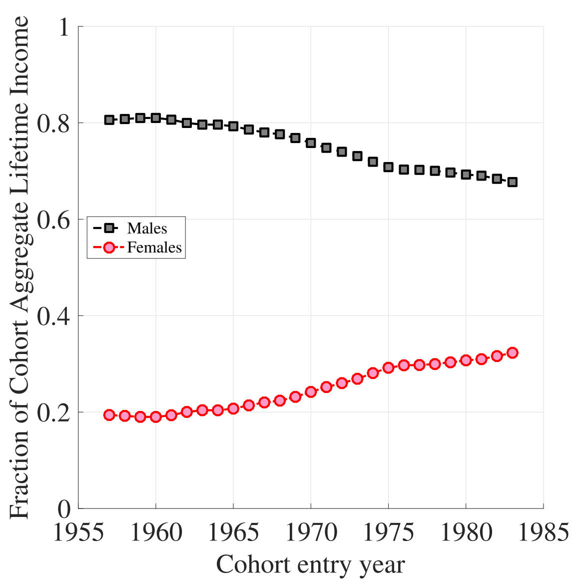


Figure E.5: Share of Cohort Aggregate Earnings Going to Each Gender Group, no earnings or years worked selection

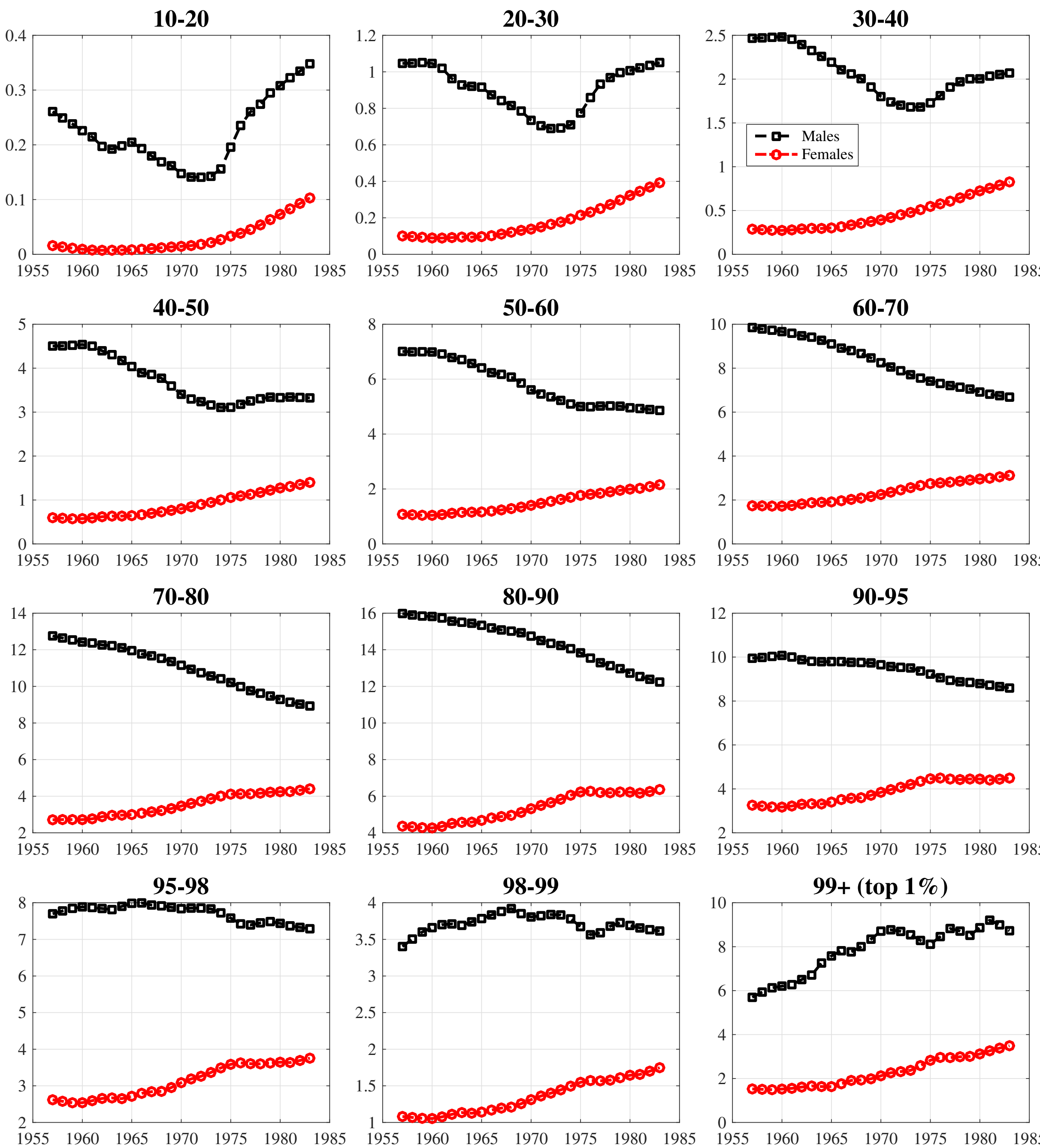


Figure E.6: Share of Cohort Lifetime Earnings Going to Each Gender / Percentile Groups (indicated by the lower and upper end of percentile thresholds), no earnings or years worked selection

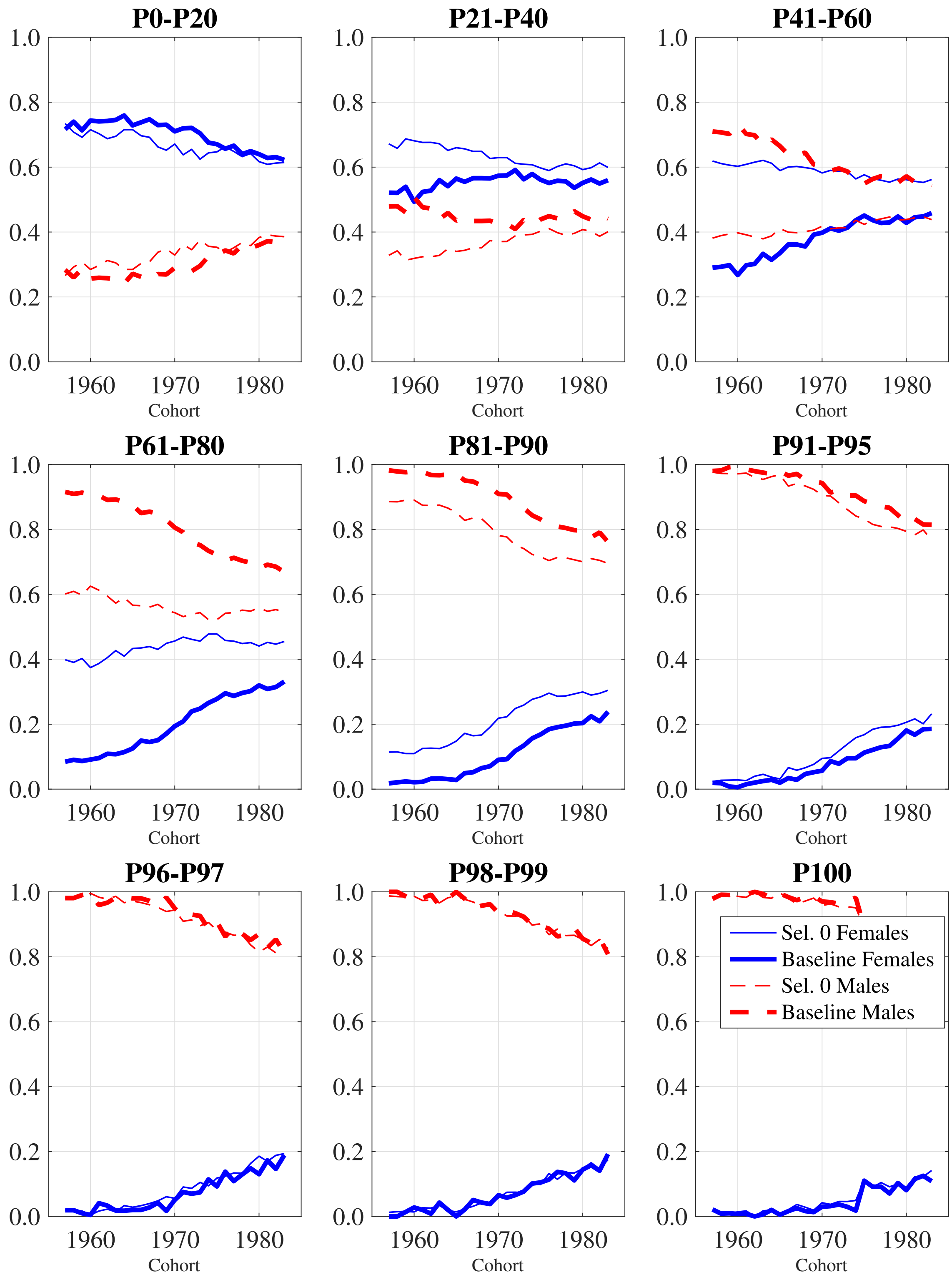


Figure E.7: Fraction of percentile's total lifetime earnings accruing to each gender in that percentile group, 1pc sample

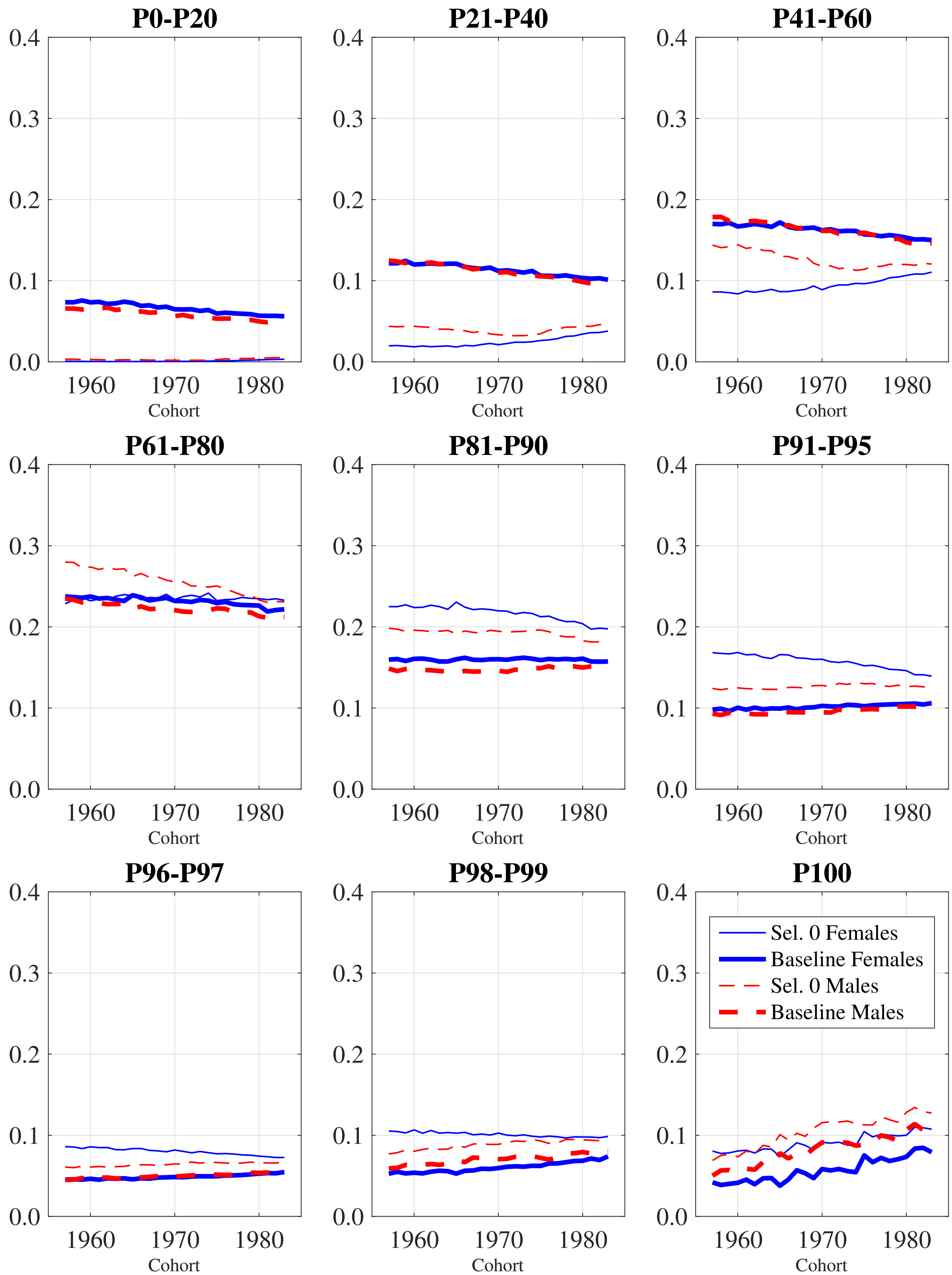


Figure E.8: Fraction of gender's total lifetime earnings accruing to each gender-specific percentile group, 1pc sample

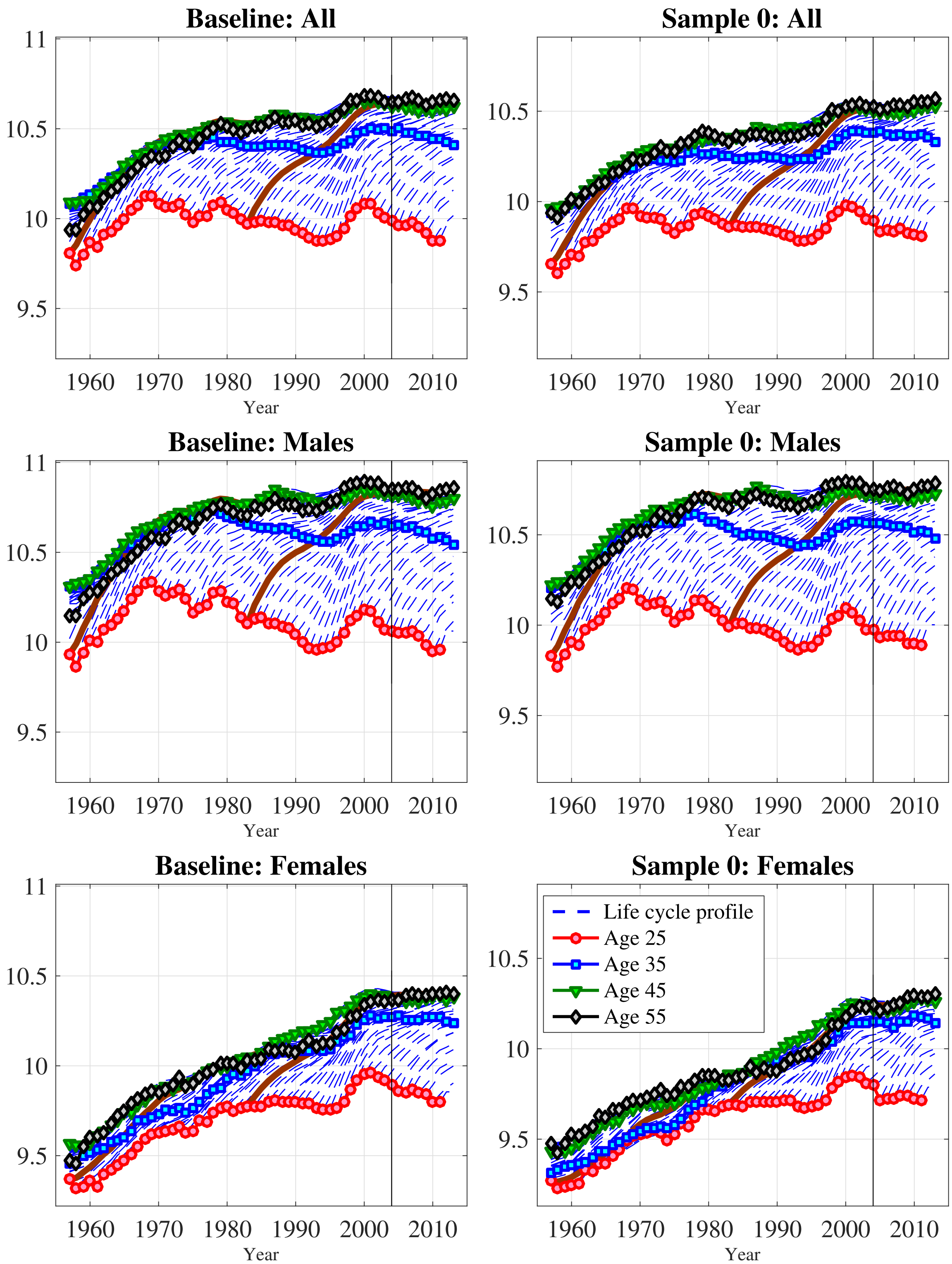


Figure E.9: Mean log earnings, 1pc sample

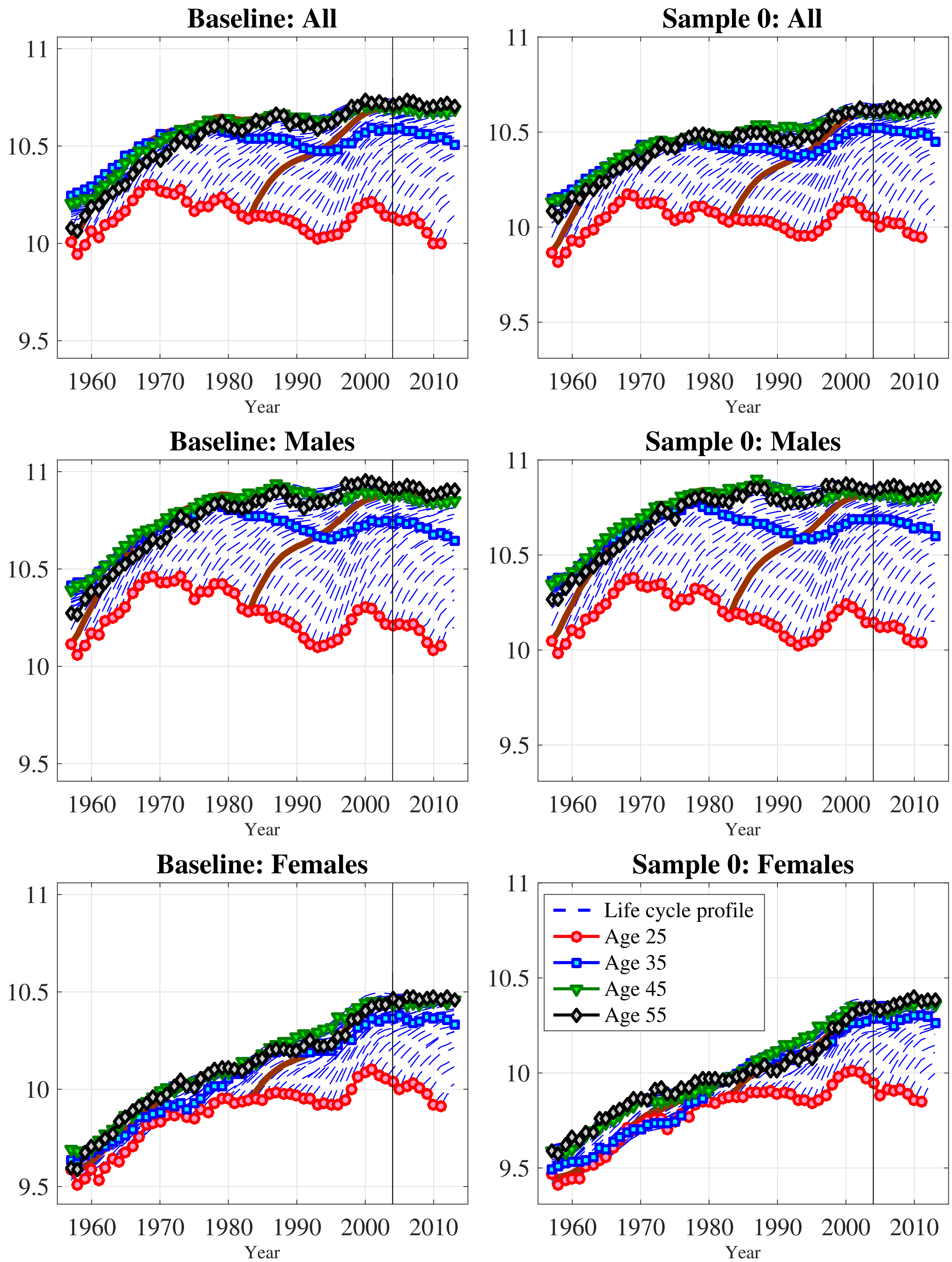


Figure E.10: P50 log earnings, 1pc sample

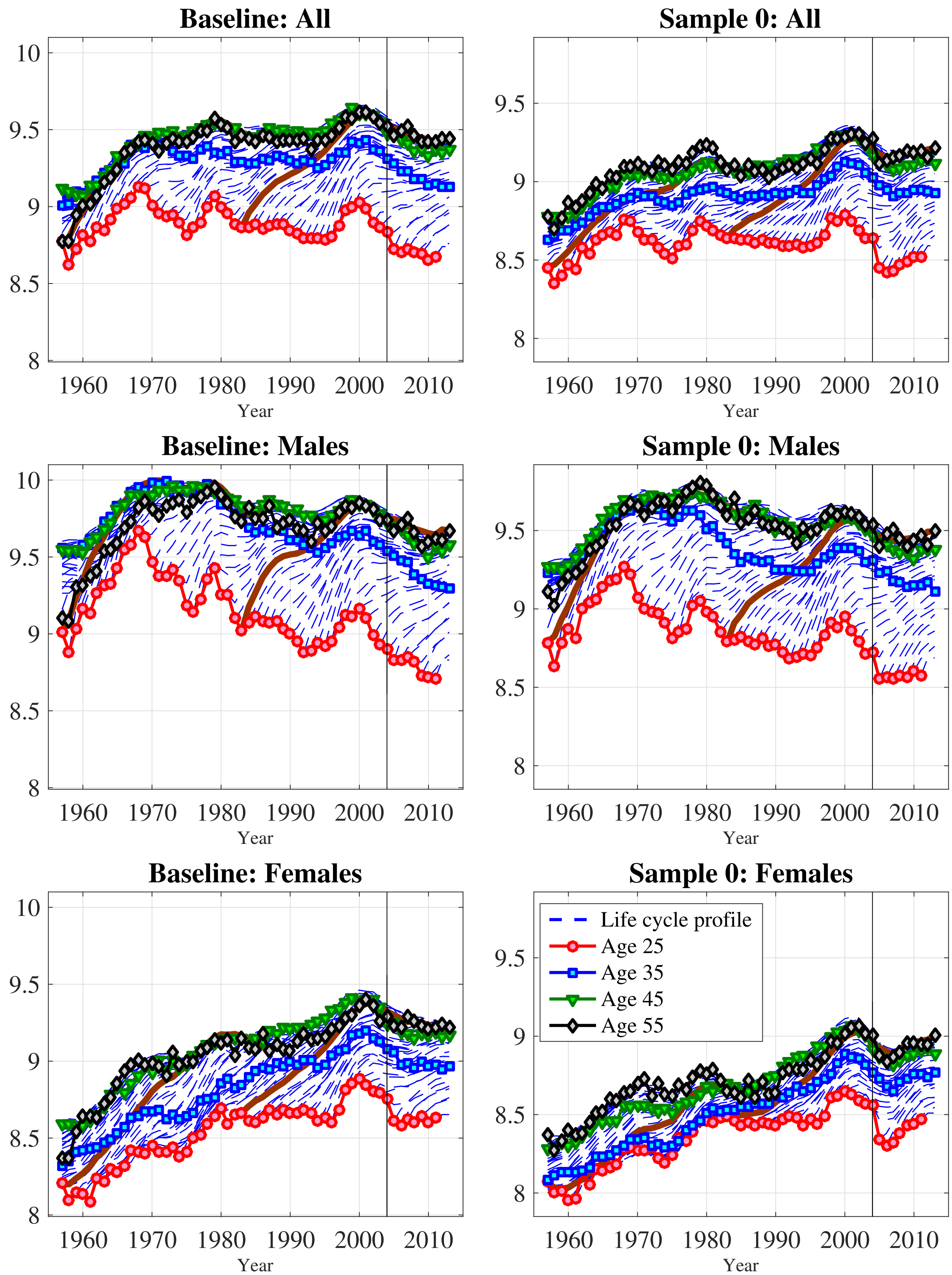


Figure E.11: P10 log earnings, 1pc sample

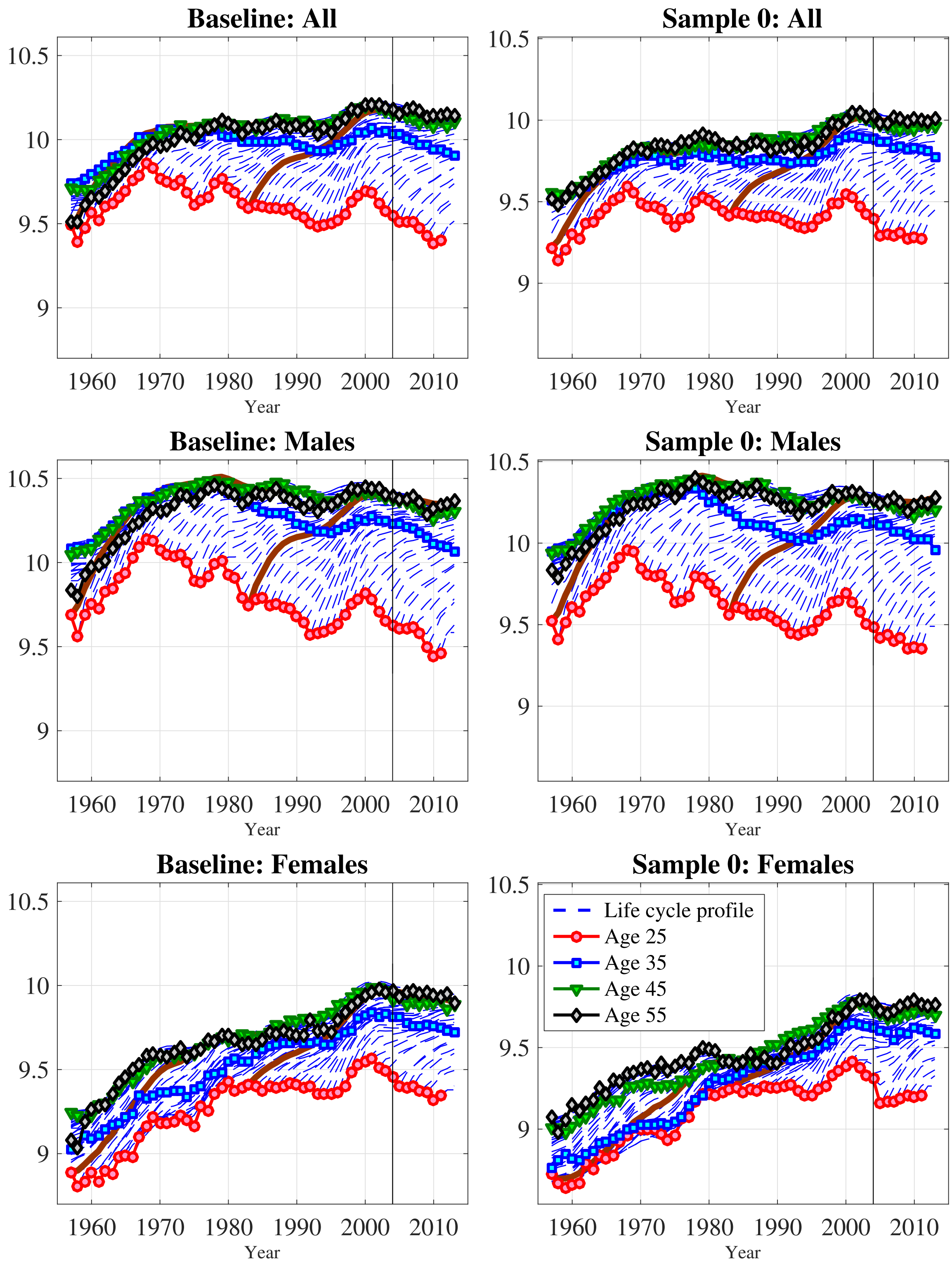


Figure E.12: P25 log earnings, 1pc sample

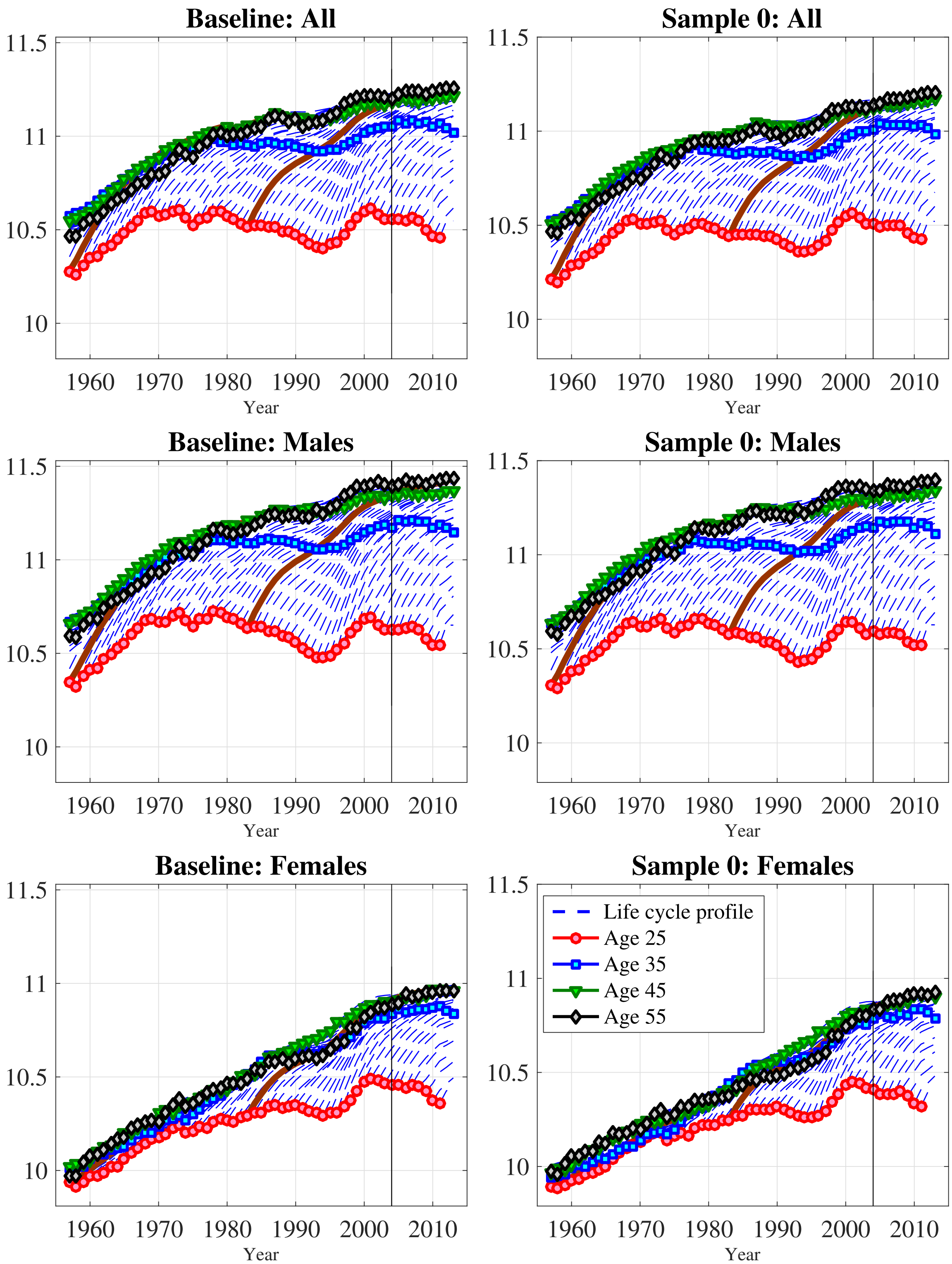


Figure E.13: P75 log earnings, 1pc sample

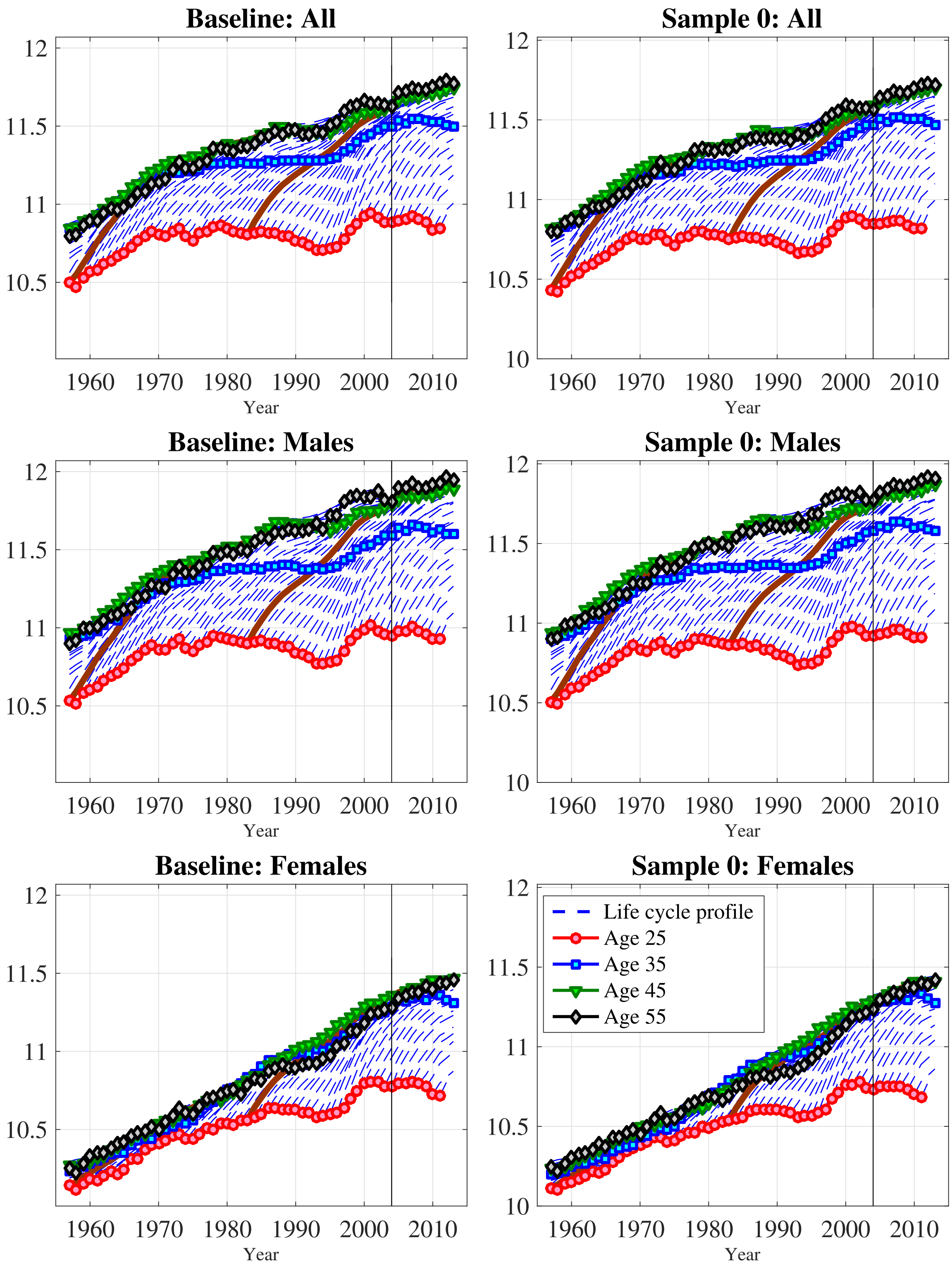


Figure E.14: P90 log earnings, 1pc sample

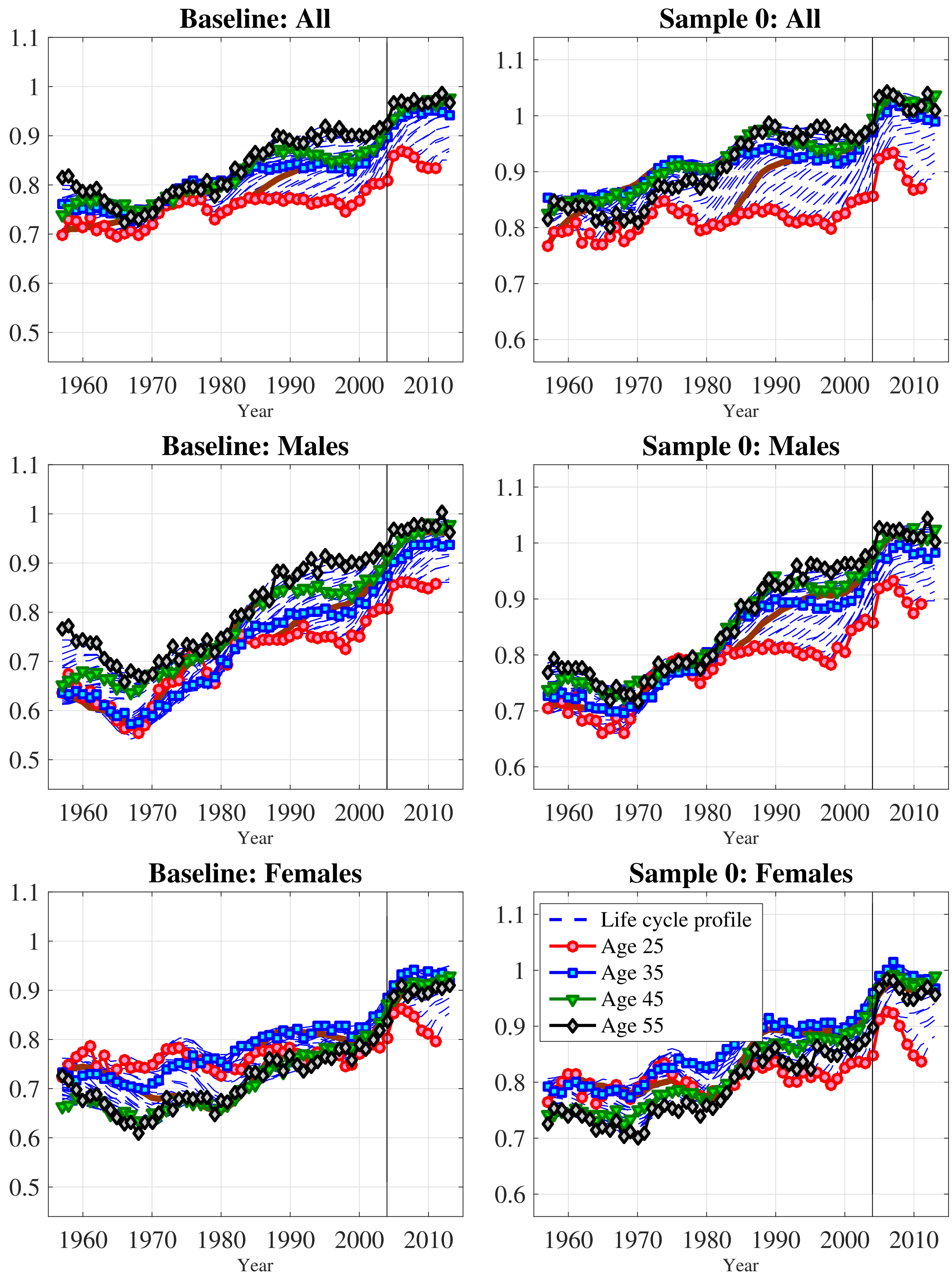


Figure E.15: SD log earnings, 1pc sample

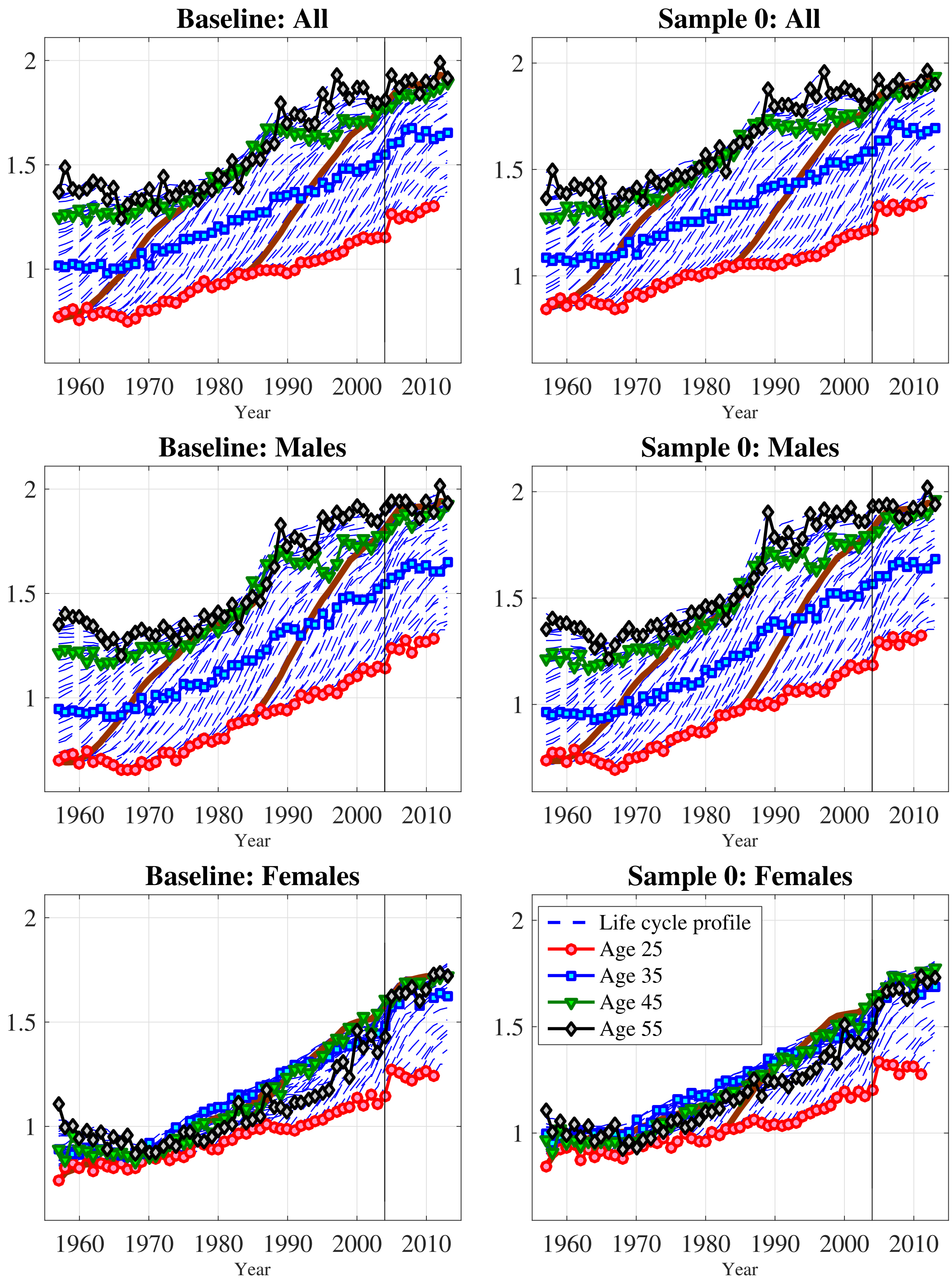


Figure E.16: P98–P50 log earnings, 1pc sample

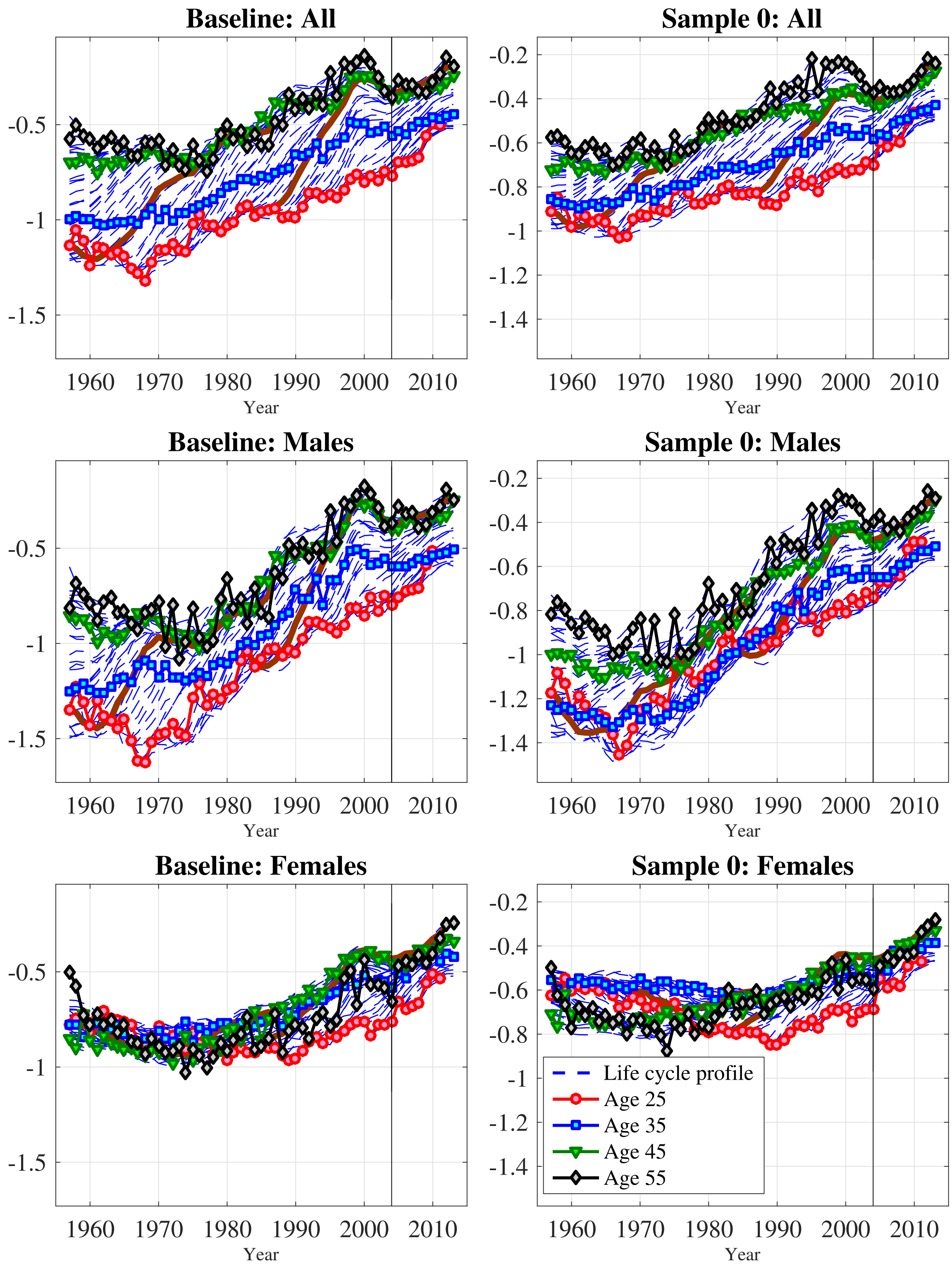


Figure E.17: Skew of log earnings, 1pc sample

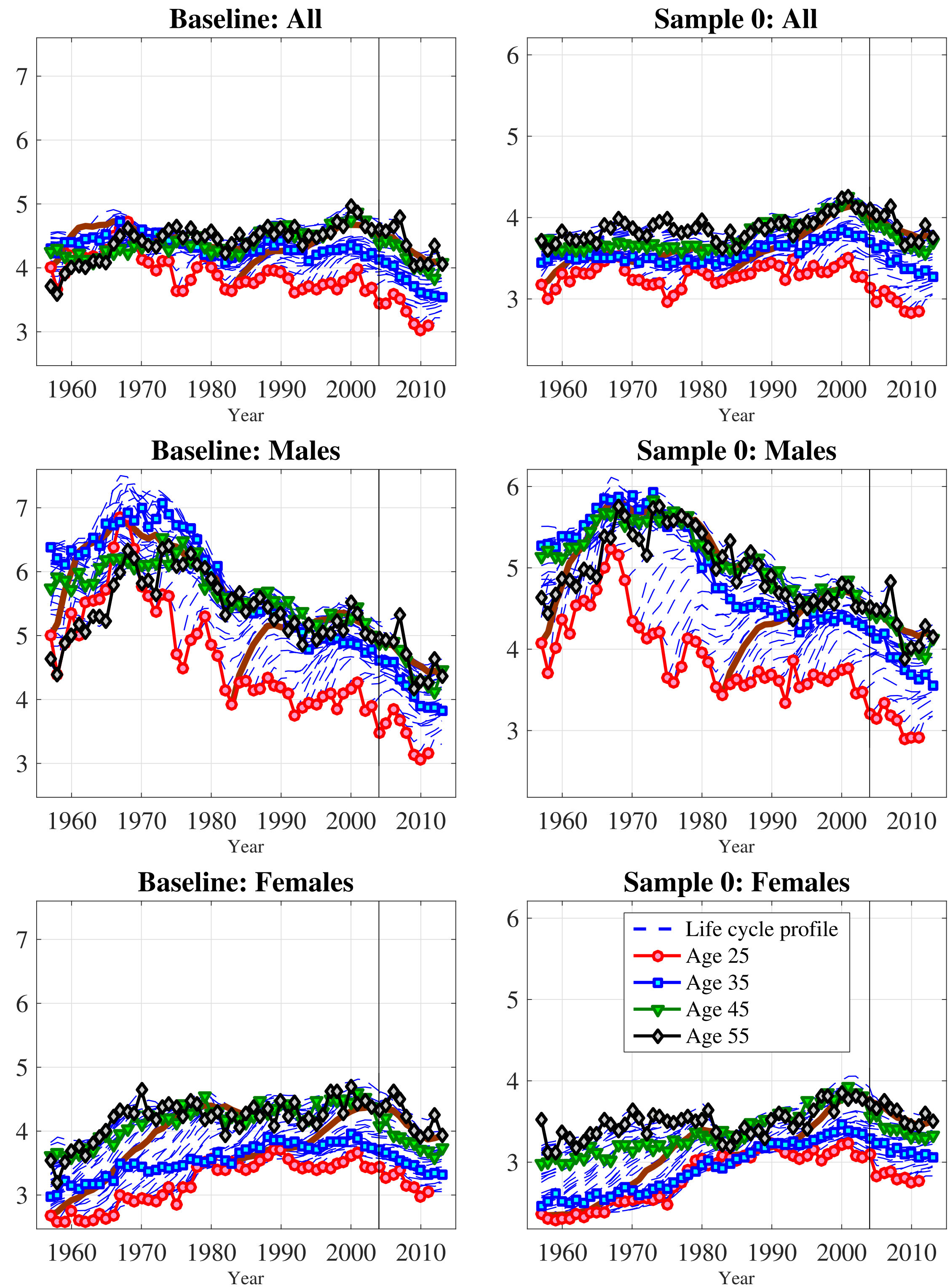


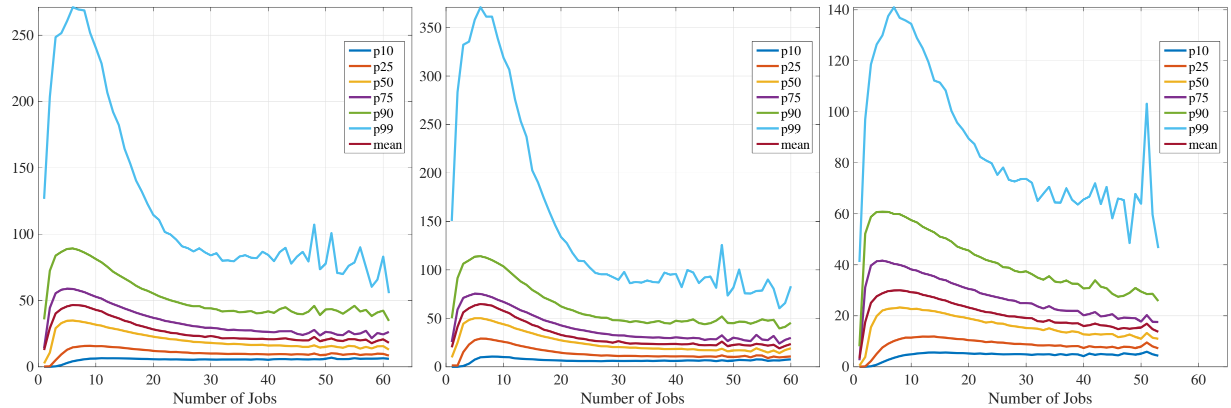
Figure E.18: Kurtosis of log earnings, 1pc sample

Table E.1: Fraction of cohort's total lifetime earnings accruing to each percentile, 1pc sample, selection 0

Selection	Cohort	p0p20	p21p40	p41p60	p61p80	p81p90	p91p95	p96p97	p98p99	rest
0	1957	0.1	2.0	8.2	23.6	23.3	16.0	7.8	9.9	9.0
0	1958	0.1	2.1	8.4	23.5	23.2	15.8	7.6	9.8	9.5
0	1959	0.1	2.0	8.4	23.4	22.7	15.7	7.8	10.1	9.8
0	1960	0.1	2.0	8.3	23.7	22.8	15.8	7.8	10.0	9.5
0	1961	0.1	2.0	8.5	23.4	22.5	15.7	7.7	10.1	10.1
0	1962	0.1	2.0	8.4	23.6	22.7	15.6	7.7	10.0	9.9
0	1963	0.1	2.0	8.4	23.1	22.5	15.6	7.7	10.0	10.6
0	1964	0.1	2.1	8.6	23.2	22.5	15.6	7.6	9.9	10.5
0	1965	0.1	2.0	8.2	22.6	21.9	15.3	7.6	10.3	11.9
0	1966	0.1	2.1	8.4	22.9	22.1	15.4	7.7	10.2	11.1
0	1967	0.1	2.0	8.4	22.6	21.7	15.3	7.7	10.3	12.1
0	1968	0.1	2.1	8.6	23.1	21.6	15.1	7.6	10.1	11.6
0	1969	0.1	2.2	8.7	22.7	21.4	15.2	7.6	10.0	12.1
0	1970	0.1	2.1	8.5	22.4	21.4	15.1	7.6	10.2	12.6
0	1971	0.1	2.2	8.7	22.7	21.2	14.9	7.5	10.1	12.7
0	1972	0.1	2.3	8.9	22.5	20.8	14.8	7.6	10.3	12.6
0	1973	0.1	2.4	8.9	22.8	20.9	14.8	7.5	10.1	12.5
0	1974	0.1	2.5	9.2	22.8	20.8	14.8	7.6	10.2	12.1
0	1975	0.2	2.7	9.2	22.7	20.8	14.7	7.4	10.1	12.3
0	1976	0.2	2.9	9.7	23.0	20.5	14.6	7.4	9.9	11.9
0	1977	0.2	3.0	9.8	22.7	20.2	14.3	7.3	9.9	12.7
0	1978	0.2	3.2	10.1	22.7	19.8	14.1	7.2	10.0	12.6
0	1979	0.3	3.3	10.2	22.7	19.8	14.1	7.3	10.1	12.2
0	1980	0.3	3.5	10.3	22.5	19.3	13.8	7.2	9.9	13.1
0	1981	0.3	3.6	10.4	22.2	19.0	13.7	7.2	9.9	13.6
0	1982	0.3	3.6	10.6	22.3	19.0	13.7	7.2	9.9	13.3
0	1983	0.4	3.8	10.7	22.4	18.9	13.6	7.2	10.1	12.9

Table E.2: Fraction of cohort's total lifetime earnings accruing to each percentile, 1pc sample, selection 3

Selection	Cohort	p0p20	p21p40	p41p60	p61p80	p81p90	p91p95	p96p97	p98p99	rest
3	1957	5.2	10.2	16.3	24.6	16.4	10.2	5.0	6.4	5.7
3	1958	5.1	10.1	16.2	24.6	16.2	10.1	4.9	6.5	6.2
3	1959	5.2	10.0	15.9	24.0	16.2	10.3	5.1	6.8	6.3
3	1960	5.1	10.1	16.3	24.1	16.3	10.3	5.0	6.7	6.0
3	1961	5.2	10.0	15.9	23.9	16.2	10.3	5.1	6.9	6.5
3	1962	5.2	10.1	16.0	24.0	16.1	10.2	5.0	6.9	6.4
3	1963	5.1	9.8	15.7	23.9	16.2	10.2	5.1	6.9	7.2
3	1964	5.2	9.9	15.7	24.0	16.2	10.1	5.1	6.9	7.1
3	1965	4.9	9.6	15.3	23.1	15.9	10.2	5.2	7.2	8.4
3	1966	5.0	9.8	15.5	23.5	16.0	10.3	5.2	7.0	7.7
3	1967	4.9	9.5	15.1	23.1	15.9	10.3	5.2	7.5	8.4
3	1968	4.9	9.7	15.3	23.1	15.9	10.2	5.2	7.5	8.1
3	1969	4.9	9.6	15.1	22.9	16.0	10.3	5.1	7.3	8.8
3	1970	4.9	9.5	15.0	22.8	15.8	10.3	5.2	7.2	9.4
3	1971	5.0	9.6	15.0	22.7	15.7	10.2	5.2	7.3	9.4
3	1972	4.9	9.5	14.8	22.4	15.8	10.5	5.4	7.5	9.3
3	1973	4.9	9.6	15.0	22.5	15.8	10.2	5.2	7.3	9.3
3	1974	5.1	9.6	14.9	22.5	15.9	10.4	5.3	7.5	8.8
3	1975	4.9	9.5	15.0	22.6	15.8	10.3	5.3	7.4	9.1
3	1976	5.0	9.6	15.0	22.4	15.9	10.4	5.3	7.2	9.0
3	1977	5.0	9.5	14.8	22.2	15.7	10.3	5.3	7.4	9.8
3	1978	4.9	9.4	14.6	22.0	15.8	10.4	5.4	7.8	9.6
3	1979	4.9	9.4	14.6	22.0	15.8	10.6	5.5	7.8	9.4
3	1980	4.7	9.3	14.4	21.6	15.6	10.6	5.5	7.8	10.5
3	1981	4.7	9.1	14.1	21.3	15.6	10.7	5.5	7.8	11.1
3	1982	4.8	9.2	14.1	21.5	15.7	10.7	5.5	7.9	10.7
3	1983	4.8	9.1	14.2	21.5	15.7	10.8	5.7	8.0	10.3

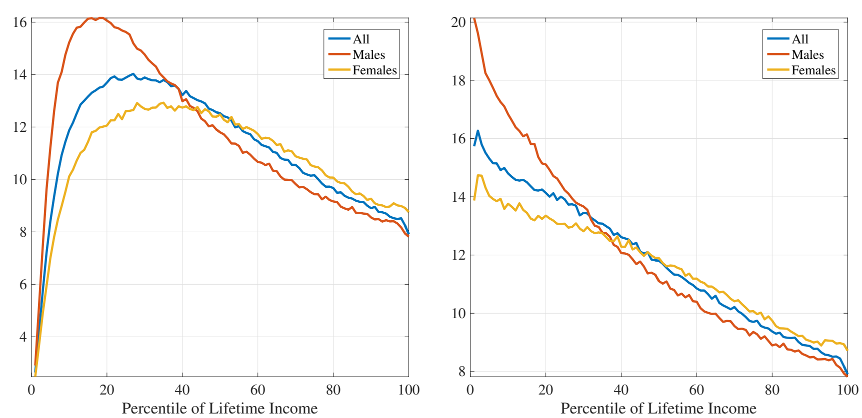


(a) All (b) Males (c) Females

Figure F.1: Distribution of lifetime earnings by number of unique jobs, broad sample

F Additional Figures on Lifetime Incomes Today

This appendix reports additional statistics on the distribution of lifetime earnings and its relationship with the number of jobs workers have, the state they live in, and the overall level of inequality for a sample that has a broader selection criteria (is more inclusive) than the baseline sample used in the main text. The data source is a 10% extract of the MEF from 1978 to 2013, which includes earnings data that is non-topcoded and covers all individuals regardless of the sector of the job they hold. Statistics are reported for this "broad sample" which includes all US-born individuals without a minimum threshold for lifetime earnings level, as well as for a "narrow sample," which coincides with the baseline sample in the main text.



(a) Broad sample (b) Narrow sample

Figure F.2: Average number of unique EINs by lifetime earnings percentile

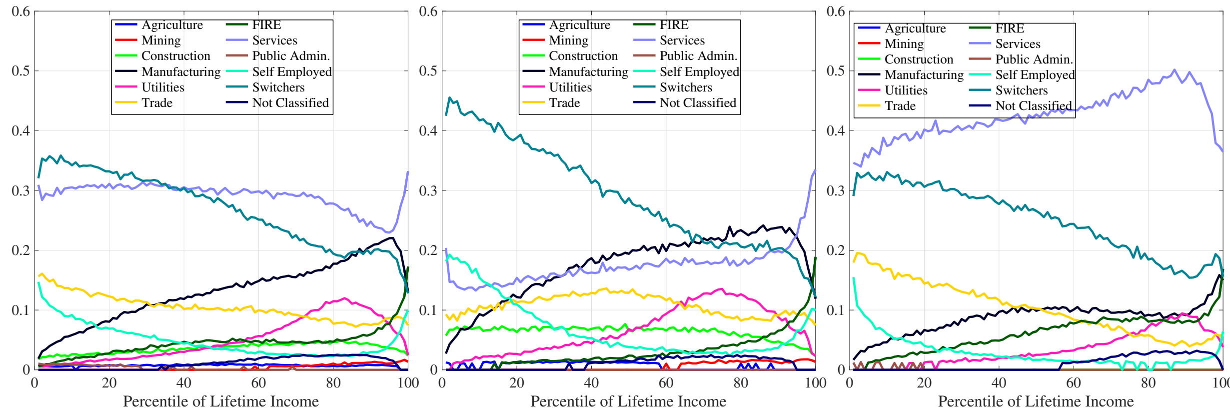
Table F.1: Lifetime Earnings Inequality: Broad Sample

	Mean ($'000)	Inequality					Mean yrs
		Sd Log	IQR	90-10	90-50	50-10	> $1,560
Lifetime Earnings							
All	39.08	1.39	3.97	19.09	2.71	7.05	24.2
Males	51.40	1.32	3.22	14.88	2.45	6.06	25.7
Females	26.99	1.38	4.01	19.28	2.70	7.15	22.8
							Fraction present
Annual Earnings							
All	36.99	1.25	14.49		3.03		78.0
Males	48.50	1.18	6.92		2.67		82.8
Females	25.14	1.26	28.40		3.28		72.9
Annual Earnings (CPS)							
All	35.99	1.14	7.25		2.71		
Males	48.23	1.00	3.13		2.37		
Females	24.12	1.19	88.39		3.13		

Table F.2: Lifetime Earnings Distribution: Broad Sample

	Percentiles						
	p10	p25	p50	p75	p90	p95	p99
Broad Sample							
All	4.38	13.51	30.44	53.34	81.97	108.95	229.35
Males	7.01	21.00	41.66	67.01	101.44	138.28	306.61
Females	3.14	9.85	22.07	39.32	59.40	74.90	128.14
Annual Earnings							
All	0.00	4.11	25.74	49.38	78.16	104.51	224.35
Males	0.00	10.74	35.54	61.33	94.20	129.63	295.84
Females	0.00	1.44	17.83	36.74	57.31	74.02	134.25
Annual Earnings (CPS)							
All	0.00	7.95	28.12	49.80	76.39	98.97	196.26
Males	1.83	20.28	39.36	62.40	93.04	121.71	290.09
Females	0.00	1.03	18.14	36.19	55.31	70.06	114.97

Notes: Statistics for US-born individuals only. Lifetime statistics refer to 31 years of earnings between ages 25 and 55 for the cohorts turning 25 in 1978 to 1983. Annual statistics are averages of annual statistics based on annual cross-sections from 1978 to 2013. For annual statistics, no additional restrictions are imposed. For lifetime statistics, data is restricted to individuals who survive until age 55.



(a) All (b) Males (c) Females

Figure F.3: Fraction of each percentile of lifetime earnings in each industry, narrow sample

Table F.3: Lifetime Earnings Inequality: Narrow Sample

	Mean ($'000)	Inequality Sd Log	IQR	90-10	90-50	50-10
Lifetime Earnings						
All	45.26	0.80	2.84	7.42	2.43	3.05
Males	57.40	0.78	2.53	6.75	2.32	2.91
Females	32.28	0.74	2.73	6.52	2.33	2.80
Annual Earnings						
All	47.38	0.95	3.04	10.36	2.47	4.20
Males	58.69	0.93	2.75	9.20	2.36	3.88
Females	34.16	0.90	3.04	9.72	2.33	4.17
Annual Earnings (CPS)						
All	44.61	0.86	2.75	8.04	2.35	3.44
Males	54.09	0.79	2.48	6.43	2.23	2.88
Females	33.17	0.84	2.79	8.12	2.23	3.66

Notes: Statistics for US-born individuals only. Lifetime statistics refer to 31 years of earnings between ages 25 and 55 for the cohorts turning 25 in 1978 to 1983. Annual statistics are averages of annual statistics based on annual cross-sections from 1978 to 2013. For annual statistics, no additional restrictions are imposed. For lifetime statistics, data is restricted to individuals who survive until age 55.

Table F.4: Lifetime Earnings Distribution: Narrow Sample

	Percentiles						
	p10	p25	p50	p75	p90	p95	p99
Broad Sample							
All	11.07	19.19	33.80	54.50	82.14	109.73	167.92
Males	14.87	26.22	43.28	66.42	100.36	138.01	218.13
Females	9.19	15.07	25.71	41.17	59.86	75.11	101.27
Annual Earnings							
All	8.35	18.73	34.95	57.04	86.68	116.53	254.09
Males	11.25	24.74	43.46	67.98	102.77	142.48	328.24
Females	6.60	14.45	27.37	43.69	64.34	82.34	152.13
Annual Earnings (CPS)							
All	10.40	20.37	35.32	56.02	83.20	107.51	234.48
Males	15.17	26.83	43.49	66.32	97.17	127.61	295.26
Females	7.71	15.47	27.68	43.04	61.99	77.37	126.39

Table F.5: Fraction of State's Population in Each Decile of Lifetime Earnings: Broad Sample

	Deciles of Lifetime Earnings									
	1	2	3	4	5	6	7	8	9	10
AK	12.63	11.37	10.37	10.13	8.78	9.49	9.18	9.01	9.75	9.30
AL	12.61	12.33	11.56	11.33	10.67	9.95	9.27	8.56	7.42	6.30
AR	14.01	12.54	11.85	11.32	10.66	10.08	9.08	8.01	6.68	5.76
AZ	12.22	11.67	10.58	10.28	10.23	10.12	9.40	8.86	8.79	7.85
CA	11.92	10.27	9.64	9.17	9.01	8.97	9.08	9.63	10.83	11.50
CO	15.65	13.22	11.03	9.94	9.40	9.06	8.26	8.24	7.68	7.53
CT	6.11	7.71	8.43	8.96	8.97	9.59	10.26	11.83	13.49	14.65
DC	9.14	8.42	8.14	8.36	8.45	9.02	9.77	10.95	12.96	14.77
DE	7.35	9.38	8.77	9.38	10.26	10.21	10.52	11.25	11.77	11.13
FL	11.79	11.48	11.19	10.96	10.78	10.09	9.59	8.90	7.90	7.31
GA	11.94	11.85	11.43	11.12	10.67	10.41	9.86	8.83	7.72	6.16
HI	6.87	7.51	8.50	9.06	10.10	11.24	12.27	12.09	12.58	9.78
IA	6.25	8.44	9.71	10.40	10.97	12.07	12.38	10.99	9.54	9.26
ID	12.95	11.47	10.68	9.82	9.73	9.36	9.69	9.30	8.91	8.08
IL	8.97	9.25	9.30	9.51	9.34	9.71	10.02	10.75	11.27	11.89
IN	12.43	10.71	10.20	9.87	9.69	9.45	9.24	9.52	9.31	9.57
KS	15.34	13.71	11.54	9.97	9.52	8.69	8.56	8.00	7.77	6.90
KY	11.73	11.51	11.14	10.94	10.81	10.47	9.92	9.06	8.08	6.34
LA	14.31	12.25	11.34	10.66	10.02	9.53	8.93	7.99	7.71	7.24
MA	6.62	7.95	8.75	9.24	9.43	9.73	10.40	11.20	12.50	14.18
MD	9.10	9.22	9.46	9.81	9.90	10.05	10.48	10.63	11.18	10.17
ME	8.76	10.41	11.47	11.35	11.10	11.04	10.93	9.60	8.20	7.16
MI	9.72	9.69	9.73	9.36	9.34	9.25	9.62	10.37	11.60	11.32
MN	5.81	7.85	9.14	9.91	10.71	11.56	12.12	12.10	11.11	9.69
MO	9.16	9.77	10.19	10.46	10.71	10.68	10.28	9.68	9.77	9.30
MS	14.08	12.42	12.30	11.94	11.00	10.18	8.93	7.65	6.52	4.98
MT	9.39	10.94	11.30	10.73	10.52	10.62	9.81	9.28	8.91	8.49
NC	9.17	10.35	11.19	12.14	12.69	11.82	10.72	8.78	7.26	5.86
ND	6.34	8.61	10.83	10.78	11.31	11.75	10.84	10.54	10.03	8.97
NE	6.86	8.90	10.17	10.95	11.37	11.56	11.05	10.71	9.36	9.07
NH	5.84	8.18	10.17	9.76	11.14	12.09	12.42	11.98	9.61	8.79
NJ	7.38	8.31	8.40	8.51	8.87	9.00	9.69	10.67	12.95	16.22
NM	11.88	11.11	11.18	10.36	10.86	10.41	9.69	8.53	8.79	7.19
NV	10.11	8.91	9.94	9.78	9.81	10.64	10.61	10.58	10.48	9.14
NY	8.82	8.66	8.87	8.92	8.94	9.02	9.19	10.26	11.84	15.49
OH	9.04	9.69	9.80	10.03	9.99	10.22	10.76	10.87	10.27	9.34
OK	10.44	11.04	10.79	10.53	10.48	10.68	9.95	9.36	8.61	8.11
OR	9.67	10.45	10.99	10.23	10.29	10.15	10.35	10.56	9.49	7.82
PA	8.20	8.80	9.21	9.67	9.98	10.32	10.82	11.14	10.92	10.93
RI	6.75	8.03	9.11	9.76	9.89	10.82	10.96	11.39	11.45	11.84
SC	11.26	11.21	11.46	11.61	11.80	11.03	10.35	8.67	7.26	5.34
SD	6.94	8.96	10.53	11.18	11.44	11.72	11.42	10.27	9.04	8.50
TN	11.38	10.84	11.09	11.12	11.24	10.94	9.90	9.19	7.50	6.79
TX	11.28	11.02	10.49	10.50	10.28	10.06	9.97	9.32	8.68	8.39
UT	10.74	10.59	9.46	8.98	9.15	9.44	9.82	10.53	10.69	10.59
VA	9.11	10.11	10.32	10.77	10.75	10.63	10.77	10.21	9.19	8.13
VT	8.34	8.95	10.23	10.92	12.02	11.84	11.19	11.03	8.11	7.38
WA	9.02	9.76	9.60	9.46	9.81	9.91	10.44	11.10	11.08	9.82
WI	5.93	7.59	9.04	9.93	10.63	11.61	12.08	12.06	11.58	9.57
WV	13.39	11.05	10.81	10.45	10.02	10.09	9.53	9.73	8.38	6.55
WY	8.47	10.46	10.09	9.85	[illegible]	10.30	10.21	9.94	10.61	10.07