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Uncovering the American Dream: Inequality and Mobility in Social Security Earnings Data since 1937
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ABSTRACT

This paper uses Social Security Administration longitudinal earnings micro data since 1937 to analyze the evolution of inequality and mobility in the United States. Earnings inequality follows a U-shape pattern, decreasing sharply up to 1953 and increasing steadily afterwards. We find that short-term and long-term (rank based) mobility among all workers has been quite stable since 1950 (after a temporary surge during World War II). Therefore, the pattern of annual earnings inequality is very close to the pattern of inequality of longer term earnings. Mobility at the top has also been very stable and has not mitigated the dramatic increase in annual earnings concentration since the 1970s. However, the stability in long-term earnings mobility among all workers masks substantial heterogeneity across demographic groups. The decrease in the gender earnings gap and the substantial increase in upward mobility over a career for women is the driving force behind the relative stability of overall mobility measures which mask declines in mobility among men. In contrast, overall inequality and mobility patterns are not significantly influenced by the changing size and structure of immigration nor by changes in the black/white earnings gaps.

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1 Introduction

One of America's most celebrated values is giving its people the opportunity to move up the economic ladder over their lifetimes. This opportunity, often summarized by the "American Dream" expression, is considered as a key building block of the U.S. social fabric. It is seen as the best antidote against the high levels of annual earnings inequality which the free market American economy generates. It also carries the promise that economically disadvantaged groups such as women, ethnic minorities, or immigrants can achieve economic success within their lifetime.[1] Although the concept of the "American Dream" is hotly debated in the press and among policy makers and the broader public, it has never been rigorously measured over long periods of time due to lack of suitable data. In order to understand fully the evolution of economic disparity and opportunity in the United States, it is therefore crucial to combine the analysis of earnings inequality with the analysis of long-term mobility.

A large body of academic work has analyzed earnings inequality and mobility in the United States. A number of key facts on earnings inequality from the pre-World War II years to the present have been established:[2] (1) Earnings inequality decreased substantially during the "Great Compression" of the 1940s (Goldin and Margo, 1992) and remained low over the next two decades, (2) Earnings inequality has increased substantially since the 1970s and especially during the 1980s (Katz and Murphy, 1992; Katz and Autor, 1999), (3) the top of the earnings distribution experienced enormous gains over the last 25 years (Piketty and Saez, 2003), (4) short-term rank-based mobility has remained fairly stable (Gottschalk, 1997) since the 1970s, (5) the gender gap has narrowed substantially since the 1970s (Goldin, 1990; O'Neill and Polachek, 1993; Blau, 1998; Goldin, 2006a). There are, however, important questions that remain open due primarily to lack of homogenous and longitudinal earnings data covering a long period of time.

First, no annual earnings survey data covering most of the US workforce are available before the 1960s so that it is difficult to measure overall earnings inequality on a consistent basis before the 1960s and in particular analyze the mechanisms of the Great Compression during the World War II decade. Second and as mentioned above, studies of mobility have focused primarily on short term mobility measures due to lack of long and large longitudinal data. Therefore, little is known about earnings mobility across a full career such as the likelihood that a worker starting in the bottom quintiles ends up in the top quintile by the end of his/her career. We know even less about the evolution of such long-term mobility over time, and how mobility over a career has contributed to reducing economic disparity across gender and ethnic groups.

[1] The American Dream expression is also used for intergenerational upward mobility. Our paper focuses only on mobility within a life-time. See Solon (1999) for a survey on intergenerational earnings mobility.

[2] A number of studies have also analyzed inequality in America in earlier periods (see Lindert, 2000, for a survey)

Third and related, there is a controversial debate on whether the increase in inequality since the 1970s have been offset by increases in earnings mobility. To the extent that individuals can smooth transitory shocks in earnings using savings and credit markets, inequality based on longer periods than a year is a better measure of true economic disparity. Two recent findings in the literature suggest that mobility might have mitigated inequality increases. Krueger and Perri (2006) and Slesnick (2001) argue that consumption inequality has not increased despite an increase in income inequality.[3] Kopczuk and Saez (2004), Kennickell (2006) and Scholz (2003) find no major increase in wealth concentration in the 1980s and 1990s in spite of the surge in top income shares.[4]

The goal of this paper is to use the large Social Security Administration (SSA) micro data available since 1937 to make progress on those questions. The SSA data we use combine four key advantages relative to the data that have been used in previous studies on inequality and mobility in the United States. First, the SSA data we use for our research purposes are very large: a 1% sample of the full US population is available since 1957, and a 0.1% sample since 1937. Second, the SSA data are annual and cover a very long time period of almost 70 years. Third, the SSA data are longitudinal as samples are selected based on the same Social Security Numbers every year. Finally, the earnings data have very little measurement error and are fully uncapped (with no top code) since 1978.

Although Social Security earnings data have been used in a number of previous studies[5] (often matched to survey data such as the Current Population Survey), the data we have assembled for this study overcome three important previous limitations. First, from 1951 to 1977, quarterly earnings information can be used to extrapolate earnings up to 4 times the Social Security annual cap, allowing us to study groups up to the top percentile of the earnings distribution.[6] Second, we can match the data to employers and industry information starting in 1957 allowing us to control for expansions in Social Security coverage which started in the 1950s. Finally, and perhaps surprisingly, the Social Security annual earnings data before 1951 have never been used

[3]Those results are challenged by Attanasio et al. (2007) who question the quality of the Consumer Expenditure Survey (CEX) data used in those studies. The earlier study by Cutler and Katz (1991) found an increase in consumption inequality in CEX data.

[4]Edlund and Kopczuk (2007) argue that an increase in *intergenerational* mobility at the top of the distribution explains this pattern.

[5]For example, Leonesio and Del Bene (2006) have recently used SSA data since 1951 to analyze life-time inequality. They use, however, top-coded earnings data. Congressional Budget Office (2007) use uncapped SSA earnings data since 1981 and focus on short-term mobility and earnings instability.

[6]Previous work using SSA data before the 1980s has almost always used data capped at the Social Security annual maximum (which was around the median in the 1960s) making it impossible to study the top half of the distribution. To our knowledge, the quarterly earnings information is not stored in the main administrative SSA database and it seems to have been retained only in the 1% sample since 1957 and in the 0.1% sample since 1951 that we are using in this study.

outside SSA for research purposes.[7]

As most administrative data, the main drawback is that few socio-demographic variables are available relative to standard survey data. Date of birth, gender, place of birth (including a foreign birth indicator), and race are available since 1937. Furthermore, employer information (such as geographic location, industry and size) is available since 1957. Because we do not have information on important variables such as family structure, education, and hours of work, our analysis will focus only on earnings rather than wage rates and will not attempt to explain the links between family structure, education, labor supply and earnings, as many previous studies have done. In contrast to studies relying on income tax returns and official Census Bureau inequality measures, the whole analysis is also based on individual rather than family-level data. We also focus only of wage earnings and hence exclude self-employment earnings as well as all other forms of income such as capital income, business income, and transfers. Because of expansion in social security coverage, we focus exclusively on employment earnings from commerce and industry workers (representing about 70% of all US employees) which is the core group always covered since 1937.

We construct continuous and homogeneous series of employment earnings inequality and mobility for the period 1937-2004 for commerce and industry workers.[8] First, we construct inequality measures such as Gini coefficients, and income shares of various groups such as quintiles, and smaller upper income groups. We construct these measures based on annual incomes but also based on longer measures such as 3 or 5 year earnings averages. Second, we construct measures of group gaps such as the fraction of Women, Blacks, or foreign born in quintiles and smaller upper groups of the earnings distribution relative to population ratios. Third, we construct short-term mobility series showing the probability of moving from one quantile to another quantile after 1, 3, or 5 years. Fourth, we construct two types of long-term mobility series. The first type measures mobility of long term 11 year earnings spans after 10, 15 or 20 years relative to the full work force. The second type measures mobility within one's birth cohort: we divide full careers from age 25 to age 60 into three stages of 12 years each (early, middle, and late). We then compute probabilities of moving from one quintile group to another quintile group across stages. Finally, we compute cohort-level measures of career long earnings inequality.

Our series allow us to uncover three main findings. First, our annual series confirm the U-shape pattern of earnings inequality since the 1930s, decreasing sharply up to 1953 and increasing steadily and continuously afterwards. The U-shape pattern of inequality is also present within

[7]The only study we found was Leimer (2003). The existence of the pre-1951 electronic micro data seems to be unknown to academic researchers. Social Security Administration (1937-1952) provided detailed annual statistical reports on reported earnings before the data were put in electronic format.

[8]Some of the series are constructed for sub-periods, due to top coding before 1978, the lack of quarterly earnings before 1951 (which affects our imputation procedure) and smaller sample size before 1957.

each gender group and is more pronounced for men. The Great Compression in earnings from 1938 to 1953 took place in two distinct phases. Inequality decreased sharply during the war years. This process is clear at the top of the distribution, and present but masked by changes in the composition of the labor force during World War II at the bottom. Inequality rebounded partially in 1945-1946 and then decreased again, especially at the bottom, but more slowly till the early 1950s. Uncapped earnings data since 1978 show that earnings shares of all groups except the top 5% have decreased over the last 25 years. Furthermore, the increases within the top 5% have been concentrated among the top 1% and especially the top 0.1%. Therefore the pattern of *individual* top earnings shares is very close to the *family* top earnings shares constructed with tax return data in Piketty and Saez (2003).

Second, we find that short-term and long-term mobility among all workers has been quite stable since the 1950s.[9] Therefore, the pattern of annual earnings inequality is very close to the pattern of inequality of longer term earnings. Those findings cast some doubts on consumption based studies ((Krueger and Perri, 2006), (Slesnick, 2001)) claiming that increases in annual earnings inequality overstate increases in economic welfare inequality. Furthermore, mobility at the top of the earnings distribution, measured by the probability of staying in a top group after 1, 3, or 5 years has also been very stable since 1978 and therefore has not mitigated the dramatic increase in annual earnings concentration. Long term career mobility measures for all workers are also quite stable since 1951 either when measured unconditionally or when measured within cohorts.

Third, we find that the stability in long-term earnings mobility among all workers masks substantial heterogeneity across demographic groups. The decrease of the gender gap in earnings, which started in the late 1960s, has taken place throughout the distribution, including the very top, and has contributed greatly to reducing long-term inequality and increasing long-term mobility across all workers. Upward mobility over a career was much lower for women than for men but this mobility gap has also been reduced significantly in recent decades. This is therefore the driving force behind relative stability of overall mobility measures which mask declines in mobility among men. We also find that while the closing of the gender gap in career earnings was evident for all cohorts in the labor force at the time, it nevertheless displays a sharp break starting with the 1941 cohort suggesting that changes taking place in the 1960s made a large difference in women career choices and achievement.[10] In contrast, overall inequality and mobility patterns are not significantly influenced by the changing size and structure of immigration nor by changes in the black/white earnings gaps. Consistent with previous work (e.g., Smith and Welch, 1989; Donohue and Heckman, 1991; Chandra, 2000), we find a sharp narrowing of the Black vs. White

[9] Mobility was unsurprisingly higher during the World War II decade but this was a temporary increase due to the large turnover in the labor market generated by the War.

[10] Those findings are consistent with the analysis presented in Goldin (2004, 2006a) emphasizing breaks in a number of gender gaps series.

gap exactly during World War II and resuming in the early 1960s but ending abruptly in the late 1970s except within the top percentile of the earnings distribution.

The paper is organized as follows. Section 2 describes the data and our estimation methods. Section 3 presents inequality results based on annual earnings. Section 4 focuses on short-term mobility and its effects on inequality while Section 5 focuses on long-term career mobility and inequality. Section 6 explains how the evolution of gender and ethnic gaps has affected overall patterns of long-term mobility and inequality. Finally, Section 7 offers some concluding remarks. The complete details on the data and our methodology, as well as sensitivity analysis are presented in appendix. Complete tabulated results in electronic format are posted online.

2 Data, Methodology, and Previous Work

2.1 Social Security Administration Data

• Data

We will rely on datasets constructed in the Social Security Administration for analytical purposes known as the Continuous Work History Sample (CWHS) system. Detailed documentation of these datasets can be found in Panis et al. (2000). These datasets are derived from the administrative-level data and their primary purpose is to support research and statistical analysis. The annual samples are selected based on a fixed subset of digits of the transformation of the Social Security Number. The same digits are used every year and the sample can be treated as a random sample of the data (see, Harte, 1986, for the algorithm and more discussion). We will use three main datasets from SSA.[11]

(1) The 1% CWHS file contains information about taxable social security earnings from 1951 to date (2004), basic demographic characteristics such as year of birth, sex and race, type of work (farm or non-farm, wage or self-employment), self-employment taxable income, insurance status for the Social Security Programs, and several other variables. Because Social Security taxes apply up to a maximum level of annual earnings, however, earnings in this dataset are effectively top-coded at the annual cap before 1978. Starting in 1978, the dataset also contains information about full compensation from the W-2 forms, and hence earnings are no longer top coded. W-2 wage forms report the full wage income compensation including all salaries, bonuses, and exercised stock-options exactly as wage income reported on individual income tax returns.

(2) The second file is known as the Employee-Employer file (EE-ER) and we will rely on its

[11] As explained in the appendix we also make a very limited use of the 1% extract from the Master Earnings File. Furthermore, we derive the foreign place of birth indicator from the Numident dataset — the administrative database of information about each assigned SSN.

longitudinal version (LEED) that covers 1957 to date. While the sampling approach based on the SSN is the same as the 1% CWHS, individual earnings are reported at the employer level so that there is a record for each employer a worker is employed by in a year. This dataset contains basic demographic characteristics, compensation information subject to top-coding at the employer-employee record level (and with no top code after 1978), and information about the employer including geographic information and industry at the three digit (major group and industry group) level.

Importantly, the LEED (and EE-ER) dataset also includes imputed wages above the taxable maximum from 1957 to 1977. The imputation procedure is based on the quarter in which a person reached the taxable maximum and is discussed in more detail in Kestenbaum (1976, his method II). The idea is to use earnings for quarters when they are observed to impute earnings in quarters that are not observed (because the annual taxable maximum has been reached) and to rely on a Pareto interpolation when the taxable maximum is reached in the first quarter. Taxable maximums varied over time and before 1978, depending on the year, between less than 20% (in the late 1970s) to more than 40% (in the mid-1960s) of individuals are affected. The number of individuals who were top-coded in the first quarter and whose earnings are imputed based on the Pareto imputation is less than 1% of the sample for almost all years.[12] Consequently, high-quality earnings information is available for more than 99% of the sample allowing us to study both inequality and mobility up to the top percentile.

(3) Third, we also have access to the so-called .1% CWHS file (one tenth of one percent) that is constructed as a subset of the 1% file but covers 1937-1977. This is of course a smaller sample and the data in this file also suffers from the top-coding issue, but it is unique in its covering the 1940s which is the period when most of the drop in earnings inequality documented by Goldin and Margo (1992) and Piketty and Saez (2003) took place. The .1% file contains quarterly earnings information starting with 1951 (and quarter at which the top code was reached for 1946-1950), thereby extending our ability to deal with top-coding problems.

The combination of the 1% CWHS, .1% CWHS and LEED allows for constructing a consistent longitudinal dataset covering the period from 1951 to 2004, and it allows for studying mobility and inequality up to the top percentile throughout this period and within the top percentile starting in 1978. The .1% CWHS allows us to study the distribution up to the top quintile from 1937 to 1950.

• Top Coding Issues

Earnings above the top code (from 1937 to 1945) and above 4 times the top code (from 1946 to 1977) are imputed based on Pareto distributions from wage income tax statistics published by

[12]The exceptions are 1964 (1.08%) and 1965 (1.17%)

the Internal Revenue Service and the wage income series estimated in Piketty and Saez (2003).[13] From 1937 to 1945, the fraction of workers top coded increased from about 3% in 1937 to 19.4% in 1944 and 17.3% in 1945. The number of top-coded observations increased to 33% by 1950, but the quarter when a person reached taxable maximum helps in classifying people into broad income categories. This implies that we cannot study groups smaller than the top 1% from 1951 on and we cannot study groups smaller than the top quintile from 1937 to 1950.

It is important to keep in mind therefore that annual earnings shares in top groups before 1978 are imputed from wage income tax statistics and hence are by definition calibrated to the estimates of Piketty and Saez (2003). Hence, we will restrict our mobility series and multi-annual income shares to groups and years where those imputations do not have a significant impact on our series.

• Changing Coverage Issues

Initially, Social Security covered only commerce and industry employees defined as most private for-profit sector employees and excluding farm and domestic employees as well as self-employed workers. Over time, there has been an expansion in the workers covered by Social Security and hence included in the data. An important expansion took place in 1951 when self-employed workers, farm and domestic employees were included. This reform also expanded coverage to some government and non-profit employees (including large parts of education and health care industries), with coverage further significantly increasing in 1954 and then slowly expanding since then. In order to focus on a consistent definition of workers, we include in our sample only commerce and industry employment earnings. In 2004, commerce and industry employees are about 70% of all employees and this proportion has declined only very modestly since 1937.[14]

• Sample Selection

For our primary analysis, we are restricting the sample to adult individuals aged 18 and above (by January 1st of the corresponding year) up to age 70 (by January 1st of the corresponding year). This top age restriction allows us to concentrate on the working-age population, while recognizing that some high-income individuals may continue making very high incomes even beyond the standard retirement age. Second, we consider for our main sample only workers with annual (commerce and industry) employment earnings above a minimum threshold presently defined as one-fourth of a full year-full time minimum wage in 2004 ($2575 in 2004), and then

[13] For 1946-1950, the imputation procedure preserves the rank order based on the quarter when the taxable maximum was reached.

[14] We provide in appendix some sensitivity analysis of extending our sample to all covered workers and show that the key results for recent decades are robust to including all covered workers.

indexed by nominal average wage growth for earlier years.[15] From now on, we denote this sample the "core sample".

Figure 0 presents (on the left axis) the average and median real annual earnings for our sample of interest (age 18 to 70 and earnings above the minimum threshold). The figure shows that average earnings (expressed in 2004 dollar using the standard CPI deflator) have increased from \$15,000 in 1937 to \$39,200 in 2004. As is well known, median earnings grew quickly from 1938 to 1973 and have hardly increased over the last 30 years. Figure 0 also displays (on the right axis) the number of workers in our sample. The number of adult covered workers has increased from 27 million to 95 millions over the period (130 million without the commerce and industry restriction).

2.2 Constructing Inequality and Mobility Series

• Dividing Individuals into Groups

The first step of the analysis is to divide individuals into various income groups. For this purpose, for each year t from 1937 to 2004, all commerce and industry earnings records of individuals in the sample with earnings above the minimum threshold are divided into 10 groups from the bottom quintile P0-20 to the top 0.1% (P99.9-100). The rest of the records for year t (those not yet 18, those above 70, those who are deceased and those who have earnings below the minimum threshold) form an 11th group called the Missing group. Such groups are in general defined relative to the full population of interest. Sometimes, we will restrict the population of interest to men or women only, or smaller age or cohort groups. Table 1 displays the level of earnings for each of the groups we consider in 2004.[16]

We will refer to P0-20 and P20-40 (the bottom two quintile) as the bottom groups. The median quintile P40-60 with average earnings of \$26,715 will be referred as the moderate income group. P60-80 and P80-90 with average earnings of \$41,869 and \$63,114 are considered as the middle-class groups. P90-95 and P95-99 with average earnings of \$85,304 and \$134,639 are considered as upper middle class. Groups within the top percentile (earnings above \$219,000) are considered as top groups.

In order to focus on longer term measures of inequality, we also divide individuals based on earnings averaged over 3, 5, or 11 years. In that case, zeros will be included in the average and the minimum threshold is imposed on earnings in the middle year.[17] The age restriction is

[15] We show in appendix that virtually all of our results are unaffected if we choose alternative minimum thresholds.

[16] Table A1 in appendix shows analogous figures for the full sample without the commerce-and-industry restriction.

[17] This is to keep the sample criteria the same for annual earnings and earnings over a number of years. The

imposed so that individuals are alive and aged 18 or more and 70 or less in *all* years included in the average.

• Inequality Series

We compute several types of inequality series. Those inequality series are always defined relative to our sample of interest and including only individuals earning at least the minimum earnings threshold on average. We estimate Gini coefficients. We compute shares of total earnings accruing to the income groups we have defined.

For gender and Black-White gaps, we compute the fraction of Women, Black, and immigrants in various earnings groups relative to adult population ratios. This measure has the great advantage of being a final outcome measure which is of direct interest without requiring a correction for labor force participation selection issues (see our discussion below). We also compute the fraction of Women and Blacks in quantiles cohort by cohort and based on longer term measures of earnings.

• Mobility Series

For each year from 1937 to present, we estimate a mobility matrix showing in each cell (a,b) the number of individuals falling in group a in year t and in group b in year $t+1$. Groups are defined as 11 earnings groups (or an aggregated subset of them) above. Conditional mobility series are then estimated as the fraction of individuals in group a in year t who are in group b in year $t+1$ conditional on not being missing in year $t+1$ (due to any reason such as age over 70, earnings below the minimum threshold, or death). We then repeat the same procedure but for mobility between year t and year $t+3$, and $t+5$. Some of those mobility series are computed for specific demographic groups but quantiles are defined relative to the full population of workers (unless otherwise stated).

We estimates two types of long term mobility series. The first type is unconditional. We use 11 year earnings spans and estimate mobility matrices between year t and year $t+10$, $t+15$, $t+20$. The sample is selected conditional on having earnings in the middle year t above the minimum threshold (other years can be zero) and meeting the age restriction 18-70 in all years of the 11 year span. The second is conditional on birth cohort. We estimate mobility matrices from the early career to middle career, middle to late career, and early to late career. Early career is defined as the calendar year the person reaches 25 to the calendar year the person reaches 36. Middle and later careers are defined similarly from age 37 to 48 and age 49 to 60 respectively. For example, for a person born in 1944, the early career is calendar years 1969-1980, middle career is 1981-1992, and late career is 1993-2004. Those long-term career mobility matrices are

only source of the difference between samples averaged over different number of years is due to the age restriction.

always computed conditional on having *average* earnings in each career stage above the minimum threshold. Those mobility matrices are based on cohorts (so that we always compare individuals relative to the individuals born in the same year) and hence will always be presented by year of birth.

2.3 Previous Work

As we discussed in introduction, there is a very large body of work on inequality, mobility, and gender gaps in the United States. Therefore, it is important to provide a very brief summary of the key studies so that we can place our own study in its proper context and understand the precise value added of the data we use and series we present.

- **Inequality**

Most studies of wage and earnings inequality in the United States have focused on survey data, primarily CPS micro-data available annually since 1961.[18] Before the 1960s, the only survey data covering most of the US workforce is the decennial Census which contains earnings since in 1940. Katz and Autor (1999) provide an extensive summary of the literature on the US earnings inequality using CPS and Census data.[19] The Census studies (e.g. Goldin and Margo, 1992; Murphy and Welch, 1993; Juhn, 1999) find a sharp narrowing of inequality from 1939 to 1949 (called the Great Compression by Goldin and Margo) followed by a slow reversal which accelerates in the 1970s and especially the 1980s. The CPS based studies also find a sharp increase in inequality especially during the 1980s and among men. There is, however, a controversial debate about the explanation for the widening of inequality since 1970. Some authors emphasize secular shifts in the supply of and demand for skills (see e.g. Katz and Murphy, 1992; Acemoglu, 2002; Autor et al., 2007), while others emphasize the erosion in the 1980s of labor market institutions such labor unions and the minimum wage favoring low wage workers (Lee, 1999; Card and DiNardo, 2002; Lemieux, 2006). Key to this debate is the exact timing on the widening in inequality and different survey datasets point to somewhat different patterns.[20] Finally, tax return data show a dramatic increase in the concentration of *family* wage income starting in the 1970s and accelerating in the 1980s and 1990s (Piketty and Saez, 2003).

[18] This is the data that is used for the official Census Bureau inequality series produced annually by the US government. The CPS started in 1940 but unfortunately the micro-data before 1961 are lost and only some tabulations are available.

[19] Before 1940, the literature has relied on annual series of wages for given occupations to construct occupational wage ratios.

[20] The March CPS surveys show continuous increases of residual wage inequality since the 1970s while the May CPS and outgoing CPS rotation groups show that increases in residual wage inequality happened primarily in the 1980s.

The SSA data have the advantage of being annual, starting in 1937, and contain little measurement error.[21] A number of studies have used matched SSA earnings records from the MEF (from 1951 on) to survey data. However, such matched data are always top coded at the Social Security cap before 1978 because the MEF is top-coded.[22]

• **Mobility**

There are many different ways to measure mobility and different mobility measures can sometime evolve in different ways (see e.g., Fields and Ok, 1999; Fields et al., 2003, for a theoretical discussion and a US application using PSID data from 1970 to 1995). In this paper, we focus only on rank based measures of mobility such as transition matrices across quantiles because this measure fits naturally with our analysis of inequality based on quantile shares. Another concept often used is "directional income movement", which indicates whether the earnings changes are positive or negative and by how much earnings have changed.[23] Finally, other authors have been concerned with the variability or uncertainty of incomes. This later approach is in general more structural and aims at estimating earnings dynamics processes using variance-covariance regression analysis. Authors have been particularly interested in decomposing changes in earnings inequality into its persistent and transitory components. This approach has often been preferred to the non-parametric approaches previously described because it can provide more precise estimates with relatively small survey samples. Baker and Solon (2003), however, use a large longitudinal administrative earnings data from Canada and show that the Canadian data rejects a number of restrictions often imposed in the U.S. literature (such as homogeneity of initial conditions across cohorts). Furthermore, this approach is also much less transparent and harder to interpret than the non-parametric measures. As the large SSA data allow us to obtain fairly precise non-parametric estimates, we do not attempt the parametric approach in this paper.[24]

Earnings mobility may be considered as welfare enhancing because high levels of mobility reduce long-term earnings inequality (relative to short-term earnings inequality). Long-term earnings inequality is more relevant for economic welfare than short-term inequality if households can use credit markets to smooth consumption. However, increased mobility also implies higher earnings instability and hence higher likelihood of earnings losses. Earnings instability is

[21] A number of studies have compared survey data matched to administrative data in order to assess measurement error in survey data. See Bound et al. (2001) for a survey and Bound and Krueger (1991), Bollinger (1998) for CPS data matched to SSA earnings and Abowd and Stinson (2005) for SIPP data matched to SSA earnings.

[22] As discussed above, only the 1% LEED file at SSA contains imputed earnings above the cap using the quarterly earnings structure.

[23] The recent study by Congressional Budget Office (2007) based on SSA data since 1981 uses such concepts and reports probabilities of earnings increases (or drops) by over 25%, 50% from one year to the next.

[24] It would, however, be methodologically valuable to repeat the Baker and Solon (2003) exercise using U.S. data.

welfare reducing if households cannot use credit markets (or other insurance devices) to smooth consumption.

There is a large literature on earnings mobility in the United States[25] based mostly on PSID data, which is the longest longitudinal US survey data. As a result, the literature has only been able to study mobility since the 1970s and has focused primarily on short-term mobility.[26] Gottschalk (1997) mentions: "Only a few studies have looked at changes in earnings mobility. Some have found declines, most have found no change, and none has found any increase." Indeed, Buchinsky and Hunt (1999) use NLSY data and find that mobility declined from 1979 to 1991, especially at the lower end of the earnings distribution. Moffitt and Gottschalk (1995), using PSID, find that five-year mobility rates have been stable from 1969 to 1987 but that year-to-year mobility began falling in the late 1970s. Gittleman and Joyce (1995) and Gittleman and Joyce (1996) using the short 2-year panel structure of the March CPS from 1967 to 1991 find stable year to year mobility in the 1970s and 1980s. Congressional Budget Office (2007) using SSA data finds stability in measures of absolute increases or decreases in earnings.

A number of studies have estimated the earnings variance structure and concluded that the increase in inequality since 1970s is due to increases in both the permanent and transitory components of earnings inequality. Haider (2001) uses PSID data from 1967-1991 and finds increases in earnings variability mostly in the 1970s. Gottschalk and Moffitt (1994) use PSID data from 1970 to 1987 and find that transitory variance increased from the 1970s to the 1980s. Moffitt and Gottschalk (2002) use PSID data from 1969-1996 and find that the variance of transitory earnings rose slightly in the 1980s but declined in the 1990s. Finally, Shin and Solon (2007), using PSID data from 1969 to 2004, find that earnings volatility increased in the 1970s with no clear trend afterwards (with a slight increase since 1998). If inequality increases and rank based mobility (such as the quantile mobility matrix) remains stable, then earnings instability will necessarily increase as well. This reconciles the stability of quantile mobility matrices with the increase in earnings instability documented in the United States since 1970.

As we pointed out, survey data contain significant measurement error that might affect mobility measures. Several studies (Pischke, 1995; Gottschalk and Huynh, 2006; Dragoset and Fields, 2006) compare mobility measures reported in the SIPP or PSID versus matched administrative data (SSA or tax records) and do not find systematic biases in a given direction across the two datasets although the measures of mobility can be quite different across the two datasets.

Finally, a number of studies have analyzed family income mobility (instead of individual wage earnings mobility). Hungerford (1993) uses PSID data and finds similar levels of family income mobility (rank based) in the 1970s and 1980s. Hacker (2006) and Dynan et al. (2007) using

[25] Atkinson et al. (1992) summarize the international literature on mobility.

[26] Ferrie (2005) used Census data matched by name from 1850 on to study occupational mobility over the life-time.

PSID data since 1974 find substantial increases in family income instability (using a variance decomposition) especially in the 1990s. Auten and Gee (2007) and Carroll et al. (2007) have used tax return data to examine family income mobility in the 1980s and 1990s and find that (rank based) mobility has slightly declined over time. The difference between those two sets of family income studies could be due to data (survey vs. administrative) and volatility vs. rank based mobility measures.

3 Cross Sectional Inequality

3.1 General Trends

Figure 1 plots the Gini coefficient from 1937 to 2004 for all workers and for men and women separately. The Gini series for all workers follows a U-shape. It displays a sharp decrease from 0.45 in 1938 down to 0.38 in 1953 (the Great Compression) followed by a steady and continuous increase since 1953. The figure shows close to a linear increase in the Gini coefficient over the five decades from 1953 to 2004 which suggests a slow moving phenomenon rather than an episodic event concentrated primarily in the 1980s. The Gini coefficient surpassed the pre-war level in the early 1980s and is highest in 2004 at almost 0.5. Figure 1 also shows that the pattern for males and females separately displays the same U-shape pattern. Interestingly, the upward trend in inequality is even more pronounced for men than for all workers. This shows that the rise in the Gini coefficient since 1970 cannot be attributed to gender composition changes. Figure 1 also shows that the Great Compression was much more pronounced for men than for women and took place in two steps. The Gini coefficient decreased sharply during the war from 1941 to 1944, rebounded partly from 1944 to 1946 and then declined again from 1946 to 1953. The Gini for men shows a sharp increase from 1979 to 1988 which is consistent with the CPS evidence described above. On the other hand, stability of the Gini coefficients for men and for women from the late 1950s through 1960s highlights that the overall increase in the Gini coefficient in that period has been driven by the changes in the relative earnings of men and women. This provides the first hint of the importance of changes in women's labor market behavior and outcomes, the topic we are going to return to later in the paper.

In order to understand better the mechanisms behind this inverted U-shape pattern, Figure 2 plots the earnings shares for various groups of the earnings distribution. Figure 2A plots the shares of P20-40, P60-80, and P80-90.[27] The bottom group P20-40 first increases and peaks in 1953. After 1953, a slow decline starts which accelerates in the 1970s and 1980s. By the early 1980s, all the gains in relative incomes from the "Great Compression" are lost but the drop stabilizes in the late 1980s. By 2004, the P20-40 share is at its historical minimum, down by

[27]The patterns for P0-20 and P40-60 are very similar to the pattern for P20-40 and not shown graphically. They are reported in appendix Table A3

about 30% from its peak levels in 1953. Figure 2A also displays the fourth quintile and the ninth decile earnings shares. As mentioned earlier, those groups earn on average $42,000 and $63,000 in 2004 and hence perhaps best represent the "middle-class". In contrast to the bottom quintiles, those two groups gain during the War but actually lose ground in the post-war years. Both groups' shares increase slightly from 1950 to 1970. Those two groups lose ground in the 1980s and especially the 1990s.

Figure 2B focuses on upper middle class groups (P90-95 and P95-99 with average earnings of $85,000 and $135,000 respectively in 2004) and the top percentile (all those with earnings above $219,000 in 2004). The upper middle class groups lose in relative terms during both the war and the post war period (except for a jump upward from 1945 to 1946 for P95-99 share) and increase slowly starting in the 1950s.

The top percentile decreases sharply during the war[28] and then decreases more slowly in the post war period and does not start to increase before the 1960s. The top percentile more than doubles from about 6% in the 1960s to almost 14% at the peak in 2000. Interestingly, P90-95 peaks in the early 1980s and is about flat over the last 2 decades. This shows that the increase in earnings concentration since 1970 is limited to the top 5% and that most of the gains actually accrue to the top percentile, and that not only the bottom quintiles but also the middle class and upper middle class (up to P95) has indeed be squeezed in relative terms by the gains at the top since 1970.

Finally, Figure 2C uses the uncapped data since 1978 to plot earnings shares at the top. It breaks the top percentile into three groups: the top 0.1% (P99.9-100), the next 0.4% (P99.9-99.9), and the bottom half of the top percentile (P99-99.5). It confirms the finding of Piketty and Saez (2003) that the gains have been extremely concentrated even within the top 1%. The closeness of our SSA based (individual-level) results and the tax return based (family level) results of Piketty and Saez show that changes in assortative mating played at best a minor role in the surge of top wage incomes.

3.2 The Great Compression

No other annual data on the full distribution of earnings are available between census years 1939 and 1949.[29] Previous studies (Williamson and Lindert, 1980; Goldin and Margo, 1992; Goldin and Katz, 1999) have supplemented census data with occupational ratios and distribution of wages within industries (from BLS reports) available at a higher frequency. However, no study has been able to analyze earnings inequality in general based on annual data. The SSA data

[28]This result is of course consistent with the Piketty and Saez (2003) series because our imputations are based on the wage income shares estimated by Piketty and Saez (2003).

[29]Tax returns data analyzed in Kuznets (1953) and Piketty and Saez (2003) cover only the top 10% of the income distribution during this period.

allow us to cast further light on this key episode.

Figure 3A plots the (log) P90/P50 and P50/P10 ratios from 1937 to 1956 for white males reporting earnings at least equal to a full-time full-year 2004 minimum wage ($10,300 in 2004 deflated using average wage income for earlier years) in order to be roughly comparable with Goldin and Margo (1992) Census based analysis. The compression in the upper half of the distribution (P90/P50) happened during early part of the period from 1938 to 1945 and is concentrated primarily in the War years. This evidence extends Piketty and Saez (2003) who showed using tax statistics on wage income that the large reduction in the top decile wage income share took place almost entirely during the War years of the Great Compression decade. P90/P50 remains stable during the full decade following the war and is virtually identical in 1945 and 1955. In contrast, P50/P10 actually increases slightly from 1938 to 1945 and does not change much during the wars year. P50/P10 does decline in the decade following the war but relatively modestly. P50/P10 is only slightly lower in 1956 than in 1937.

One difficulty is that the composition of the commerce and industry workforce changes drastically during the war as workers are drafted into the military and older workers re-enter the labor force, and after the war as veterans return to the work force. Although this movement out and back cannot erase the Great Compression, which is evident from comparing post-war and pre-war data as done in Goldin and Margo (1992), it might have affected significantly its timing. The magnitude of the movements in and out of the labor force is illustrated in Figure 3B. It shows share of the labor forced entering in each year and staying for at least two years, share of the labor force exiting following each year after having been in the sample for at least two years and share of the labor force present in a given year but not in the previous or the next. Some findings are expected: over 25% of the (white male) labor force in 1946 was not there in 1945. There is also clear evidence of increased draft-related exit from the labor force in 1942-1945. On the other hand, there are massive flows into the labor force (or flows from non-covered sectors to commerce and industry) between 1939 and 1941. Much of these inflows corresponds to older workers and to very young workers. The latter is reflected, for example in the large number of workers present just in 1942: the number of individuals born in 1923 in the labor force almost doubled between 1941 and 1942 and fell by 60% in 1943 reflecting the draft. The older workers flows are responsible for increased exits in 1945 and much of the entry in 1939-1943: the representation of each of the single-year cohorts born between 1880 and 1900 increased by over 20% between 1939 and 1944.

In order to eliminate the effect of changing composition of the labor force during the war, we recomputed the P90/P50 and P50/P10 ratios on sub-samples less affected by the war exit and entry effects: those in the sample every year from 1937 to 1956,[30] those who did not exit/enter during the war[31] and those who are over 40. We show the P50 to P10 ratio for these three

[30] When they are between 21 and 60. The sample includes those between 21 and 60 in a given year.

[31] War exits are defined as being present in 1937-1939, but missing for at least one year in 1941-1945. War

samples in Figure 3C. For the two samples that explicitly eliminate entry/exit during the war, there is a clear pattern of compression starting from 1938. Compression does not occur for those over 40 until about 1943. However the composition of this group is not constant: it evolves during the war as older workers are joining the labor force. Thus, we conclude that Great Compression at the bottom of the distribution is masked by compositional problems in our baseline data and in fact began taking place in the late 1930s, at about the same time as compression at the top. Compression beginning as early as late 1930s suggests that wartime regulations are unlikely to be the full explanation, and instead suggests that increased demand for less skilled labor occurring during the military build-up and as a consequence of continuing industrialization played an important role.

In Figure 3D, we show that the compositional effects during the war worked through their effect at the bottom of the distribution. The figure shows 10^{th}, 50^{th} and 90^{th} quantiles of both the baseline sample including all white males with income above the minimum wage and the sample of those who were present in all years i.e. excluding wartime entries and exits.[32] P50 and P90 move in parallel, with a little bit of a level difference reflecting positive selection of the "always in" subsample. On the other hand, P10 for the two samples diverges: P10 in the full sample does not increase nearly as much in the early 1940s as P10 in the "always in" sub-sample. The gap between the two series decreases and then remains roughly constant after 1945. Hence, the net effect of entries and exits excluded from the "always in" sample was to disproportionately add to the sample below or remove above the 10^{th} percentile, thereby keeping the P10 artificially low.

Interestingly, the compression in the upper part of the distribution lasts for several decades after the war (see Figure 2B). In contrast, the compression in the lower part of the distribution starts to unravel by the mid 1950s (Figure 2A). The different timings of these later changes suggests that different mechanisms took place in the upper versus the lower part of the distribution.

4 Short Term Mobility and Multi-Year Income Shares

4.1 Mobility at the Top

As discussed above, one of the most striking changes in the U.S. earnings distribution has been the surge in the share of total earnings going to top groups such as the top percentile. The SSA data allow us to make progress in understanding the surge in top earnings by using the longitudinal property of the SSA data to analyze whether this surge in top incomes been

entries are defined as missing between 1937 and 1939, but present in at least one year in 1941-1945. The sample is restricted to those 30 or over to make the definition based on 1937-1939 labor force participation meaningful.

[32] The quantiles are normalized by the average wage index.

mitigated by an increase in mobility for the high income groups.

Figure 4A shows the probability of staying in the top 0.1% of earnings after 1, 3, 5 and 10 years (conditional on staying in our core sample) starting in 1978. The one-year probability is between 60% and 70% and it shows no overall trend. This pattern gives little hope for attributing any part of the increase in earnings share of the top 0.1% over this period to increased short-term fluctuations of incomes at the top. Longer term mobility measures are largely consistent with this conclusion, showing no overall trend in the 1980s and 1990s.

Figure 4B further reinforces this point. It compares the share of earnings of the top 0.1% based on annual data with shares of the top 0.1% defined based on earnings averaged on the individual level over 3 and 5 years. These longer-term measures naturally smooth short-term fluctuations but show the same pattern of robust increase as annual measures do.

Figure 4C analyzes the transition from middle and upper middle class to the top 1%.[33] We consider top 1% income earners in a given year t and estimate in which group did those top 1% income earners belong to 10 years earlier (conditional on being in our core sample). The figure shows that, for top 1% earners in 2004, 38% belonged to the top 1% 10 years earlier (in 1994), about 36% belonged to P95-99, only 15% belonged to the "middle-class" groups P80-95, and a mere 11% belonged to the bottom four quintiles P0-80. Overall, the graph displays an overall relative stability over the last 50 years. The graph shows that the fraction coming from the top (P99-100 or P95-99) has increased slightly since the mid 1970s. At the same time, the fraction coming from the "middle-class" has slightly declined. This is a reverse of the earlier pattern from the 1960s and 1970s where the odds of coming from middle class groups was actually increasing.

These findings suggest that while persistence of staying in the top of the distribution has remained stable, the very top is harder to reach unless you start very to close it. This graph provides some support for the notion of the "middle class" squeeze from the popular press: income earners in P90-95 (which earn about $80,000 in 2004) have not done much better than the average since 1970 (see also Figure 2B). Meanwhile, top 1% incomes have doubled (relative to the average). Thus, at the same time as the gap in earnings between the upper middle class and the top percentile was drastically widening, it was becoming less likely that an upper middle class earner could reach the top percentile within 10 years.

4.2 Mobility in the rest of the distribution

Figures 5A and 5B display income shares averaged over 5 year (or 11 year) periods and compare the pattern with the annual earnings shares analyzed above. In order to make the comparison the simplest, we have computed the 5 year and 11 year shares using a very similar sample as

[33] Because our data prior to 1978 is top-coded, the top 1% is the smallest group for which we can show longer term patterns.

in the the case of 1 year shares.[34] The patterns of annual inequality are virtually identical to the 5 and 11 year patterns. In particular, the surge in the top 1% income share for earnings averaged over 5 or 11 years is virtually the same as the surge for annual earnings. Those results show that year to year mobility has modest effects on the pattern of economic inequality. As a result, annual earnings inequality provide a very good proxy for the level and evolution of longer term earnings inequality in the United States. Those findings cast doubts on the findings from Krueger and Perri (2006) and Slesnick (2001) arguing that consumption inequality has not increased. It is difficult to understand how the dispersion of consumption could be stable when long-term earnings (averaged over a 11 year period) dispersion display such a dramatic increase, especially given lack of evidence of significant increases in wealth concentration.

Figure 6A reports the probability of staying in the bottom two quintiles P0-40 or top two quintiles P60-100 after 1 year. Two basic findings should be noted from those figures. First, the probability of staying in the top quintiles is higher than the probability of staying in the bottom quintiles, showing that being in the bottom of the distribution in any one year is more a transitory state (on average) than being in the upper part of the distribution. This differential effect is consistent with the standard view that earnings increase over the career (making the probability of upward mobility higher than the probability of downward mobility) until the person retires and leaves our sample. Second, there is certainly no secular increase in mobility over the 70 year period we analyze. After a temporary dip during the War period, mobility has been fairly stable since 1950 and if anything has declined slightly. Mobility is at its lowest in recent years. Hence, and perhaps in contrast to popular beliefs, the idea that, in the long run, economic progress and new technologies increase relative mobility is certainly not borne out by the data.

Figure 6B examines the probability of downward mobility from P60-100 down to P0-40 and the upward mobility from P0-40 to P60-100. Comparing Figures 6A and 6B shows that downward and upward mobility is unsurprisingly much less likely than stability. Downward mobility captures the notion of earnings instability. It is closely correlated with the business cycle and spikes in downward mobility are clearly visible during recessions but there is no long-term trend. Upward mobility was significantly higher in the 1940s and has declined slowly and steadily since the 1950s and appears also to be around its lowest in recent years.

In sum, the movements in short-term mobility appear to be much smaller than changes in inequality. As a result, changes in short-term mobility have had no significant impact on inequality patterns in the United States. Those findings are consistent with previous studies for recent decades based on PSID data (see e.g., Gottschalk, 1997, for a summary) as well as the

[34]Specifically, we include individuals who have earnings above the minimum earnings threshold in the middle year of the five-year (or 11-year) average (earnings can be zero outside the middle year). We continue to impose the restrictions that the person is between 18 and 70 and alive in each year used in analysis.

most recent SSA data based analysis of Congressional Budget Office (2007) and the tax return based analysis of Carroll et al. (2007). They are more difficult to reconcile, however, with the findings of Hacker (2006) showing great increases in family income variability in recent decades.

5 Long-term mobility and Life Time Inequality

The very long span of our data allows us to estimate long-term mobility. Such mobility measures go beyond the issue of transitory earnings analyzed above and describe instead mobility across a full career. Such estimates have not been produced for the United States in any systematic way because of the lack of very long and large panels. Hence, our data can address some of the central questions on the issue of career mobility: what is the probability of getting toward the top when starting from the bottom within a lifetime? Has this social mobility grown or decreased in the United States over the last 6 decades? How does long-term mobility affect long-term inequality measures such as earnings averaged over a full career?

• Unconditional Long-Term Mobility

We begin with the simplest extension of our previous analysis to a longer-term horizon. We estimate 11 year long average individual earnings. For year t, that means earnings from year $t-5$ to year $t+5$ and classify individuals in quintiles based on those averages.[35] Figure 7 displays upward mobility probabilities from P0-40 to P80-100 after 10, 15, and 20 years. If earnings after 10, 15, or 20 years were independent of base earnings, the probability of moving up to the top quintile would be 20%. The probability is substantially lower than this although it reaches about 10% for the 20 year mobility graph for the most recent years. After a temporary surge in upward mobility due to the World War II episode, the graph shows increases in upward long-term mobility (especially after 20 years) since the 1950s, with some indication of stabilization or decline toward the end of the period. This graph suggests that, in contrast to short-term mobility, there was a noticeable increase in long-term upward mobility.

• Cohort based Long-Term Mobility

The analysis so far ignored changes in the age structure of the population as well as changes in the wage profiles over a career. To address those shortcomings we turn to cohort-level analysis. Figure 8 displays long-run mobility series.[36] Figure 8A focuses on the probability of staying in

[35] As above, the sample is selected conditional on the middle year t earnings above the minimum threshold and conditional on being aged 18 to 70 during the full 11 year window.

[36] Due to top-coding problems, we restrict attention to quintiles of the distribution and observations that can be constructed using data starting with 1951. Imputations do not have an effect on our results as long as they do not lead to mis-classifying individuals. Since we assign earnings randomly only within the top 1% (in 1951-1977), we can construct longer-term quintiles as long as all individuals in the top 1% stay in top quintile of a longer-term

the top quintile (P80-100), Figure 8B focuses on the probability of staying in the bottom 2 quintiles (P0-40), Figure 8C focuses on upward mobility and reports the probability of moving to the top quintile conditional on being in the bottom two quintiles. Finally, Figure 8D focuses on downward mobility (the probability of moving down to P0-40 when starting from P80-100). Each panel reports 3 mobility series: from the early part of the career (age 25 to 36) to the middle career (age 37 to 48), from middle to late career (age 49 to 60), and from early to late. We have also extrapolated in lighter grey the series up to six years.[37]

Two important results should be noted. First, mobility over a life-time is relatively modest. For example, Figure 8A shows that for the cohort born in 1940 (corresponding to a working career from 1965 to 2000), the probability of staying in the top quintile from early to middle is 68% and is still 54% from early to late. If there were no correlation, those probabilities should be 20%. This shows that there is a quite substantial but not deterministic relationship in earnings across those broad lifetime episodes. Figure 8B shows the probability of staying in the bottom two quintiles is also significantly higher than in the no correlation case.

Second, the pattern of mobility over the period displays modest increases in mobility over the period we analyze. Those changes are most visible in the mobility from early to late career. For example, Figure 8C shows that upward mobility from early to late career increased from less than 6% for cohorts born before the Great Depression to over 8% for cohorts born just after World War II. Symmetrically, Figure 8D shows that the probability of downward mobility also increased from less than 10% to over 13%.

Those results are consistent with the unconditional long-term mobility results from the previous section and suggest that, in contrast to the annual inequality and short-term mobility series described above which point to increasing economic disparity, long-term mobility series appear to show modest increases in mobility.

• Long-Term Inequality

Figure 9 reports the top quintile (Figure 9A) and bottom two quintiles (Figure 9B) earnings share in early, middle, and late career. The top quintile earnings shares are consistent with annual inequality and the long-term mobility pattern we have uncovered. Interestingly, the series also show that there is much more income concentration in late career than in middle career, and in middle career than in early career. Coupled with an increasing pattern at all stages, it suggests that overall inequality may further increase as currently young cohorts age.

In contrast, Figure 9B shows that the share of P0-40 has declined for early cohorts but has then increased for cohorts born after 1940. Hence, bottom quintiles are actually doing

distribution. This is true with probability close to one.

[37] As explained in detail in appendix, those extrapolations are based on series using truncated parts of each career stage.

better when we consider a longer term perspective, especially in the early part of the career. Those results are striking in light of our results from previous sections showing a worsening of the share going to bottom groups either in annual cross-sections or in averages across 5 years. Those results can actually be reconciled once compositional gender effects are understood. We turn to those effects in the next section.

6 The Role of Gender, Racial and Native-Immigrant Gaps

Economic disparity across groups such as gender, ethnic, and native vs. foreign born groups is widely perceived as a central issue in American society, and one that has attracted a lot of attention from scholars. In the context of the analysis of overall inequality and mobility in this paper, we want to examine to what extent the closing (or widening) of economic gaps across those groups has contributed to shaping the patterns we have documented earlier.

6.1 Annual Earnings Gaps

We first document the broad facts on annual earnings gaps, pointing out which facts were previously known and where the SSA data casts new light.

Figure 10 shows the fraction of women, Blacks, and foreign born workers in our commerce and industry core sample. As is well known, the fraction of women in the workforce has increased steadily since 1937 from around 27% to about 45% today. World War II generated a temporary surge in women labor force participation, two thirds of which was reversed immediately after the war.[38] Women labor force participation has been steadily increasing since the mid 1950s and seems to have reached an asymptote around 45% by 1990. Those slow and continuous gains in women labor force participation are consistent with previous work based on CPS and Census data (Goldin, 1991; Blau et al., 2006). In contrast, the fraction Black increased steadily exactly during World War II with little reversal after the War and stability afterwards.[39] Finally, the fraction foreign born displays a sharp U-shape: it decreases from over 11% in 1937 to a low below 6% around 1950 and then increases up to around 15% today. Increases since the 1980s have been particularly rapid.[40]

Figure 11 displays average earnings for each of those three groups, as well as for all workers. It shows that Black earnings caught up with Women earnings in the years just preceding World War II. From 1942 to 1961, Women and Black average earnings remained very close. Blacks'

[38]This is fully consistent with the analysis of Goldin (1991) which uses a unique micro survey data covering women workforce history from 1940 to 1951. Acemoglu et al. (2004) use the war induced changes in female labor supply to estimate its effects on the wage structure.

[39]This is consistent with previous Census analysis of Smith and Welch (1989), Donohue and Heckman (1991), and Chandra (2000).

[40]Note that our data captures only workers who use a valid Social Security Number (SSN).

earnings increased significantly more than women's from 1961 to the mid 1970s. From 1980 on, women's earnings grew faster than Black's earnings and overtook them in 1994.

Average earnings of foreign-born are close to the overall average, exceeding it somewhat prior to mid-1960s and falling behind afterward. This pattern is consistent with the shift toward immigration from less-developed countries after liberalization of immigration policies in 1965 (Borjas et al., 1997), alternatively it may be driven by an increase in the relative number of less-experienced and therefore low-earning immigrants driven by the overall increase in inflow of immigrants. Because our data excludes the informal sector, in particular immigrants without a valid SSN, the gap between overall and immigrant average earnings is likely to be somewhat understated.[41]

As is well known, the direct comparison of earnings or wage gaps among workers across different groups can be biased by composition effects such as differential changes in labor force participation[42], or differential changes in the wage structure.[43]

A simple way to get around those composition effects with our data is to consider the fraction of women (or Blacks) in each earnings group relative to the fraction of women (or Blacks) in the adult population. Those fractions with no adjustment capture the total realized gaps including labor supply decisions.[44] As a result, they combine not only the traditional wage gap among workers but also the labor force participation gap. Such measures have rarely been used when analyzing the gender or Black-White gaps[45] because economists have traditionally started by analyzing average wage ratios and then extended that analysis by looking at percentile wage ratios (such as the ratio of medians). However, we believe that the measure of the fraction female in a given group has several advantages over wage ratio measures.

First, it is a very transparent measure that is easy to understand and interpret. Second, it is neutral with respect to changes in the wage structure. Indeed, a change in the wage structure

[41]The number of foreign-born individuals in our data is close to CPS-based estimates. For example, the U.S. Census Bureau (2001) estimate for 2000 shows that 12.4% of the labor force was foreign-born (page 38), while the corresponding estimate for our commerce-industry sample is 13.4%. While undercounting of illegal immigrants biases CPS figures downwards, underestimates are believed to be in the range of 10-25% Hanson (2006) and with illegal immigrants constituting less than 1/3 of the total foreign-born population (Congressional Budget Office, 2004), the CPS-based estimates of the share of foreign-born in the labor force are unlikely to be biased by more than 10%. It appears therefore that our data captures great majority of foreign-born population.

[42]For example, if unskilled women start working, this will automatically increase the gender wage gap. Correcting for such selection issues is discussed in the case of the gender gap by Blau (1998).

[43]For example, if Blacks are less skilled than Whites on average, an increase in the skill premium will increase the overall Black-White gap, even in the absence of changes in black-white gaps by skill levels. Juhn et al. (1991) make this point and propose a decomposition. Blau and Kahn (1997) apply this to the gender gap.

[44]Labor supply decisions include participation and hours of work but also the decision to work in the commerce and industry sector (rather than other sectors or self-employment).

[45]Such measures have often been used to measure occupational gaps. See Bertrand and Hallock (2002) in the case of women among CEOs and Blau (1998); Blau et al. (2006) for a summary of the literature on such gender occupational gaps.

can be defined as gender neutral if it leaves the fraction of women in each quantile unchanged. Third, such measures could easily lend themselves to traditional decompositions in order to analyze the relative contribution of different factors (such as increased education, fertility or marriage decisions, etc.) as this is commonly done in the case of average wage ratios.[46]

• **Gender Gap**

Figures 12A and 12B plots the fraction of women overall in our core sample and in various upper income groups. As adult women aged 18 to 70 are about half of the adult population aged 18 to 70, with no gender differences in earnings, those fractions should be approximately 0.5. For comparison purposes, we report on the right y-axis the traditional gender gap measured as average women earnings divided by average men earnings (without any adjustment).

The gender gap series shows that the representation of women in upper earnings groups has increased significantly over the last four decades and in a staggered fashion across upper groups.[47] The fraction of women in P60-80 starts to increase in 1965 from around 13% and reaches about 38% in the early 1990s and has remained about stable since then. The fraction of women in the top decile (P90-100) does not really start to increase before 1973 from around 2% to almost 22% in 2004 and is still quickly increasing. Figure 12B shows that the representation of women in the top percentile did not really start to increase before the late 1970s. In 2004, the representation of women is still sharply declining as one moves up the earnings distribution. The representation at the top is clearly still increasing.[48,49]

This staggered pattern could be explained by career effects (Goldin, 2004, 2006a): starting in the 1960s, women started entering new careers but it took time before those women were able to reach the top of the ladders in their professions. Our findings are consistent with the previous literature (see e.g., Goldin, 1990; Blau and Kahn, 1997; Blau, 1998; Goldin, 2004; Blau and Kahn, 2006; Goldin, 2006b), which finds a narrowing of the gender gap especially during the 1970s and 1980s. It is useful to note that the (uncorrected) ratio of women to men earnings decreases from 1950 to the early 1970s. Hence, the early gains of women at the top are masked by increased

[46]The econometrics would be simpler than in the case of percentile wage ratios as the left-hand-side variable is simply a dummy for belonging to a given quintile. We leave such an analysis for future work.

[47]There was a surge in women in P60-80 during World War II but this was entirely reversed by 1948. As discussed above, the increase in women labor force participation during the War was only partly reversed afterwards.

[48]This is consistent with the CEO findings of Bertrand and Hallock (2002).

[49]It should be noted that, before the 1970s, a very large fraction of all college educated women were teachers (Goldin et al., 2006, Table 5) who are not included in our commerce and industry core sample. Indeed, in the full sample including all industrial groups, the fraction women in the top 10% would double to 4% (instead of 2% in commerce and industry) in 1970. The fraction women in the top 10% in 2004 is 25% (when including all industries) instead of 22% in the commerce and industry core sample. The fraction of women in the top 1% is very close in both 1970 and 2004 in the core sample and in the full sample as very few non commerce and industry workers are in the top 1%. This suggests that the dramatic trend upward in the representation of women at the top should be robust to including all employees.

labor force participation of women with low earnings.[50] The analysis of the representation of women by quantile groups has the virtue of showing very saliently where gains for women are taking place and where gains have stopped.

In contrast to the influential study by Albrecht et al. (2003) which does not find an increase in the ratio of percentiles of the distribution of men to those of women toward the top of the earnings distribution using CPS data, our results based on administrative data show that the fraction of women decreases continuously as one moves up the earnings distribution. Correspondingly, in our core sample in 2004 the percentile ratios of men to women increase in the top 10% as well: the log ratio is approximately 0.40 between P40 and P90, increases to 0.44 at P95, 0.75 at P99 and 1.04 at P99.9.[51] Under the standard assumption of both distributions being approximately Pareto, this implies that the upper tail of the men's distribution is thicker than the upper tail of the women's distribution.

• **Black-White Gap**

Figures 13A and 13B plot the fraction of Black in our full sample and in various upper income groups relative to the Black share in the adult population. With no Black-White differences in the distribution of earnings, those fractions should be around one. For comparison purposes, we also report on the right y-axis the traditional Black-White gap measured as average Black earnings divided by average earnings (without any adjustment).

Figures 13A and 13B show that the Black-White gap has followed a different pattern from the gender gap. Blacks have made progress in the middle class and upper middle class groups during World War II. The average Black to White (defined as non-Black) wage ratio display a striking step pattern: it increases sharply exactly during the war years from 1941 to 1945 and is flat afterwards. This is consistent with the census based analysis of Smith and Welch (1989), Donohue and Heckman (1991), and Margo (1995). Such a step pattern can best be explained by economic migration of Blacks from the South to the North due to labor shortages during the war, and where Blacks remain in their better paid Northern industrial occupations after the war. Unfortunately, the SSA data before 1957 do not provide geographical information (beyond state of birth) allowing us to test this hypothesis in more detail.[52] Such a sudden pattern is

[50] The jump in the ratio from 2000 to 2002 is entirely due to the big drop in top earnings following the 2001 recession (as top earners are overwhelmingly male) and illustrates the impact of changes in inequality on the uncorrected traditional earnings gap ratio.

[51] Albrecht et al. (2003) do find increasing percentile ratios in the case of Sweden using administrative data. We suspect that the difference between CPS and SSA data is due to top coding and measurement error in the CPS data. Hence, this "Glass Ceiling" phenomenon uncovered by Albrecht et al. (2003) in the case of Sweden seems also to be present in the United States. Such a pattern of increasing percentile ratios could be due to many other factors than "Glass Ceiling" (if "Glass Ceiling" is understood as discrimination preventing women from going above certain positions in their careers).

[52] Tabulations produced by SSA in Social Security Administration (1937-1952) show indeed a doubling of the

harder to reconcile with slow improvement in Blacks' education.

After stability in the Black-White gap from the end of World War II to 1960, Blacks made significant progress from the early 1960s. Virtually all of our series on Figure 13A display a clear break starting in the early 1960s, arguably in 1961.[53] It is striking to note, however, that Black progress during the 1960s and the 1970s was actually smaller (and certainly much slower) than progress during World War II. Black progress stops around 1980 and is followed by a reversal except at the top of the distribution.[54] Indeed, while the representation of Blacks dropped significantly overall and in P60-80 since 1980, it was stable for P80-90 and P90-95, and actually increased significantly in the top percentile. It is also striking to see that, in contrast to women, the fraction Black in top 1% is actually lower than in the top 0.1%. This suggests that the composition of characteristics (such as occupation) of blacks in the top 1% is likely very different for blacks than for the rest of the population or that the labor market environment that blacks face is different from women.

• Immigrant-Native Gap

The gap between earnings of foreign-born and natives can be analyzed in a similar way. Figures 14A and 14B confirm that the distribution of the immigrant population shifted toward the bottom of the distribution in the 1960s and 1970s, but this pattern has stabilized afterwards. Foreign-born workers are nowadays somewhat under-represented at the top of the distribution, but the gap is much smaller than for women or Blacks. This is consistent with previous work based on Census data since 1960: Borjas (1999) shows that immigrants are much more likely to fall in the bottom deciles of the wage distribution in 1990 than in 1960 (Table 3, p. 1726). Butcher and DiNardo (2002) show that this increasing wage gap between immigrants and natives is in large part due to the widening of the overall wage structure.[55] By definition, our represen-

fraction Black among covered workers from 1939 to 1945 outside the South while the fraction Black remained constant in the South. Those tables also show that average wages are much higher in the North than in the South both in 1939 and 1945 and that Black workers were also paid much more on average in the North than the South in 1939. Unfortunately, no tabulations by state and race are available in 1945 to verify that Blacks in the North were also paid much more than in the South after the war. Consistent with the migration explanation, the SSA micro data show that relative earnings gains of Blacks were indeed concentrated among South born Blacks with no change in relative earnings of North born Blacks.

[53]Dating exactly the beginning of Black's earnings gains is important to determine the causes. Donohue and Heckman (1991) emphasize this issue and the difficulty of dating the break point using survey data. Vroman (1991) shows using top coded SSA earnings data that Black earnings made progress relative to whites' primarily from 1965 to 1975. Card and Krueger (1993) using matched CPS-SSA earnings data also date most of the reduction in earnings gap starting after 1965.

[54]A number of studies have tried to account for the lack of progress of Blacks' relative earnings since 1980. See in particular Bound and Freeman (1989), Bound and Freeman (1992), Card and Lemieux (1994), Juhn et al. (1991).

[55]A number of studies, including Borjas (1995), Borjas (2000), LaLonde and Topel (1992), and Jasso et al.

tativeness ratios should not be affected by changes in the overall wage structure as long as the skill composition of new immigrants stays constant. Given the size and changes of immigration over the 1990s, this assumption is unlikely to be correct, though. The declining pattern of the ratios for the top 1% and top .1% visible on Figure 14B corresponds to a slightly increasing share of immigrants in the top 1% (from approximately 11% in 1990 and 13.6% in 2004) and a flat pattern in the top .1% (fluctuating between 10.5 and 12.5% from 1990 to 2004).

The patterns we find do not indicate that accounting for immigration is likely to make an important difference to measures of overall income distribution and in fact we have verified that earnings shares and the Gini coefficient for the native population are extremely close to those based on overall population (see Figure A2B in appendix).

The evidence for women and blacks shows that they have in part shared the extraordinary gains at the top of the earnings distribution. While both groups are still under-represented at the top of the distribution, the period of widening earnings distribution was also a period of reduction in gender and racial gap at the very top of the distribution.

6.2 Long-Term Earnings Gaps

Figure 15A displays the long-term upward mobility from P0-40 to P80-100 after 20 years for 11 year averages for various groups: all (as in Figure 7), men, women, Blacks and foreign-born. The figure shows a striking heterogeneity across groups. First, men have significantly higher levels of upward mobility than women and Blacks. Thus, in addition to the annual earnings gap we documented, there is an upward mobility gap as well across groups. Second, the mobility gap has also been closing overtime: the probability of upward mobility among men has been stable overall since World War II with a slight increase up to the 1960s and declines after the 1970s. In contrast, the probability of upward mobility of women has continuously increased from less than 0.5% in the 1940s to about 7% in the 1980. The probability of upward mobility for Blacks also started very low but increased earlier and more sharply than for women. It has however slightly declined since 1965. There is no major difference between upward mobility of foreign-born and the rest of the population. The increase in upward mobility for women and Blacks compensate for the stagnation or slight decline in mobility for men so that the overall upward mobility for all workers is slightly increasing. It is conceivable that upward mobility is lower for women (or Blacks) because even within P0-40, they are more likely to be in the bottom half of P0-40 than men. We recompute those upward mobility series controlling for such differences in Figure A6A in appendix. Our results are virtually unchanged showing that the mobility gap we describe is

(2000), have focused on the relative wages of immigrants and natives and analyzed how it evolves with experience in the US labor market. Lubotsky (2001) and Lubotsky (2007) used CPS and SIPP data matched to SSA earnings records and showed that using actual longitudinal data shows that convergence of immigrants wages is much slower than in Census based repeated cross section analysis.

robust to controlling for base earnings.

Figure 15A also suggests that the gains in annual earnings made by women and Black were in part due to women and Blacks already in the labor force making earnings gains rather than gains entirely due to the entry of new cohorts of women and Blacks with higher earnings.

Figure 15B focuses on career mobility within cohorts (as Figure 8). It displays upward mobility probabilities from early career (age 25-36) to late career (age 49-60) for men, women, and all workers. Similar to Figure 15A, it shows a large upward mobility gap that closes overtime: men upward mobility is stable at around 12% while women mobility increases from 1-2% to around 7%. This shows again that the reason for the slight increase in upward career mobility for all workers is entirely due to the gains made by women.[56]

Figure 16 shows that the share P0-40 over various career stages has actually declined sharply when the sample is restricted to men (rather than all workers as in Figure 9B). Interestingly, the drop starts in the early 1970s for each career stage which shows that the worsening of the economic condition for male low earners since the 1970s was a widespread phenomenon that is clearly visible from a long-run perspective. Furthermore, it is possible to show that this worsening economic situation for low earning men was even more pronounced among those men with strong attachment in the labor force (i.e., men working at least 10 years over the 12 year career stages we are considering).

Therefore, the gains of P0-40 displayed on Figure 9B for recent cohorts are due primarily to the increased attachment of women into the labor force. P0-40 used to include a large number of women with very weak labor force attachment and hence very low earnings making the P0-40 share low. The increased labor force attachment of women since the 1960s reduced the number of very low earners in P0-40 and hence drove the P0-40 share up. This effect was actually so strong that it can entirely mask the worsening economic situation of low earning men displayed on Figure 9B.

Thus, one can say that low income earners have gained modestly in recent cohorts. However, those modest gains are the net effect of great gains experienced by women who work more regularly than before and earn more than before when they work combined with great losses experienced by low earning men. Hence, it appears that women gains were at least partly men's losses, the point that has previously been suggested by Fortin and Lemieux (1998).

Figure 17 displays the fraction of women (Figure 17A) and Blacks (relative to Black adult population) (Figure 17B) in the top quintile from a long-term perspective by cohorts at each stage of the career.

Figure 17A shows three important things. First, it shows that the period starting after the mid-1960s was favorable to all women (and not only young women): the share of women in the

[56]Those results are also robust to controlling for differences in the distribution of base earnings for men and women within P0-40. See appendix Figure A6B.

top quintile increases around the 1920 cohort for late career women (aged 49-60), around the 1930 cohort for mid career women (aged 37-48), and around the 1941 cohort for early career women (aged 25-36). This demonstrates that women's progress cannot be entirely due to a change in education, fertility or marriage status, or career decisions of young women. Second, Figure 17A also shows a sharp break in the early and middle career situation starting with the 1941 cohort. This means that there was also an additional positive effect on women born starting with the 1941 cohort. This is consistent with the sharp breaks found by Goldin (2004, 2006a) in various series such as college graduation of women, fraction women in professional schools, age of first marriage of educated women, or employment expectations of young women.[57] Third, young women representation in the top quintile seems to have stopped growing for cohorts 1965-1974 and the representation of women at the top in mid career is no longer higher than in early career (after the 1960 cohort). This suggests that economic progress of women might well reach an asymptote well before parity is attained.[58] The lack of changes in the top two quintiles for young women born after 1965 is striking in light of the continuous and rapid progress of women relative college graduation rates for cohorts 1965 to 1975 (see (Goldin et al., 2006)).

Figure 17B shows that the progress in representation of Blacks at the top shows also very sharp gains followed by a clear downturn at all career stages starting with the 1950 cohort.

7 Conclusion and Future Work

Our paper has used U.S. Social Security earnings administrative data to construct series of inequality and mobility in the United States since 1937. The analysis of these data has allowed us to start exploring the evolution of mobility and inequality over a full career as well as complement the more standard analysis of annual inequality and short term mobility in several ways. We found that changes in mobility have not substantially affected the evolution of inequality, so that annual snapshots of the distribution provide a good approximation of the evolution of the longer term measures of inequality.

However, our key finding is that while the overall measures of mobility are fairly stable, they hide heterogeneity by gender groups. Inequality and opportunity among *male* workers has worsened along almost any dimension since the 1950s: our series display sharp increases in annual earnings inequality, slight reductions in short-term mobility, large increases in long-

[57] Goldin and Katz (2002) demonstrate that availability of birth control pills for single women, starting in the late 1960s, had strong effects on marital and educational choices of women. The SSA data shows that women start gaining with the 1941 cohort suggesting that factors happening earlier than the pill for single women also had a positive impact on women's earnings.

[58] A similar figure for P60-80 shows that the fraction of women in the second to top quintile has stopped growing for early career women born after 1958 and is around 0.39 for cohorts 1958-1974. The fraction of women among all early careers is around 0.45 for those cohorts (see appendix Figure A7).

term career wide inequality with slight reduction or stability of long-term mobility. Against those developments stand the very large earning gains achieved by women since the 1950s, due to increases in labor force attachment as well as increases in earnings conditional on working. Those gains have been so great that they more than compensate for the increase in inequality for males when focusing on the bottom of the distribution.

Thus, the weakening of social norms and labor market institutions inherited from the post-war years which favored low skilled white male workers[59] at the expense of women, Blacks, and top talent has had two important and conflicting consequences for earnings inequality in recent decades. It has allowed women to close a large part of the gender gap, hence improving the position of low earners (especially from a lifetime and upward mobility perspective). However, it may have also strengthened pure market forces which have contributed to increasing sharply the pay of top earners in the US economy.

We would like to develop the present analysis in several ways in future work. First, we plan on investigating in more detail the mechanisms of the surge in top earnings using employee-employer data. This will allow us to examine the industrial composition of top earnings and its evolution. We will also be able to analyze the evolution of the labor market for top earners (such as tenure, turn-over, and earnings changes within jobs and across jobs). Second, our analysis has remained largely descriptive without trying to test formally specific hypotheses or decompose patterns into various factors. Even though the administrative SSA data have relatively few covariates, it should be possible to expand the analysis in that direction.

More importantly, our analysis has lead us to assemble various SSA data that had not been systematically used for research purposes previously. We hope that our broad analysis of inequality and mobility, as well as the new opportunities for joint research projects between SSA and outside academic researchers, will encourage further research with these extraordinary SSA earnings data which can cast new light on many different aspects of labor economics in the United States.

[59]Levy and Temin (2007) describe the earlier set of institutions as the "Treaty of Detroit" and characterize it by strong unions, very progressive taxes, and high minimum wages, and argue that those institutions have been replaced by the Washington consensus favoring free markets and deregulation.

Appendix

A.1 Data Sample and Organization

• Covered Workers

Table 2.A1 of the *Annual Statistical Supplement* of SSA (2005) presents the evolution of covered employment and self-employment provisions from 1937 to date. At the start in 1937, only employees in commerce and industry were covered. There have been a number of expansions in coverage since 1937.

In 1951 most self-employed workers and all regularly employed farm and domestic employees became covered. The coverage has also been (in some cases electively or for new hires) extended to non-profit organizations and some state and local government employees. A further expansion to state and local employees covered under a state or local retirement system took place in 1954, followed by many smaller change expanding coverage to additional categories of state, local and federal government employees. For this reason, we eliminate from our main sample (referred to as "commerce and industry") workers that fall into categories that have not always been covered. Quantitatively, other than directly obvious categories of public administration, self-employed, farm workers and household employees, these expansions brought into the system a large number of workers in education and health care.

Self-employment and farm earnings do not correspond to W-2 forms, instead SSA obtains this information from the IRS as reported on tax returns. As a result, self-employment earnings were effectively top-coded at the taxable maximum until 1993 (when the cap for Medicare tax was eliminated) and are never present in the data on a quarterly basis. All of it makes it impossible to pursue any reasonable imputation strategy for top incomes in that group. Additionally, the presence of self-employment earnings may potentially interact with withholding and reporting of other types of income. Hence, we exclude individuals with other than occasional self-employment income, i.e. those who have self-employment income in two subsequent years (the number of observations affected is very small). Imputations above maximum taxable earnings from 1951 to 1977 (either our own imputations from 1951 to 1956 or the LEED imputations from 1957 to 1977) are also based solely on employment earnings excluding farm wages. Therefore, excluding self-employment earnings and farm employment earnings has no repercussions for imputations above the top code.

To exclude non-always covered industry categories, we rely on industry codes present in the LEED (starting with 1957). We exclude workers with main source of earnings in the following categories (using SIC classification): 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), public administration (91-97).

These categories were selected by looking at the fraction of individuals in each industry in 1957 who were present in the data in 1950, i.e. prior to expansions (when industry codes are not available). We selected categories with over 60% of newly covered workers (the average for the whole sample was 29%, with no large remaining categories exceeding 40%).

Between 1951 and 1956 no industry codes are present. Hence, we apply a heuristic to correct for the expansion of coverage during that period. We eliminate earnings in 1951-1956 for workers who worked in one of the excluded industries in 1957 or 1958 (if there are no earnings in 1957) and who did not have any covered earnings in 1949-1950. We also eliminate 1951-1956 earnings for workers with no earnings in 1947-1950 and 1957-1960. For the remaining workers working in the excluded industries as of 1957 (who were by construction working in a covered occupation in 1949 or 1950), we randomly assign the date of joining that industry drawn from the uniform distribution on (1950,1957) and erase earnings in 1951-1956 preceding this imputed date. We verified that this procedure brings us close to matching the pattern of employment dynamics in the 1950s.

Figure A1 shows the numbers of workers in our full sample (already excluding self-employed and farm workers) and in the commerce-industry sample that underlies most of the estimates presented in the paper. By construction, the series coincide prior to 1951 and diverge afterwards. We also show how the number of observation relates to employment from the NIPA tables. The commerce and industry sample constitutes between 70 and 90% of overall employment, with a slight downward trend. We also compare our estimate of the number of commerce and industry workers to employment in the same industries constructed using the NIPA tables and find that this relationship is quite stable.

• Top Coding and Imputations Before 1978

The general idea is to use earnings for quarters when they are observed to impute earnings in quarters that are not observed (because the annual taxable maximum has been reached) and to rely on a Pareto interpolations when the taxable maximum is reached in the first quarter. Pareto parameters are obtained from income tax statistics tabulations (published in U.S. Treasury Department: Internal Revenue Service (1916-2004) by size of wage income combined with the Piketty and Saez (2003) homogeneous series estimated based on the same tax statistics source. The important point to note is that we do a Pareto interpolation by brackets because the location of the top code (or 4 times the top code) changes overtime and the Pareto parameter is somewhat sensitive to the threshold of earnings defining the top tail. Each individual*year observation who reaches the annual taxable maximum is assigned a random iid uniformly distributed variable u_{it}. We describe our imputations from 1937 to 1977 by reverse chronological order as the complexity of the imputations is greater in the earlier years.

From 1957 to 1977, the 1% LEED file provides imputed earnings above the top code. This

imputation was originally done using quarterly earnings information and Method II described below. The imputation was based on employment earnings (and excluding farm wages and self-employment earnings). Unfortunately, the quarterly earnings information has not been retained in the LEED file and hence we cannot replicate directly ourselves the imputation. The original Method II imputation for those above 4 times the top code was set equal to a given constant (which only varied by year and gender). From 1957 to 1977, we replace this LEED imputation for observations above 4 times the top code with a single Pareto interpolation:

$$z_{it} = (4 \cdot taxmax) \cdot u_{it}^{-1/a_t},$$

where a_t is the Pareto parameter estimated from the Piketty and Saez (2003) wage income series. a_t is estimated as $b/(b-1)$ where b is average earnings above the threshold $(4 \cdot taxmax)$ divided by the threshold. We pick as the threshold for the Pareto interpolation the percentile (P95, P99, P99.5 or P99.9) threshold from the Piketty and Saez (2003) series closest to the $4 \cdot taxmax$ threshold.

From 1951 to 1956, the 0.1% CWHS also reports the earnings by quarter (up to point where the taxable maximum is reached). This information allows us to apply Method II (described in Kestenbaum, 1976). If the taxable maximum is reached in quarter 1, we do a Pareto interpolation as described above. If the taxable maximum is reached in quarter T ($T = 2, 3, 4$), then earnings in quarters $T, .., 4$ are estimated as earnings in the most recent quarter with earnings exceeding earnings in quarter T or as earnings in quarter T if there is no earlier quarter with higher earnings.

From 1946 to 1950, the 0.1% CWHS reports the quarter in which the taxable maximum is reached (but does not report the amount of earnings in each quarter before the tax code is reached). This allows us to apply Method I to impute earnings. Method I is described in Kestenbaum (1976). Method I assumes that earnings are evenly distributed over the year. Hence, if the taxable maximum X is reached in quarter 1, we assume that annual earnings are above $4 \cdot X$. If the taxable maximum is reached in quarter 2, we assume that annual earnings are between $2 \cdot X$ (when the taxable max is reached at the very end of quarter 2) and $4 \cdot X$ (when the taxable max is reach at the very beginning of quarter 2). Similarly, if the taxable maximum is reached in quarter 3, we assume that annual earnings are between $\frac{4}{3} \cdot X$ and $2 \cdot X$ and if the taxable maximum is reached in quarter 3, we assume that annual earnings are between X and $\frac{4}{3} \cdot X$. We assume that the distribution of earnings in each of those brackets follows a Pareto distribution estimated bracket by bracket from the wage income tax statistics. The formula for imputed earnings z_{it} in the bracket $[z_1, z_2)$ is:

$$z_{it} = z_1 \cdot \left(u_{it} + (1 - u_{it}) \cdot \frac{z_1}{z_2} \right)^{-\frac{1}{a}},$$

where a is the Pareto parameter which is specific to each year and bracket.[60] For the top bracket, the Pareto parameter is estimated as $b/(b-1)$ where b is average earnings above the threshold $(4 \cdot taxmax)$ divided by the threshold.

For each year b is obtained from the Piketty and Saez (2003) series. For brackets below the top, the Pareto parameter a is obtained from the tax statistics using the formula:

$$a = \frac{\log(p_2/p_1)}{\log(z_1/z_2)}, \tag{1}$$

where p_i is the fraction of earners above z_i and z_i are the cap thresholds X, $\frac{4}{3} \times X$, $2 \times X$, and $4 \times X$.

From 1937 to 1945, the 0.1% CWHS reports only earnings up to the top code with no additional information on quarterly earnings for those who reach the annual top code. Hence, the data are effectively top coded up to the social security taxable maximum of \$3,000 for those years. The number of top coded individuals in our main sample grows from about 3% in 1937-1939 to almost 20% in 1944 and 1945 (see Table A2). Because the relative location of the top code changes so much during these years, a single standard Pareto interpolation would not reproduce accurately the wage income distribution from the tax statistics.

Therefore, for that period, we have imputed earnings above the top code using a Pareto interpolation by brackets in order to replicate the top wage income shares from Piketty and Saez (2003). More precisely, we replicate the Piketty and Saez (2003) wage income shares for P90-95, P95-99, and P99-100 up to a multiplicative factor (constant across years) in order to paste our series in 1951.

From 1937 to 1956, the 0.1% CWHS contains relatively few observations at the top, hence the Pareto imputation for the top bracket can sometimes generate extreme values which can have a large impact on top income shares. In order to remedy this noise issue in the imputation, we randomly order top-coded observations and space them equally in the corresponding c.d.f. underlying the Pareto imputation. This method guarantees that we match the top income share exactly without sampling noise.

Note that imputations in various years are independent and that imputations are independent of any earnings information in other years that we may know. In other words, we do not try to impute the mobility patterns for top-coded observations. This procedure is innocuous for the annual income shares of groups bigger than the top-coded group because by construction it matches those share exactly. It is important to note that it also provides an unbiased estimate of top income share based on averages over a number of years if all individuals with imputed income remain in the top income group. Because in 1951-1977 imputations apply to at most 1% of the sample and, empirically, the likelihood of an observation falling out from the top quintile for reason other than death or retirement is extremely low, this procedure is expected to provide

[60] The same formula applies for the top bracket where $z_2 = \infty$.

a good approximation of the income share of the top quintile of distribution averaged over a number of years.

• Data cleaning

As pointed out by (Utendorf, 2001/2002), there are a number of errors in the uncapped earnings for year 1978 to 1980 that are due to errors in the coding of the data and which bias severely top income shares and mobility measures if not corrected for. There are also some erroneous observations in some years after 1978 (although much less common).

We first explain the nature of these problems, and then describe our procedure. We also describe the procedure that to use in our ongoing work that deals with the problems more precisely and explain why it is not applied in this paper. The problems are already present in the administrative database (Master Earnings File, MEF) from which CWHS and LEED are derived. Among other things, the MEF contains information on total compensation (starting in 1978) and Social Security covered earnings derived from W-2. Each W-2 corresponds to one or more records in the database. A single W-2 may correspond to multiple records, either to accommodate multiple boxes on W-2 or to split large numbers. A single employment relationship may correspond to multiple W-2s, for example when the W-2 was later amended. Subsequent corrections of errors are also recorded as additional records in the MEF. The research databases are obtained from the MEF by aggregating information to the employer level (LEED) or individual level (CWHS). Any problems in the underlying MEF records are then potentially confounded and hence hard to detect due to aggregating them with other information. The problems in the administrative data take a variety of forms: some records are duplicated, adjustments may be made to FICA earnings but not to total compensation, typos are present and so on. Problems in the MEF are common in 1978-1980, the dominant (but not the sole) one being omission of the decimal point in total compensation figure.[61] The documentation for the MEF indicates that the total compensation in 1978 and soon after may reflect the decimal point as being in the wrong position but does not provide a way to identify affected observations. These problems affect total compensation. The (top-coded) FICA earnings are of very high quality, presumably because they are the critical input in computing benefits.

Using the MEF, these problems are hard but not impossible to identify and address by comparing FICA and total compensation, searching for duplicates, checking for the lack of adjustments to total compensation when adjustments to FICA are present and so on. An ideal correction routine would work directly on the MEF. In our ongoing work, we follow this path

[61] Another important type of problem arises when corrections to W-2 were made: they are implemented by adding two new records — one showing the amended income and another with negative income equal to the old value so that it gets offset when aggregating. In practice, these negative numbers are correctly included in the FICA field but sometimes missing from the total compensation field making aggregation of total compensation less reliable.

and work directly with extracts from the MEF. However, estimates presented in this paper rely on our earlier and more heuristic data cleaning procedure that incorporates information on total compensation and FICA earnings present in 1% CWHS and LEED. The main reason for this approach is our desire to retain consistency of pre- and post-1978 data. CWHS and LEED are derived from the MEF after about a year and are not subsequently updated to reflect any future adjustments and undergo some additional processing. Starting with 1978, CWHS and LEED can be thought of as (processed) extracts from the MEF, however prior to 1978 these datasets contain some information that is not present in the modern MEF.[62] Since MEF does not contain detail information for years prior to 1978, data cleaning procedure relying on the MEF would require replicating the process of creating LEED and CWHS in order to retain consistency with pre-1978 data, we did not attempt to do so. However, we rely on the 1% MEF in 1978-2004 to address another deficiency of the data. In some years a substantial number of observations is missing from CWHS but present in the MEF.[63] We investigated carefully the patterns of entry/exit from the sample and did not find evidence that such problems were present prior to 1978. Not addressing this issue would result in discrete changes in the number of observations used driven by factors other than Social Security coverage.

We proceed as follows to construct earnings variables in 1978-2004. We construct corrected total compensation for everyone as described below. However, we use FICA-covered earnings for individuals with earnings below taxable maximum and use the corrected total compensation only for those with earnings above the taxable maximum.

Our objective is to obtain a dataset that preserves information for high-income individuals and does not distort mobility patterns. In designing the data cleaning procedure, we compared income distributions, mobility patterns and joint distributions of incomes from all available sources with those for years that are not affected by these issues and with earnings distribution based on income tax records. The procedure was designed to be as conservative as possible so that we do not correct observations that need not be adjusted.

Unless otherwise indicated, the procedure is applied to all years starting with 1978 (but in practice affects few observations after 1980). We first supplement CWHS earnings by earnings from the MEF (using the same definition as one used for earnings in the CWHS to maintain consistency) if CWHS is missing. Next, we verified that virtually all 1978-1979 observations that are missing in LEED but present in the CWHS and that have total earnings greater than $100,000 have FICA earnings (when below taxable max) and earnings in adjacent years smaller

[62] Obviously, how earnings histories are recorded and stored by the SSA evolved over time and the CWHS has not always been a simple extract from the administrative database. In fact, the CWHS predates the computer technology: it started in 1940, with information originally recorded on punch cards (Perlman and Mandel, 1944).

[63] The worst case in that respect is 1981, when 50,000 out of 900,000 observations are missing. The extent of this last problem generally falls over time, by 1987 it applies to less than 2% of observations and by the end of our sample it falls below 1%.

by the factor of the order 100. In many cases, FICA earnings are exactly 1/100th of total earnings. Consequently, we divide CWHS earnings in such cases by 100. There are 2400 cases of this nature in 1978 and about 1400 in 1979. We are confident that over-correction here, if any, is limited to a handful of cases.

In other cases, we use CWHS total earnings if (1) LEED earnings are missing (2) CWHS earnings are greater than 50 and smaller than 5 times LEED earnings or (3) (in 1978-1979) when CWHS earnings exceed LEED earnings by a multiple of 100,000 with CWHS above taxable max and earnings in at least one of the three following years equal to at least a half of CWHS earnings.[64] If none of these is the case, we start with LEED earnings.

We compare Social Security earnings with total compensation and if the latter is 100 times greater than the former (plus or minus $100), we use Social Security earnings. For other observations we proceed with a more heuristic algorithm. Candidates to be corrected are defined as follows: an observations must have FICA earnings higher than taxable max minus 10 or total earnings must exceed FICA earnings by a factor of at least 5, with FICA earnings positive. We make adjustments only to those observations among the ones identified above that have earnings in adjacent years that are very much out of line. We use income in the three following years (fewer years in 2002-2004) and income in two preceding years with the exception of 1978-1980 when we use instead income in 1977. Starting with the last year, we correct by dividing by 100 or reverting to LEED in cases where LEED and CWHS were different by a multiple of 100,000 if and only if the following three conditions hold: (1) income in any of the adjacent years as specified above is not zero, (2) income in all the adjacent years is less than 20 of income in the year considered and (3) if 1977 income is used, it is not at the taxable max. We repeat this step one more time for 1979 and 1980 so that some additional corrections take place based on already corrected observations.

In our final dataset, in 1978, 50,000 out of approximately 870,000 observations have their origin in LEED and in 1979 this is the case for 100,000 of approximately 900,000. In other years, earnings have their source only in CWHS or MEF.[65] Due to the multitude of tests that we apply before an observation gets corrected, the number of observations that are affected by our correction procedure is small (and the numbers below are overestimates because we construct the corrected earnings measure for all observations, including those with earnings below the taxable maximum for which we end up using FICA earnings anyway). Other than the accurate adjustment of observations missing from LEED mentioned above, we end up correcting about 6900 observations in 1978, 5600 in 1979 and 800 in 1980. Afterwards, this procedure usually affects 500 or fewer observations, with the exception of 1982, 1987, 2002, 2003 and 2004 when it affects approximately 1000 cases. Although the number of affected observations is very

[64] We verified that W2-level earnings data in 1978-1979 in LEED never exceed 100,000 and in fact include only the last five digits (and decimal part).

[65] In 1978-1980, few observations from MEF need to be used.

small relative to the sample size, their pre-corrected values were heavily concentrated at the top and both mobility and inequality patterns at the top were obviously and very significantly incorrect. These adjustments bring earnings shares in line with tax statistics and generate mobility patterns that do not exhibit significant discontinuities.

A.2 Series Estimation

- **Sample Selection**

We use as the base year t sample individuals aged at least 18 by the end of year t and aged at most 70 by the beginning of year t.

Our base sample is also defined for individuals whose annual earnings are least equal to a minimum threshold $X(t)$. $X(t)$ is defined at $\$2,575$ in 2004 which is 1/4 of a full time full year minimum wage (500 hours times \$5.15). $X(t)$ is defined for earlier years using the Average Wage Index (AWI) estimated by SSA from 1951 to present. For years 1937 to 1950, the SSA does not compute an AWI. We have estimated the AWI based on the nominal annual average wage and salaries from National Income and Product Accounts. This annual average wage and salaries is directly estimated as total wages and salaries divided by the number of employees (which includes both full time and part time employees).

- **Earnings Shares and Gini**

For each year t, we divide our sample of interest into 10 groups P0-20, P20-40, P40-60, P60-80, P80-90, P90-95, P95-99, P99-99.5, P99.5-99.9, P99.9-100. We then obtain earnings shares by dividing earnings accruing in each of those groups by total earnings for our sample of interest (denoted by P0-100). Individuals excluded from the sample of interest (either because of their age, or because their earnings are below $X(t)$) is called the out group and forms the 11th group.

Gini coefficients are estimated using the standard exact formula of computing the correlation between earnings and rank in the distribution.

- **Multi-Year Earnings Shares**

We also compute earnings shares based on multi-year averages (such as 3 or 5 years). In that case, we average earnings over a 3 or 5 year period using the AWI. Our year t sample is defined as individuals with earnings in year t above $X(t)$ and aged 18 to 70 over the 3 or 5 year period. We impose the minimum threshold on year t so that our sample is directly comparable to the annual earnings share samples. We then rank individuals based on their multi-year averages and compute corresponding multi-year earnings shares.

- **Short-Term Mobility**

We consider again our 10 earnings groups plus the out group.

For each year from 1937 to present, we estimate an 11x11 mobility matrix showing in each cell (a, b) the number of individuals falling in group a in year t and in group b in year $t+1$. We then repeat the same procedure but for mobility between year t and year $t+3$, $t+5$, $t+10$. For years prior to 1978, because of top coding, we limit the cells up to the top 1%. For years 1937 to 1945, we have to further limit our mobility computations at the top because of top coding limitations for those years. The smallest group we can consider is the top decile and even the top quintile for 1943-1945.

The mobility series presented are always conditional on staying in our sample of interest. For example, the probability of staying in the top quintile after 1 year is defined as the ratio of individuals in top quintile in both years t and $t+1$ divided by the individuals in the top quintile in year t who are still in our sample of interest in year $t+1$ (age 18 to 70 and earnings above the minimum threshold). We present in the sensitivity analysis section some comparison results based on unconditional mobility.

• Gender, Black-White and Immigrant gaps

For gender, Black-White and Immigrant gaps, we compute the fraction of Women, Black and Immigrants in various earnings groups. We express the fraction Black and Immigrant relative to the overall share of population in these groups. We estimate the Black and Immigrant adult population share using decennial Census estimates from 1930 to 2000 and using the Statistical Abstract of the US (2006 edition) for year 2004. Those sources provide the fraction of Blacks and Immigrants in the population aged 20-64. We do not correct for the fact that our population of interest is 18-70. We use cubic splines to interpolate between those years.

• Career Mobility and Inequality

For long term mobility and inequality series, we divide one's career into three stages. Early career is defined as the calendar year the person reaches 25 to the calendar year the person reaches 36. Middle and later careers are defined similarly from age 37 to 48 and age 49 to 60 respectively. For example, for a person born in 1944, the early career is calendar years 1969-1980, middle career is 1981-1992, and late career is 1993-2004. Hence the cohort born in 1944 is the latest for which our data can capture the full career. Symmetrically, the cohort born in 1912 is earliest for which our data can capture the full career.

We estimate average individual earnings at each stage of the career for each individual. Averages are always performed using the AWI. Our sample of interest is defined as individuals whose average earnings in a given stage of the career is above the minimum indexed threshold. We then rank individuals within their cohort of birth into quintiles at each stage of their career. We cannot consider groups smaller than quintiles because of top coding imputations.

We compute earnings shares for each quintile by cohort and career stage. We estimate the probability of moving from quintile a to quintile b from the early career to middle career, middle to late career, and early to late career. Those long-term mobility matrices are always computed conditional on having average earnings in each career stage above the minimum threshold. Those mobility matrices are based on cohorts (so that we always compare individuals relative to the individuals born in the same year) and hence are always be presented by year of birth.

We have extended our career mobility and long-term gender and Black-White gaps estimates to later cohorts for which we do not have complete earnings information. To do so, we compute the average of earnings over the first six years of any given stage of the career (25-30, 37-42, 49-54) and scale the resulting series to match the full 12-year period value for the last cohort that we can observe for 12 years. This provides as with six extra data points for the younger cohorts that are displayed on our figures in gray. In the sensitivity analysis section we show that series based on such six-year averages track reasonably well the full 12-year series.

A.3 Sensitivity Analysis

Figure A2 compares estimates of the Gini coefficient for our commerce-industry core sample and various alternative samples. Figure A2A displays the Gini coefficient for a broader sample including all industrial groups. The overall trend and pattern is the same. The Gini including all industries is lower today than the commerce and industry sample while the Gini for the two samples was almost identical in 1970. This is consistent with Katz and Krueger (1991) who show that inequality within the public sector has increased much less than in the private sector in the 1980s. We cannot document changes in inequality outside the commerce and industry sector during the Great Compression. However, Margo and Finegan (2002), using census data, showed that a similar compression took place within the public sector as well. This suggests that the overall U-shape pattern for the Gini should be robust to including all sectors.

Figure A2A also displays the Gini coefficient when increasing the minimum threshold by a factor 4 (so that it is equal to a full-time full-year minimum wage \$10,300 in 2004). Unsurprisingly, the Gini is lower for that sample. However, the overall U-shape pattern and the key inflection points remain identical. Figure A2A also displays the Gini coefficient when excluding the top 1% earner. The figure shows that the increase in the Gini in the 1980s and especially the 1990s is noticeably smaller when excluding the top 1%. This is not surprising that the top 1% share has increased dramatically and the share going to the top affects significantly the Gini (this can be easily seen by drawing the Lorenz curve). This shows that Gini estimates based on top coded data such as the CPS are likely to be severely biased relative to administrative data with no top code and good coverage at the top. Finally, Figure A2A shows that the U-shape pattern is also robust to limiting the sample to workers aged 25-60 (inequality is unsurprisingly lower for that narrower age group).

Figure A2B displays the Gini coefficient for various demographic groups. The Gini coefficients white and those born in the U.S. is almost distinguishable from the series based on the full population, which is not surprising given that those groups constitute the great majority of the population. The Gini coefficient for the blacks is much lower than overall. It follows a different pattern than the overall Gini until the early 1970s, peaking during the WWII and stabilizing afterwards. Forces affecting inequality since the 1970s influenced Blacks as well, as the inequality among them grew in line with the overall trend. The Gini coefficient for immigrants follows similar pattern as the overall for most of the period, with the exception of the early 1940s and the 1990s. The Gini coefficient among immigrants stabilized in the 1990s, presumably reflecting an increase in low-income immigration during that period.

Figure A3 shows that restricting the sample to commerce and industry does not have an important effect on our mobility figures. On the other hand, there is evidence that, contrary to our baseline sample, mobility for men has been declining suggesting that the overall stability of mobility patterns has to do with the difference in changes experienced by men and women.

All mobility figures in the paper present probabilities of moving between groups conditional on staying in the sample (i.e., excluding retirements, disability, unemployment and deaths). Figure A4 shows the alternative unconditional probability. By construction, the unconditional probabilities are lower than conditional ones but their time patterns are very similar.

Figure A5 illustrates how we construct imputations for cohorts for which we have less than twelve years of data at a given stage of a career. We show in gray the probability of staying in P80-100 based on average earnings over the first six years of a career and in black the corresponding regular series. These series extend for six more years. Our imputation scales the last seven years of the 6-year series so that it matches the 12-year one; we show the extension in the graph as well. The figure illustrates that 6-year and 12-year based series are close to parallel suggesting that this out-of-sample imputation is likely to be informative.

Figure A6A and A6B explore how our long-term upward mobility results are affected when we control for the distribution of base earnings within P0-40. More precisely, we re-estimate the upward mobility series by re-weighing the fraction of women (or men, blacks, or foreign-born) in P0-20 versus P20-40 in base year so that they are equal to those in the overall distribution. The graphs show that this has only a minimal effect on the patterns we find suggesting that fully controlling for base earnings would not change our findings. Table A4 reveals why this is the case for women: fraction of women in P0-20 and P20-40 is very similar so that reweighing makes little difference.

Figure A7 displays the fraction of women in the overall sample and in the fourth quintile P60-80 by career stage and birth cohort. The figure shows that women participation increased slowly overtime (in contrast to the fraction of women in the top quintile). The figure also shows that the fraction of women in P60-80 increased sharply but has reached an asymptote for recent

cohorts suggesting that the long-term gender gap will not close entirely.

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Figures footnotes

Figure 0: Sample is the core sample defined as all employees in Commerce and Industry with earnings above minimum threshold ($2,575 in 2004 and indexed using average wage for earlier years) and aged 18 to 70 (by January 1st of a given year t). Commerce and Industry is defined as all industrial sectors excluding government employees, agriculture, hospitals, educational services, social services, religious and membership organizations, and private households. Only commerce and industry earnings are included. Self-employment earnings are fully excluded. See the appendix for details.

Figure 1: Sample is the core sample (see Figure 0 footnote)

Figure 2: Sample is the core sample (see Figure 0 footnote). Earnings above the top code (annual social security cap from 1937-1945 and 4 times the annual cap from 1946-1977) are imputed using Pareto distributions calibrated based on wage income tax statistics. Earnings since 1978 are fully uncapped.

Figure 3: Sample is white males in the core sample with earnings greater than $10,300 in 2004, indexed using average wage. An individual is considered present in the sample when earnings are above the minimum threshold, entry and exit into the sample are defined accordingly. Series presented in Panel C are constructed based on subsamples that impose additional restrictions. The "over 40 years old" sample includes individuals 40 or older in the given year. The "in sample 1937-1956" group includes those who are 21 and over in a given year and present in the sample every year between 1937 and 1956 as along as they are between 21 and 60. The "no entry/exit during war" subsample includes those who are 30 or over and excludes individuals with (1) war-related exits defined as being present in the sample in 1937-1939 and absent for at least one year between 1941 and 1945 or (2) war-related entries defined as not being present in the sample in 1937-1939 but present in at least one year between 1941 and 1945.

Figure 4: Sample is core sample (see Figure 0). Probabilities of staying in top 0.1% group in Panel A are *conditional* on being in the top 0.1% group in base year and staying in the core sample after 1, 3, 5, or 10 years. In Panel B, 3 and 5 year averages in year t are estimated for individuals with earnings above the minimum threshold in the middle year t (earnings can be zero in other years) and alive and aged 18 to 70 in the 3 (or 5) year window. Earnings over the 3 or 5 year window are averaged using the average wage index. Panel C displays the location in year $t-10$ of top 1% core sample earners in year t *conditional* on being in the core sample in year $t-10$.

Figure 5: Sample is core sample (see Figure 0). 5 and 11 year averages in year t are estimated for individuals with earnings above the minimum threshold in the middle year t (earnings

can be zero in other years) and alive and aged 18 to 70 in the 5 (or 11) year window. Earnings over the 5 or 11 year window are averaged using the average wage index.

Figure 6: Sample is core sample (see Figure 0). Panel A displays the probabilities of staying in group P0-40 (P60-100) after 1 year *conditional* on being in group P0-40 (P60-100) in base year and staying in core sample after 1 year. Panel B displays the probabilities of moving from P60-100 to P0-40 (P0-40 to P60-100) after 1 year *conditional* on being in group P60-100 (P0-40) in base year and staying in core sample after 1 year. Shaded areas denote recession months defined using NBER dates (yearly tick marks correspond to the middle of the year). Because of small sample size, series before 1957 are smoothed using a weighted 3-year moving average with weight of .5 for cohort t and weights of .25 for $t-1$ and $t+1$ (sample size of SSA data is 0.1% up to 1956 and 1% afterwards).

Figure 7: Sample in year t is core sample (see Figure 0) with additional restriction that individual is alive and aged 18 to 70 in the 11 window centered around middle year t. The figure displays the probability of moving from P0-40 to P80-100 after 10 (15, 20) years *conditional* on being in group P0-40 in base year and staying in core sample (with additional restriction as in base year) after 10 (15, 20) years. Percentile groups in year t $(t+10, t+15, t+20)$ are defined based on 11 year earnings averages (centered around middle year t $(t+10, t+15, t+20)$ and using average wage index) and conditional on earnings in middle year being above the minimum threshold and conditional on being alive and aged 18 to 70 in the 11 window around middle year. Because of small sample size, series including earnings before 1957 are smoothed using a weighted 3-year moving average with weight of .5 for cohort t and weights of .25 for $t-1$ and $t+1$.

Figure 8: Sample is career sample defined as follows for each career stage and birth cohort: all employees with average Commerce and Industry earnings (using average wage index) over the 12-year career stage above the minimum threshold ($2,575 in 2004 and indexed on average wage for earlier years). Note that earnings can be zero for some years. Quintiles are then defined within each birth cohort based on average (Commerce and Industry) earnings in each career stage. Probability of moving from quintile q_1 to quintile q_1 from a career stage s_1 to career stage s_2 is conditional on being in the career sample in both career stages s_1 and s_2 and conditional on being in quintile q_1 in stage s_1. Because of small sample size, series including earnings before 1957 are smoothed using a weighted 3-year moving average with weight of .5 for cohort t and weights of .25 for $t-1$ and $t+1$. Estimates in lighter grey are imputed based on less than 12 year of earnings (as the career stage is right-censored in 2004), see appendix for details.

Figure 9: Sample is career sample for each given stage and birth cohort (see Figure 8). Quintile shares are defined within each cohort and career stage. Smoothing as in Figure 8.

Figure 10: Sample is core sample (see Figure 0).

Figure 11: Sample is core sample (see Figure 0).

Figure 12: Sample is core sample (see Figure 0). Panels A and B display the fraction of women in various groups. Panel A displays the average earnings ratio of women to men on the right axis.

Figure 13: Sample is core sample (see Figure 0). Panels A and B display the fraction of Blacks in various groups (relative to the fraction of Blacks in the adult population aged 18 to 70 estimated from decennial Census data and cubic spline interpolation between census years). Panel A displays the average earnings ratio of Blacks to Whites on the right axis.

Figure 14: Sample is core sample (see Figure 0). Panels A and B display the fraction of foreign born individuals in various groups (relative to the fraction foreign born in the adult population aged 18 to 70 estimated from decennial Census data and spline interpolation between census years). Panel A displays the average earnings ratio of foreign born to natives on the right axis.

Figure 15: Sample in Panel A is core sample with same restriction and smoothing as in Figure 7. Probabilities for each group (such as women) are also conditional on belonging in the group. Sample in Panel B is career sample (as in Figure 8). Probabilities for each group (such as women) are conditional on being in the group (smoothing and imputations beyond 2004 is as in Figure 8).

Figure 16: Sample is career sample for each given stage and birth cohort (see Figure 8). Quintile shares are defined within each cohort and career stage. Quintile shares for men are computed in the career sample restricted to men (smoothing is as in Figure 8).

Figure 17: Sample is career sample for each given stage and birth cohort (see Figure 8). Panel A reports the fraction of women in the top quintile for each career stage and birth cohort groups (smoothing and imputations beyond 2004 as in Figure 8). Panel B reports the fraction of Black in the top quintile (relative to blacks at the given career stage and birth cohort) for each career stage and birth cohort groups. Panel B series are smoothed *throughout* using a weighted 3-year moving average with weight of .5 for cohort t and weights of .25 for $t-1$ and $t+1$.

Figure 0: Aggregate SSA Earnings and Workers

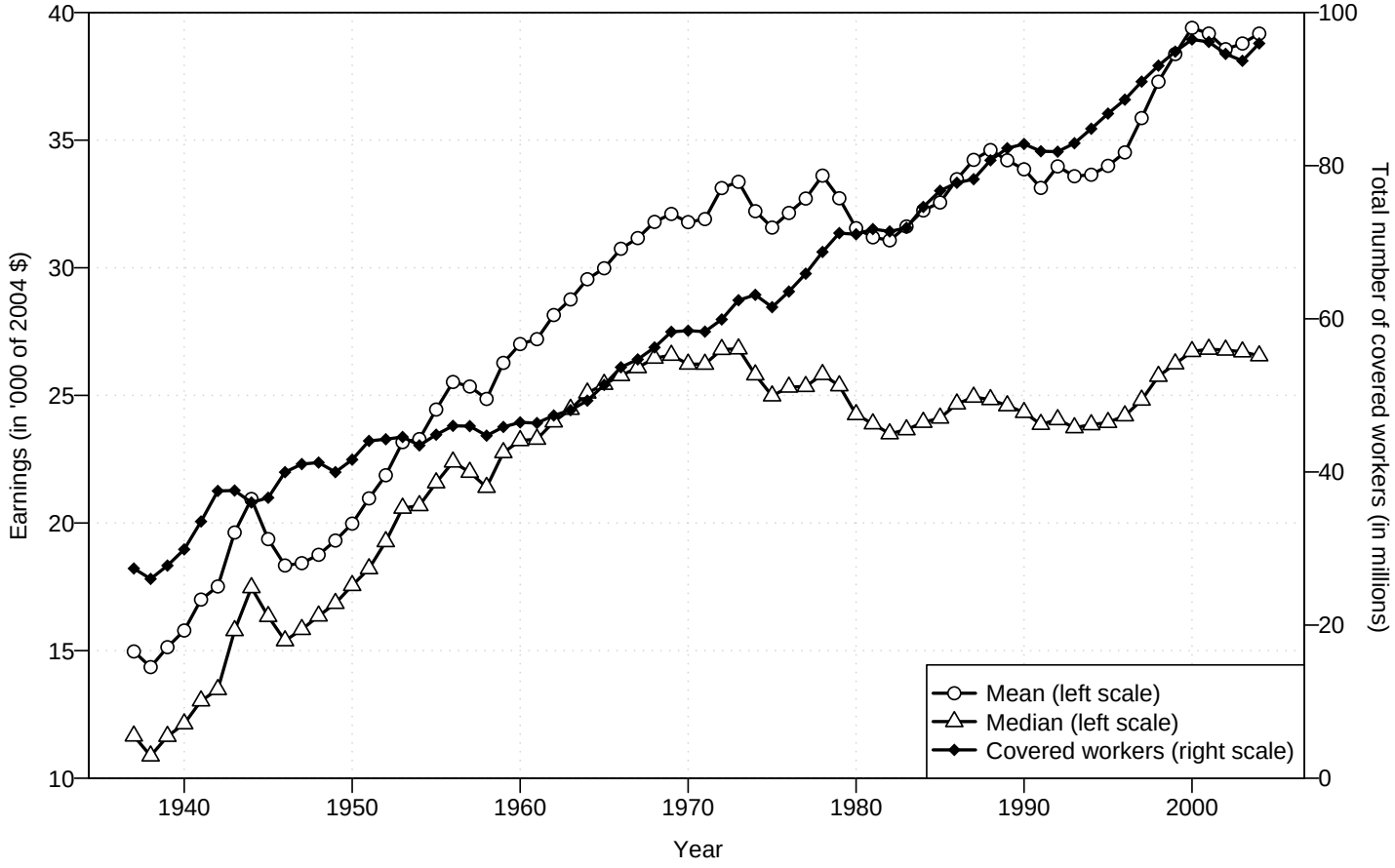

Figure 1: Gini coefficient

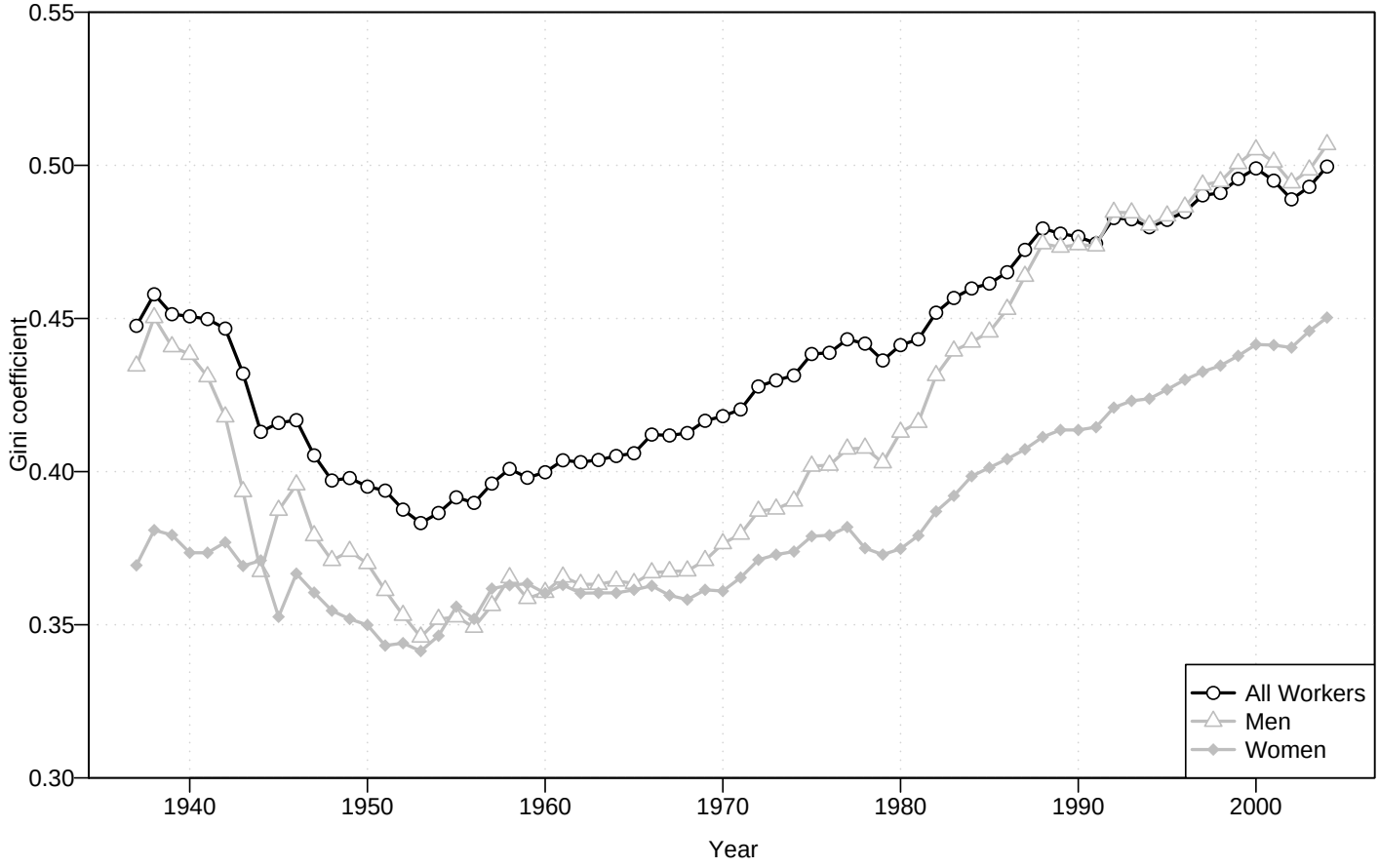

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Figure 2A: Bottom and Middle Earnings Shares

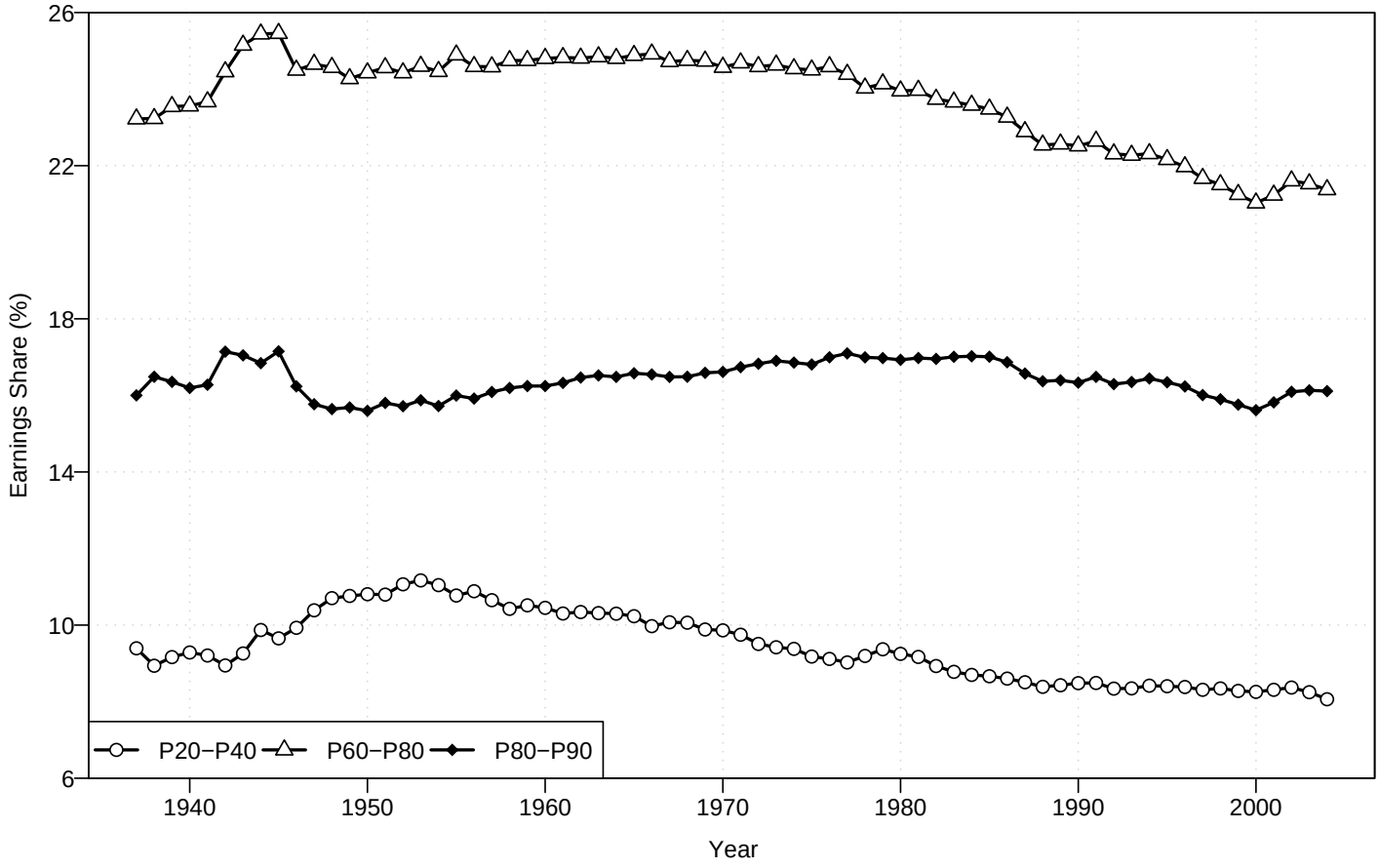

Figure 2B: Upper Earnings Shares

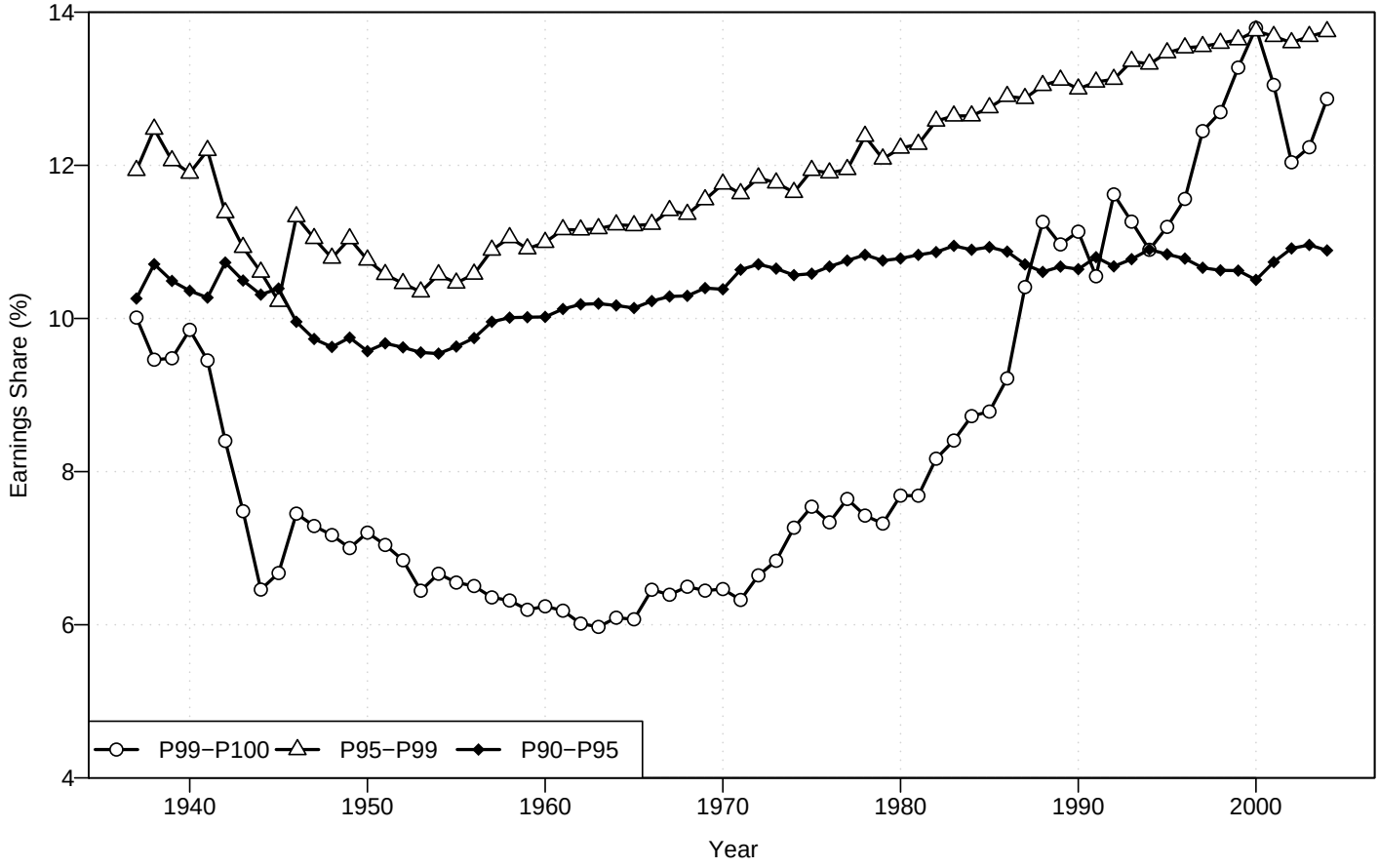

Figure 2C: Top Earnings Share

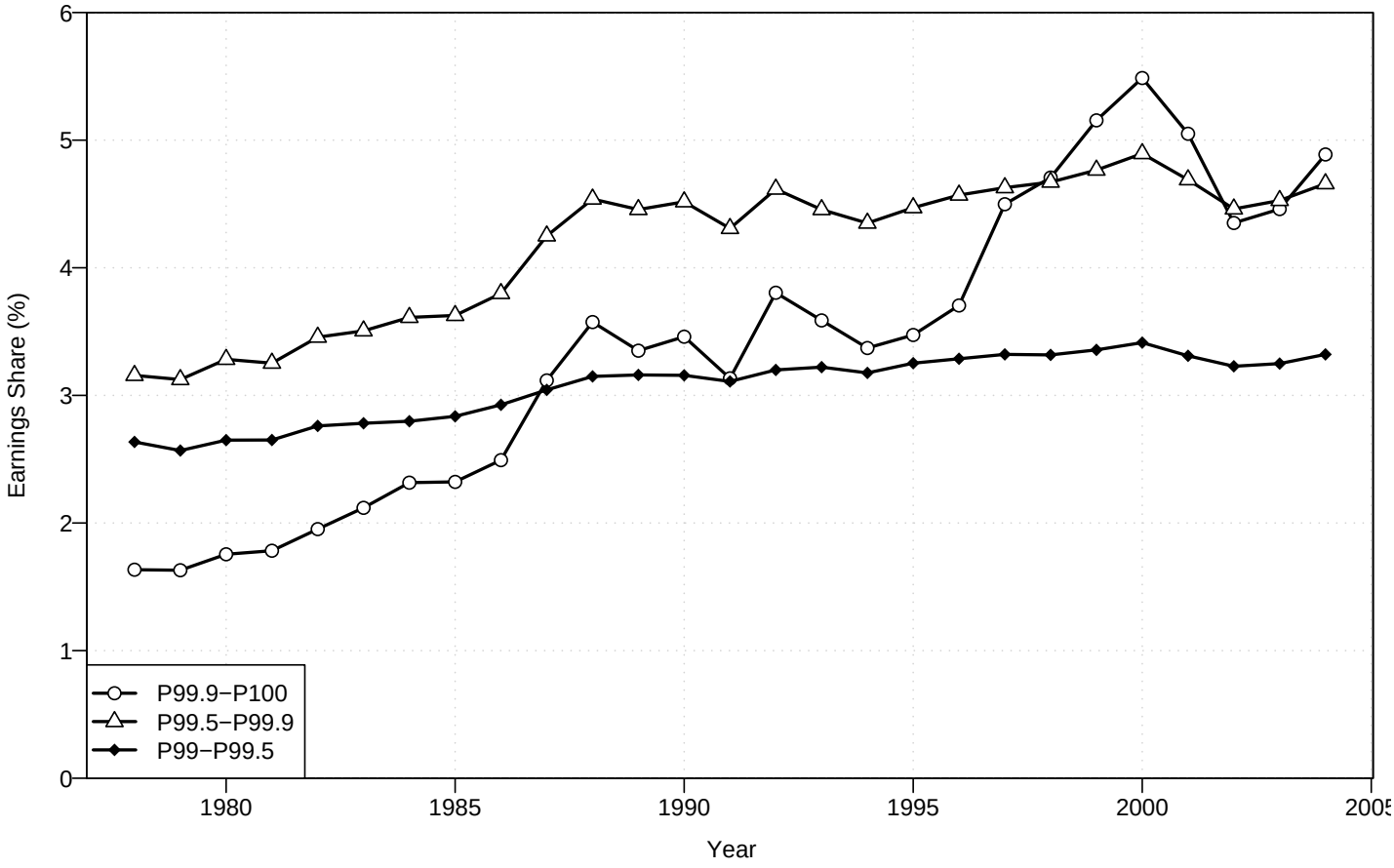

Figure 3A: Great Compression (White Males)

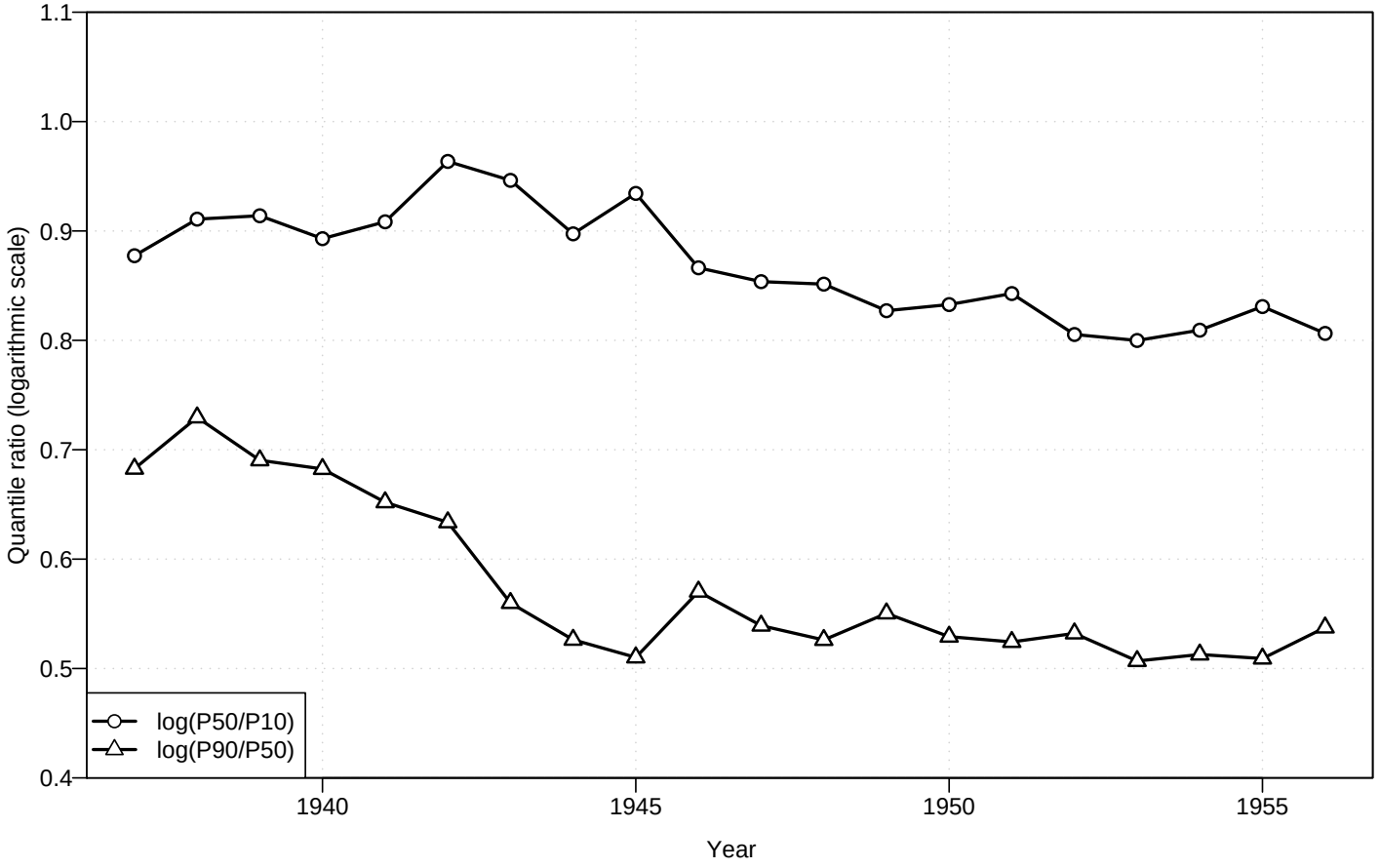

Figure 3B: Great Compression: Entry and Exit

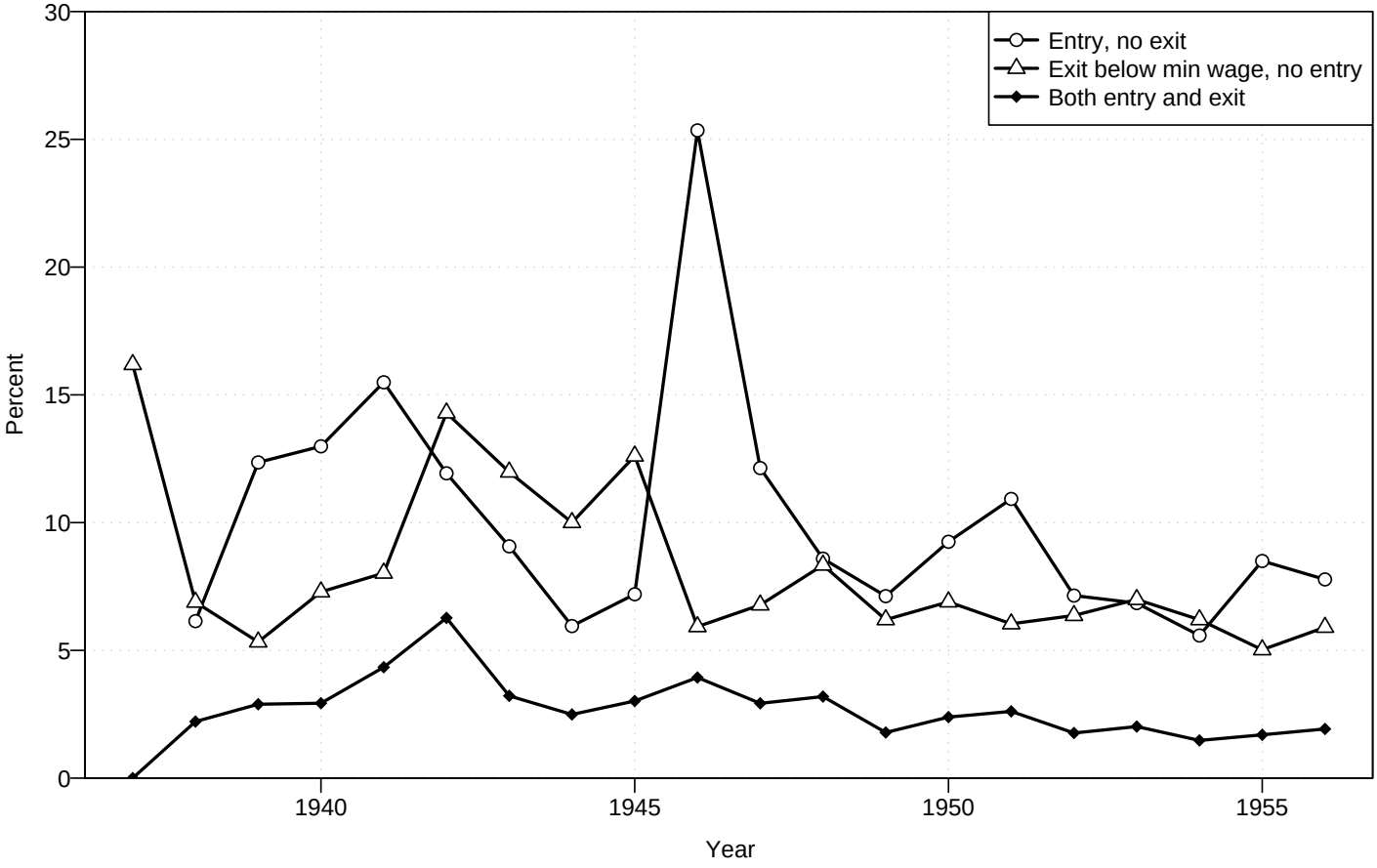

Figure 3C: Great Compression at the Bottom of the Distribution (White Males) − log(P50/P10)

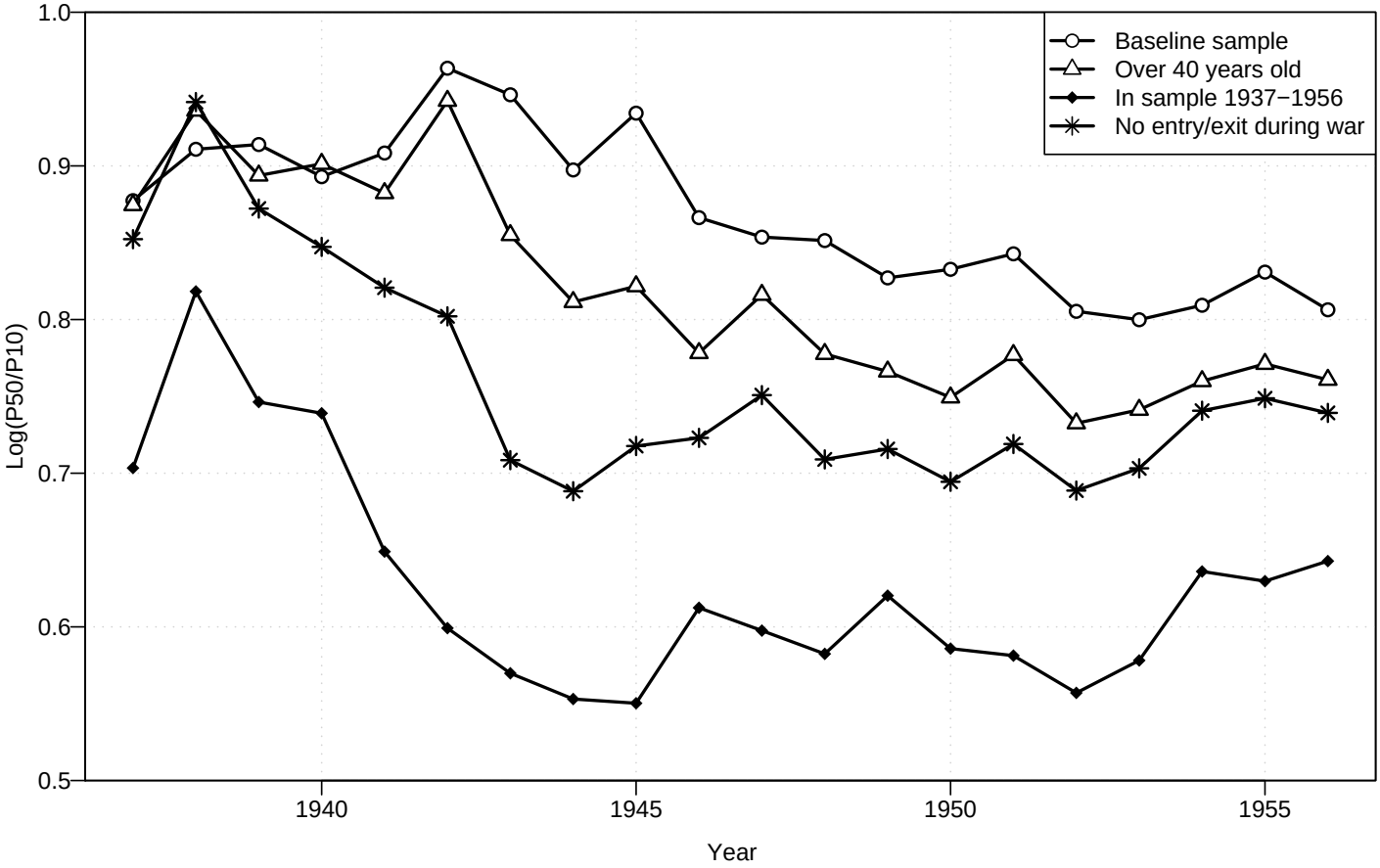

Figure 3D: Great Compression − Quantiles

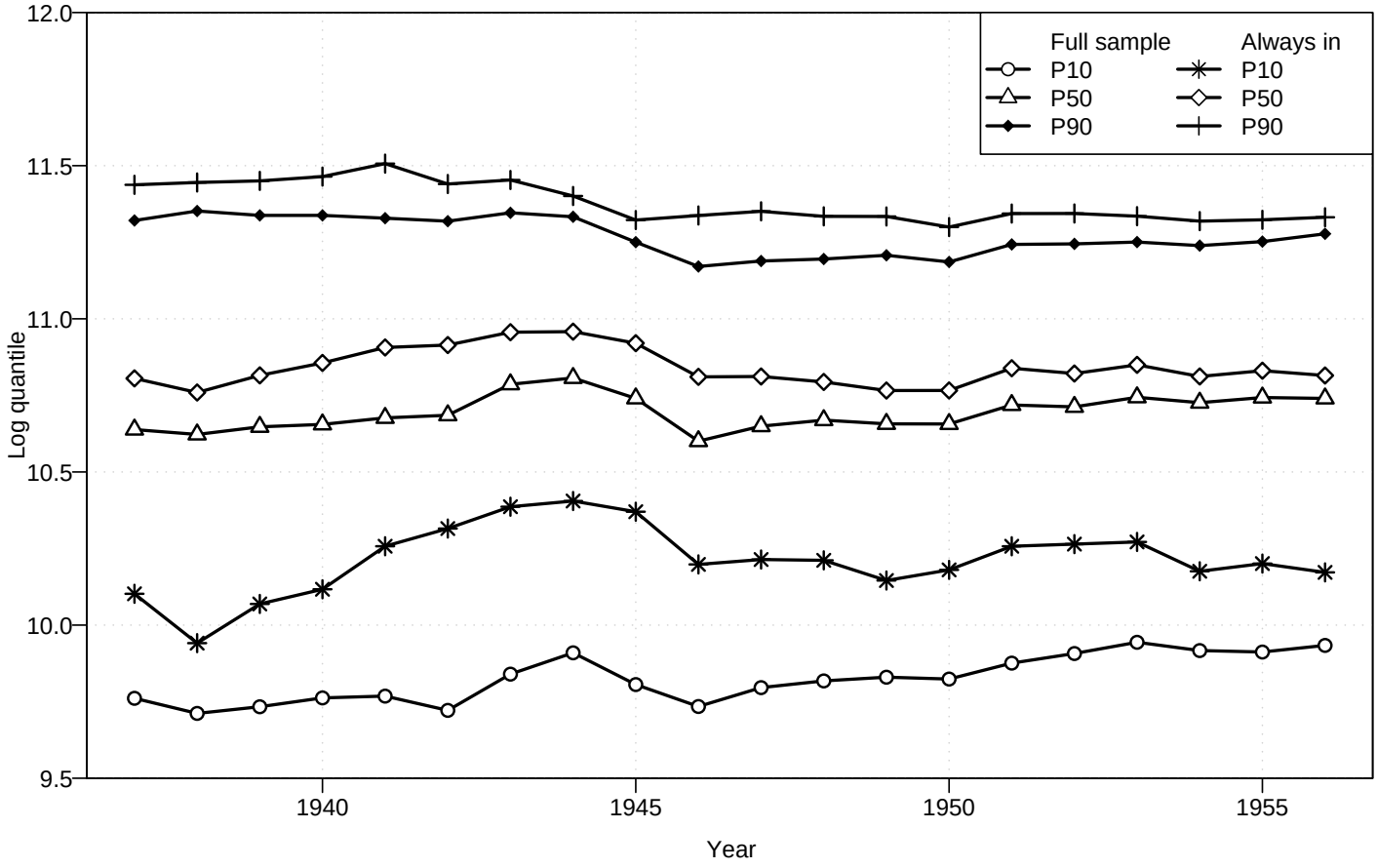

Figure 4A: Probability of Staying in Top 0.1%

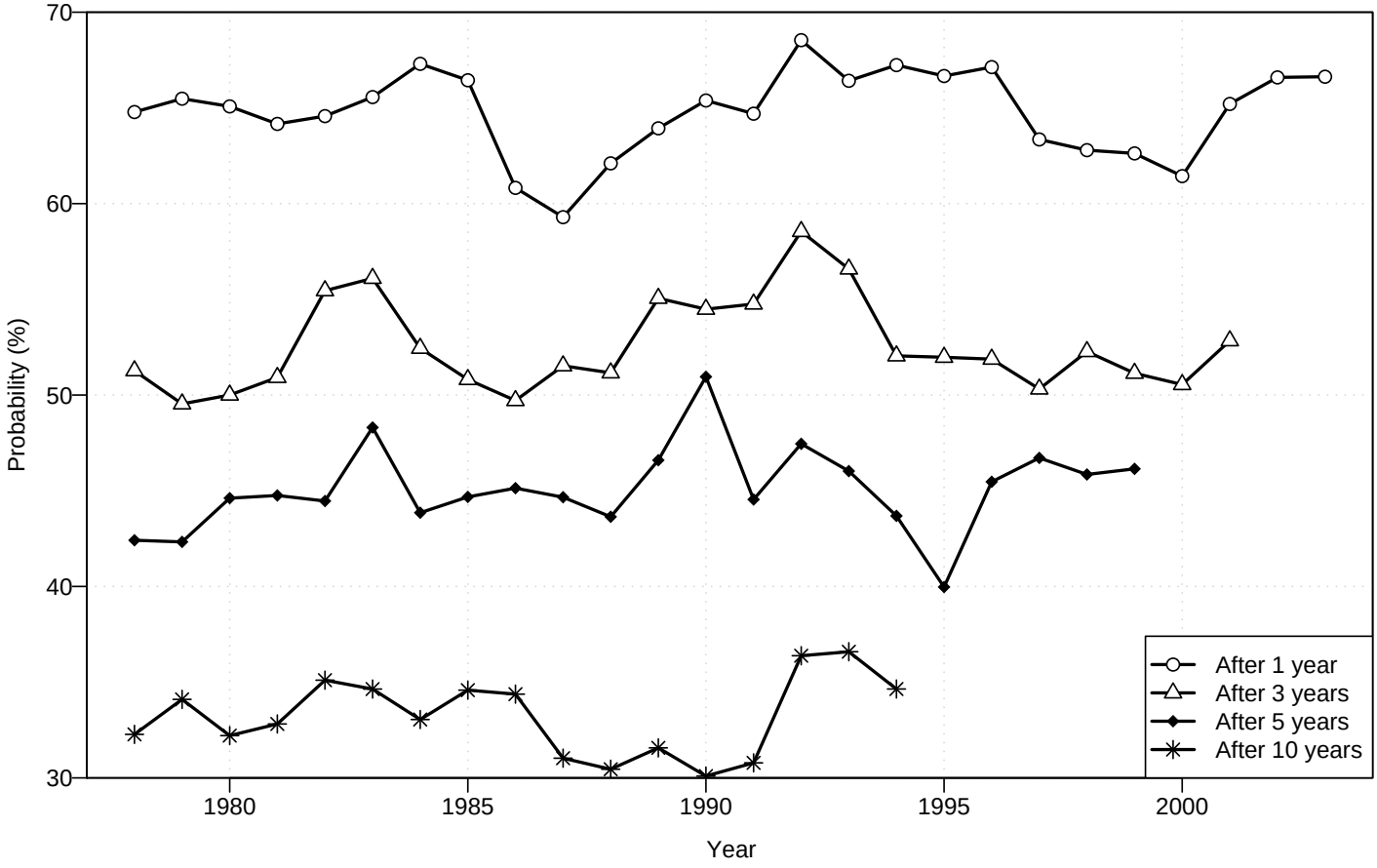

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Figure 4B: Top 0.1% Multi−Year Earnings Share

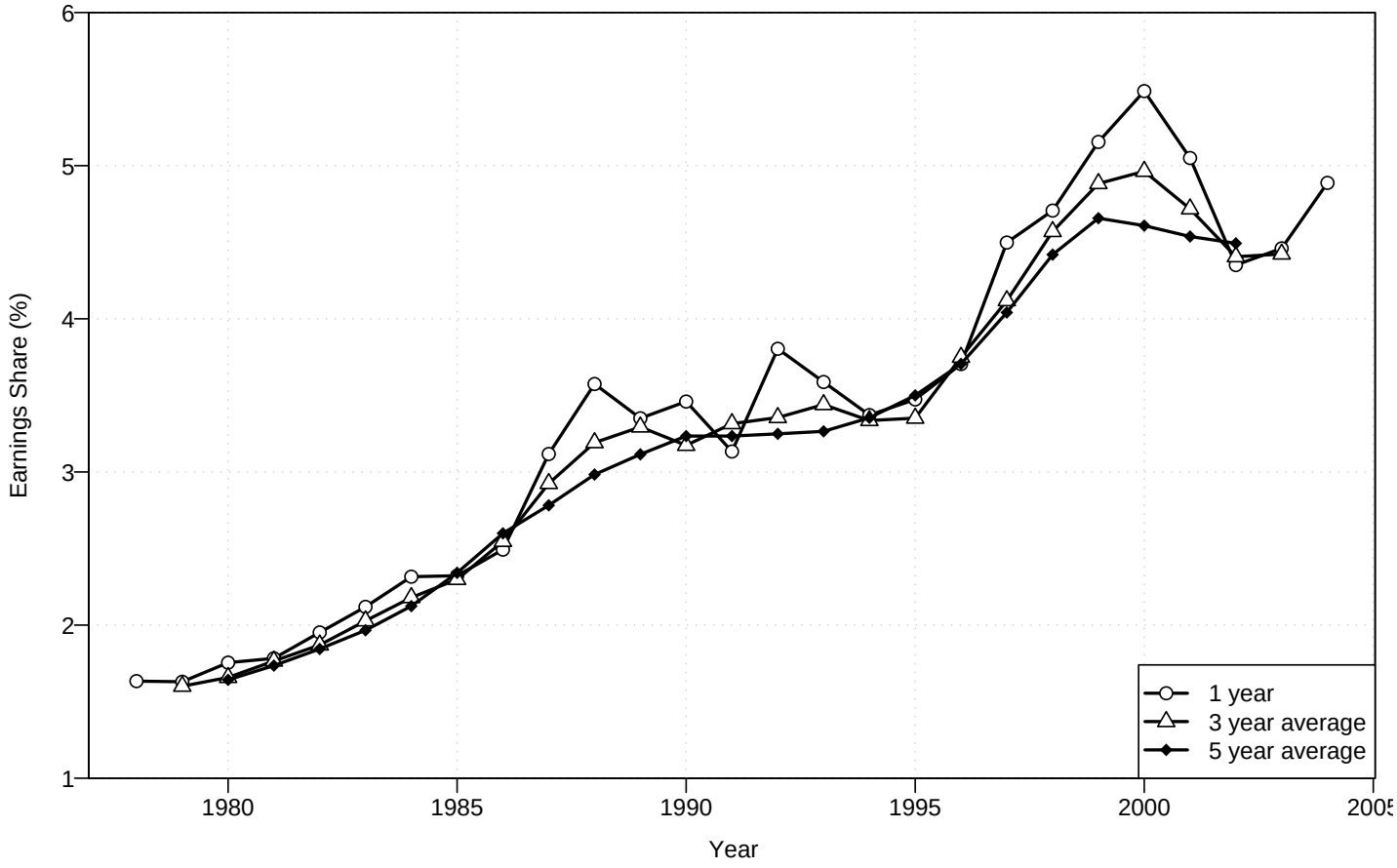
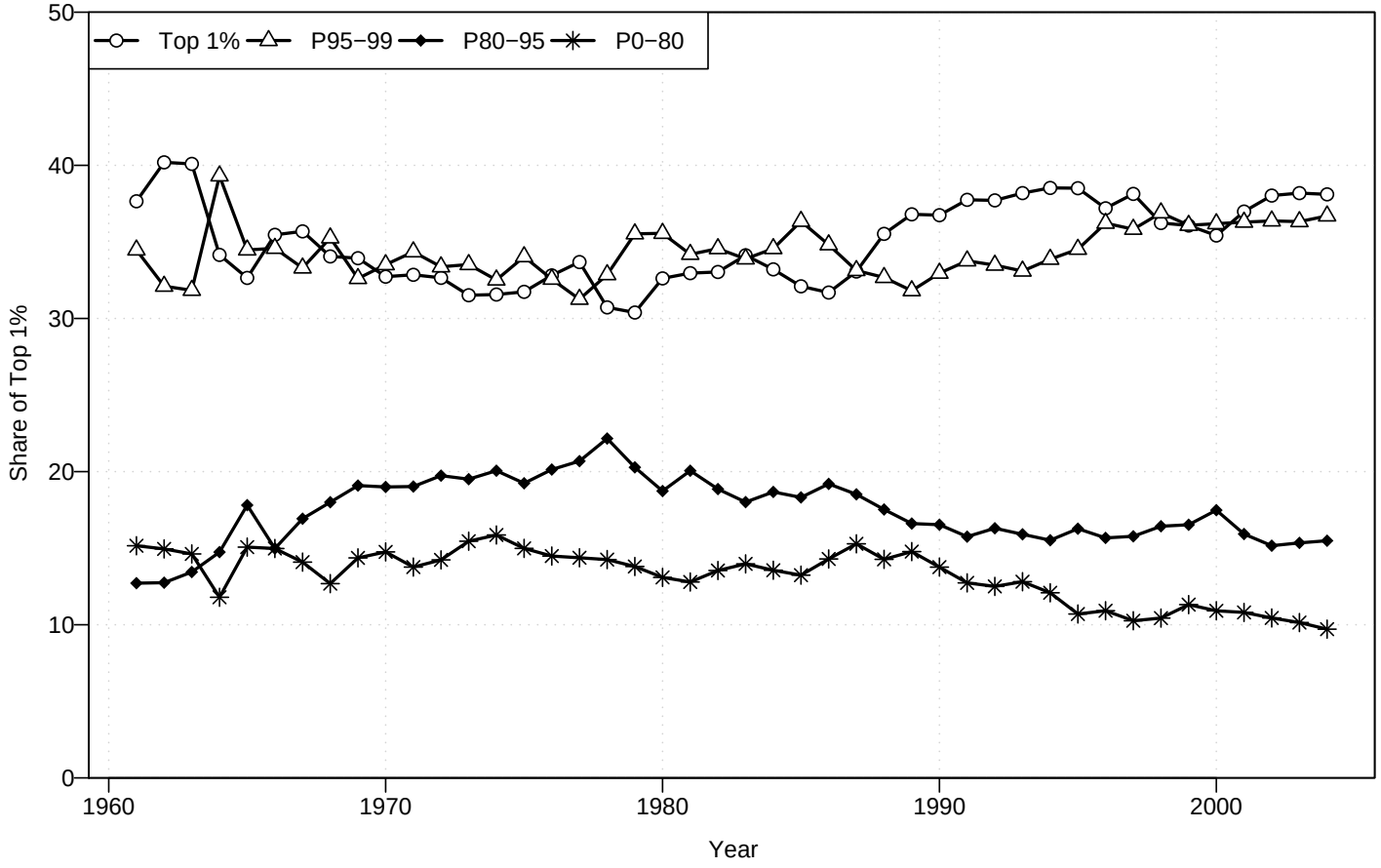


Figure 4C: Source of Top 1% Ten Years Earlier



See notes on pages 50-52

Figure 5A: Bottom Shares (multi−year)

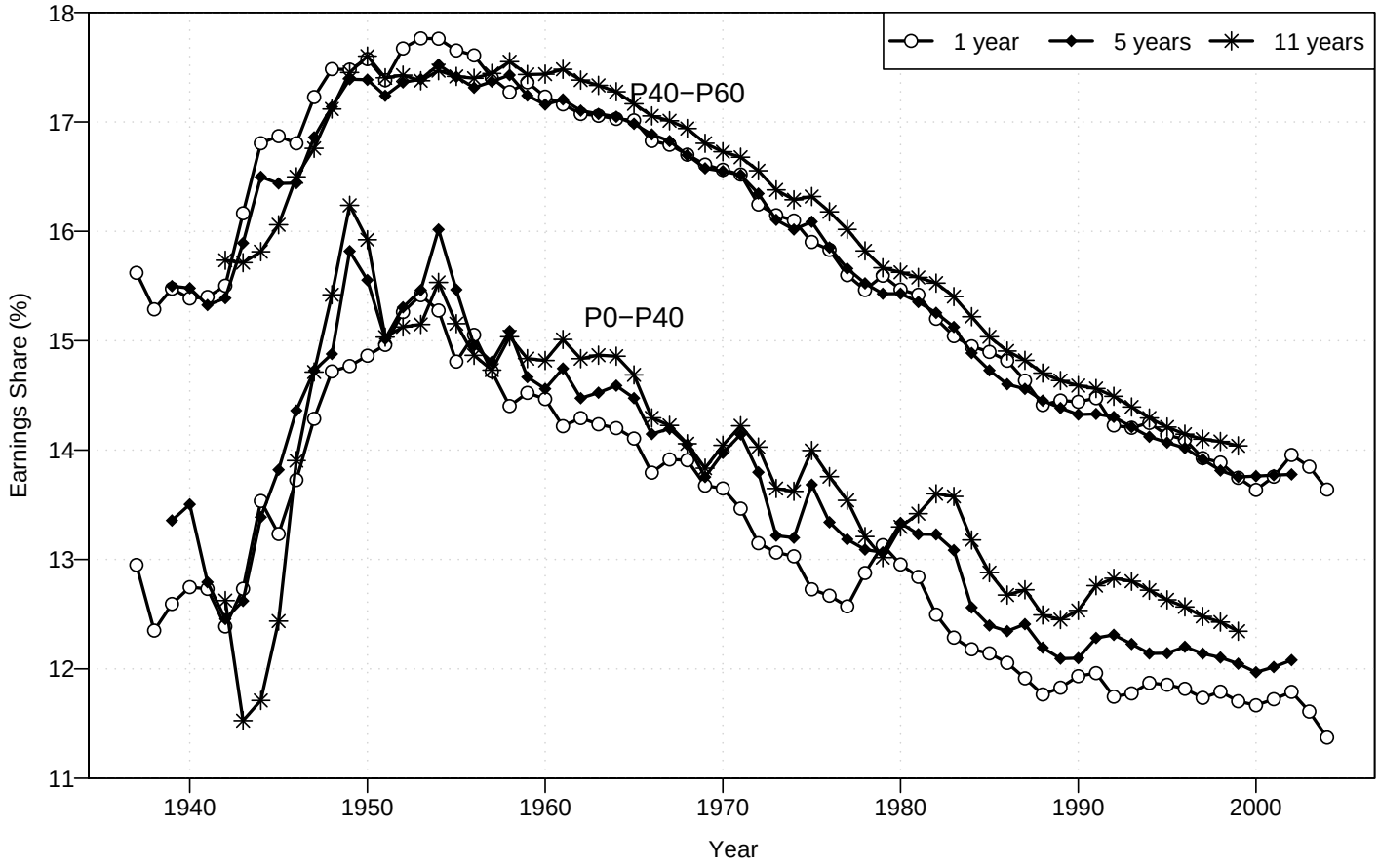
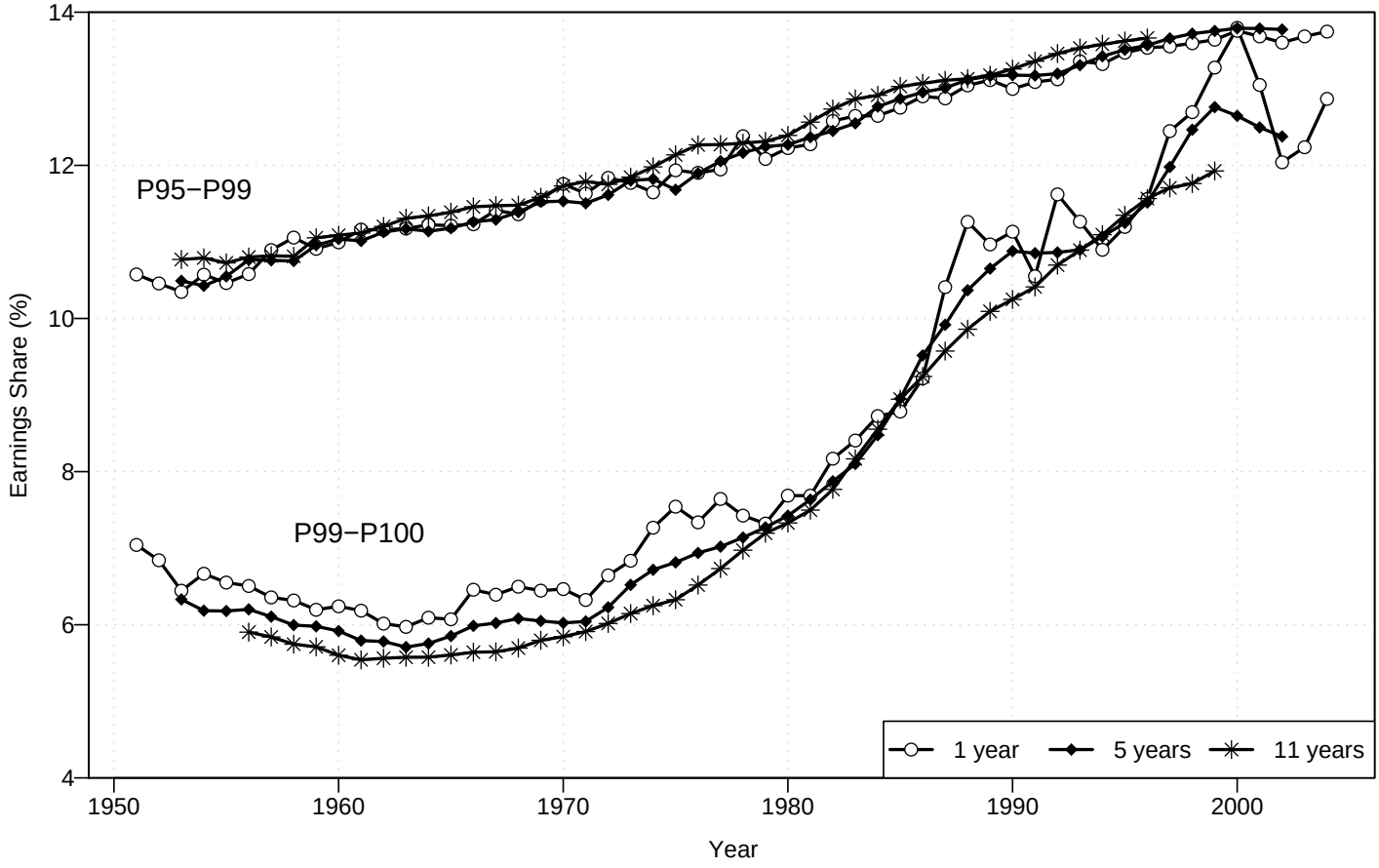


Figure 5B: Upper Shares (multi−year)



See notes on pages 50-52

Figure 6A: Probability of Staying in Top and Bottom Groups

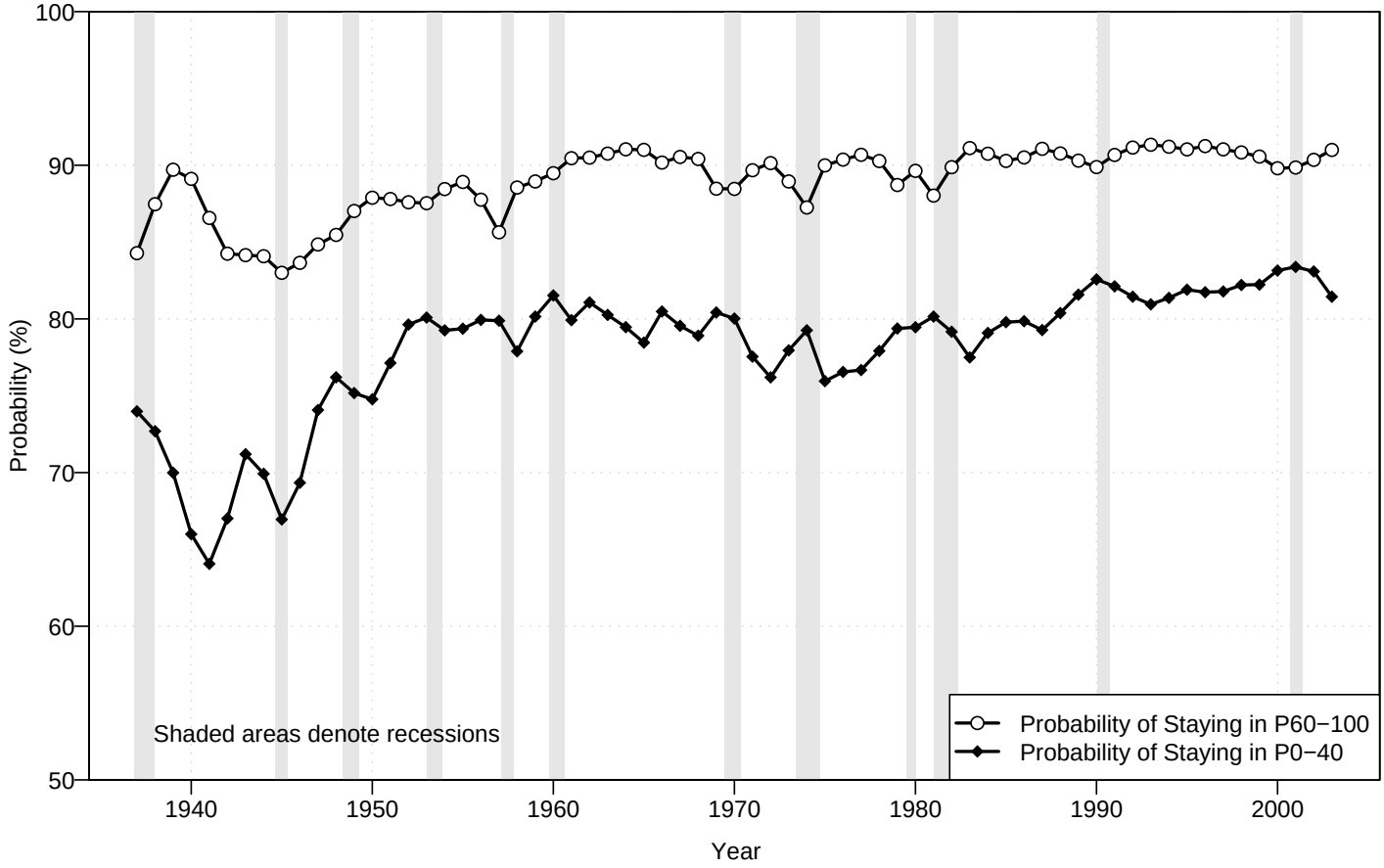


Figure 6B: Downward and Upward Mobility

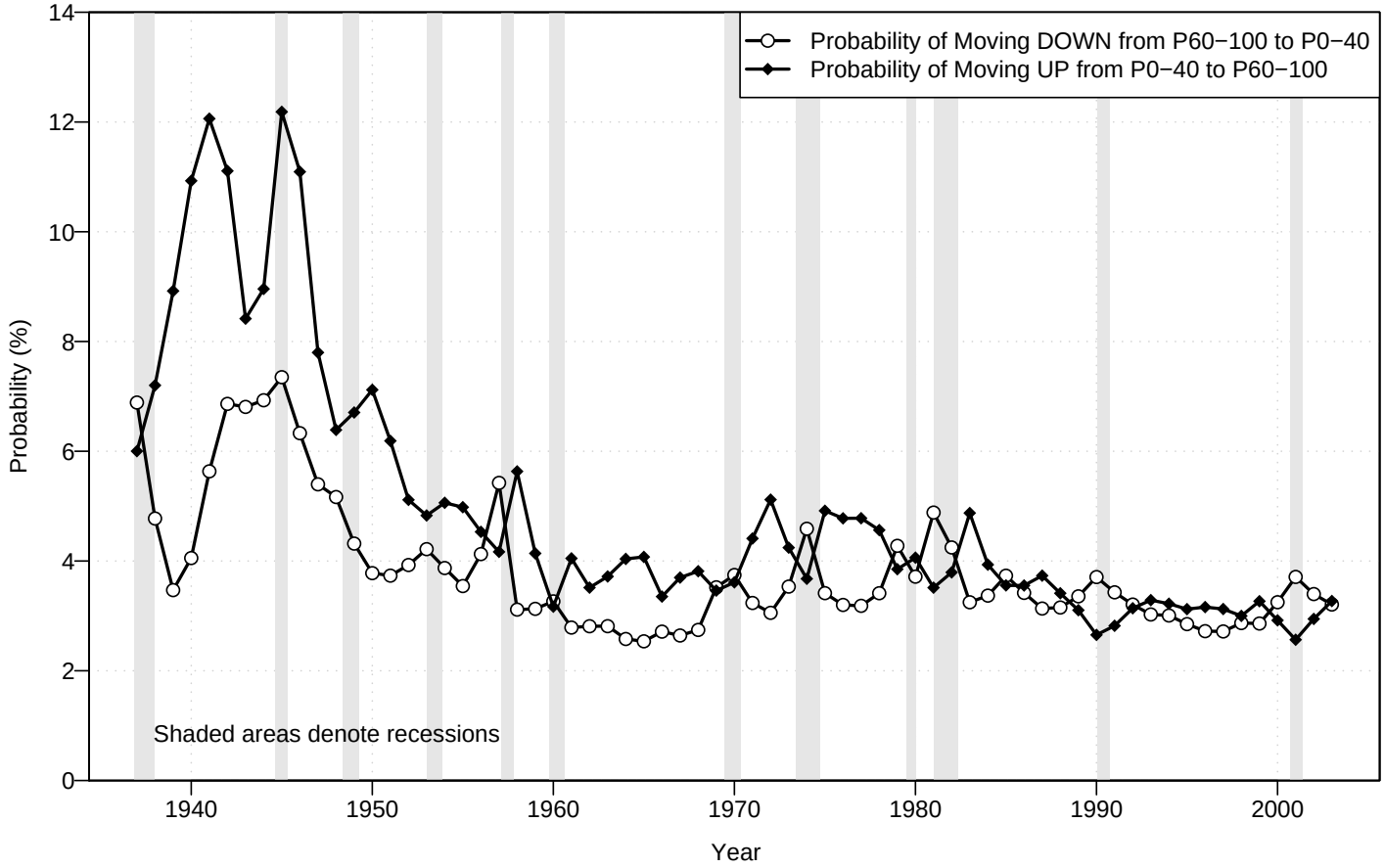


Figure 7: Probability of Upward Mobility for 11 Year Earnings Average

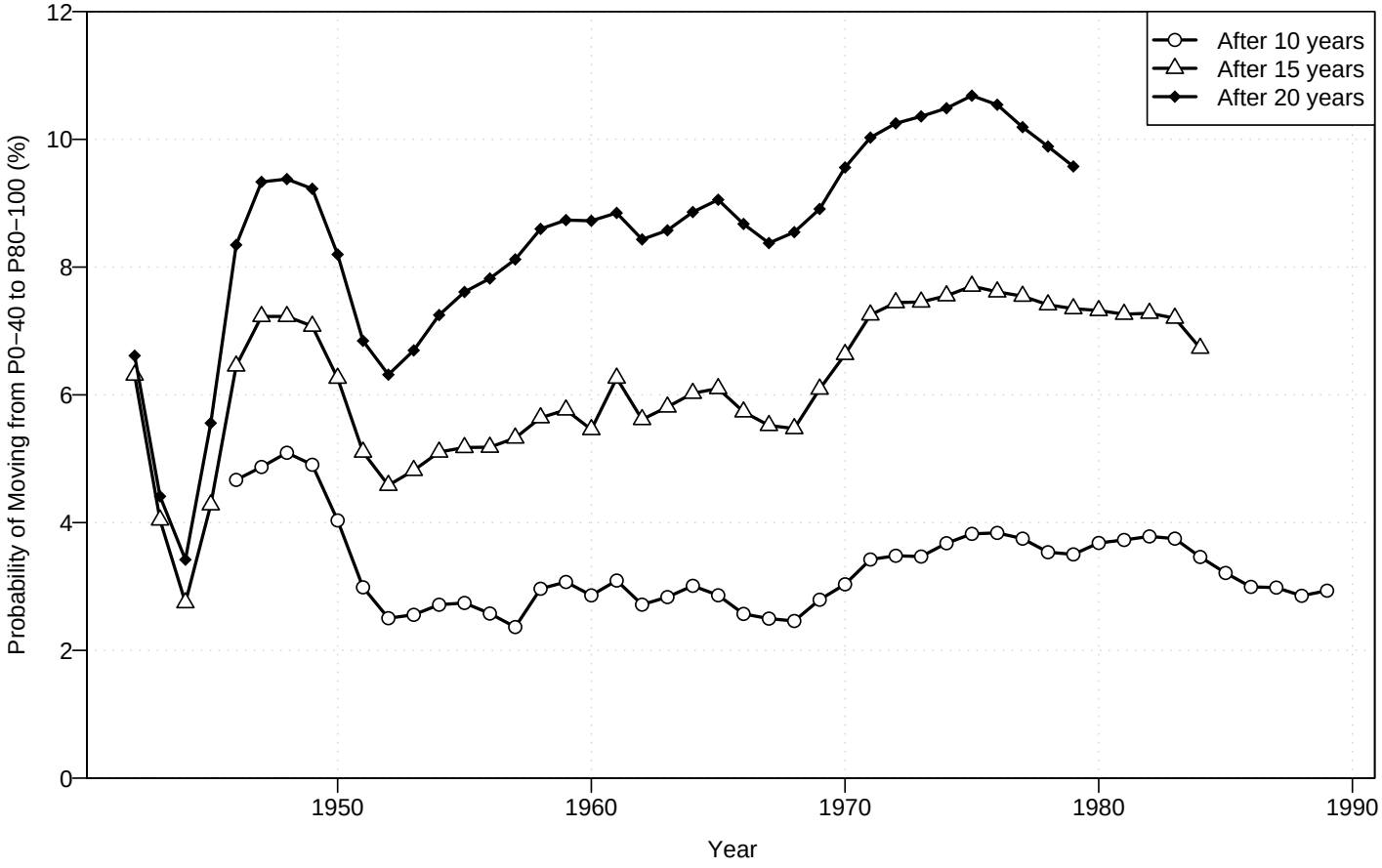
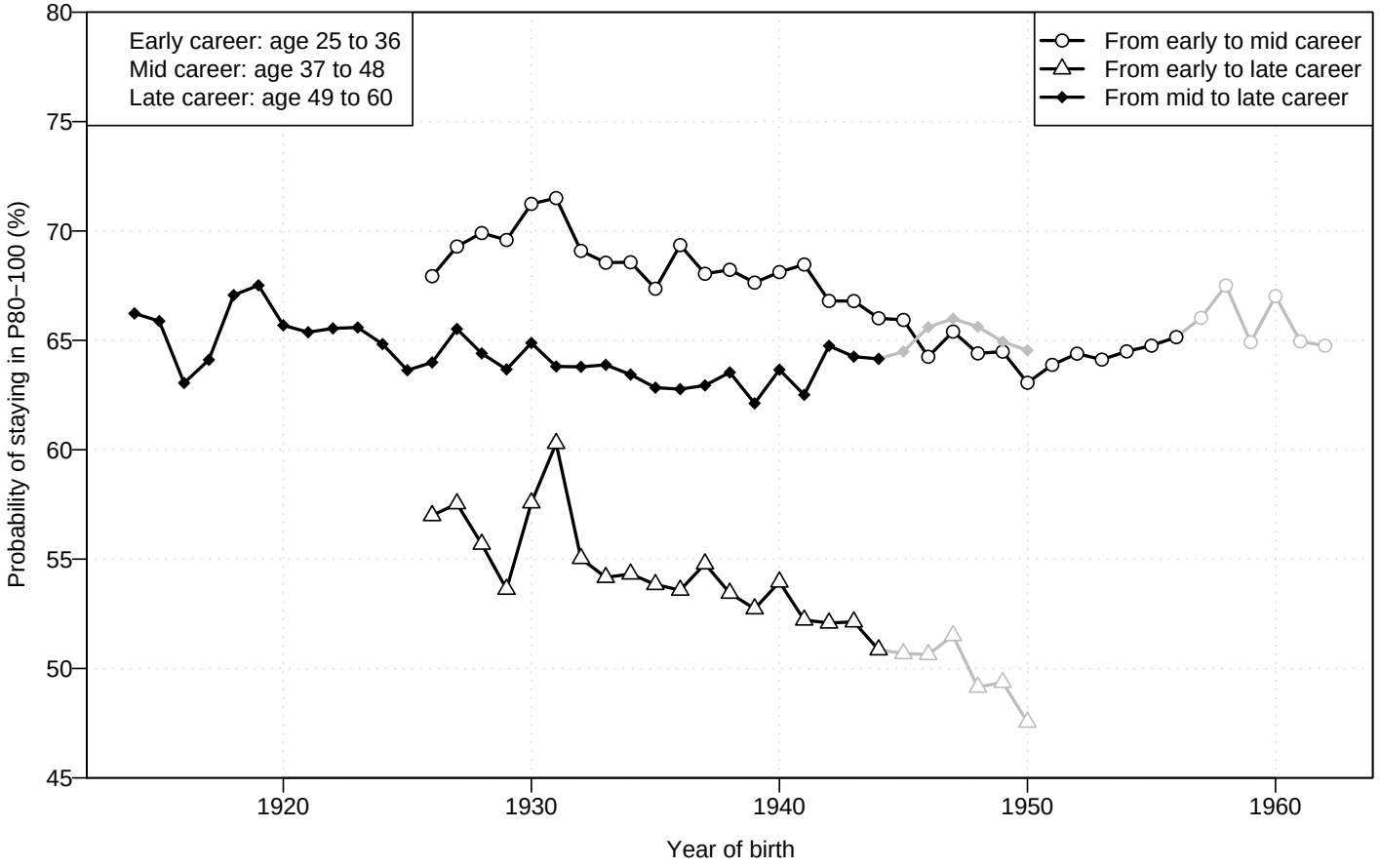


Figure 8A: Probability of Staying in Top Quintile over a Career



See notes on pages 50-52

Figure 8B: Probability of Staying in Bottom Two Quintiles over a Career

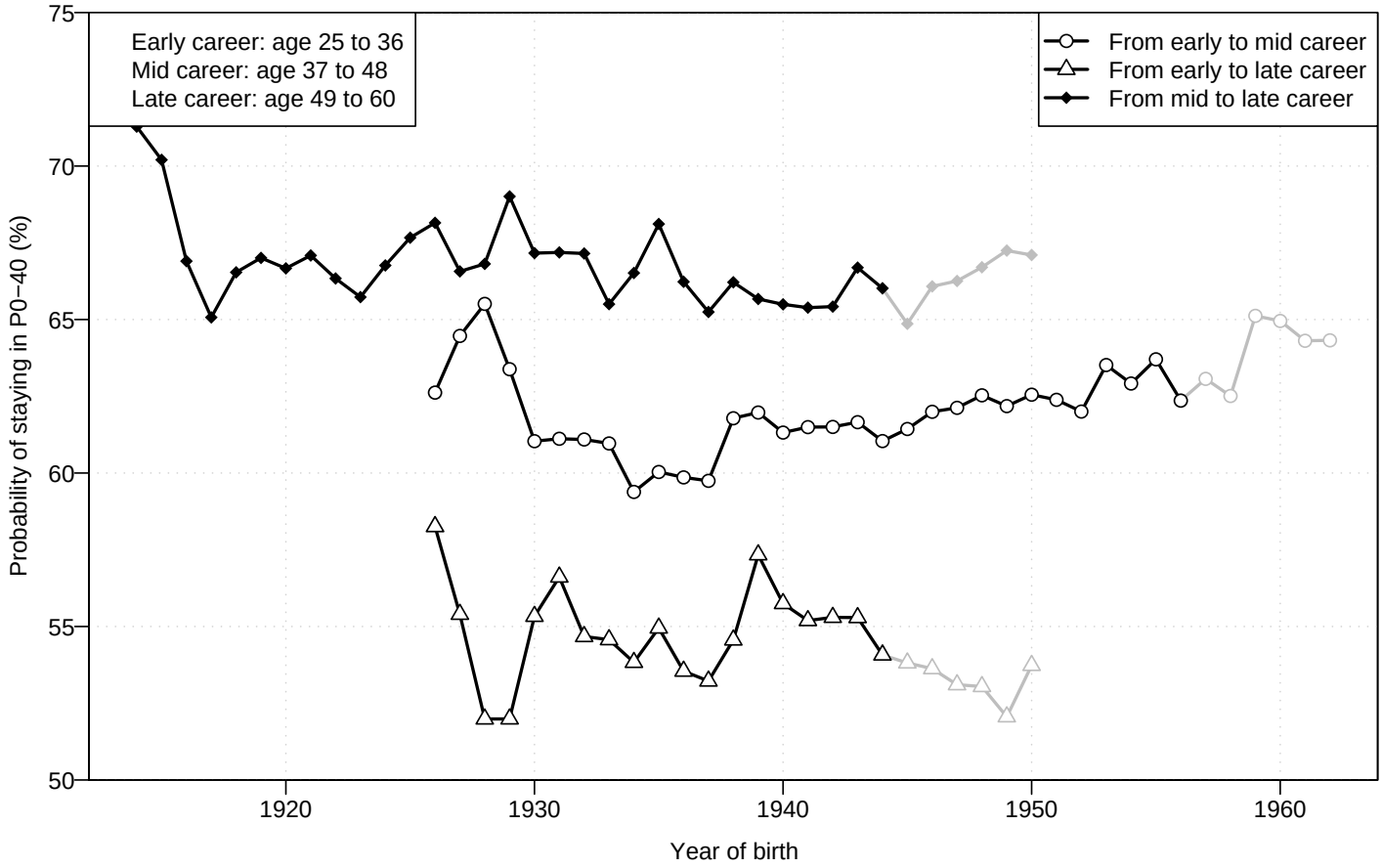


Figure 8C: Probability of Upward Mobility over a Career

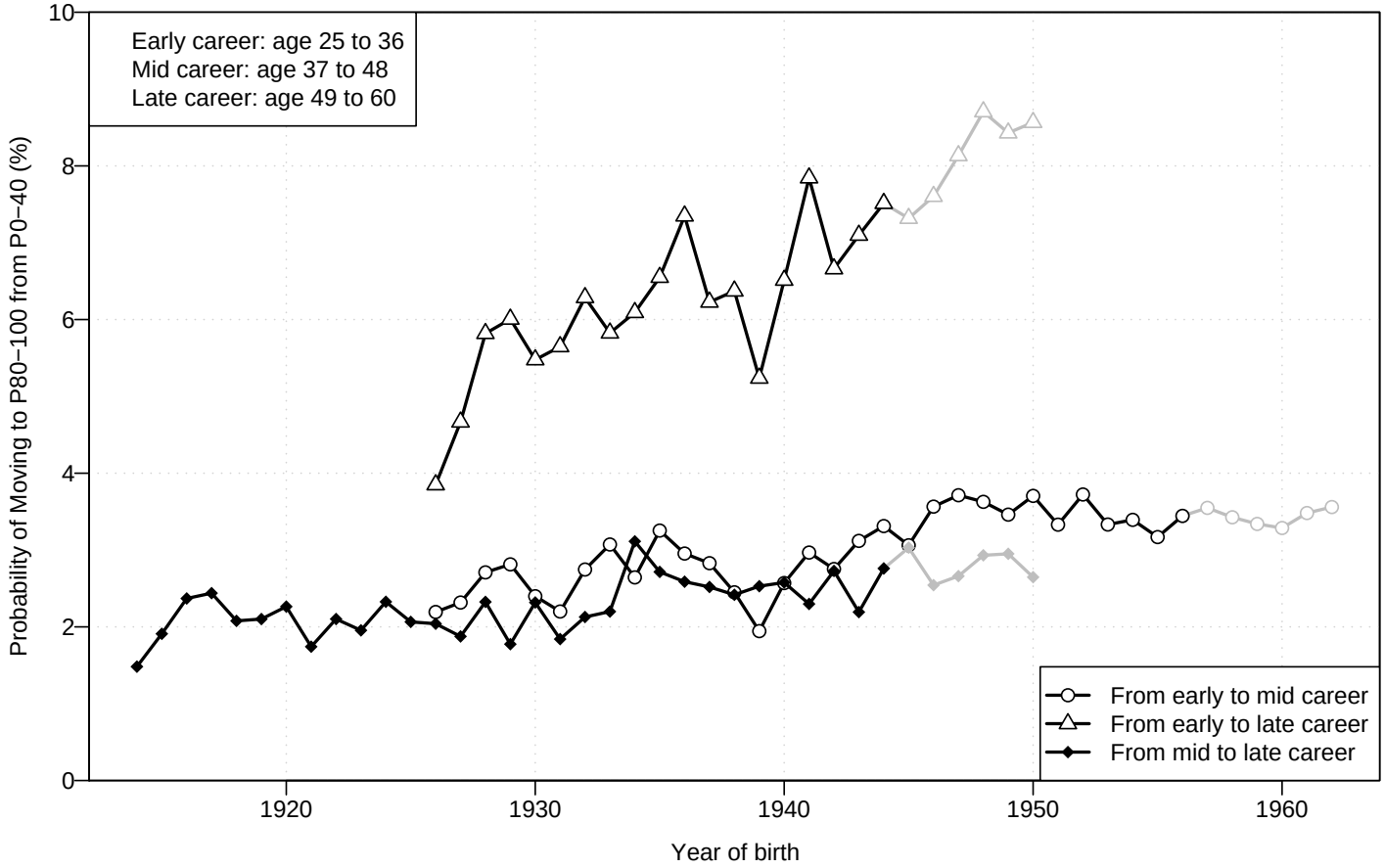


Figure 8D: Probability of Downward Mobility over a Career

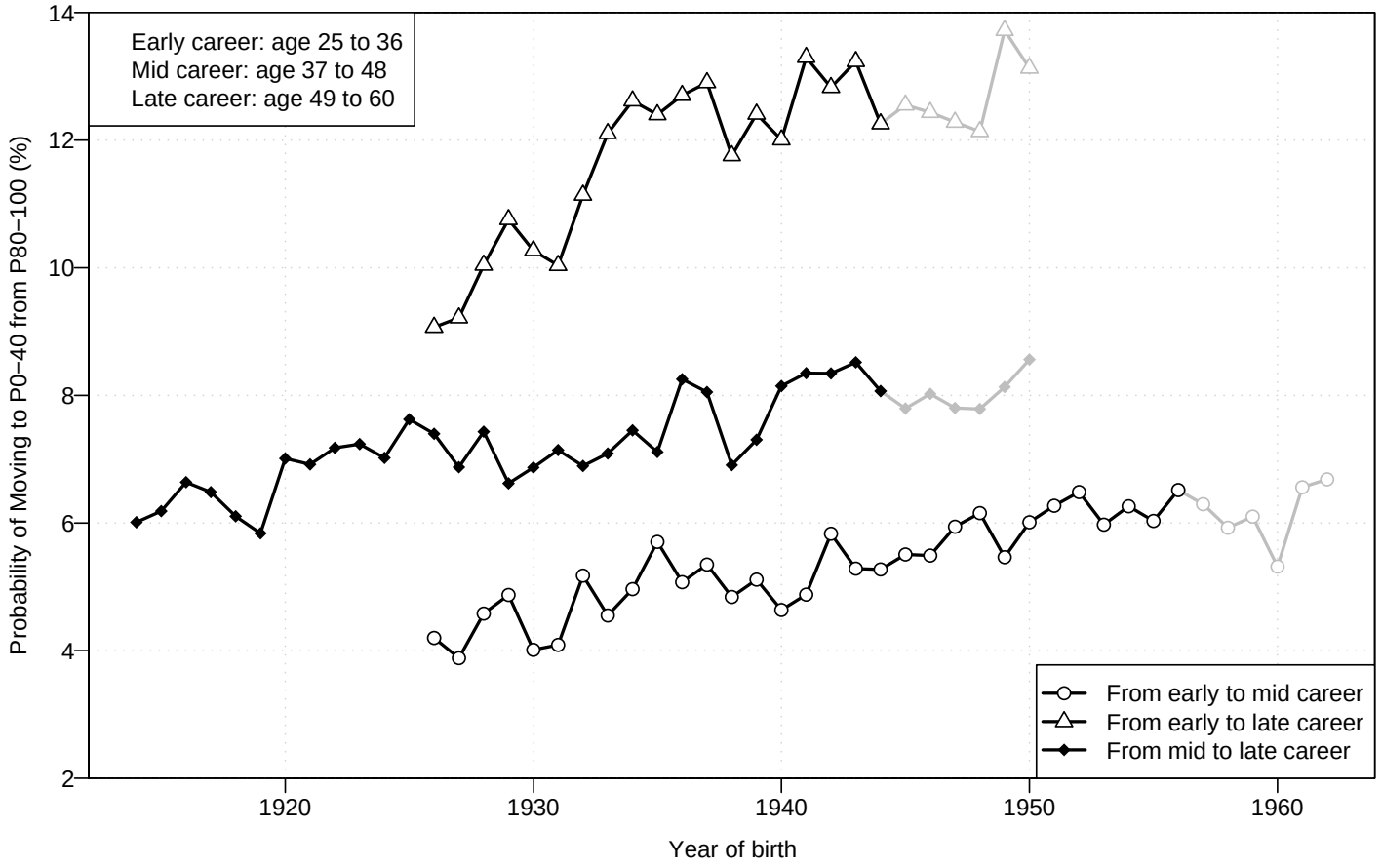


Figure 9A: Long−Term Top Quintile Share

See notes on pages 50-52

Figure 9B: Long−Term P0−40 Share

Figure 10: Fraction of Female, Black and Foreign−Born Workers

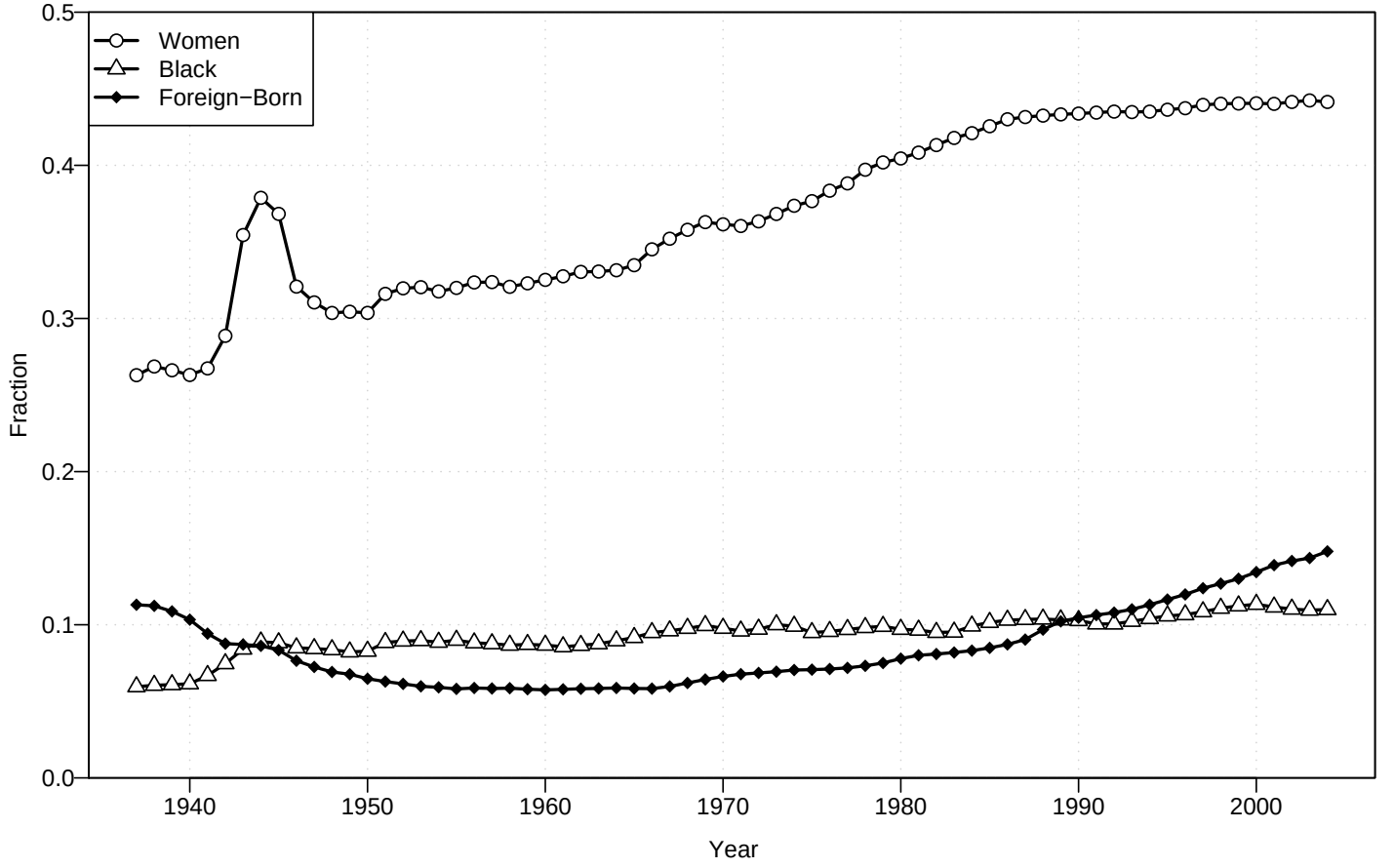


Figure 11: Average Earnings of Female, Black and Foreign−Born Workers

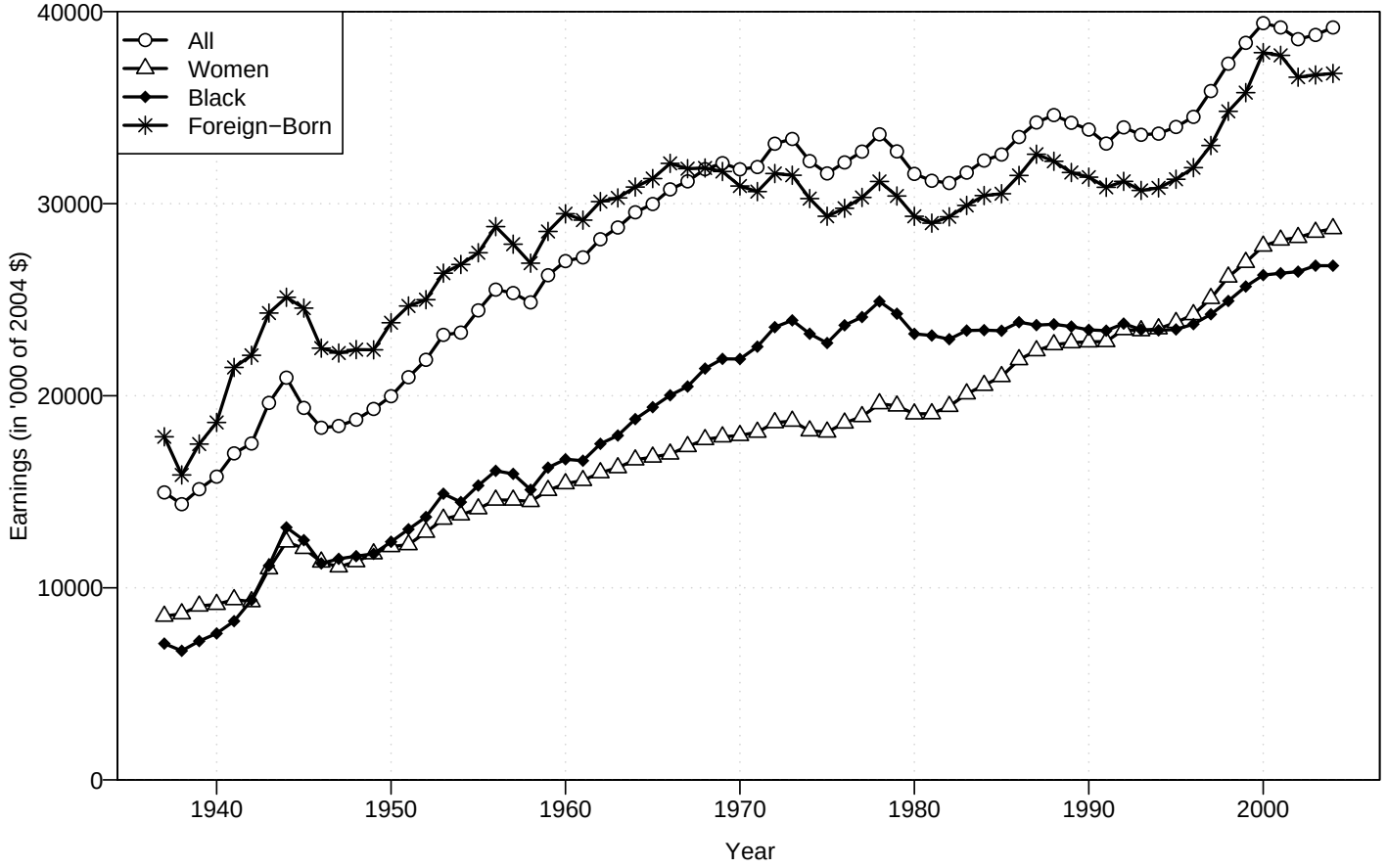


Figure 12A: Gender Gap in Upper Groups

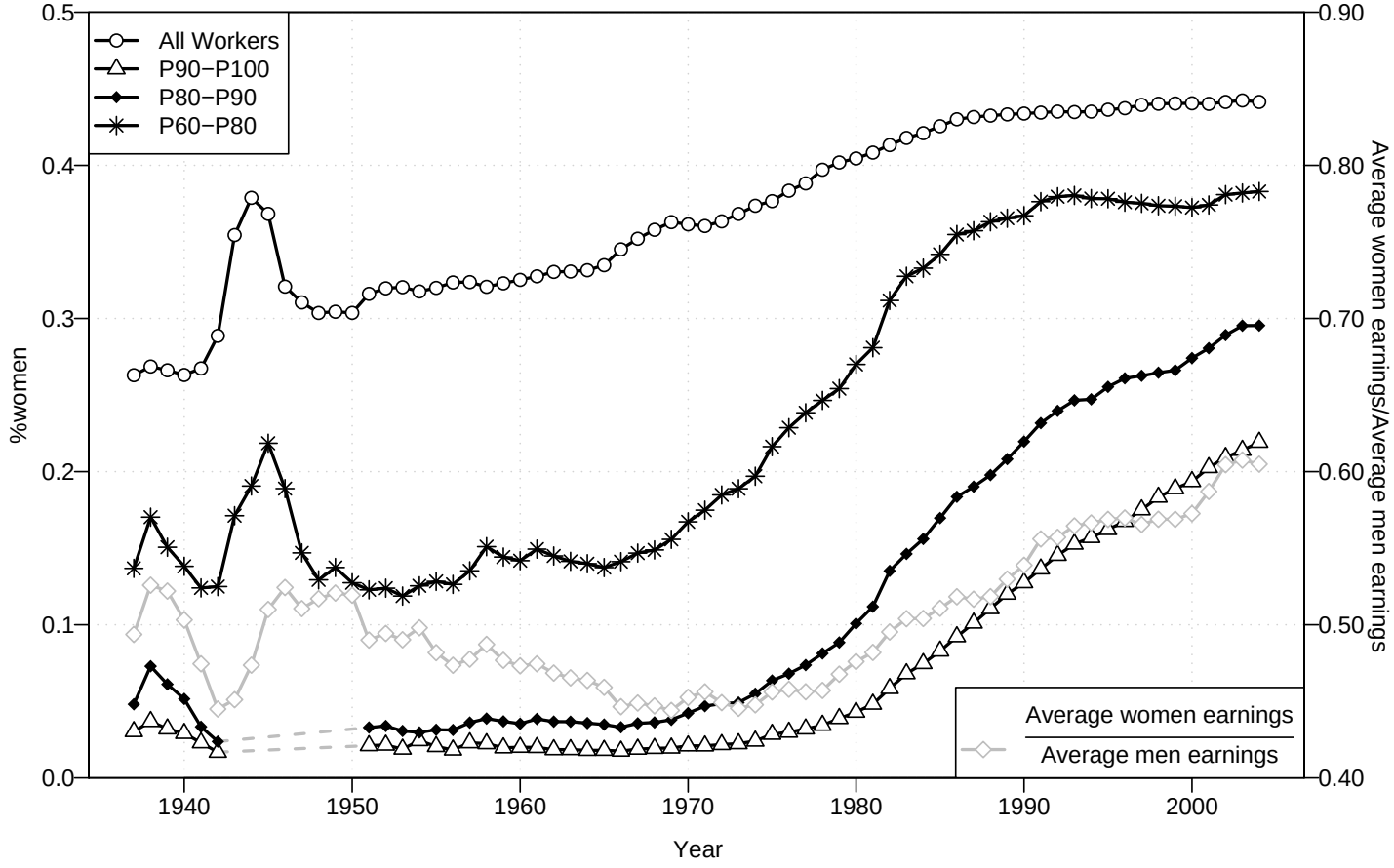


Figure 12B: Gender Gap in Top Groups

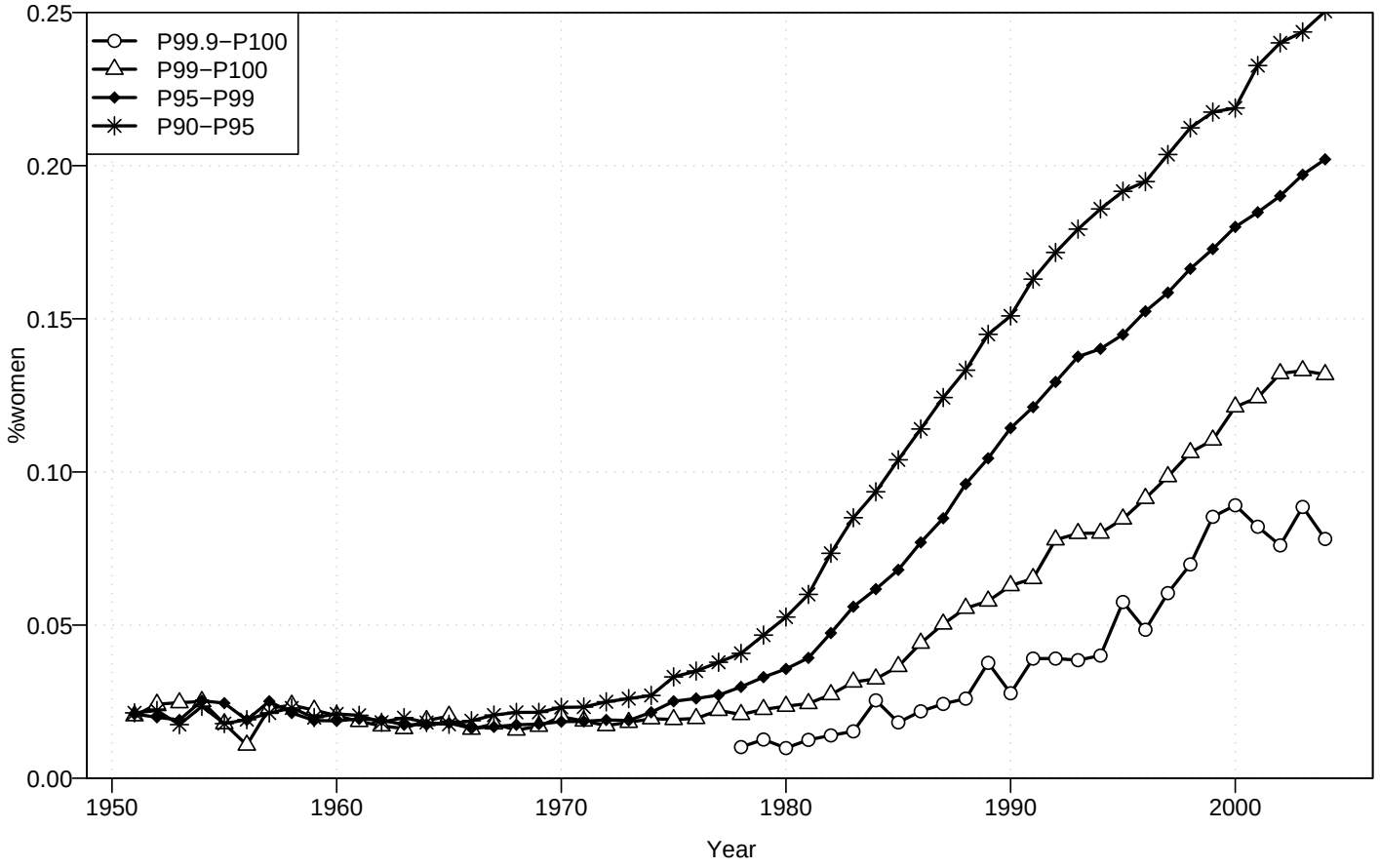


Figure 13A: Black−White Gap in Upper Groups

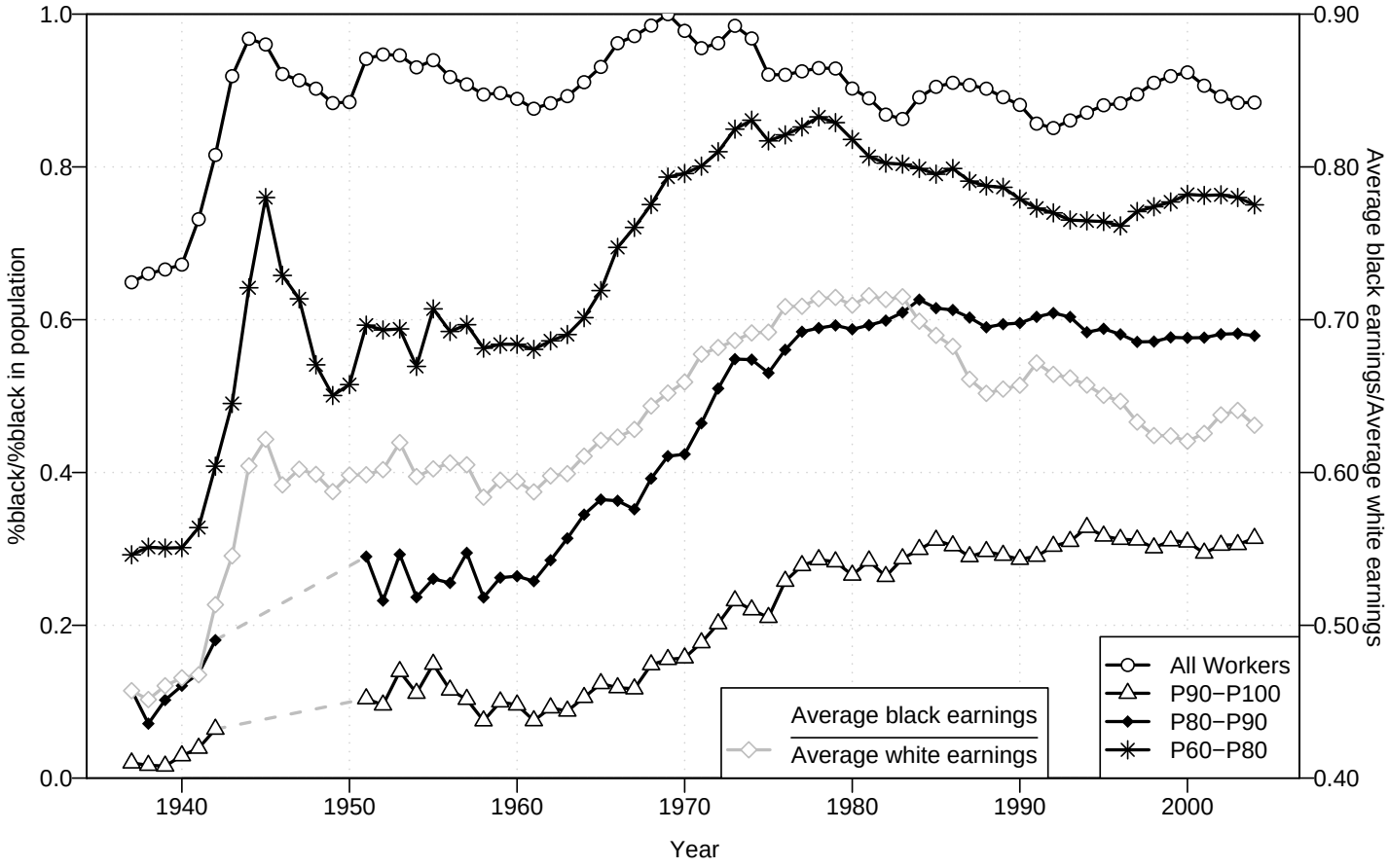


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Figure 13B: Black−White Gap in Top Groups

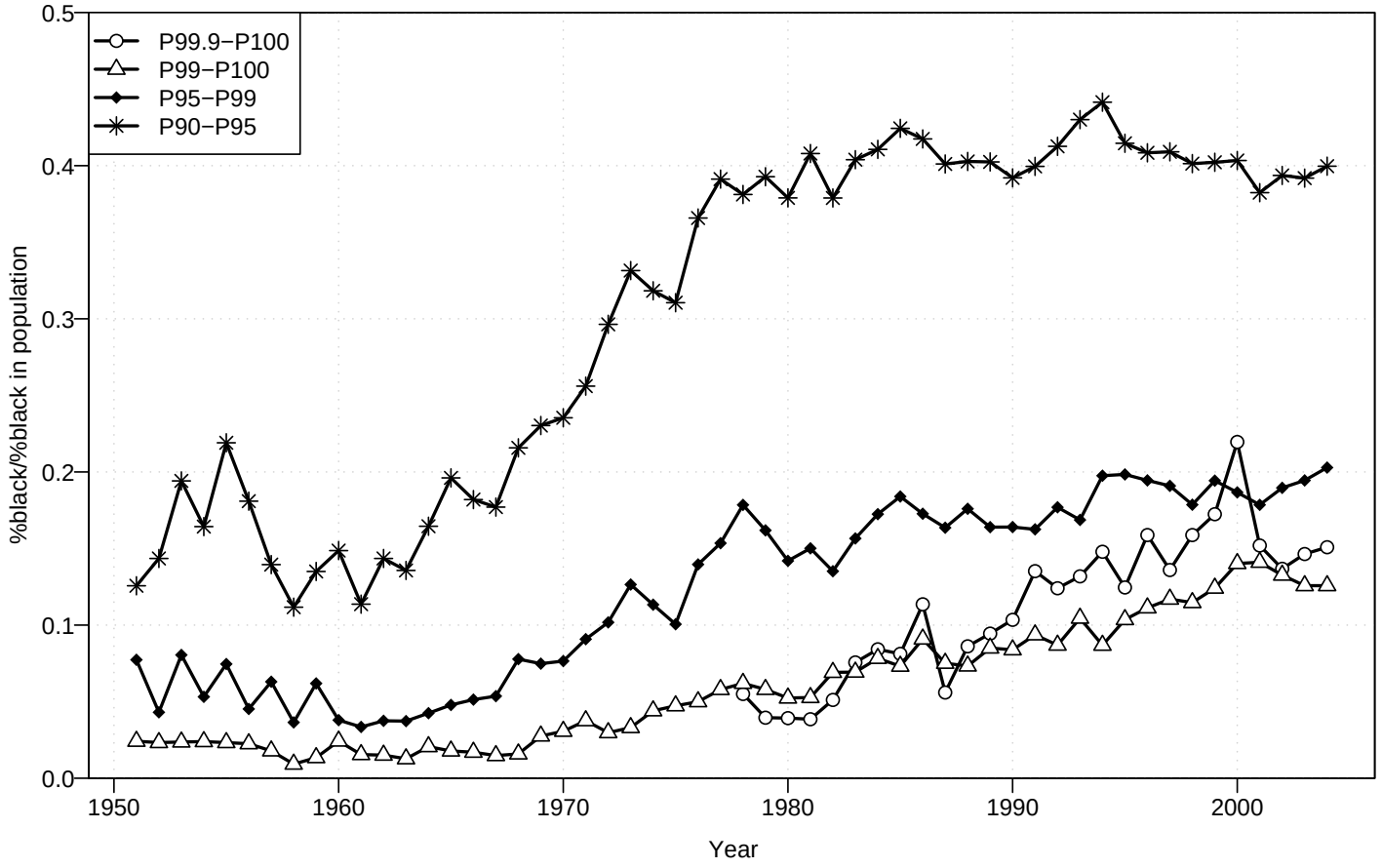


Figure 14A: Immigrant−Native Gap in Upper Groups

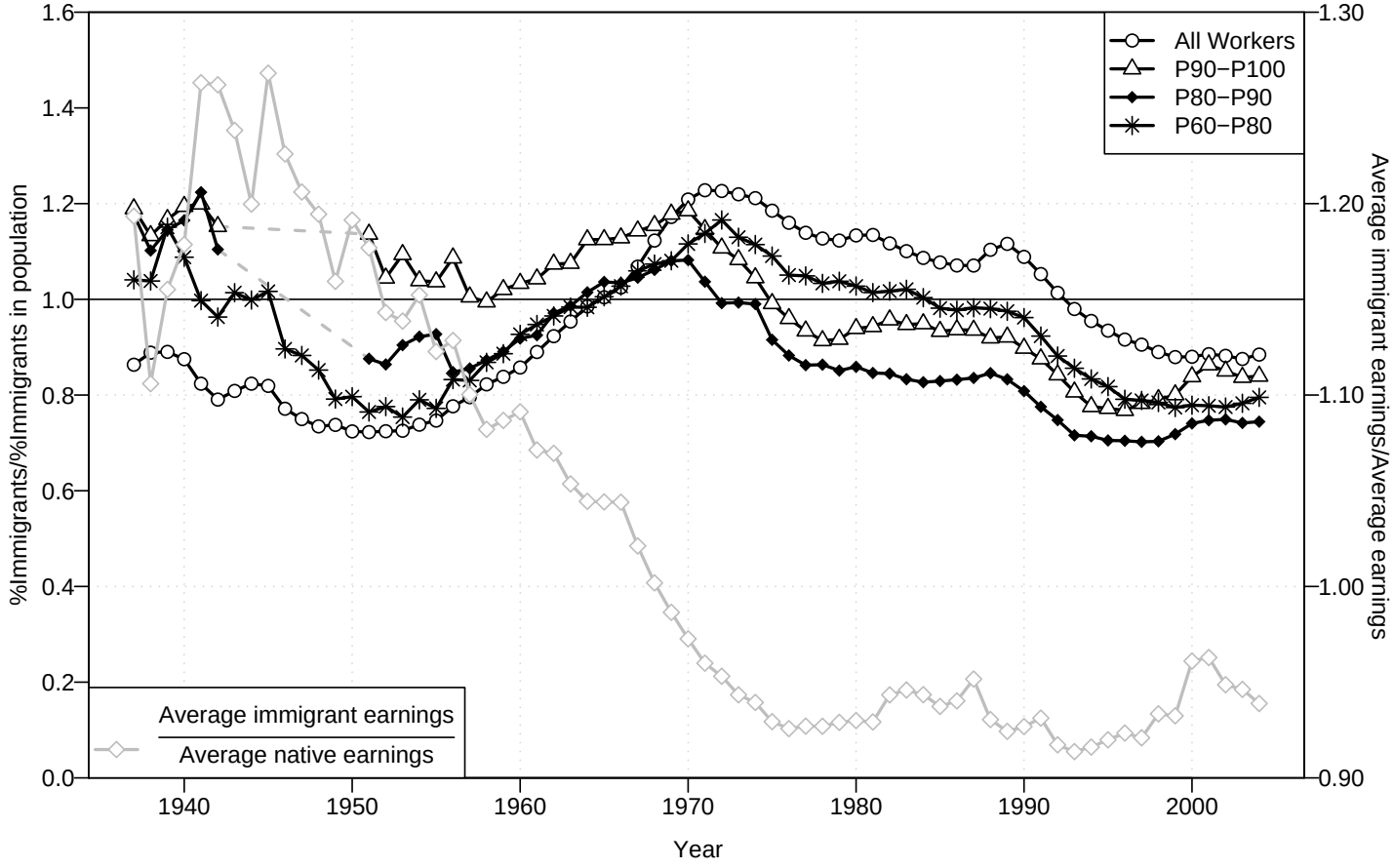


Figure 14B: Immigrant−Native Gap in Top Groups

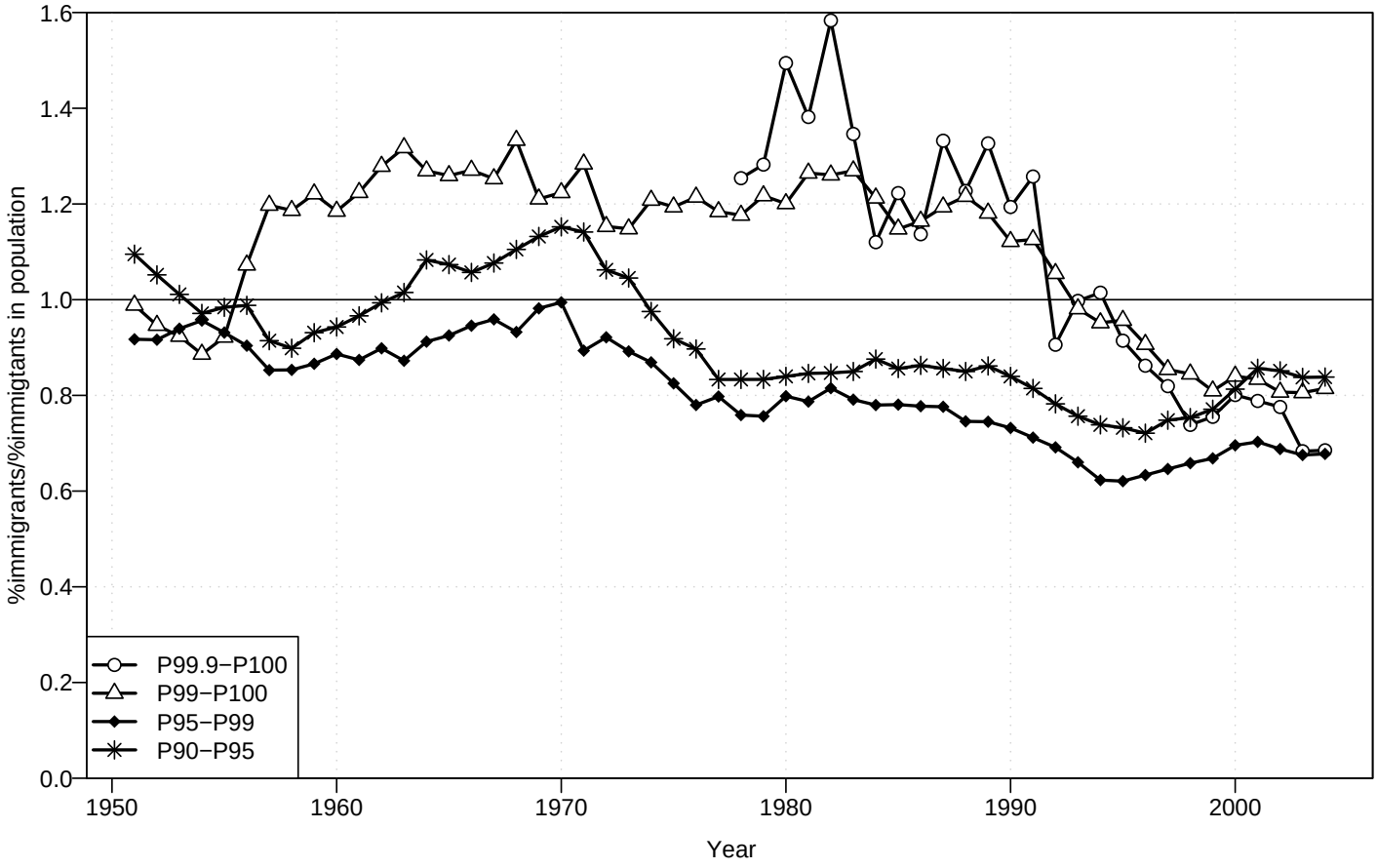


Figure 15A: Upward Mobility from P0−40 to P80−100 After 20 Years, MA11

See notes on pages 50-52

Figure 15B: Probability of Upward Mobility over a Career by Gender

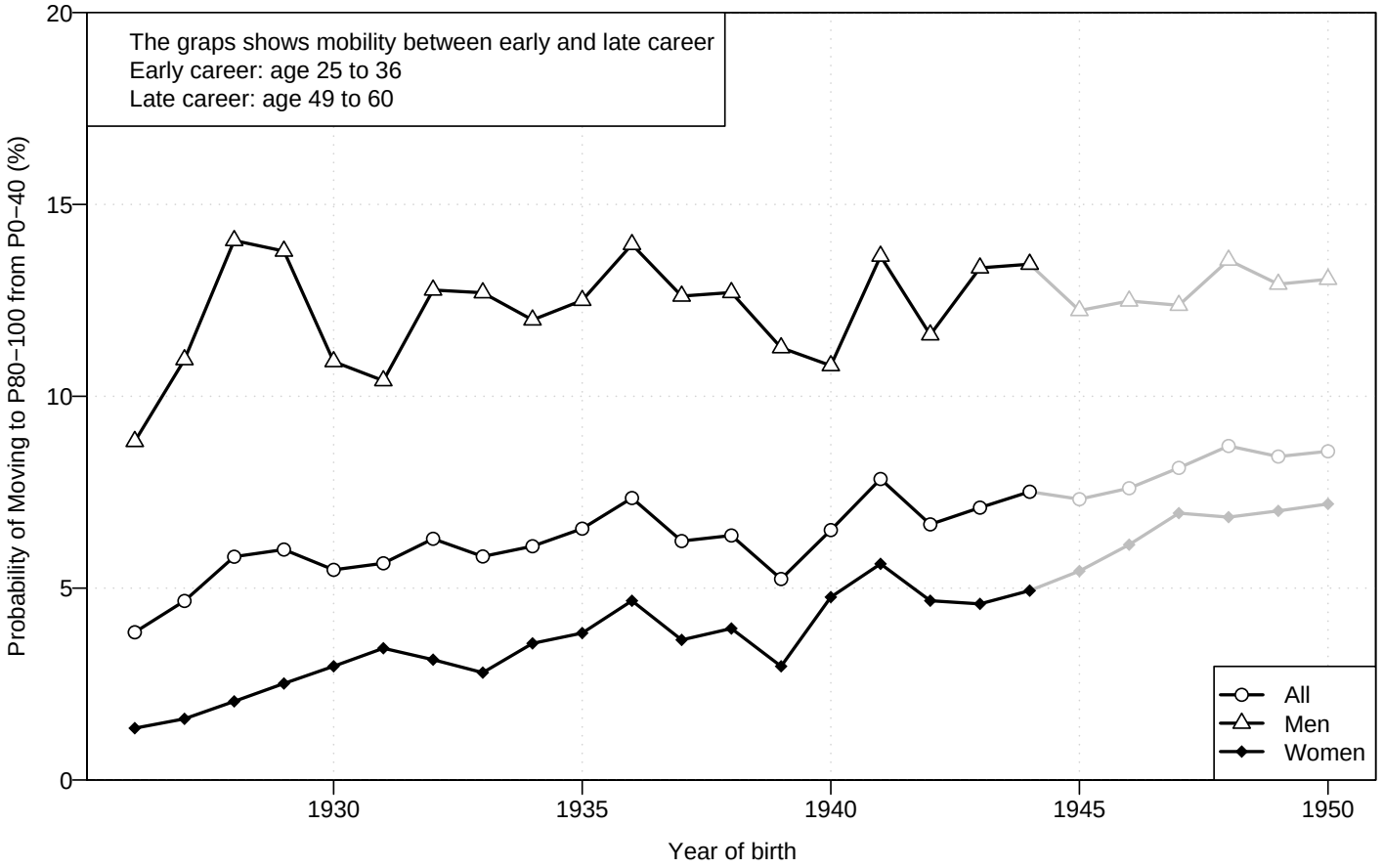
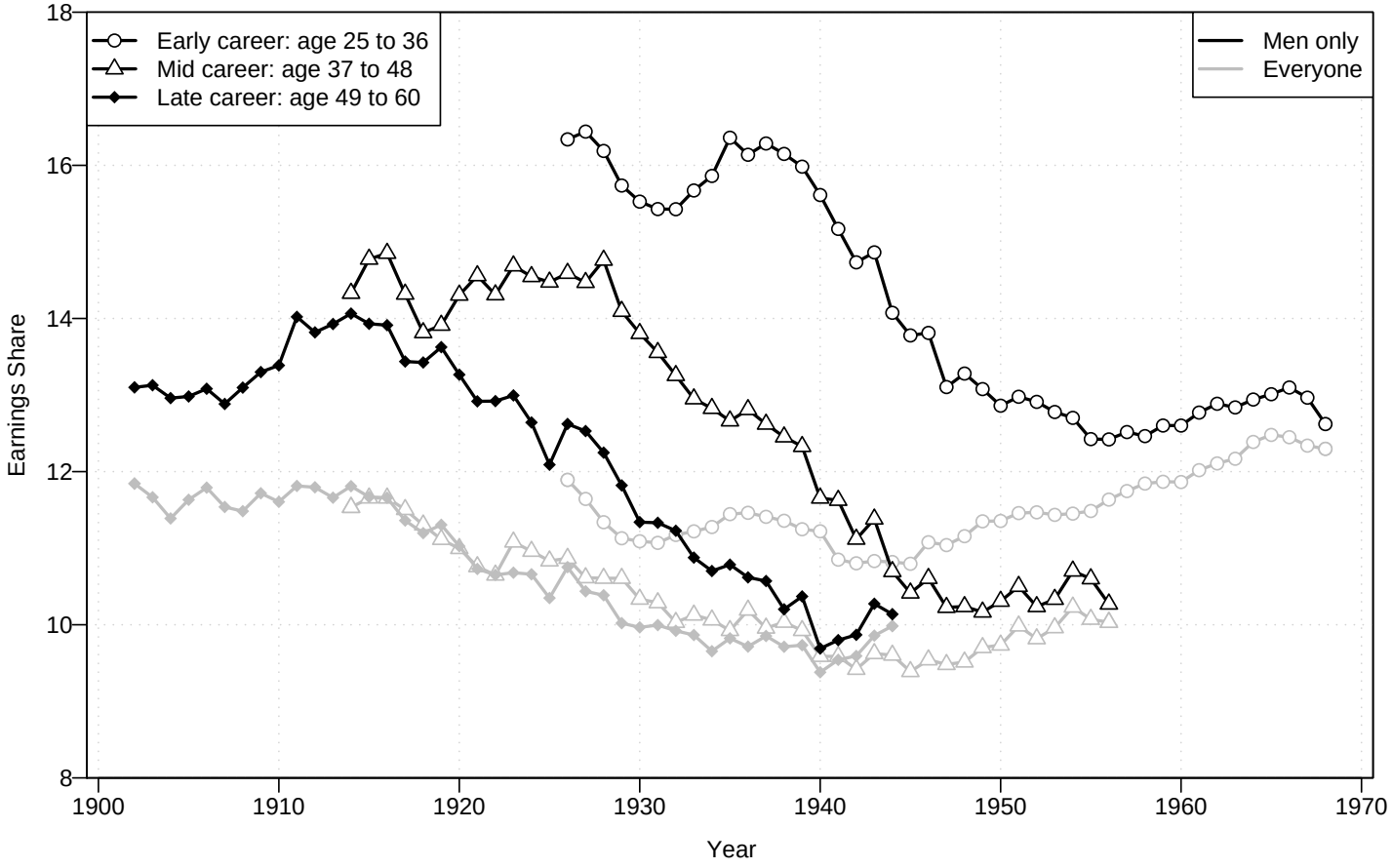


Figure 16: Long−Term P0−40 Share (Men Only)



See notes on pages 50-52

Figure 17A: Women in Top Quintile (Long−Term)

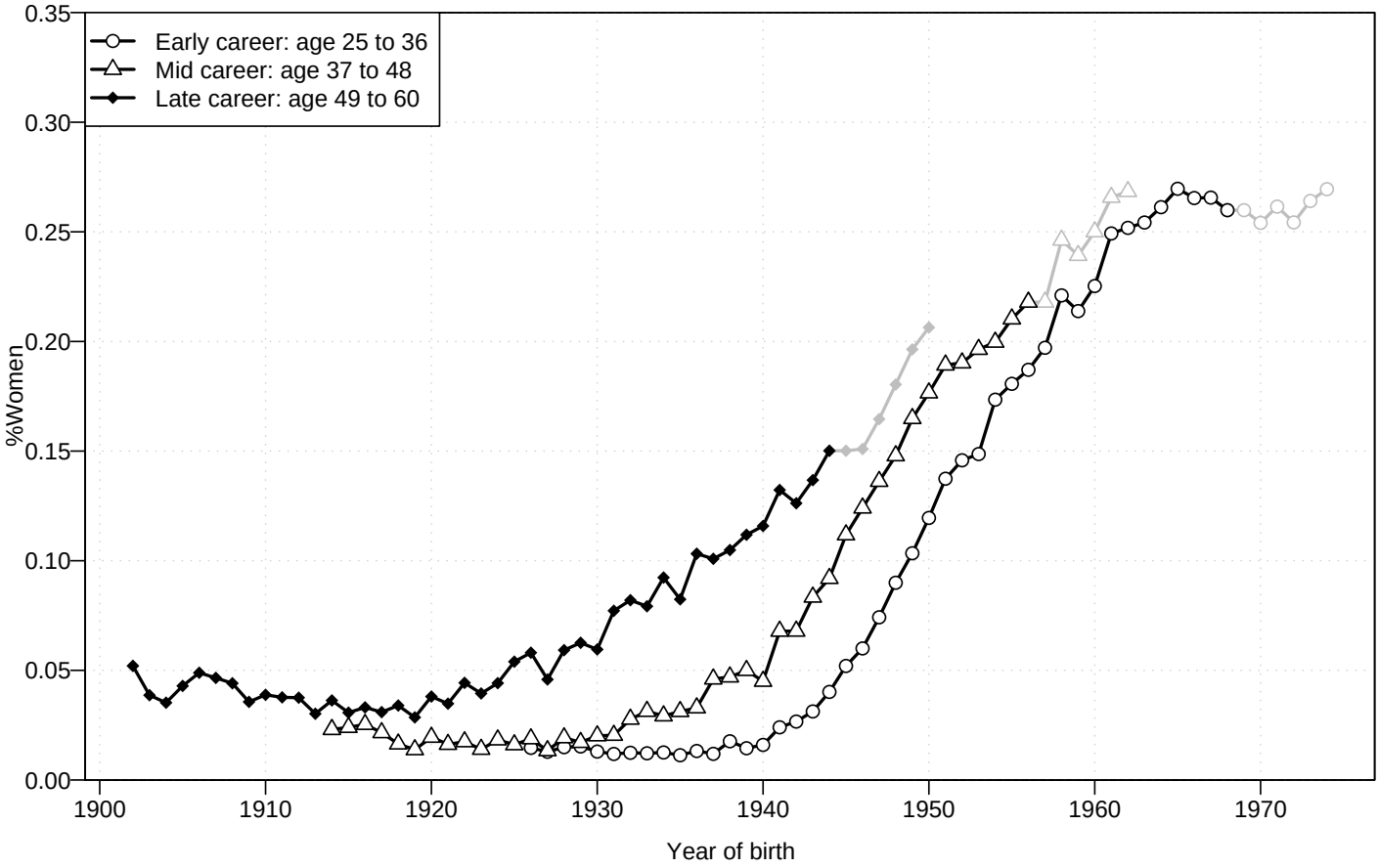


Figure 17B: Blacks in Top Quintile (Long−Term)

Appendix figures footnotes

Figure A1: Workers in full sample defined as all employees above minimum threshold ($2,575 in 2004 and indexed on average wage for earlier years) and aged 18 to 70 (by January 1st of a given year t). In contrast to core sample, there are no industry restrictions. Self-employment earnings are fully excluded. Commerce-industry sample denotes the core sample (see Figure 0). NIPA excluding military is the number of full time and part-time civilian employees from National Income and Products Accounts. NIPA commerce-industry is the number of full time and part-time civilian employees excluding government employees, agriculture, fish and forestry, health services, educational services, social services and membership organizations, and private households.

Figure A2: Commerce and industry core sample is the core sample (see Figure 0). Including all industries sample is the core sample extended to include all industries as in Figure A1. Core sample using min threshold 4 times higher ($10,300 in 2004) limits the core sample to individuals with (commerce and industry) earnings above $10,300 in 2004 (and indexed using average wage for earlier years) which is 4 times the minimum threshold used in the core sample. Core sample aged 25-60 limits the core sample to workers aged 25-60 (instead of 18-70).

Figure A3: Figure A3 displays the (conditional) probability of staying in P60-100 after 1 year for the core sample (same as in Figure 6A), for the core sample extended to including all industries (same definition as in Figure A1), for the core sample restricted to men.

Figure A4: Figure A4 displays the probability of staying in P60-100 after 1 (or 5) year for the core sample conditional on being in the core sample after 1 (or 5) years (as in Figure 6A) and unconditional (the individual can then have no earnings, have died, or exceeded the 70 year age limit after 1 (or 5) years).

Figure A5: Figure A5 displays the probability of staying in the top quintile between stages of a career defined as in Figure 8 (solid lines) and the probability of staying in the top quintile defined based on earnings during the first six years of each stage of the career (dashed lines).

Figure A6: Figure A6 (A and B) replicates Figure 15 (A and B) but re-weighing the upward mobility estimates assuming that the distribution of individuals in a given group (women, men, blacks, or foreign born) across P0-20 and P20-40 in base year is the same as for all workers (only workers present in both year t and $t+1$ are included). This re-weighing allows to control partially for unequal distributions of each group within P0-40 in base year.

Figure A7: Sample is career sample for each given stage and birth cohort (see Figure 8). Graph reports the fraction of women in the sample and in the second quintile for each career stage and birth cohort groups (smoothing and imputations beyond 2004 as in Figure 8).

Figure A1: Sample and NIPA Workers

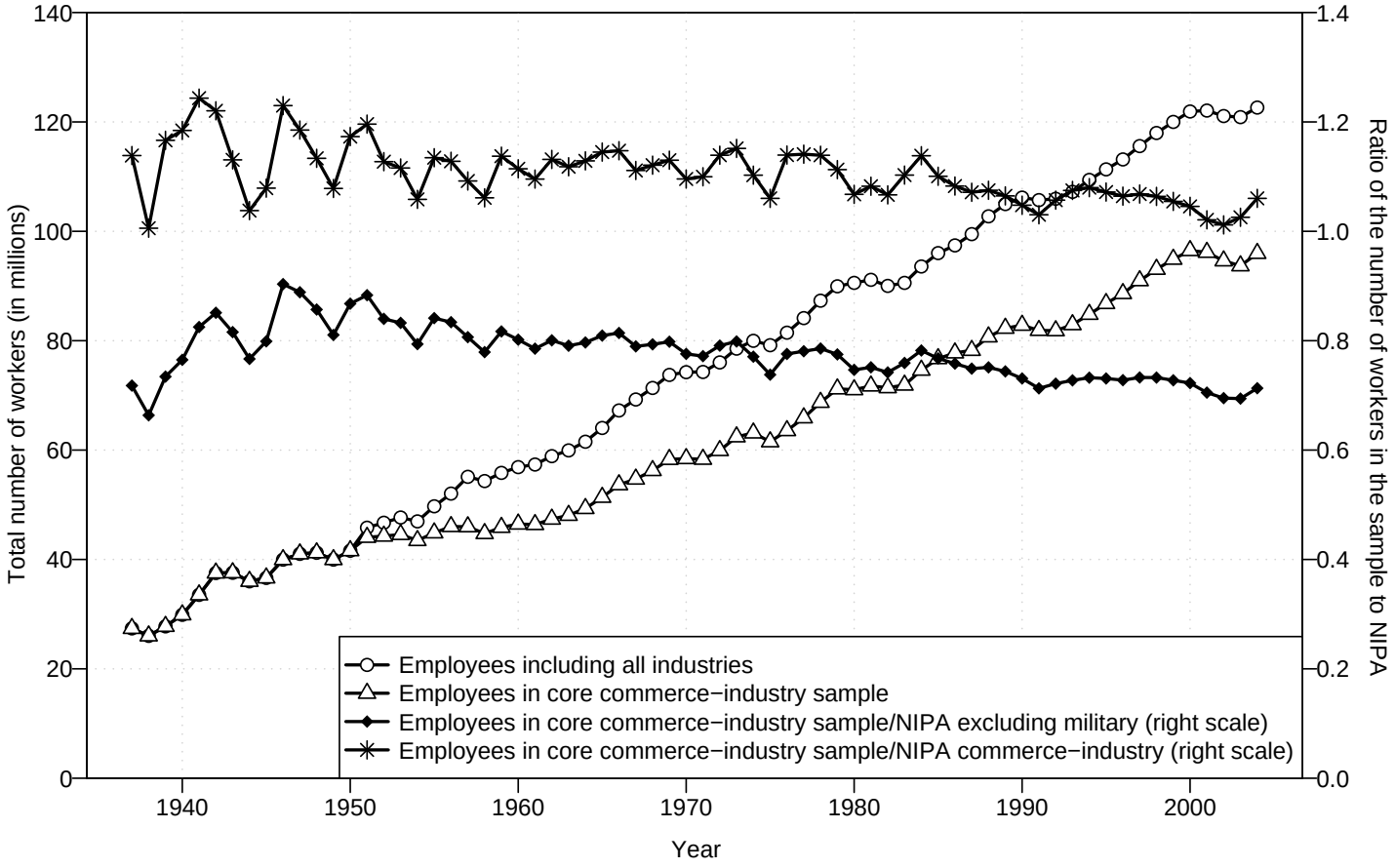
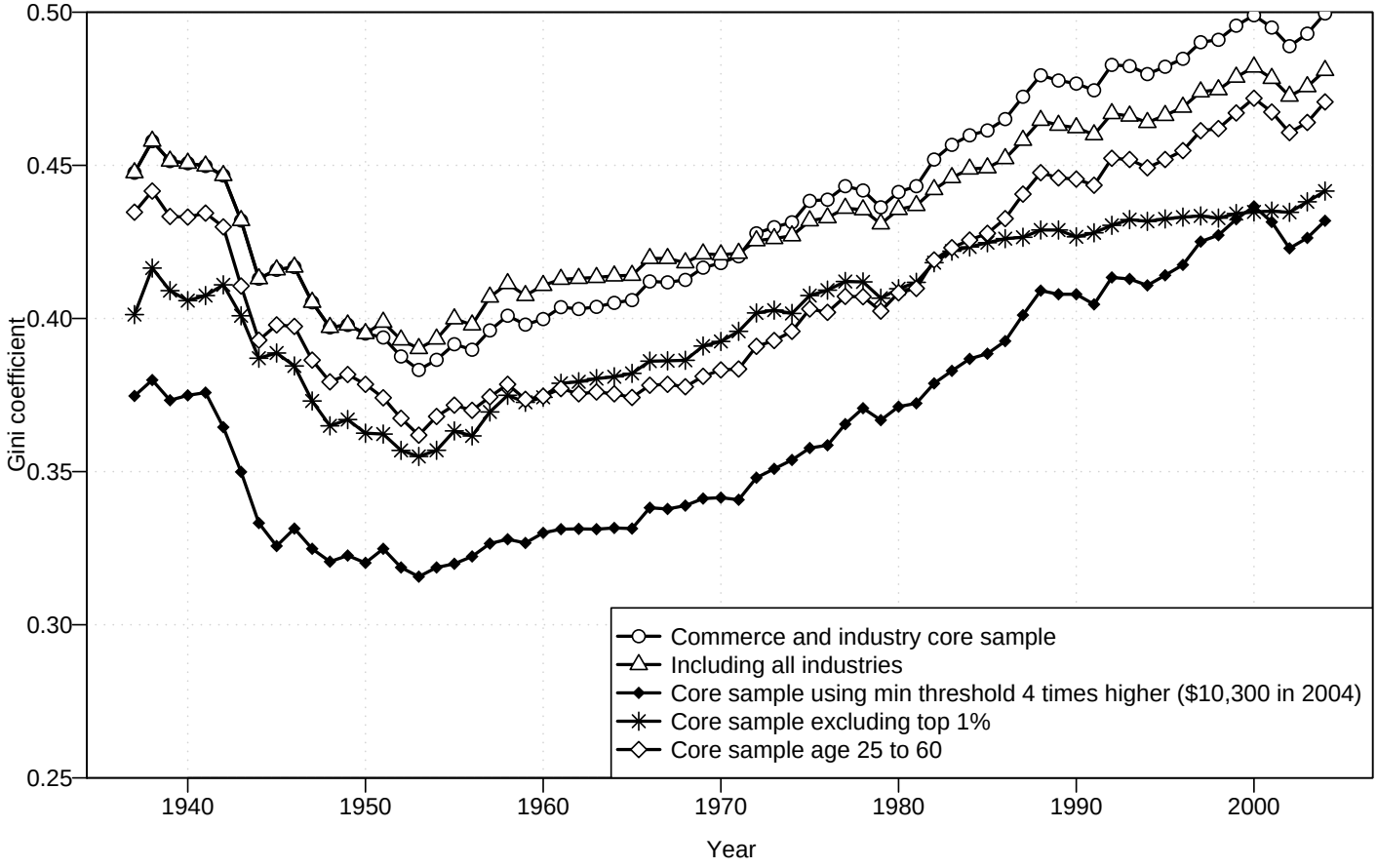


Figure A2−A: Gini coefficient



See notes on page 71

Figure A2−B: Gini coefficient by race and place of birth

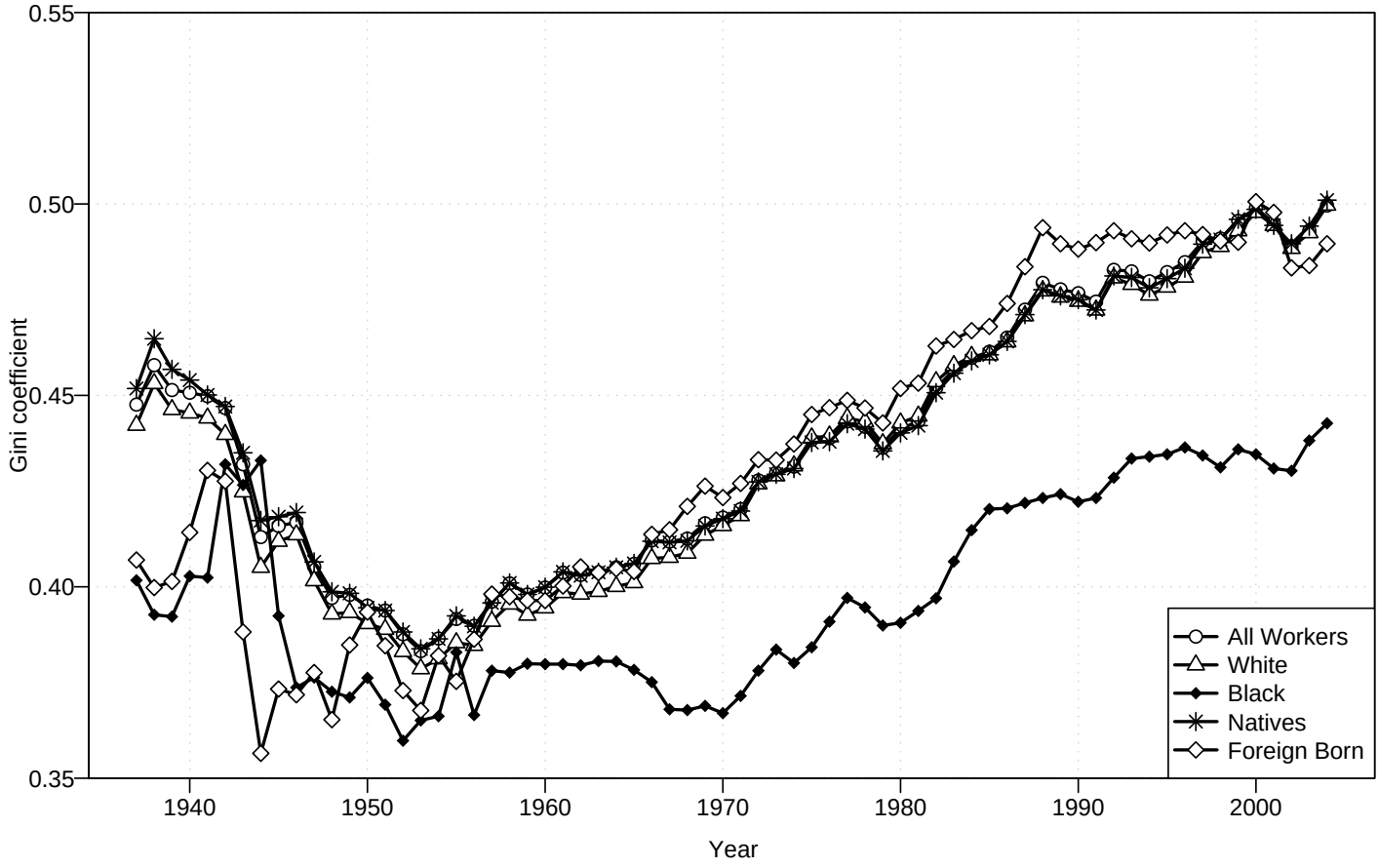
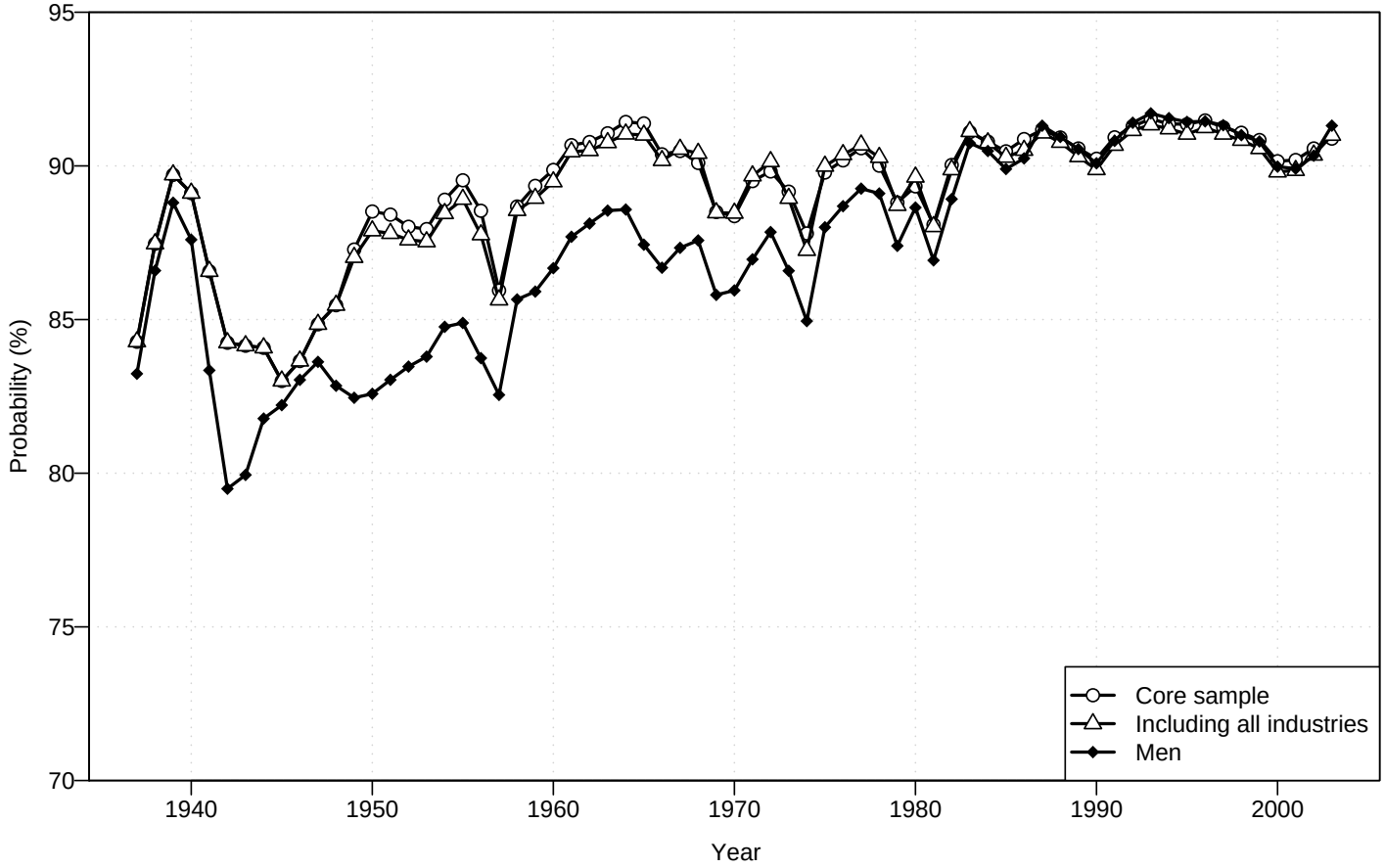


Figure A3: Core sample vs all industries: Probability of Staying in P60−100



See notes on page 71

Figure A4: Conditional and Unconditional Probability of Staying P60−100

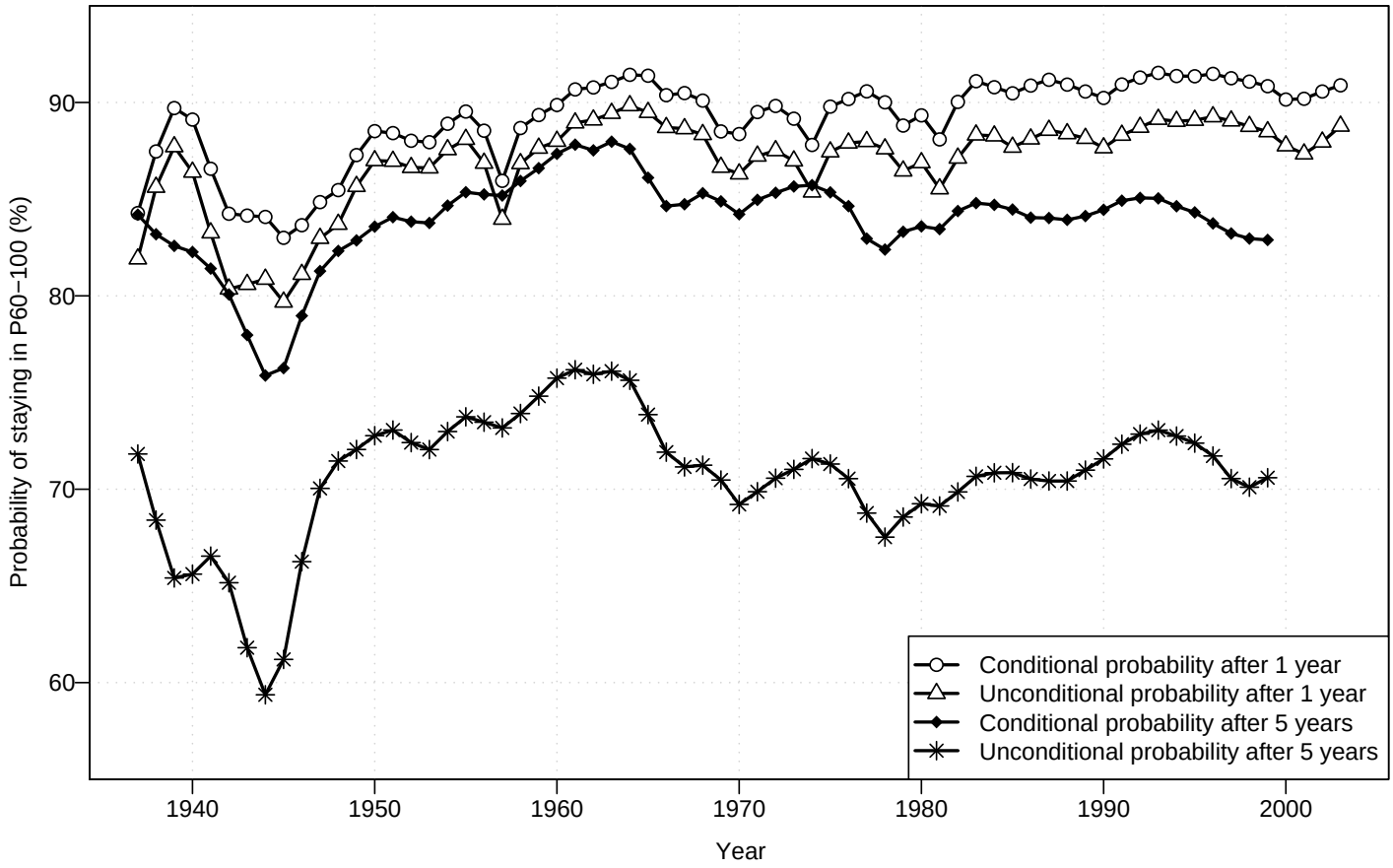
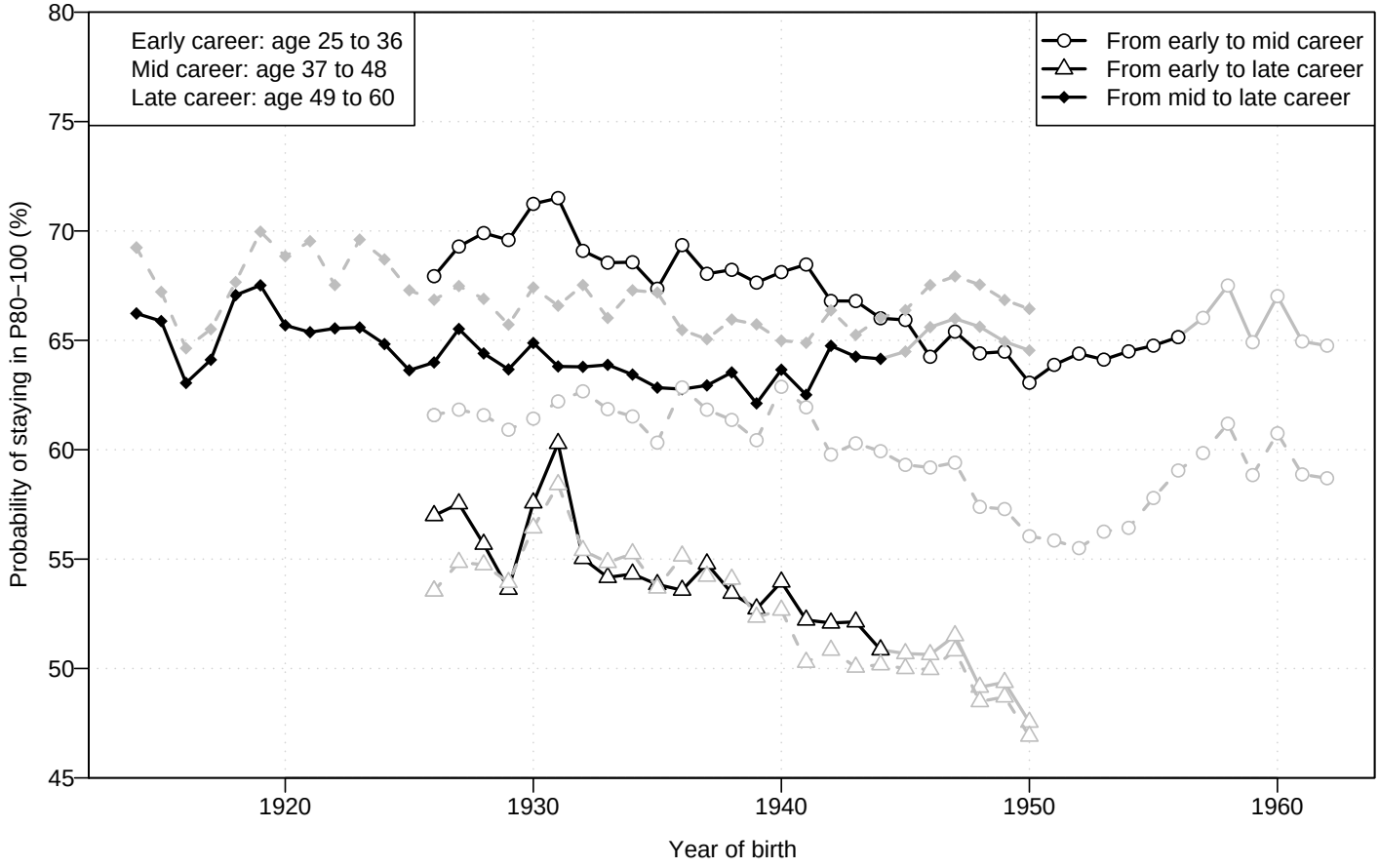


Figure A5: Mobility Imputations for Incomplete Cohorts − Top Quintile



See notes on page 71

Figure A6−A: Probability of Upward Mobility over a Career by Gender (reweighted)

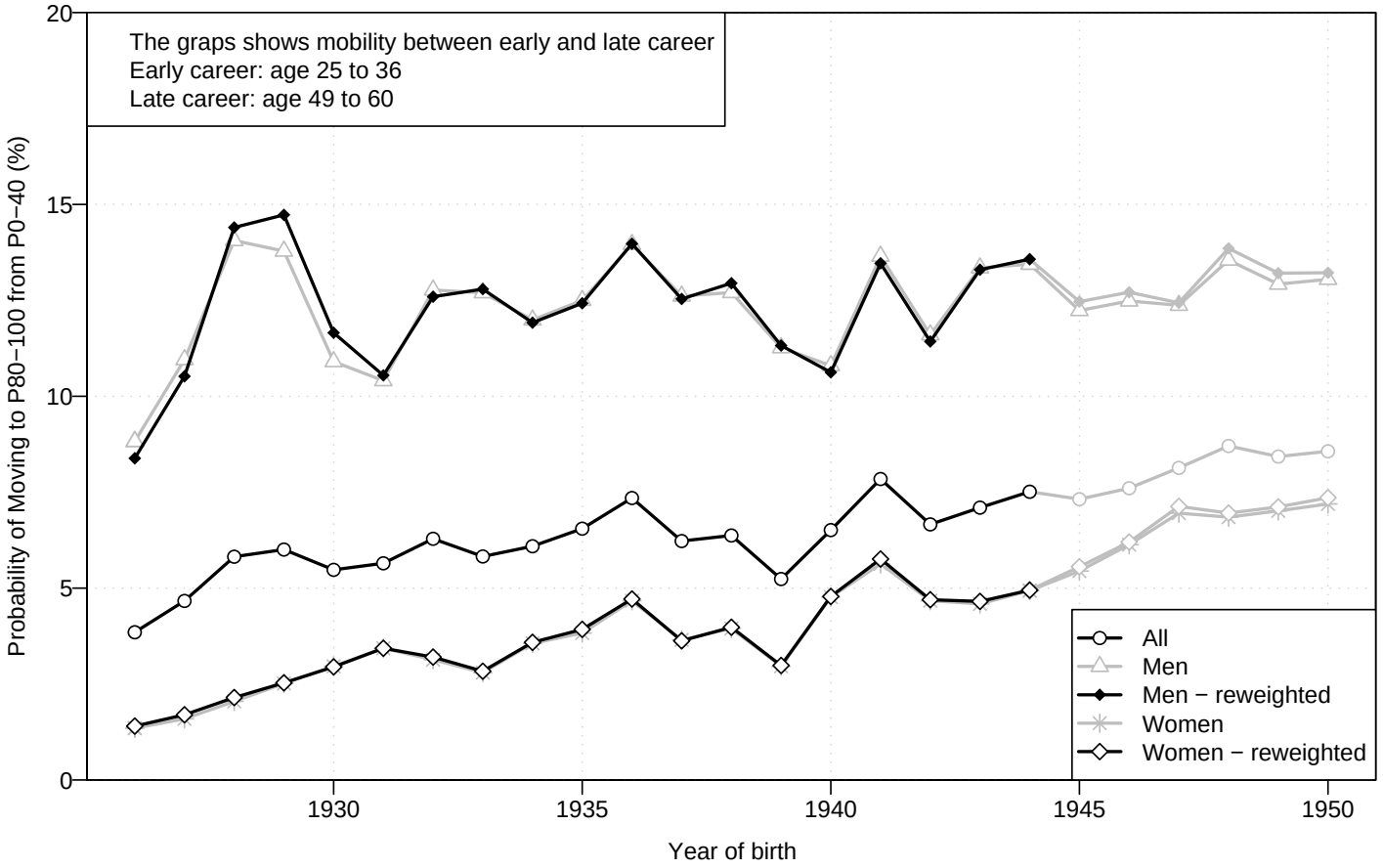
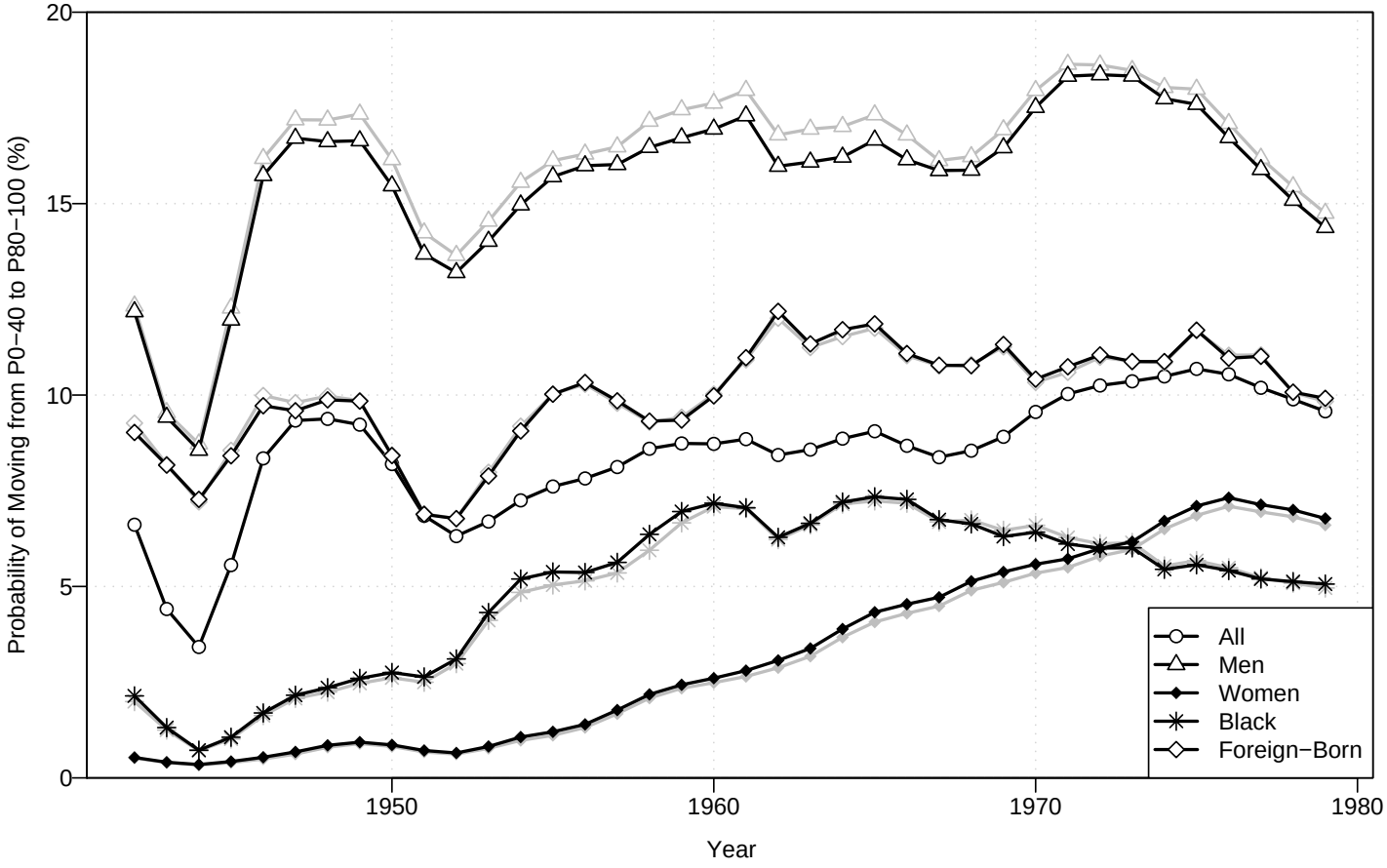
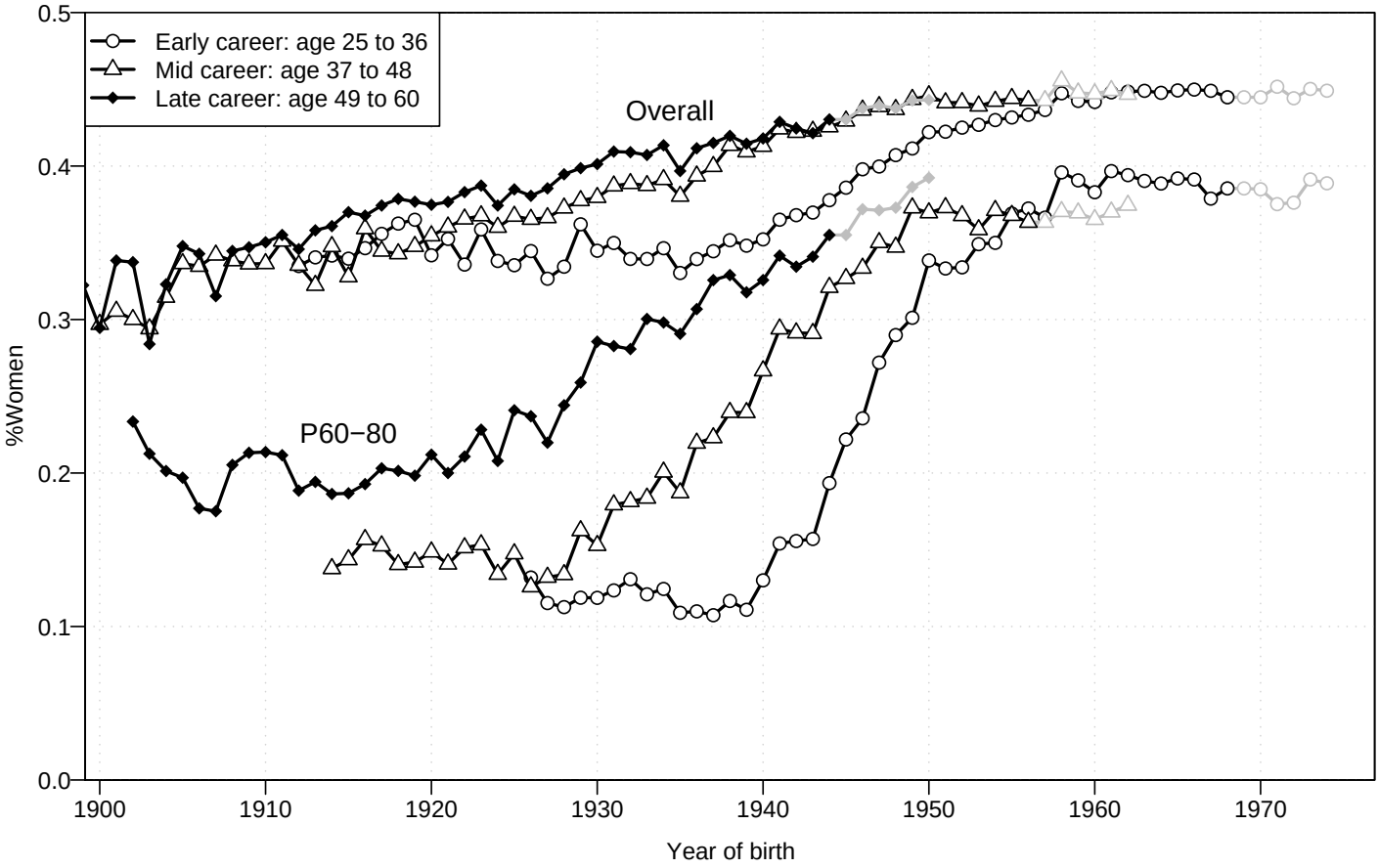


Figure A6−B: Upward Mobility from P0−40 to P80−100 After 20 Years, MA11 (reweighted)



See notes on page 71

Figure A7: Women in P60−80 (Long−Term)



See notes on page 71

Table 1: Thresholds and Average Earnings by Group in 2004 — Commerce and Industry Sample

Percentile threshold (1)	Income threshold (2)	Income group (3)	Average income (4)	Number of workers (5)
P50	26,553	P0-100	39,176	95,965,600
P0	2,575	P0-20	6,482	19,192,400
P20	10,827	P20-40	15,794	19,193,400
P40	20,966	P40-60	26,715	19,193,500
P60	33,042	P60-80	41,869	19,192,400
P80	53,173	P80-90	63,114	9,596,800
P90	76,211	P90-95	85,304	4,798,800
P95	98,681	P95-99	134,639	3,838,600
P99	219,153	P99-99.5	260,240	479,800
P99.5	319,402	P99.5-99.9	456,234	383,900
P99.9	771,353	Top .1%	1,914,153	96,000

Table A1: Thresholds and Average Earnings by Group in 2004 — Full Sample

Percentile threshold (1)	Income threshold (2)	Income group (3)	Average income (4)	Number of workers (5)
P50	26,941	P0-100	38,014	122,630,000
P0	2,575	P0-20	6,611	24,524,000
P20	11,136	P20-40	16,213	24,526,200
P40	21,375	P40-60	27,068	24,526,900
P60	33,280	P60-80	41,702	24,526,700
P80	52,379	P80-90	61,530	12,263,200
P90	73,510	P90-95	82,077	6,131,300
P95	92,882	P95-99	124,302	4,905,400
P99	199,026	P99-99.5	234,329	613,100
P99.5	285,845	P99.5-99.9	406,570	490,500
P99.9	682,466	Top .1%	1,666,034	122,700

Table A2: Aggregate Statistics and the Number of Observations

Year	workers (core, no min)	workers (all industries)	workers (core sample)	Average (2004 $)	Median (2004 $)	Gini MA1	Gini MA5	Tax max (nominal $)	%Above tax max	%Above 4*tax max
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1937	30,850	27,395	27,395	14,968	11,656	0.448		3,000	3.61	
1938	29,840	26,031	26,031	14,354	10,874	0.458		3,000	3.52	
1939	31,661	27,771	27,771	15,136	11,642	0.451	0.441	3,000	3.63	
1940	34,041	29,885	29,885	15,789	12,133	0.451	0.437	3,000	4.02	
1941	37,782	33,531	33,531	17,000	13,032	0.450	0.444	3,000	5.44	
1942	42,480	37,524	37,524	17,514	13,477	0.447	0.444	3,000	9.56	
1943	42,618	37,575	37,575	19,629	15,785	0.432	0.433	3,000	15.74	
1944	40,675	36,008	36,008	20,942	17,468	0.413	0.416	3,000	19.48	
1945	42,013	36,630	36,630	19,369	16,339	0.416	0.412	3,000	17.35	
1946	45,058	39,975	39,975	18,336	15,388	0.417	0.408	3,000	16.06	0.48
1947	45,534	41,028	41,028	18,427	15,830	0.405	0.401	3,000	23.15	0.61
1948	45,579	41,226	41,226	18,755	16,358	0.397	0.397	3,000	28.75	0.65
1949	44,213	39,976	39,976	19,313	16,851	0.398	0.382	3,000	28.97	0.71
1950	45,766	41,604	41,604	19,977	17,553	0.395	0.384	3,000	32.88	0.69
1951	47,817	45,808	44,052	20,965	18,210	0.394	0.392	3,600	28.94	0.64
1952	47,853	46,716	44,273	21,872	19,272	0.388	0.387	3,600	33.26	0.70
1953	48,064	47,675	44,567	23,170	20,582	0.383	0.384	3,600	37.64	0.78
1954	47,102	46,964	43,469	23,288	20,683	0.387	0.376	3,600	38.34	0.94
1955	48,493	49,721	44,864	24,445	21,577	0.392	0.384	4,200	31.77	0.61
1956	49,661	52,043	46,021	25,526	22,392	0.390	0.392	4,200	34.99	0.73
1957	49,998	55,115	45,985	25,348	21,989	0.396	0.393	4,200	36.46	0.78
1958	48,999	54,336	44,740	24,861	21,398	0.401	0.389	4,200	36.68	0.84
1959	49,936	55,831	45,876	26,274	22,759	0.398	0.396	4,800	32.36	0.67
1960	50,544	56,882	46,475	27,012	23,230	0.400	0.398	4,800	34.86	0.78
1961	50,540	57,359	46,388	27,204	23,284	0.404	0.395	4,800	36.08	0.82
1962	51,521	58,892	47,377	28,148	23,962	0.403	0.399	4,800	38.38	0.88
1963	52,313	59,946	48,072	28,760	24,457	0.404	0.399	4,800	40.14	0.96
1964	53,711	61,529	49,320	29,552	25,094	0.405	0.398	4,800	42.18	1.08
1965	55,888	64,043	51,370	29,982	25,436	0.406	0.401	4,800	43.89	1.17
1966	58,259	67,247	53,668	30,745	25,779	0.412	0.406	6,600	29.46	0.63
1967	59,294	69,253	54,699	31,163	26,088	0.412	0.406	6,600	31.51	0.70
1968	60,979	71,359	56,262	31,798	26,460	0.413	0.410	7,800	25.54	0.53
1969	63,144	73,746	58,298	32,109	26,574	0.417	0.415	7,800	29.05	0.65
1970	63,595	74,250	58,449	31,789	26,227	0.418	0.412	7,800	31.13	0.75
1971	63,797	74,283	58,327	31,908	26,223	0.420	0.410	7,800	33.82	0.83
1972	65,673	76,031	59,919	33,124	26,801	0.428	0.417	9,000	29.79	0.74
1973	68,251	78,549	62,428	33,369	26,824	0.430	0.428	10,800	24.12	0.58
1974	68,996	79,982	63,131	32,217	25,806	0.431	0.429	13,200	17.62	0.44
1975	67,668	79,177	61,520	31,576	24,981	0.438	0.422	14,100	17.80	0.50
1976	69,660	81,467	63,560	32,148	25,325	0.439	0.430	15,300	17.90	0.46
1977	72,047	84,131	65,900	32,712	25,350	0.443	0.434	16,500	18.15	0.50
1978	74,186	87,318	68,732	33,611	25,820	0.442	0.438	17,700	18.81	0.51
1979	76,554	89,947	71,194	32,723	25,378	0.436	0.439	22,900	12.02	0.32
1980	76,701	90,574	71,038	31,552	24,249	0.441	0.437	25,900	10.91	0.33
1981	77,513	91,133	71,721	31,194	23,888	0.443	0.440	29,700	9.50	0.29
1982	77,639	90,022	71,408	31,076	23,497	0.452	0.442	32,400	8.74	0.31
1983	78,310	90,571	71,882	31,618	23,655	0.457	0.445	35,700	7.77	0.28
1984	81,227	93,570	74,612	32,245	23,946	0.460	0.456	37,800	7.71	0.30
1985	83,662	96,018	76,722	32,559	24,113	0.461	0.461	39,600	7.71	0.30
1986	84,893	97,422	77,768	33,470	24,666	0.465	0.465	42,000	7.26	0.32
1987	85,362	99,485	78,234	34,228	24,932	0.472	0.466	43,800	7.25	0.40
1988	87,996	102,741	80,702	34,613	24,837	0.479	0.472	45,000	7.56	0.45
1989	89,644	104,982	82,278	34,212	24,596	0.478	0.475	48,000	7.09	0.43
1990	90,078	106,169	82,828	33,858	24,334	0.477	0.476	51,300	6.50	0.41
1991	89,294	105,707	81,884	33,130	23,865	0.475	0.474	53,400	6.40	0.37
1992	89,414	105,952	81,828	33,973	24,052	0.483	0.474	55,500	6.48	0.42
1993	90,827	107,215	82,933	33,587	23,734	0.482	0.476	57,600	6.29	0.39
1994	92,748	109,400	84,825	33,646	23,852	0.480	0.479	60,600	6.08	0.36
1995	94,842	111,329	86,804	33,995	23,941	0.482	0.480	61,200	6.48	0.40
1996	96,703	113,146	88,624	34,520	24,201	0.485	0.481	62,700	6.77	0.43
1997	99,006	115,584	90,976	35,865	24,816	0.490	0.485	65,400	6.91	0.45
1998	101,077	117,980	93,064	37,290	25,750	0.491	0.488	68,400	7.04	0.47
1999	102,992	120,005	94,897	38,375	26,237	0.496	0.490	72,600	6.85	0.47
2000	104,735	121,912	96,481	39,400	26,720	0.499	0.491	76,200	7.76	0.54
2001	104,766	122,082	96,164	39,177	26,811	0.495	0.490	80,400	6.68	0.44
2002	103,500	121,076	94,600	38,564	26,776	0.489	0.489	84,900	5.98	0.37
2003	102,780	120,880	93,695	38,787	26,707	0.493		87,000	6.14	0.38
2004	105,637	122,630	95,966	39,176	26,553	0.500		87,900	6.48	0.42

0.1% sample from 1937 to 1956, 1% from 1957 to 2004. Number of workers in thousands.

Table A3: Earnings Shares, 1937-2004

Year	P0-20	P20-40	P40-60	P60-80	P80-90	P90-95	P95-P99	P99-99.5	P99.5-99.9	P99.9-100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1937	3.56	9.39	15.62	23.22	16.00	10.26	11.93	2.64	3.65	3.72
1938	3.41	8.94	15.29	23.23	16.49	10.71	12.47	2.66	3.61	3.20
1939	3.43	9.16	15.48	23.55	16.35	10.49	12.06	2.56	3.57	3.34
1940	3.46	9.28	15.39	23.56	16.19	10.36	11.90	2.54	3.61	3.70
1941	3.53	9.21	15.40	23.67	16.28	10.27	12.20	2.71	3.65	3.10
1942	3.44	8.95	15.50	24.46	17.14	10.73	11.38	2.25	3.15	3.00
1943	3.47	9.26	16.17	25.15	17.05	10.50	10.93	2.09	2.87	2.53
1944	3.66	9.87	16.81	25.44	16.84	10.31	10.61	1.96	2.54	1.96
1945	3.58	9.65	16.87	25.46	17.15	10.39	10.22	1.84	2.52	2.31
1946	3.80	9.93	16.80	24.50	16.23	9.96	11.33	2.57	3.14	1.74
1947	3.90	10.39	17.23	24.65	15.77	9.73	11.05	2.52	3.00	1.76
1948	4.02	10.70	17.48	24.57	15.64	9.63	10.79	2.37	2.91	1.89
1949	4.01	10.76	17.48	24.27	15.69	9.75	11.04	2.42	2.87	1.70
1950	4.06	10.81	17.57	24.43	15.60	9.57	10.76	2.30	2.88	2.02
1951	4.17	10.80	17.38	24.56	15.80	9.68	10.58	2.32	2.82	1.90
1952	4.20	11.07	17.67	24.43	15.72	9.62	10.46	2.36	2.71	1.77
1953	4.25	11.17	17.76	24.60	15.87	9.56	10.35	2.22	2.67	1.56
1954	4.23	11.04	17.76	24.46	15.72	9.54	10.57	2.42	2.72	1.53
1955	4.04	10.77	17.65	24.89	16.00	9.63	10.46	2.22	2.71	1.62
1956	4.17	10.88	17.61	24.59	15.92	9.74	10.58	2.28	2.65	1.58
1957	4.07	10.65	17.40	24.58	16.09	9.96	10.89	2.30	2.64	1.42
1958	3.98	10.43	17.27	24.75	16.19	10.01	11.06	2.31	2.62	1.39
1959	4.01	10.52	17.36	24.75	16.24	10.02	10.91	2.26	2.60	1.33
1960	4.02	10.45	17.23	24.80	16.24	10.02	10.99	2.30	2.60	1.35
1961	3.92	10.30	17.16	24.83	16.33	10.12	11.16	2.30	2.57	1.31
1962	3.95	10.34	17.07	24.81	16.47	10.18	11.16	2.26	2.52	1.24
1963	3.92	10.31	17.06	24.85	16.52	10.19	11.17	2.25	2.49	1.23
1964	3.90	10.30	17.03	24.80	16.48	10.17	11.22	2.26	2.53	1.30
1965	3.87	10.23	17.01	24.88	16.58	10.14	11.21	2.24	2.49	1.35
1966	3.82	9.97	16.83	24.92	16.55	10.23	11.23	2.33	2.67	1.45
1967	3.84	10.07	16.79	24.72	16.48	10.29	11.41	2.34	2.65	1.41
1968	3.84	10.06	16.70	24.75	16.49	10.30	11.36	2.39	2.67	1.43
1969	3.79	9.89	16.61	24.73	16.59	10.40	11.55	2.37	2.67	1.41
1970	3.79	9.86	16.56	24.57	16.61	10.38	11.76	2.41	2.69	1.36
1971	3.72	9.75	16.52	24.69	16.74	10.64	11.63	2.36	2.63	1.33
1972	3.64	9.51	16.25	24.59	16.83	10.71	11.84	2.45	2.77	1.43
1973	3.64	9.42	16.15	24.63	16.90	10.65	11.77	2.46	2.87	1.51
1974	3.65	9.38	16.10	24.54	16.86	10.57	11.65	2.52	3.07	1.67
1975	3.55	9.18	15.90	24.50	16.81	10.58	11.93	2.61	3.15	1.78
1976	3.55	9.12	15.83	24.59	17.00	10.68	11.90	2.54	3.09	1.71
1977	3.55	9.02	15.60	24.39	17.10	10.76	11.95	2.59	3.20	1.86
1978	3.68	9.19	15.46	24.03	16.99	10.83	12.38	2.64	3.16	1.63
1979	3.76	9.37	15.59	24.14	16.97	10.76	12.08	2.57	3.12	1.63
1980	3.71	9.25	15.47	23.95	16.93	10.78	12.23	2.65	3.28	1.75
1981	3.67	9.17	15.42	23.97	16.98	10.83	12.28	2.65	3.25	1.78
1982	3.57	8.93	15.20	23.74	16.95	10.87	12.58	2.76	3.46	1.95

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1983	3.51	8.78	15.04	23.66	17.01	10.95	12.65	2.78	3.51	2.12
1984	3.48	8.70	14.95	23.58	17.02	10.90	12.65	2.80	3.61	2.32
1985	3.48	8.66	14.90	23.48	17.01	10.93	12.75	2.84	3.63	2.32
1986	3.45	8.60	14.82	23.27	16.87	10.87	12.90	2.93	3.80	2.49
1987	3.41	8.51	14.64	22.89	16.57	10.71	12.87	3.04	4.25	3.12
1988	3.38	8.39	14.41	22.54	16.37	10.61	13.04	3.15	4.54	3.57
1989	3.40	8.43	14.45	22.57	16.39	10.68	13.11	3.16	4.46	3.35
1990	3.45	8.48	14.44	22.52	16.33	10.64	13.00	3.16	4.52	3.46
1991	3.47	8.49	14.47	22.64	16.48	10.80	13.09	3.11	4.31	3.13
1992	3.40	8.34	14.23	22.31	16.29	10.68	13.12	3.20	4.62	3.80
1993	3.43	8.35	14.20	22.27	16.35	10.77	13.36	3.22	4.46	3.59
1994	3.45	8.42	14.25	22.32	16.44	10.90	13.32	3.18	4.35	3.37
1995	3.45	8.40	14.14	22.16	16.34	10.84	13.47	3.25	4.47	3.47
1996	3.43	8.38	14.10	21.97	16.23	10.78	13.54	3.29	4.57	3.70
1997	3.42	8.31	13.93	21.67	16.01	10.66	13.55	3.32	4.63	4.50
1998	3.45	8.35	13.89	21.51	15.90	10.63	13.59	3.32	4.67	4.71
1999	3.42	8.28	13.75	21.25	15.76	10.63	13.64	3.36	4.77	5.16
2000	3.41	8.26	13.64	21.03	15.61	10.50	13.76	3.41	4.89	5.49
2001	3.41	8.31	13.76	21.23	15.82	10.74	13.68	3.31	4.69	5.05
2002	3.42	8.37	13.96	21.60	16.09	10.91	13.60	3.23	4.46	4.35
2003	3.36	8.25	13.85	21.53	16.13	10.96	13.68	3.25	4.53	4.46
2004	3.31	8.06	13.64	21.37	16.11	10.89	13.75	3.32	4.66	4.89

Table A4: Gender Gap: %women

Year	%Women in Sample	P0-20	P20-40	P40-60	P60-80	P80-90	P90-95	P95-P99	P99-99.5	P99.5-99.9	P99.9-100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1937	26.297	0.394	0.419	0.326				*0.088*			
1938	26.864	0.369	0.396	0.354				*0.113*			
1939	26.618	0.370	0.402	0.361				*0.099*			
1940	26.311	0.378	0.412	0.347				*0.089*			
1941	26.739	0.413	0.426	0.346				*0.076*			
1942	28.867	0.469	0.436	0.394				*0.073*			
1943	35.449	0.540	0.559	0.475				*0.100*			
1944	37.880	0.582	0.594	0.491				*0.114*			
1945	36.830	0.486	0.569	0.533				*0.127*			
1946	32.083	0.474	0.476	0.415				*0.120*			
1947	31.050	0.490	0.468	0.407				*0.094*			
1948	30.362	0.484	0.468	0.395				*0.085*			
1949	30.441	0.475	0.478	0.387				*0.092*			
1950	30.367	0.476	0.481	0.392				*0.085*			
1951	31.608	0.516	0.518	0.397				*0.075*			
1952	31.970	0.531	0.527	0.389	0.124	0.034	0.022	0.020		*0.024*	
1953	32.044	0.536	0.534	0.389	0.119	0.031	0.018	0.019		*0.025*	
1954	31.765	0.530	0.519	0.387	0.125	0.030	0.023	0.025		*0.025*	
1955	31.997	0.542	0.520	0.383	0.128	0.031	0.018	0.025		*0.018*	
1956	32.355	0.559	0.530	0.377	0.126	0.031	0.019	0.019		*0.011*	
1957	32.377	0.555	0.520	0.379	0.135	0.036	0.021	0.025		*0.023*	
1958	32.068	0.532	0.504	0.386	0.151	0.039	0.023	0.021		*0.024*	
1959	32.297	0.553	0.512	0.378	0.144	0.037	0.020	0.019		*0.022*	
1960	32.522	0.552	0.520	0.385	0.142	0.035	0.021	0.019		*0.020*	
1961	32.755	0.545	0.521	0.394	0.149	0.038	0.021	0.019		*0.019*	
1962	33.042	0.555	0.526	0.399	0.145	0.037	0.018	0.019		*0.017*	
1963	33.067	0.556	0.533	0.396	0.141	0.037	0.020	0.017		*0.016*	
1964	33.150	0.555	0.537	0.399	0.140	0.036	0.018	0.017		*0.019*	
1965	33.479	0.561	0.544	0.405	0.137	0.035	0.018	0.018		*0.020*	
1966	34.515	0.576	0.564	0.420	0.141	0.033	0.019	0.016		*0.016*	
1967	35.210	0.580	0.578	0.429	0.147	0.036	0.021	0.017		*0.018*	
1968	35.793	0.587	0.583	0.443	0.149	0.036	0.022	0.017		*0.016*	
1969	36.293	0.591	0.587	0.452	0.156	0.038	0.022	0.018		*0.017*	
1970	36.148	0.578	0.579	0.452	0.167	0.042	0.023	0.018		*0.020*	
1971	36.041	0.571	0.570	0.452	0.175	0.047	0.023	0.019		*0.019*	
1972	36.344	0.578	0.566	0.452	0.185	0.048	0.025	0.019		*0.017*	
1973	36.827	0.587	0.570	0.459	0.189	0.049	0.026	0.019		*0.018*	
1974	37.362	0.589	0.579	0.464	0.197	0.055	0.027	0.022		*0.019*	
1975	37.662	0.576	0.572	0.473	0.216	0.064	0.033	0.025		*0.019*	
1976	38.345	0.580	0.577	0.483	0.229	0.068	0.035	0.026		*0.020*	
1977	38.823	0.584	0.579	0.487	0.238	0.074	0.038	0.027		*0.022*	
1978	39.715	0.596	0.593	0.493	0.246	0.081	0.041	0.030	0.024	0.019	0.010
1979	40.191	0.596	0.599	0.497	0.254	0.088	0.047	0.033	0.027	0.019	0.013
1980	40.451	0.583	0.593	0.505	0.270	0.101	0.053	0.036	0.030	0.019	0.010

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1981	40.832	0.583	0.588	0.509	0.281	0.112	0.060	0.039	0.028	0.022	0.013
1982	41.325	0.571	0.577	0.510	0.312	0.135	0.073	0.047	0.033	0.023	0.014
1983	41.791	0.565	0.571	0.519	0.328	0.146	0.085	0.056	0.036	0.030	0.015
1984	42.102	0.576	0.568	0.513	0.333	0.156	0.094	0.062	0.036	0.029	0.025
1985	42.554	0.576	0.570	0.513	0.342	0.170	0.104	0.068	0.041	0.036	0.018
1986	43.009	0.574	0.569	0.515	0.355	0.184	0.114	0.077	0.050	0.042	0.022
1987	43.155	0.574	0.567	0.514	0.357	0.190	0.124	0.085	0.062	0.043	0.024
1988	43.247	0.569	0.565	0.511	0.363	0.198	0.133	0.096	0.069	0.046	0.026
1989	43.326	0.566	0.563	0.508	0.365	0.208	0.145	0.104	0.069	0.049	0.038
1990	43.381	0.563	0.560	0.505	0.367	0.220	0.151	0.114	0.070	0.062	0.028
1991	43.445	0.553	0.553	0.506	0.376	0.232	0.163	0.121	0.077	0.057	0.039
1992	43.510	0.550	0.549	0.505	0.380	0.240	0.172	0.129	0.093	0.069	0.039
1993	43.480	0.550	0.545	0.500	0.380	0.247	0.179	0.138	0.096	0.070	0.039
1994	43.509	0.556	0.545	0.494	0.378	0.247	0.186	0.140	0.098	0.068	0.040
1995	43.633	0.557	0.548	0.490	0.378	0.255	0.192	0.145	0.098	0.074	0.058
1996	43.732	0.560	0.549	0.488	0.376	0.261	0.195	0.152	0.104	0.086	0.048
1997	43.947	0.562	0.552	0.490	0.375	0.263	0.204	0.159	0.111	0.093	0.060
1998	44.023	0.565	0.553	0.486	0.374	0.265	0.212	0.166	0.122	0.095	0.070
1999	44.039	0.562	0.555	0.485	0.373	0.266	0.217	0.173	0.122	0.102	0.085
2000	44.052	0.559	0.556	0.481	0.372	0.274	0.219	0.180	0.138	0.109	0.089
2001	44.017	0.553	0.550	0.482	0.374	0.281	0.233	0.185	0.144	0.110	0.082
2002	44.140	0.546	0.546	0.485	0.381	0.289	0.240	0.190	0.158	0.114	0.076
2003	44.240	0.546	0.544	0.486	0.382	0.295	0.244	0.197	0.152	0.121	0.089
2004	44.141	0.542	0.541	0.484	0.383	0.295	0.250	0.202	0.148	0.125	0.078

Table A5: Short-Term Mobility: Probability of Staying in the Same Group after One Year

Year	P0-20	P20-40	P40-60	P60-80	P80-100	P90-100	P99-100	P99.9-100
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1937	52.59	46.79	49.54	56.43	79.26	78.76		
1938	46.22	48.45	56.66	66.65	86.87	86.46		
1939	45.70	50.28	58.48	68.34	86.68	85.92		
1940	38.51	43.47	53.01	63.41	86.07	83.43		
1941	38.51	39.06	49.00	57.50	79.93	74.85		
1942	39.10	40.51	48.64	54.72	76.03	53.93		
1943	49.52	48.04	54.44	58.13	76.54	41.83		
1944	45.67	45.81	51.01	55.81	77.00	41.76		
1945	37.59	40.67	47.79	51.60	76.02	48.23		
1946	45.95	41.63	47.34	52.92	74.81	65.74		
1947	50.98	48.45	54.07	52.33	69.97	67.74		
1948	54.34	49.64	53.18	49.91	66.86	64.60		
1949	50.27	50.94	56.18	54.26	71.10	64.19		
1950	47.89	48.94	55.30	55.98	73.92	63.49		
1951	55.97	52.77	56.96	62.90	79.98	74.22	76.17	
1952	57.71	55.25	59.24	63.98	80.60	74.37	72.08	
1953	61.05	55.75	58.68	63.34	79.09	71.92	71.89	
1954	55.45	56.10	59.83	65.74	82.66	77.36	76.51	
1955	58.31	55.89	60.81	65.95	82.53	76.88	81.86	
1956	60.24	54.09	58.87	65.63	80.61	74.79	83.52	
1957	60.09	53.74	56.36	62.97	79.63	75.15	77.05	
1958	55.74	53.88	58.24	65.93	83.14	78.84	78.54	
1959	59.18	55.67	59.77	66.98	83.40	79.26	78.14	
1960	60.46	57.24	61.92	68.94	84.28	78.94	77.95	
1961	58.00	56.61	62.56	69.10	84.56	80.90	78.19	
1962	60.01	57.23	62.93	69.52	84.37	80.84	78.16	
1963	58.52	57.22	63.04	69.47	84.73	81.22	76.31	
1964	57.03	56.87	62.77	68.84	84.87	81.56	70.46	
1965	55.38	55.82	61.45	66.77	83.58	80.40	71.49	
1966	58.25	56.28	61.42	68.17	84.24	79.34	77.28	
1967	57.70	55.59	61.10	68.41	84.80	79.66	76.89	
1968	57.52	54.63	60.22	67.97	84.93	80.41	73.36	
1969	59.71	54.35	58.45	66.07	83.15	78.54	71.52	
1970	58.87	54.46	59.25	66.83	83.46	78.58	72.96	
1971	55.05	52.65	59.12	67.58	84.59	80.04	73.02	
1972	53.36	51.27	58.60	67.70	85.30	80.41	74.73	
1973	55.84	51.50	58.05	65.67	83.66	78.31	73.57	
1974	57.52	52.25	57.58	64.92	82.46	78.50	70.32	
1975	52.67	50.69	59.00	67.97	86.02	81.70	73.67	
1976	53.36	51.25	59.66	68.73	86.58	81.71	73.57	
1977	51.96	51.56	60.38	69.55	87.52	82.27	63.83	
1978	54.59	52.70	60.61	69.60	87.10	83.38	74.33	64.78
1979	56.97	53.18	59.98	68.15	85.19	81.76	76.23	65.48
1980	56.53	54.44	61.47	69.76	86.44	83.20	77.41	65.08
1981	57.42	54.22	60.11	67.40	84.47	81.58	75.17	64.16
1982	54.95	54.66	62.73	71.22	86.94	83.69	76.00	64.57
1983	52.17	53.71	62.93	72.02	88.63	85.62	78.43	65.57
1984	54.86	54.37	62.64	71.92	88.40	85.41	77.61	67.30
1985	56.13	55.00	62.83	71.52	87.84	85.03	75.66	66.44
1986	56.26	55.39	63.24	72.14	88.09	85.03	73.40	60.82
1987	55.93	55.00	62.95	72.44	89.03	85.95	74.90	59.29
1988	57.59	55.72	63.32	72.52	88.79	86.00	75.17	62.10
1989	59.44	56.66	63.58	72.09	88.15	85.90	75.23	63.93
1990	60.83	57.05	63.78	72.33	87.77	85.59	76.47	65.39
1991	59.54	57.71	65.09	73.65	88.53	86.34	78.18	64.70
1992	58.58	57.69	65.16	73.91	89.20	87.07	78.37	68.54
1993	57.68	57.33	64.81	73.76	89.47	87.28	78.33	66.42
1994	58.94	57.22	64.62	73.81	89.49	87.09	78.75	67.24
1995	59.59	57.77	64.81	73.56	89.37	87.05	78.07	66.67
1996	59.58	58.01	64.69	73.40	89.26	86.83	77.88	67.13
1997	59.71	57.90	64.27	72.80	88.88	86.17	76.48	63.35
1998	60.87	58.41	64.50	72.71	88.73	86.11	75.22	62.79
1999	61.31	58.33	64.16	72.25	88.51	85.56	74.47	62.62
2000	63.18	58.39	63.64	71.62	87.63	84.77	72.80	61.44
2001	62.89	58.89	64.55	72.40	87.81	86.18	75.20	65.21
2002	61.79	59.22	65.70	73.79	88.49	86.68	76.55	66.59
2003	59.52	57.84	64.94	73.75	89.38	87.39	77.55	66.63