The Evolution of Black-White Differences in Occupational Mobility Across Post-Civil War America*

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Abstract

We examine long-run differences in intergenerational occupational mobility between Black and White Americans using linked censuses and survey data from 1850 to 2021. We document two main results. First, shifts in mobility dynamics, most notably for the 1940–1950 cohort, reshaped occupational structures and reduced racial segregation. Second, new measures of intergenerational persistence reveal both *bottlenecks* and the enduring *memory* in the mobility system, offering new perspectives on the role of mobility in explaining the lack of convergence in Black-White occupational outcomes.

JEL classification: D31, D63, J15, J62, N31, N32
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1 Introduction

Disparities in intergenerational mobility between Black and White individuals constitute a fundamental dimension of racial inequality in the United States. Recent economic research has consistently shown that Black Americans exhibit lower upward mobility and higher downward mobility than White Americans, for both the last half-century (Bhattacharya and Mazumder, 2011; Mazumder, 2014; Chetty et al., 2020) and over the larger postbellum period (Collins and Wanamaker, 2022).

Most empirical research on this topic, however, has examined income mobility. In this article, we shift the focus to occupational mobility. Although closely related, occupational mobility reveals dimensions of racial inequality that income measures alone often obscure (Björklund and Jäntti, 2000; Mazumder and Acosta, 2015). In particular, occupations provide a more direct window into how historical events, or aggregate shocks, have reshaped the labor market opportunities for Black Americans and produced lasting effects that were transmitted across generations, thereby reinforcing or reducing the racial gap in economic outcomes, including income. In this sense, occupation serves as a key mechanism through which aggregate shocks influence income, while also providing insight into the microeconomic foundations of income mobility. Moreover, the availability of occupational data, consistently recorded across historical and contemporary sources, provides a major empirical advantage, enabling these types of analyses over longer time horizons.

Since the Civil War, Black Americans have experienced dramatic changes in occupational opportunities. Under Jim Crow, most Black Southerners were systematically confined to agriculture, domestic service, and other low-paying "menial" work. The Great Migration marked the first major shift, as millions of Black Americans moved out of the rural South to northern cities and into industrial and service jobs previously unavailable to them. The Civil Rights Act of 1964 and the Equal Employment Opportunity Act of 1972 created a second major transformation, which expanded access to jobs in the public sector and increasingly in professional and managerial occupations (Smith and Welch, 1989; Donohue and Heckman, 1991; Boustan, 2016). Collins and Wanamaker (2014) shows that Black men who left agricultural work for industrial jobs, especially unskilled and semi-skilled labor, earned far more than they would have in Southern farming. These various historical episodes underscore the value of occupation-based approaches, which would offer additional insights beyond income-based analyses.

In this paper, we study long-run differences in intergenerational occupational mobility between Black and White Americans. First, we construct a comprehensive dataset that combines linked historical census data (1850 to 1940) and 10 contemporary large-scale sur-

vey data (the 1960s to the present); and analyze historical patterns in occupational mobility between Black and White men across birth cohorts. Second, we use the Kitagawa-Oaxaca-Blinder decompositions and counterfactual experiments to quantify the importance of these mobility dynamics in explaining the observed changes in cross-sectional distributions and racial inequality over time. Finally, we investigate the properties of persistence embedded in the mobility process to further examine the role of mobility in explaining the lack of Black-White convergence in cross-sectional distributions.

Our analyses of occupational mobility build on the long-standing use of Markov Chain models—the natural mathematical framework for analyzing discrete outcomes such as occupational categories—in the study of intergenerational mobility. Unlike most prior work, which assumes a time-invariant intergenerational transition ($\mathbf{P}$), we allow this process to vary over time and construct period-specific transition matrices or *mobility regimes* ($\mathbf{P}_t$) leveraging our sample of father-son pairs spanning 170 years.

We begin by translating these Markov chain transition matrices into a set of distinct calculations that illuminate features of mobility dynamics and connect with the evolution of the racial gap in occupational distributions. Our decomposition of the changes in the cross-sectional distributions first establishes that shifts in the transition matrices ($\mathbf{P}_t$ to $\mathbf{P}_{t+1}$) played a significant role, most pronouncedly for Black men in the 1940-1950 birth cohorts. Our counterfactual simulations further highlight the critical role of this cohort's mobility regime in establishing the contemporary occupational distribution and reducing the Black-White occupational gap. Assessing the importance of education and migration in shaping the mobility process of this cohort, we find that education plays a greater role than migration within each racial group. Across racial groups, the effect of education was larger for White men than for Black men; the impact of migration was larger for Black men.

Despite the substantial progress achieved by the 1940–1950 cohort, subsequent generations did not maintain this momentum, and occupational segregation by race has remained non-trivial since then. We show that such persistent disparities stem from racial differences in mobility regimes rather than initial conditions. In fact, had Black men experienced the same mobility dynamics as White men, the racial occupational gaps would be markedly smaller, whereas equalizing initial conditions alone would have left the gap largely intact.

Motivated by this critical role of the racial mobility gap in explaining the lack of Black-White convergence, we proceed to investigate the properties of persistence embedded within each mobility regime by introducing two new measures. First, we measure mobility *bottlenecks* using the mean first passage times of Markov Chains, which help identify occupational transitions that are particularly difficult to achieve. Our results show that bottlenecks moving from "Manual" to "Non-Manual" occupations exhibit significant

changes over time, particularly for Black men, initially showing estimates of mean first passage times close to 20 generations and reaching about 3 by the 1960–1970 birth cohort. Conversely, bottlenecks moving from "Non-Manual" to "Manual" occupations remain stable across birth cohorts and racial groups, with estimates consistently lower for Black men, producing a racial gap averaging about 1 generation. These findings underscore the presence of persistent bottlenecks within the occupational structure that cannot be adequately captured by income-based analysis alone.

Second, we measure how parental influence, which we term *memory*, dissipates across generations. Our approach operationalizes the classic sociological notion of *independence of origin* (Prais, 1955), which characterizes a perfectly mobile society as one in which offspring outcomes are independent of ancestral background. In Markov Chains, this independence is realized at the steady state (μ^*), where the outcome distribution no longer depends on the initial conditions. We measure the system's memory of the initial conditions by the *distance* to the steady state ($\mu_t - \mu^*$), and the rate of memory dissipation by the *rate of convergence* towards it. A larger distance indicates stronger dependence on initial conditions, such as the legacy of 1860s occupational distributions. And a lower rate implies greater persistence of parental influence or longer memory of past occupational distributions.

We find that parental memory is both persistent and heterogeneous across family backgrounds for both racial groups. For the 1940-1950 birth cohort, for example, convergence to the steady state occurs within 5 generations, implying persistence of parental memory for about 125 to 150 years. Overall, parental memory is stronger for Black men than for White men in this cohort. However, when accounting for variations in memory across parental occupation groups, White men show stronger aggregate parental memory—reflecting greater heterogeneity than that observed among Black men. Furthermore, when examining the rate at which parental memory dissipates across birth cohorts, we find a notable divergence: while White men show a steady increase over time, progress stalls for Black men, particularly beginning with the 1940–1950 cohort.

The final yet important focus of our paper is to distinguish between structural mobility—mobility generated by aggregate changes in the economy—and exchange mobility (or relative mobility), which reflects individuals' movement up or down the occupational ladder relative to others. This distinction, long recognized in sociological studies (Erikson and Goldthorpe, 1992; Featherman et al., 1975; Sobel et al., 1985), helps explain the evolving racial gap arising from two sources: large-scale occupational restructuring that shifts individuals across jobs, and relative movement of individuals compared to their peers.

To operationalize this distinction, we propose two different ways to measure structural mobility. Namely, we treat the evolution of mobility regimes ($\mathbf{P}_t$ to $\mathbf{P}_{t+1}$)—analyzed in our

decomposition analysis above—as capturing one form of structural mobility, and mobility that is produced in the process of reaching the steady state of a given Markov Chain as the other (μ_t to μ^*). Exchange mobility, in the latter case—which builds on the definition proposed in Berger and Snell (1957) and also adopted in Markandya (1982); Dardanoni (1993, 1995)—is then mobility that occurs at the steady state or mobility in the absence of changes in the cross-sectional distribution.

Our analysis based on the *first* form of structural mobility reveals that aggregate shocks have differentially affected Black and White men, underscoring racial disparities in structural mobility that are central to the cross-sectional racial gap. Turning to the *second* form of structural mobility, we find that its magnitude for a given mobility regime is very small. Further isolating exchange mobility uncovers an important contrast: while White men exhibit steady progress over time, Black men do not. Taken together, our findings collectively reveal a previously unexplored dimension of racial inequality in mobility.

Literature and Contribution

We build on a growing body of studies on historical trends in intergenerational mobility. The availability of digitized census data and innovative methods for linking censuses across time periods have significantly expanded the scope and scale of research in this area (Abramitzky et al., 2022; Helgertz et al., 2022). Song et al. (2020) and Collins and Wanamaker (2022) leverage these linked censuses with other survey data to assess patterns of mobility over long time horizons. Jácome et al. (2025) and Buckles et al. (2023b) expand this analysis to examine mobility patterns including both men and women across Black and White American populations. Important contributions also include efforts to improve the accuracy of linking methods (Bailey et al., 2020; Olivetti and Paserman, 2015) and measurement of occupations to help address biases in mobility estimates (Ward, 2023).

We complement these studies by constructing a new dataset combining both the linked historical censuses (1850 to 1940) and 10 contemporary surveys (1962 to 2021), which offers a comprehensive combination of important features to study mobility: birth cohort coverage spanning 1860 to 1970, inclusion of both Black and White father-son pairs, and harmonized measures of occupation, education, and region of residence across all data sources.[1] Our data construction, thus, produces continuous and comprehensive period-specific transition matrices by race, which are used to construct the cumulative application of these transition processes. This enables the broad set of measures proposed

[1] Our data construction for the contemporary periods closely aligns with that of Jácome et al. (2025), which also combines survey data to study the income-based aggregate mobility trends in the US. Since our analysis focuses on men, we do not include National Longitudinal Study–Young Women, National Longitudinal Study–Mature Women, and National Fertility Survey in our sample.

in this paper, thereby extending earlier 20th-century occupation-based mobility studies (Blau and Duncan, 1967; Duncan, 1968; Featherman and Hauser, 1976; Hout, 1984), and more importantly, facilitating a comprehensive analysis of long-run trends in Black-White mobility. To the best of our knowledge, this is the first paper that constructs such a sequence of nonhomogeneous Markov chains, spanning over 7 generations.

Next, our analyses relate to studies examining the Black-White mobility gap. Prior work consistently documents stark differences in mobility patterns between the two racial groups, with Black men exhibiting lower rates of upward mobility and higher rates of downward mobility than White men (Hertz, 2005; Mazumder, 2014; Chetty et al., 2020; Collins and Wanamaker, 2022). The literature further reaches a broad consensus in finding little evidence of convergence in these gaps, particularly for those born after 1960. In line with this slowdown, recent studies further find no systematic trends in *aggregate* mobility patterns for these recent cohorts (Chetty et al., 2014; Ward, 2023; Jácome et al., 2025).

Against this backdrop, three studies are particularly closely related to our work—Chetty et al. (2020), Collins and Wanamaker (2022), and Jácome et al. (2025)—which reach key conclusions that are broadly consistent with our findings. Chetty et al. (2020) uses income tax data and census records for recent birth cohorts (1978–1983) and highlights the contrasting Black-White mobility patterns and the critical role of the racial mobility gap over the initial conditions in explaining the cross-sectional racial inequality. Collins and Wanamaker (2022) similarly underscores these results in the long run by leveraging data from linked censuses and survey data (OCG 1962, 1973; NLSY79). Jácome et al. (2025) compiles survey data to study the long-run mobility trends for the US across Black and White (men and women combined) and finds significant progress in mobility for the 1940–1950 cohort of Black Americans.

Despite these broad alignments, our focus on studying persistence in mobility importantly distinguishes our work from these studies. That is, we offer a novel perspective on the racial gap by studying persistence embedded in the mobility process—through a set of analyses that are feasible only in the Markov chain-based approach—and quantify the enduring mobility constraints faced by Black men, thereby highlighting dimensions of persistence that are not captured in existing studies.

Specifically, our analysis of mobility bottlenecks provides insights beyond standard contingency tables by analyzing the entire sequence of transitions between origin and destination occupations. Thus, our approach illuminates deeper patterns of persistence, clarifies where mobility is most restricted, and pinpoints where policy interventions could be most effective. In addition, our study of memory dissipation—compared to examining

persistence using the intergenerational elasticity parameter in regression-based methods[2]—offers advantages in analyzing more complex forms of persistence: (i) retains complete information about the distribution of each offspring generation, including steady states; (ii) accommodates nonlinear, state-dependent dynamics in convergence to steady states; (iii) can be flexibly applied to study short- or medium-run dynamics, which is more relevant for studying how different historical events affect progress toward independence of origin.

Finally, our work contributes to studies examining structural versus exchange mobility. The conceptual distinction dates back to the seminal work of Kahl (1957), and exchange mobility, in particular, has long been a key measurement of interest in sociological studies as it allows for examining social fluidity (McClendon, 1977; Sobel, 1983; Sobel et al., 1985). Previous studies mostly propose statistical calculations, such as applying log-linear models to contingency tables (Goldthorpe et al., 1980), transforming contingency tables to adjust the cross-sectional distributions (Hauser et al., 1975; Sobel et al., 1985), and using an odds-ratio-based approach (Altham, 1970; Altham and Ferrie, 2007). More recently, Blume et al. (2025) measures exchange mobility using an imbalance matrix, capturing the difference between the inflow and outflow of each occupation (or class).

Our two different approaches to measuring structural mobility, together with our extensive data construction, collectively allow for a comprehensive evaluation of structural and exchange mobility in the context of Black-White inequality: (i) structural shocks have differentially impacted mobility by race, contributing to the evolving Black-White occupational gaps; and (ii) exchange mobility rates, calculated for each cohort's mobility regime, have improved only for White men, while progress has stalled for Black men.

The rest of the paper is organized as follows. Section 2 describes our measurements. Section 3 discusses the data and sample construction. Section 4 shows descriptive patterns of our sample. Section 5 examines the role of mobility in explaining cross-sectional distributions. Section 6 studies properties of persistence in mobility. Section 7 concludes.

2 Methodological Approach: Markov Chains

We model the intergenerational occupational transitions using a discrete-time Markov chain with finite state space, which assumes that the distribution of the current generation depends only on that of the parents and not on any of the other preceding generations.

[2]Existing studies employing regression-based approaches have similarly examined persistence in mobility by focusing on steady states derived under the assumption of a first-order autoregressive process in log income over generations (e.g., Mazumder, 2005; Chetty et al., 2020). In these models, the rate of convergence toward the steady state also depends on the initial condition and the intergenerational elasticity parameter. However, these models impose a constant intergenerational elasticity, implying a uniform geometric rate of convergence toward the steady state.

We denote the occupational distribution in period t by a row vector μ_t, and the transition matrix by $\mathbf{P} = [p_{ij}]$ where each row adds up to 1, i.e., $p_{ij} = Pr(\text{Son's occ} = j \mid \text{Father's occ} = i)$. The occupational transition process can then be described as

$$\mu_t = \mu_{t-1}\mathbf{P}, \tag{1}$$

where, for homogeneous Markov chains, the transition matrix ($\mathbf{P}$) is constant over time.

Assuming that $\mathbf{P}$ is *regular* (irreducible, positive recurrent, and aperiodic) and that the states in the transition matrix communicate over time, there exists a unique long-run equilibrium independent of the given initial condition μ_0:

$$\lim_{t\to\infty} \mu_0\mathbf{P}^t = \mu^*, \tag{2}$$

where μ^* is the steady-state vector of the Markov process $\mathbf{P}$, capturing the distribution of descendants in the infinitely distant future.

For our purpose of studying mobility trends over the long time horizon, which includes significant changes in the socioeconomic structure and thus in the patterns of intergenerational occupational transitions, we allow these transition matrices to vary over time. We refer to these as period-specific transition matrix or *mobility regimes* ($\mathbf{P}_t$). The occupational transition process is then described by nonhomogeneous Markov chains:

$$\mu_t = \mu_{t-1}\mathbf{P}_t. \tag{3}$$

Here, μ_{t-1} is taken as the state variable, whereas $\mathbf{P}_t$ incorporates the new information or shocks realized in period t that affects μ_t. While our analysis is centered on nonhomogeneous Markov chains, in a subset of exercises, we consider each transition matrix $\mathbf{P}_t$ in isolation and use it to form a hypothetical homogeneous Markov chain—which allows us to understand the full properties of each transition matrix.

2.1 Decomposition of Changes in the Evolution of Occupational Distributions

We begin by translating Markov chain transition matrices into a set of distinct calculations that illuminate features of Black-White intergenerational mobility dynamics and connect with the evolution of Black-White occupational differences. We introduce two approaches.

First, we implement a Kitakawa-Oaxaca-Blinder-type decomposition to quantify the contribution of changes in the mobility process ($\mathbf{P}_t$ to $\mathbf{P}_{t+1}$) in explaining changes in the cross-sectional occupational distributions (μ_t to μ_{t+1}) and trace out the evolution of its importance. From Equation (3), we express changes in the cross-sectional occupational

structure between periods t and $t+1$ as,

$$\mu_{t+1} - \mu_t = \mu_t \mathbf{P}_{t+1} - \mu_{t-1}\mathbf{P}_t.$$

Then, we add and subtract by $\mu_t \mathbf{P}_t$ to obtain the following decomposition:

$$\Delta\mu_{t+1} = \mu_{t+1} - \mu_t = \underbrace{(\mu_t - \mu_{t-1})\mathbf{P}_t}_{\text{(1) } \Delta\text{distribution}} + \underbrace{\mu_t(\mathbf{P}_{t+1} - \mathbf{P}_t)}_{\text{(2) } \Delta\text{transition}}. \tag{4}$$

The first term captures the contribution of changes in the occupational distributions ($\mu_t - \mu_{t-1}$) had there been no changes in the transition process ($\mathbf{P}_{t+1} = \mathbf{P}_t$). In that case, the occupational distribution would continue to converge toward the steady state distribution implied by $\mathbf{P}_t$, reflecting the persistence of the mobility regime $\mathbf{P}_t$ into period $t+1$.[3] The second term reflects the contribution of changes in the mobility process ($\mathbf{P}_{t+1} - \mathbf{P}_t$), capturing the net impact of the shock to the transition process ($\Delta\mathbf{P}_{t+1}$) on the change in the distribution ($\Delta\mu_{t+1}$), accounting for the persistence of the previous mobility regime $\mathbf{P}_t$.

Here, we define changes in the mobility process ($\mathbf{P}_{t+1} - \mathbf{P}_t$) as our first form of "structural mobility," which captures shifts in the period-specific socioeconomic structures that shape intergenerational occupational transitions. In sociological studies, structural mobility refers to mobility arising from aggregate changes in the economy, which is distinct from exchange mobility—individuals moving up or down the occupational ladder compared to others (i.e., one person's upward mobility results from another person's downward mobility).[4] Our objective here is not to propose an alternative decomposition of total mobility into structural and exchange components. Instead, we explore how structural forces shape the intergenerational transition process by studying changes in transition matrices over time (see Section 6.3.3 for measurements that isolate exchange mobility). This analysis highlights the evolving impact of these structural factors, which operate through channels of the mobility process, in shaping cross-sectional distributions.

Second, we further study the contribution of each period-specific transition matrix, or mobility regime, to achieving the current occupation distribution and affecting racial inequality. To this end, we implement a series of counterfactual experiments that trace

[3] Note that $\mu_t = \mu_{t-1}\mathbf{P}_t$ already reflects the influence of $\mathbf{P}_t$—it is the first step toward its steady-state distribution given μ_{t-1} as the initial condition. That is, if $\mathbf{P}_{t+k} = \mathbf{P}_t \; \forall k \geq 0$, μ_{t+k} would converge towards μ^*. μ_t is the realized distribution, whereas $\tilde{\mu}_{t+1} = \mu_t \mathbf{P}_t$ is the counterfactual distribution under $\mathbf{P}_{t+1} = \mathbf{P}_t$ in $t+1$.

[4] Traditionally, subject to the criticism by Sobel (1983), the sociology literature has defined total mobility as the sum of the off-diagonal elements of the contingency table, and structural mobility as the change in the marginal distributions (measured as one-half of the L^1 norm). By construction, structural mobility cannot exceed total mobility, so the residual is interpreted as exchange mobility. According to that definition, $\mu_{t+1} - \mu_t$ itself would be the structural mobility.

alternative trajectories of mobility processes.

We start with the historical evolution of the occupational distribution, building on our formulation of the evolution of cross-sectional densities in Equation (3),

$$\mu_t = \mu_{t-1}\mathbf{P}_t = \mu_{t-2}\mathbf{P}_{t-1}\mathbf{P}_t = \cdots = \mu_0\mathbf{P}_1\cdots\mathbf{P}_{t-1}\mathbf{P}_t,$$

where the current occupational distribution is an outcome of all the past events that shaped the mobility regime in each period. We propose the following measures of counterfactual occupational distribution $\mu_{t|\tau}$, which represent how the occupational distribution would have evolved if these historical events had not occurred since period $\tau \in \{1, 2, \cdots t-1\}$ and the old mobility regime had persisted until now.

$$\begin{aligned}
\mu_{t|1} &= \mu_0\mathbf{P}_1\mathbf{P}_1\cdots\mathbf{P}_1\mathbf{P}_1 \\
\mu_{t|2} &= \mu_0\mathbf{P}_1\mathbf{P}_2\cdots\mathbf{P}_2\mathbf{P}_2 \\
&\vdots \\
\mu_{t|t-1} &= \mu_0\mathbf{P}_1\mathbf{P}_2\cdots\mathbf{P}_{t-1}\mathbf{P}_{t-1} \\
\mu_{t|t} &= \mu_0\mathbf{P}_1\mathbf{P}_2\cdots\mathbf{P}_{t-1}\mathbf{P}_t
\end{aligned} \tag{5}$$

Here, the change in cross-sectional distributions attributable to shifts in mobility regimes, or structural mobility, is quantified by differences in the counterfactual distributions over a reference period τ, represented by $\mu_{t|\tau} - \mu_{t|\tau-1}$. The role of mobility regime τ in explaining the actual distribution μ_t can then be assessed by how much $\mu_{t|\tau} - \mu_{t|\tau-1}$ contribute towards achieving μ_t. This analysis complements decompositions in Equation (4) that highlight the overall magnitude of structural mobility in explaining cross-sectional changes over time.

2.2 Measurement of Persistence in Intergenerational Mobility

We then investigate properties of persistence embedded in each transition matrix. Our Markov Chain framework allows for a comprehensive assessment of two key features: (i) bottlenecks and (ii) memory dissipation. These measures provide valuable insights into the enduring lack of Black-White economic convergence documented in prior research (Bound and Freeman, 1992; Fairlie and Sundstrom, 1997).

2.2.1 Bottlenecks in Mobility

We first measure persistence in mobility by focusing on "bottlenecks," defined using the *mean first passage times*—that is, the expected time required to move from one occupation

to another for each source and destination pair of occupations—and use these to identify regions of the occupational distribution that present significant obstacles to moving.[5]

For each pair of occupations (i, j) with $i \neq j$, let $T_{ij} \in \mathbb{N}$ denote the random variable that captures the first passage time from state i to j, and let $h_{ij}(n) = Pr(T_{ij} = n)$. $h_{ij}(n)$ can be constructed recursively as $h_{ij}(n) = \sum_{k \neq j} p_{ik} h_{kj}(n-1)$ for $n \geq 2$, with $h_{ij}(1) = p_{ij}$. The mean first passage times, b_{ij}, can be expressed as

$$b_{ij} = E[T_{ij}] = \sum_{n=1}^{\infty} n h_{ij}(n). \tag{6}$$

Note that b_{ij} satisfies the following system of linear equations:

$$b_{ij} = 1 + \sum_{k \neq j} p_{ik} b_{kj} \tag{7}$$

Suppose that the chain begins in the state i. With probability p_{ij}, state j can be reached in one step ($T_{ij} = 1$). With probability p_{ik}, the chain first reaches state $k \neq j$ and would achieve the expected first passage time of $(1 + b_{kj})$, where 1 reflects the first period and b_{kj} reflects the fact that it will take the same mean first passage time from state k to j from the next period onward. Therefore, $b_{ij} = 1 \cdot p_{ij} + \sum_{k \neq j}(1 + b_{kj}) \cdot p_{ik}$. Since $p_{ij} + \sum_{k \neq j} p_{ik} = 1$, we obtain $b_{ij} = 1 + \sum_{k \neq j} p_{ik} b_{kj}$.[6]

This exercise importantly complements traditional mobility analysis based on contingency tables (e.g., the proportion of individuals on the off-diagonals). While contingency tables summarize origin-destination transitions, they overlook the pathways through which individuals move across statuses. By accounting for the full sequence of transitions needed to reach, for example, a high-status occupation from a low-status background for the first time, our approach allows for exploring deeper patterns of intergenerational persistence in mobility, thereby offering more policy-relevant insights into where mobility is most restricted and interventions may be most effective.

[5] A substantive concept of bottleneck has been widely documented in inequality studies. For example, Fishkin (2014) emphasizes the ethical salience of bottlenecks for perpetuating inequalities and limiting access to opportunities (e.g., the gatekeeping role of elite college enrollment).

[6] Let $v_j \equiv [b_{ij}]_{i \neq j} = (b_{1j}, \cdots, b_{(i-1)j}, b_{(i+1)j}, \cdots b_{Nj})'$, and let P_{-j} denote the transition matrix with the j-th row and column removed ($(N-1) \times (N-1)$). The above system of equations can be rewritten as $v_j = 1 + P_{-j} v_j$. Rearranging, $v_j = (I_{N-1} - P_{-j})^{-1} \mathbb{1}_{N-1}$. The full set of b_{ij} can thus be obtained from the transition matrix P.

2.2.2 Memory in Mobility

We next study persistence in mobility by examining how parental influences, which we term "memory," dissipate across generations. This concept of memory operationalizes the perspective that views mobility as *independence of origin*—a classic notion proposed in sociological mobility research (Prais, 1955). Here, a perfectly mobile society is characterized as one in which offspring outcomes are *independent* of ancestral background.

In our context of Markov Chains, independence of origin is achieved at the steady state (μ^*), where the distribution of offspring outcomes no longer reflects information about the initial conditions. Thus, by focusing on the *distance* to the steady state and the *rate of convergence* toward it, we measure the system's "memory" of the initial conditions and "the rate of memory dissipation," respectively. We measure these separately for each birth cohort or period t, where we assume that the period-specific transition matrix $\mathbf{P}_t$ is maintained indefinitely into future generations (i.e., the homogeneous Markov chain using $\mathbf{P}_t$), taking μ_t as the initial distribution.

Our measures build on methods in Blume et al. (2025) and construct a sequence of memory curves.[7] Specifically, we define *Aggregate Deviations* (AD) as the difference between the simulated cross-sectional densities at time $t+s$ ($\hat{\mu}_{t+s} = \mu_t \mathbf{P}_t^s$ for $s = 0, 1, 2, \cdots$) and the steady state (μ^*),

$$AD(\mathbf{P}_t, \mu_t, s) = \|\mu_t \mathbf{P}_t^s - \mu^*\| \tag{8}$$

That is, starting from the distribution at t, the transition matrix $\mathbf{P}_t$ is used repeatedly for the subsequent s generations instead of the actual transition matrices ($\mathbf{P}_{t+1}, \mathbf{P}_{t+2}, \cdots$). Greater values of AD imply a stronger memory of the initial conditions communicated through the mobility process. Examining how $AD(\mathbf{P}_t, \mu_t, s)$ evolves with s captures the pattern of memory dissipation as the system converges to its steady state.

While AD is intended to capture the overall convergence in the distribution, it is silent on the experience of each individual. To capture heterogeneity in the persistence of memory across individuals by family background, we modify AD to evaluate *Individual Deviations* (ID) by parental group j,

$$ID(\mathbf{P}_t, j, s) = \|e_j \mathbf{P}_t^s - \mu^*\|, \tag{9}$$

where the population-level vector of μ_t in Equation (8) is replaced with a unit vector e_j,

[7] The approach draws on the *mixing* properties of the Markov chain mobility analyses, where mixing time of a Markov chain is the time until the chain is close to its steady-state distribution, μ^*. Technically speaking, mixing analysis evaluates the memory of stochastic processes based on the dependence of probabilities for sets of random variables realized before some time t and those realized at $t+k$ or later. See Bradley (1986) for an exhaustive treatment.

namely, a vector of zeros with a 1 in state (or occupation) j. We next take the weighted average of these individual deviations and derive the total individual memory of the system: the *Aggregated Individual Deviations* (AID),

$$AID(\mathbf{P}_t, \mu_t, s) = \sum_j \|e_j \mathbf{P}_t^s - \mu^*\| \cdot \mu_{t,j}. \tag{10}$$

For our empirical analyses, we calculate the distances between data points ($\|\cdot\|$) using the L^1 norm ($\sum_{k=1}^{n} |x_k|$).[8] The difference between the AD and AID measures reflects the magnitude of heterogeneity across family backgrounds in sorting opportunities.[9]

We then define the *rate* at which memory dissipates, *Aggregate Mobility* (AM) and *Aggregated Individual Mobility* (AIM), by taking the ratios of the distance to steady state between s and $s-1$ (for $s \geq 1$),

$$AM(\mathbf{P}_t, \mu_t, s) = \frac{AD(\mathbf{P}_t, \mu_t, s)}{AD(\mathbf{P}_t, \mu_t, s-1)}, \quad AIM(\mathbf{P}_t, \mu_t, s) = \frac{AID(\mathbf{P}_t, \mu_t, s)}{AID(\mathbf{P}_t, \mu_t, s-1)}, \tag{11}$$

where AM and AIM are less than one since the distance to the steady state decreases in s. Thus, *greater* values of AM and AIM correspond to higher persistence or *slower* convergence and, therefore, imply *lower* mobility as independence of origin.[10] We also use $1 - AM$ or $1 - AIM$, with greater values indicating higher memory dissipation.

Building on our definition of the rate of convergence, we can now revisit the concept of perfect mobility, which was introduced earlier in this section. In our framework, perfect mobility implies a complete dissipation of memory in one period, rendering the current distribution independent of the parental distribution. This occurs when the rows of the transition matrix are identical. Conversely, the system exhibits immobility when the transition matrix demonstrates high persistence, closely resembling an identity matrix.

We note that our measures allow us to study intermediate dynamics, which can, for example, converge slowly in the short and accelerate in the medium run (Blume et al., 2025). As we trace out the evolution of these measures across different birth cohorts, analysis based on short- or medium-run dynamics becomes more relevant in understanding whether and how different historical regimes and institutional contexts facilitate or inhibit progress toward independence of origin. Such flexibility of our approach enables us to capture more complex forms of persistence that log-linear regression models often fail to detect.[11]

[8] See Blume et al. (2025) for more details.

[9] $0 \leq AID - AD \leq 2(1 - \frac{1}{n})$. See Appendix E.2 for the proof.

[10] As s increases, AM converges to the second-largest eigenvalue of the transition matrix $|\lambda_2|$, which governs the asymptotic rate of convergence (Shorrocks, 1978; Conlisk and Sommers, 1979)

[11] These models assume a first-order autoregressive process with a constant intergenerational elasticity,

Our measures evaluated at the limit are also informative as they help connect with concepts of *exchange mobility*—the portion of mobility occurring independently of structural changes. This concept has long been a key measurement of interest in sociological mobility studies as it allows for examining social fluidity, or the extent to which parental background constrains offspring outcomes, controlling for structural mobility (McClendon, 1977; Sobel, 1983; Sobel et al., 1985).

This brings us to our final measurement, which builds on the definition of exchange mobility proposed in Berger and Snell (1957) and also adopted in Markandya (1982); Dardanoni (1993, 1995) and more: mobility in the absence of changes in the cross-sectional distribution. This is effectively our measure of AIM evaluated at the steady state,

$$EM(\mathbf{P}_t) = \lim_{s\to\infty} AIM(\mathbf{P}_t, \mu_t, s). \tag{12}$$

We use AIM instead of AM to fully capture heterogeneity in the persistence of memory among individuals from different family backgrounds.

As we trace out the evolution of AIM as s increases, the difference between AIM examined at each time s, net of exchange mobility EM, captures mobility produced in the process of reaching its steady state,

$$SM(\mathbf{P}_t, \mu_t, s) = AIM(\mathbf{P}_t, \mu_t, s) - EM(\mathbf{P}_t). \tag{13}$$

This is our second form of *structural mobility*, defined for a given structural environment or mobility regime $\mathbf{P}_t$, which importantly complements our first definition focusing on changes in the mobility regimes $\Delta\mathbf{P}_t$. Our approach based on Markov Chains critically enables our proposed investigation to distinguish between structural and exchange mobility, which is another important advantage over standard log-linear regression models.

The results for measurements introduced in Sections 2.1 and 2.2 and related discussions are presented in Sections 5 and 6, respectively.

3 Data and Sample Construction

3.1 Historical Data, 1850-1940

We first draw on newly released linkages between full-count US Censuses from 1850 to 1940 in the Census Linking Project (CLP version 2.0) (Abramitzky et al., 2022). The CLP linking method relies on several different automated algorithms to create matched

forcing convergence to the steady state at a uniform geometric rate.

individual records across census years based on variables such as first and last names, year of birth, and state/country of birth and provides 36 crosswalks between any pairs of Censuses from 1850 to 1940. Abramitzky et al. (2020) and Abramitzky et al. (2021) discuss in detail the linking methods used for the construction of CLP.

We focus on the decadal links between 1850-1860, 1860-1870, 1870-1880, 1880-1900, 1900-1910, 1910-1920, 1920-1930, and 1930-1940.[12] We implement links based on "Exact" and "Conservative" matching methods, both of which leverage the ABE algorithm with exact names. The "Exact" linking approach, as opposed to the NYSIIS, reduces false positives (Bailey et al., 2020). The "Conservative" links require individuals to be unique within a 5-year age window, which further reduces errors in matching individuals across different census years. Given our focus on race, we use the link that relies on race as a matching variable. These linkage data are then merged with age, sex, race, occupation, education, region of residence, and household member information in full-count US Censuses 1850-1940 (Ruggles et al., 2025).[13]

Our sample construction of father-son pairs proceeds as follows. First, we create the master "person-link" file by joining all the linking files, which would track all individuals ever linked in the census over multiple years of census. We also create a separate "intergen-link" file which identifies all father-son linkages from the raw census data. Second, we start from the census data at each snapshot year, and merge with the "person-link" file to track each individual over time if the link is found. Third, we combine this with the "intergen-link" file and identify all the instances where the father of the individual is observed. If the father is observed multiple times for the same individual, we use the father observed in the most recent past (including the current year).[14] Finally, we combine this with the "person-link" file again to track each father over time if the link is found.[15]

We also construct two alternative samples: one using linkages of full-count US Censuses from 1850 to 1940 in the IPUMS Multigenerational Longitudinal Panel (MLP version 1.0)

[12]The 1890 Census data are missing because the original files were lost due to a fire.

[13]The variable on education (*educ*) becomes available from the 1940 Census. The most relevant variable available in earlier censuses is information on literacy (*lit*). In our analysis studying the role of education in mobility patterns (Sections 5 and 6), we mainly use *educ* for birth cohorts 1900-1910 and onward.

[14]If multiple "intergen-links" are found for the same individual at different points in time, it is possible that different fathers are linked to the same individual (as identified by "person-link"). It could be that the fathers are the same person but failed to be linked (false negative), or also that the sons are not the same person but linked by error (false positive). The current approach avoids all this complexity with the assumption that the most recent observation of the father-son link is the most accurate, at least for the current census year.

[15]Table B.1 compares linking and matching rates by different linking methods. We show that CLP yields individual linking rates of 23-30 percent for White men, which are generally more than twice those for Black men (10-15 percent). The intergenerational linking rates are less than half of these figures for both groups. When restricting to father–son pairs with valid occupational information—the sample used for our transition matrices—the rates fall to 6-7 percent for White men and about 2 percent for Black men.

(Helgertz et al., 2022); and the other using the Census Tree data (Buckles et al., 2023a). The MLP linking method relies on a probabilistic algorithm based on individuals' sex, place of birth, birth year, first and last names, and household information to find potential matches across census years. The MLP linking technique produces a single linked record for each individual. The Census Tree data leverages information from users of FamilySearch.org, an online genealogy platform, to create linkages across censuses. It also adds new census links obtained using machine learning algorithms and existing links generated using other methods (e.g., CLP, MLP, FamilySearch), but refined to remove conflicting links.[16] In Section 4, we compare descriptive mobility patterns using these alternative samples.

3.2 Contemporary Data, 1962-2021

Our analysis of the contemporary periods relies on 10 different large-scale social surveys, including General Social Survey (1972–2021), Occupational Changes in a Generation (1962, 1973), National Survey of Families and Households (1987-1988, 1992-1994, 2001-2003), Panel Study of Income Dynamics (1968-2019), National Longitudinal Study of Youth (1979-2012), National Longitudinal Study–Young Men (1966–1981), National Longitudinal Study–Older Men (1966–1990), Survey of Income and Program Participation (1986-1988), Americans View Their Mental Health (1957, 1976), and National Survey of Black Americans (1979-1980, 1987-1988, 1988-1989, 1992).[17]

From each survey, we collect variables for age, sex, race, occupation, education, and region of residence of the respondents and their fathers. We focus on the Black and White sons in their prime age (35-55). When combining multiple survey datasets, the original sampling weights provide valuable information but are not directly comparable across surveys. In particular, surveys with larger sample sizes inherently contain more information regardless of the sum of their original weights. To address this, we normalize the weights so that their sum within each survey equals the corresponding sample size, while preserving the relative weighting structure within each survey. This normalization is performed separately by race because some surveys oversample certain groups.

Our data construction for the contemporary periods builds on Song et al. (2020) but differs by (i) focusing on publicly available surveys, (ii) adding the National Survey of Black Americans to expand our sample for Black men; and (iii) including variables on race,

[16] Compared to CLP, individual linking rates are higher when using either the MLP or Census Tree data. For White men, rates range from 54 to 70 percent with MLP and 78 to 86 percent with the Census Tree. For Black men, the rates are between 27 and 41 percent with MLP and 55 and 66 percent with the Census Tree. When examining the probability of matching father-son pairs with valid occupational information, the rates are much lower overall but still higher than with CLP. With MLP (Census Tree), they range between 14 and 19 (24 and 45) and between 4 and 5 (10 and 21) percent for White and Black men, respectively (Table B.1).

[17] See Section D for a detailed description of each data source.

education, and region of residence for the father-son dyads.[18] In this sense, our approach closely aligns with that of Jácome et al. (2025), which also combines large-scale survey data to study income-based mobility trends, including both Black and White men and women. Since our analysis focuses on men, we do not include National Longitudinal Study–Young Women, National Longitudinal Study–Mature Women, and National Fertility Survey in our sample.[19] However, our approach, which further combines the linked censuses, extends the birth cohort coverage from the post-Civil War period to the present.

3.3 Sample Construction

To construct our sample, we combine the linked historical censuses and survey data and restrict to Black and White men born between 1856 and 1975. We group them into six birth cohorts (1856-1875, 1876-1895, 1896-1915, 1916-1935, 1936-1955, and 1956-1975), which are labeled in our analysis by midyears (1860-1870, 1880-1890, 1900-1910, 1920-1930, 1940-1950, and 1960-1970). This is equivalent to focusing on individuals aged between 35 and 55 in six snapshot years: 1910, 1930, 1950, 1970, 1990, and 2010.[20]

We begin by constructing the *original contingency table*, which records the number of individuals in each cell, grouped by the father's and the son's occupation in each snapshot year. We next adjust this table to match the contemporaneous occupational distribution. Specifically, denoting each element of the contingency table as c_{ij}, where i indicates the father's occupation and j the son's, the adjusted values are $\hat{c}_{ij} = c_{ij}/(\sum_k c_{kj}) \cdot g_j$, where g_j is the occupational distribution among the prime age men (35-55) of the current race from the Decennial Censuses (1910 to 1990) and the American Community Survey (ACS, 2010). This transformation ensures that $\sum_i \hat{c}_{ij} = g_j$ holds, and therefore addresses the discrepancy between the aggregate marginal distribution and the one implied by the contingency table, which can arise, for example, because the probability of finding the linked father is not necessarily uniform across all cells of the contingency table. Similar approaches have been applied in prior studies (e.g., Ward, 2023; Jácome et al., 2025). From this *adjusted contingency table*, we construct the transition matrix $\mathbf{P}$ using $p_{ij} = \hat{c}_{ij}/\sum_k \hat{c}_{ik}$.

Our main sample includes birth cohorts from 1860 to 1910, primarily drawn from historical censuses, and birth cohorts from 1920 to 1970 drawn from surveys. To test the sensitivity of our analysis with respect to changes in the data sources from the linked

[18] We exclude the Wisconsin Longitudinal Survey (1957-2011) as the survey does not provide a nationally representative sample.

[19] We exclude the American National Election Studies (1948–2016) because the occupational definitions used for fathers' occupations cannot be harmonized with our occupational groupings, as detailed below.

[20] See Table B.2 for the mapping between birth cohorts and snapshot periods. As a robustness check, we try an alternative definition of periods using the same age range (35-55) in years 1900, 1920, ..., 1980, and confirm similar results (Figure A.6).

censuses to surveys, we additionally construct the 1900-1910 birth cohort mainly using survey data—as the coverage for this birth cohort overlaps between the two sources—and examine whether the mobility estimates change using this alternate sample (Section 4).

3.4 Measurement of Occupations

For the linked historical censuses, whenever feasible, we maintain multiple observations of occupations in the linked sample and select the modal occupation observed when individuals are aged between 25 and 55. The modal value helps remove measurement errors associated with a snapshot measure of occupations.[21] When the modal occupation is not unique, we use the occupation measured in the year closest to age 40 as the lifetime occupation (Haider and Solon, 2006).

For the survey data, we construct the occupation variables in two different ways based on the structure of the data. In longitudinal studies, where both offspring and parents report their main occupations in each survey year, we apply the same approach as described above for the historical censuses. In cross-sectional surveys, where fathers' information is often not directly observed, we rely on respondents' retrospective reports of their fathers' characteristics during childhood or adolescence (usually when the respondents were 15 or 16 years old). While fathers' information provided in prospective and retrospective surveys may not always match, Jácome et al. (2025) shows that nationally representative longitudinal surveys such as the PSID demonstrate over 80% consistency rates between the occupations reported by individuals and those their offspring recall.

We start by constructing 7-category occupations (Professional and Semi-professionals; Proprietors, Managers, and Officials; Clerical; Sales; Skilled Manual; Semi-Skilled and Unskilled Manual; and Farming) using the 1950 census 3-digit occupation codes.[22] Our classification approach—consistent with the Erikson-Goldthorpe-Portocarero (EGP) class scheme widely used in the sociological literature (Erikson and Goldthorpe, 1992)—focuses on differences in task and skill requirements between these occupational categories and therefore does not explicitly assign any ranked orderings. This aligns with our analyses based on Markov Chains, which do not require ranked categories.[23] We then collapse the 7-category occupations to construct 5-category (Professional and Managers; Clerical and Sales; Skilled Manual; Semi-Skilled and Unskilled Manual; and Farming) as well as

[21] Ward (2023) shows that such errors in linked censuses may lead to biased mobility estimates. Mazumder and Acosta (2015) articulates the importance of constructing "primary occupations" to mitigate concerns related to transitory effects.

[22] In the National Survey of Black Americans, parental occupation information is only available in 22 occupation categories, which we manually map to our categorization of occupations.

[23] Interpreting our results together with wage and skills information of occupations helps connect our findings with the existing literature. We include these discussion points in the relevant sections of our paper.

3-category (Non-Manual, Manual, and Farming) occupations. See Table B.3 for a detailed mapping of the 3-digit occupation codes to our categorization of occupations.

Our main analyses are based on the 3-category definitions—this decision mainly reflects a practical concern: our measurements based on Markov chains may yield unstable estimates when some cells in the transition matrix have only a few observations or zero entries. This issue becomes more salient as we construct transition matrices separately by region of residence (South vs. non-South) or by education group (less than high school, high school graduates, any college), which are the key elements that facilitate our analysis in Section 5 assessing mechanisms. Still, in a subset of analyses, we also explore mobility estimates using 5-category and 7-category definitions whenever a more nuanced understanding of mobility patterns is required.

We note that our construction of the "Farming" group is based on the 1950 Census 3-digit occupation codes, 100 (farmers, both owners and tenants), 123 (farm managers), and 810–840 (farm laborers). We recognize that this classification is not ideal, as it combines landowners, tenants, and laborers who differ significantly in terms of economic and social status. In fact, the importance of accurately distinguishing among these subgroups is particularly critical for the historical periods, though such refinements are challenging due to data limitations. Previous studies have attempted to overcome this issue by introducing finer subgroups based on land ownership (Collins and Wanamaker, 2022; Collins and Margo, 2011) as well as constructing income measures that include non-wage and self-employment income (Collins and Wanamaker, 2022; Ward, 2023; Jácome et al., 2025).[24]

Unfortunately, addressing this issue in our setting is particularly challenging because our analyses are based on Markov chains, where, again, zeros are undesirable. Indeed, subdividing the farmer group into farmers (100, 123) and farm laborers (810-840) results in producing multiple cells with zeros in the transition probabilities, especially for the more recent cohorts of Black men (see Tables B.15 to B.20). Related to these concerns, Section 4 tests robustness of our findings with respect to alternative definitions of farmers—where we include farm laborers with the "Manual" occupation group.

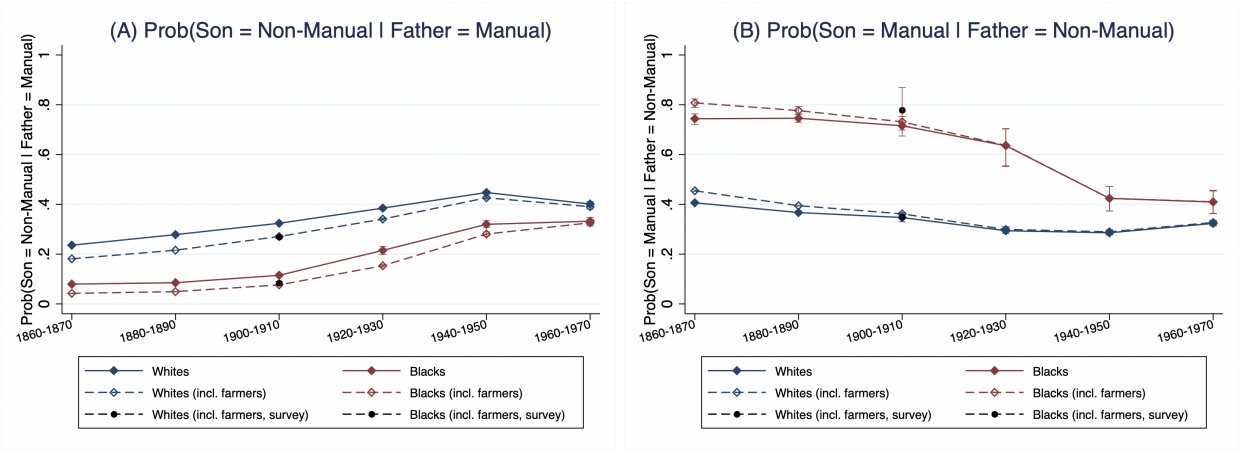
4 Descriptive Patterns in Intergenerational Occupational Mobility

We begin by examining the evolution of intergenerational occupational mobility patterns using the contingency tables constructed separately for our sample of birth cohorts and

[24]Collins and Margo (2011) relies on the home ownership information available in historical censuses to proxy for farm ownership given the close correspondence in the data. Note that, in our context, since we treat our occupations as unranked, this issue is less concerning compared to income-based mobility studies that use occupations to construct proxies for income rank or status.

racial groups.[25] Figure 1 presents results for White (in navy) and Black men (in maroon). The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. All measurements reported throughout this paper include 95 percent confidence intervals constructed using a bootstrap procedure (Efron, 1979) with 200 draws.[26]

Figure 1: Patterns in Occupational Mobility (Birth Cohorts, 1860-1970)



Notes: The graph presents results for White (in navy) and Black men (in maroon) using contingency tables constructed for the 3-category occupations. The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. The dashed lines connect the point estimates of the probability of moving from "Farming" or "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Farming" or "Manual" (right) across our sample of birth cohorts. The point estimates with black solid and hollow circles use survey data to estimate transitions from "Farming" or "Manual" to "Non-Manual" (left) and "Non-Manual" to "Farming" or "Manual" (right). Bootstrapped 95 percent confidence intervals based on 200 draws are included.

For both Black and White men, the likelihood of transitioning from "Manual" ("Non-Manual") to "Non-Manual" ("Manual") occupations has increased (decreased) over time. Although there is convergence between Black and White men in these transition rates over time, a significant racial gap remains: White men continue to exhibit higher rates of transitions from "Manual" to "Non-Manual" occupations and lower rates of transitions from "Non-Manual" to "Manual" occupations than Black men. While our analysis does not assume a ranked order of occupations, interpreting these patterns in terms of upward

[25]Contingency tables present the joint distribution of father-son occupation information. Normalizing each row to one transforms the contingency tables into transition matrices. Tables B.5 and B.6 provide the corresponding transition matrices for 3-category occupations. Tables B.7 to B.10 and Tables B.11 to B.14 provide transition matrices for 5- and 7-category occupations.

[26]For each bootstrap replication: (1) For the survey data, we randomly draw, with replacement, a new sample of the same size as the original dataset. (2) For the census data, we randomly draw the multinomial random variable based on the original contingency table (before adjustment). We calculate our measures using each resampled dataset. The resulting empirical distribution of these 200 bootstrapped results is used to calculate the 95 percent confidence intervals.

("Manual" to "Non-Manual") and downward ("Non-Manual" to "Manual") mobility helps confirm our findings with prior work (Duncan et al., 1972) documenting persistently lower upward and higher downward mobility among Black men relative to White men.[27]

To better compare the racial gap in these mobility trends, Figure A.2 computes the log differences in transition probabilities between the two groups, $\log(Prob_{black}) - \log(Prob_{white})$, which captures the mobility patterns of Black men relative to White men. Relative transitions from "Manual" to "Non-Manual" occupations increase steadily up to 1940-1950 birth cohorts but level off for the 1960–1970 cohort, while relative transitions from "Non-Manual" to "Manual" exhibit a downward trajectory, with a sharp decline beginning in the 1940–1950 cohorts. Such racial disparities in mobility patterns align with previous empirical work on the Black-White gap in intergenerational economic mobility (Hertz, 2005; Mazumder, 2014; Chetty et al., 2020; Collins and Wanamaker, 2022).

To further assess the role of farmers in shaping our results, we repeat the exercise including farmers by examining the probability of moving from "Farming" or "Manual" to "Non-Manual" and from "Non-Manual" to "Manual" or "Farming"; the results are shown in point estimates connected by dashed lines in Figure 1. Note that farmers represent a unique occupation group that not only shows a particularly high rate of status transmission from father to son but also continues to be exposed to the gradual decline of the agricultural sector since World War I (Song et al., 2020). While the results show a slight decrease (increase) in the level of probability moving from "Manual" to "Non-Manual" ("Non-Manual" to "Manual"), the trends remain qualitatively similar to the baseline results.

As our final robustness check, we conduct three additional exercises, which yield quantitatively similar results relative to the baseline. First, we test the sensitivity of our estimates with respect to changes in the data sources from the linked censuses to survey data. As the coverage for the 1900-1910 birth cohort overlaps between the two data sources, we conduct a parallel analysis using survey data for this cohort (Figure 1, black dots).[28] Second, we check our results using an alternative definition of farmers, where we include farm laborers (occ1950 codes 810-840) in the "Manual" occupation group (Figure A.3). Third, we examine how our results change when using different linking methods for the historical sample. Figures A.4 and A.5 show results using the historical sample constructed using MLP (Helgertz et al., 2022) and Census Tree data (Buckles et al., 2023a), respectively.

[27] In the sociology literature, upward (downward) mobility refers to the sum of upper (lower) triangle of the contingency table excluding the diagonal elements, where the occupations are sorted (in the increasing order) by some notion of the socioeconomic status.

[28] Tables B.23 and B.24 show results of mobility estimates using each survey for birth cohorts 1920-1930 to 1960-1970, where we find quantitatively similar results.

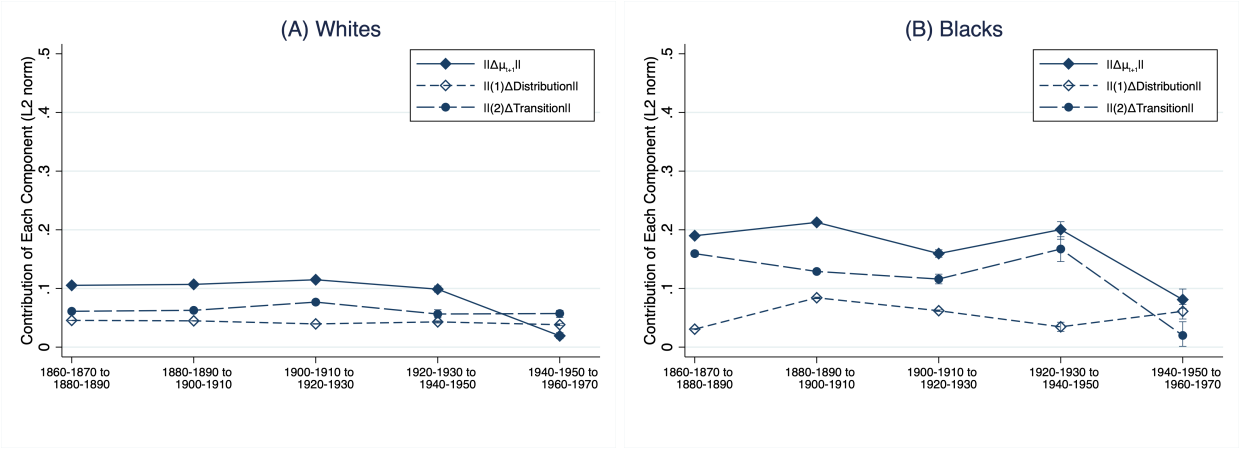
5 The Role of Intergenerational Mobility in Black-White Inequality

We next study the connection between mobility and cross-sectional occupational distributions using two complementary approaches described in Section 2.1. We also discuss our first form of structural mobility, defined using the change in mobility regimes ($\mathbf{P}_t$ to $\mathbf{P}_{t+1}$).

5.1 Kitagawa-Oaxaca-Blinder Decompositions

We begin with the decomposition exercise to study the importance of changes in mobility in explaining the observed evolution of the cross-sectional occupational distributions. To better illustrate aggregate trends, we compute the L^2 norms of each term in Equation (4) and present them in Figure 2.[29]

Figure 2: Aggregate Measurements of Kitagawa-Oaxaca-Blinder Decompositions



Notes: The graphs show the magnitude of the change in occupational distributions ($\|\mu_{t+1} - \mu_t\|$ in solid lines) and the two components ($\|(\mu_t - \mu_{t-1})\mathbf{P}_t\|$ in short-dashed lines and $\|\mu_t(\mathbf{P}_{t+1} - \mathbf{P}_t)\|$ in long-dashed lines) shown in Equation (4), presented separately for White (left) and Black men (right) for our sample of birth cohorts. We take L^2 norms. Our calculations are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

We note three important patterns. First, in most periods for both racial groups, the magnitude of change driven by the mobility process ($\|\mu_t \Delta\mathbf{P}_{t+1}\|$, long-dashed lines) exceeds the change attributed to occupational distributions ($\|\Delta\mu_t \mathbf{P}_t\|$, short-dashed lines). This suggests that structural mobility plays a more significant role than the inertial component in shaping the evolution of cross-sectional distributions $\Delta\mu_{t+1}$: a larger portion of the changes in the occupational distribution is explained by the structural component. Second, a comparison between racial groups shows that Black men typically experience greater

[29] Upon taking the L^2 norms, equality in Equation (4) is replaced by inequality due to triangle inequality: $\|\mu_{t+1} - \mu_t\| \leq \|(\mu_t - \mu_{t-1})\mathbf{P}_t\| + \|\mu_t(\mathbf{P}_{t+1} - \mathbf{P}_t)\|$.

overall and structural changes in occupational distribution. In contrast, the racial disparity in the inertial component is less pronounced. Third, examining trends across periods reveals a clear decline in the magnitude of changes following the 1940–1950 cohort. While the magnitude of change remains stable for White men until this point, it shows a gradual decrease for Black men. An exception to this trend is a distinct increase in the magnitude of changes observed among Black men between the 1920–1930 and 1940–1950 birth cohorts, primarily driven by the structural component.

Table 1: Kitagawa-Oaxaca-Blinder Decompositions by Race

Occupation (Initial Share: Whites; Blacks)	Cohorts (from)	Cohorts (to)	Whites			Blacks		
			(1) ΔOcc Shares	(2) ΔDistribution	(3) ΔTransitions	(4) ΔOcc Shares	(5) ΔDistribution	(6) ΔTransitions
Non-Manual (0.234; 0.048)	1860-1870	1880-1890	0.062 (.062, .063)	0.022 (.022, .022)	0.041 (.04, .041)	0.013 (.012, .014)	0.004 (.004, .005)	0.009 (.008, .01)
	1880-1890	1900-1910	0.071 (.07, .072)	0.027 (.027, .027)	0.044 (.044, .045)	0.035 (.034, .036)	0.008 (.007, .009)	0.027 (.025, .028)
	1900-1910	1920-1930	0.092 (.089, .095)	0.03 (.03, .03)	0.063 (.059, .065)	0.107 (.099, .114)	0.016 (.015, .017)	0.091 (.082, .099)
	1920-1930	1940-1950	0.075 (.072, .079)	0.034 (.033, .036)	0.041 (.036, .046)	0.15 (.139, .16)	0.028 (.022, .034)	0.122 (.107, .136)
	1940-1950	1960-1970	-0.013 (-.016, -.009)	0.028 (.027, .029)	-0.041 (-.045, -.036)	0.058 (.047, .071)	0.044 (.035, .052)	0.014 (-.001, .03)
Manual (0.469; 0.465)	1860-1870	1880-1890	0.02 (.019, .02)	0.015 (.015, .015)	0.005 (.004, .005)	0.128 (.125, .13)	0.019 (.019, .02)	0.108 (.105, .111)
	1880-1890	1900-1910	0.009 (.008, .009)	0.008 (.008, .008)	0.001 (0, .001)	0.13 (.127, .132)	0.055 (.054, .056)	0.075 (.072, .078)
	1900-1910	1920-1930	-0.031 (-.034, -.028)	-0.004 (-.004, -.004)	-0.027 (-.03, -.024)	0.011 (.002, .02)	0.034 (.032, .035)	-0.023 (-.032, -.014)
	1920-1930	1940-1950	-0.062 (-.066, -.059)	-0.024 (-.025, -.022)	-0.039 (-.044, -.034)	-0.132 (-.143, -.12)	-0.018 (-.024, -.011)	-0.114 (-.128, -.098)
	1940-1950	1960-1970	0.014 (.011, .018)	-0.026 (-.027, -.025)	0.04 (.036, .044)	-0.057 (-.069, -.046)	-0.042 (-.051, -.033)	-0.014 (-.031, 0)

Notes: The table shows the results of the decomposition exercise shown in Equation (4) for White (Columns (1)-(3)) and Black men (Columns (4)-(6)) across "Non-Manual" and "Manual" occupations, where each row represents changes in the occupational shares from one period to another; and how much each component contributes to the occupation-specific change in shares. We report the initial shares of each occupation in the first column in parentheses. Our calculations are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

We next turn to Table 1, which shows the decomposition results by occupational group for White and Black men in Columns (1) to (3) and Columns (4) to (6), respectively.[30] Each row reports (i) changes in the occupational shares ($\Delta\mu_{t+1}$) and (ii) the contribution of each component (ΔDistribution and ΔTransitions). Initial occupation shares are reported in the

[30]Due to space constraints and the focus of the current discussion, we include results for "Non-Manual" and "Manual" occupations in the main text. Table B.25 includes results for "Farmers." Table B.26 shows results combining both racial groups.

first column (in parentheses): the share of "Non-Manual" ("Manual") occupations is 0.234 (0.469) for White men and 0.048 (0.465) for Black men.

An increase in the share of "Non-Manual" occupations between the 1860-1870 and the 1880-1890 birth cohorts, as well as the 1880-1890 and the 1900-1910 birth cohorts, is markedly larger in magnitude for White men than for Black men. However, this pattern reverses in later cohorts, with Black men experiencing larger increases in these shares. In particular, Black men show a substantial increase between the 1900–1910 and 1920–1930 cohorts, with the most significant change occurring between the 1920–1930 and 1940–1950 cohorts: more than 80 percent of the changes in these shares for Black men are explained by changes in transitions or *structural mobility*.

A reciprocal pattern holds for "Manual" occupations. For both groups, the occupational shares increase between the 1860–1870 and 1880–1890 cohorts, as well as between the 1880–1890 and 1900–1910 cohorts, where the magnitude of change is significantly larger for Black men than White men. These shares then decline substantially in later cohorts. Again, for Black men, the most pronounced change occurs between the 1920–1930 and 1940–1950 cohorts, with 86 percent of the decline attributable to structural mobility.

We note that the positive (negative) trend of "Non-Manual" ("Manual") occupations continues into the 1960–1970 cohort only for Black men. However, even for Black men, the magnitude of change becomes substantially small relative to the previous period, and the importance of structural mobility in explaining these changes also diminishes.

5.2 Counterfactual Dynamics and Distributions

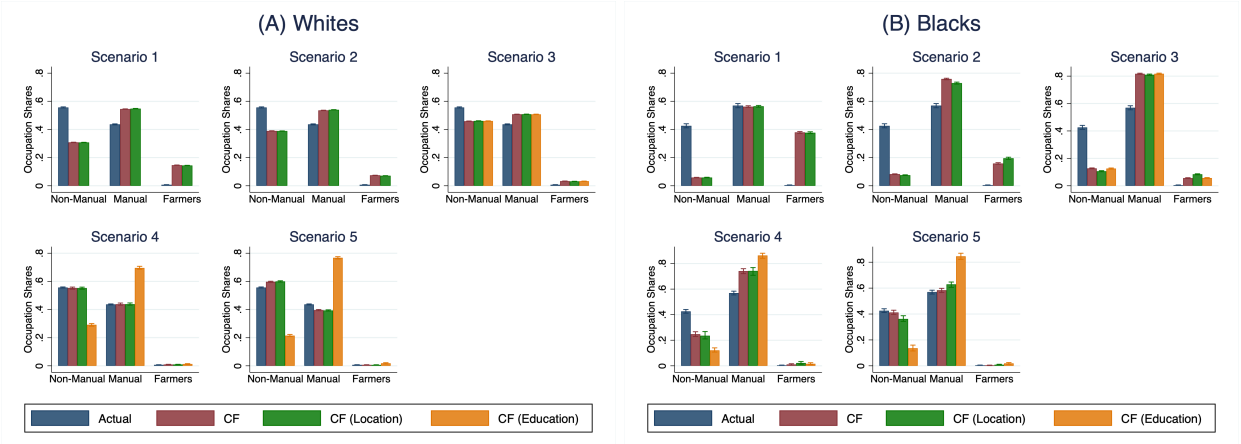
Building on the importance of the mobility channel, we next conduct a series of counterfactual experiments to assess the role of each mobility regime in achieving the current occupational distribution and explaining the cross-sectional racial inequality.

Figure 3 presents the counterfactual occupational distributions for White (left) and Black men (right) across five different scenarios based on Equation (5), which generates offspring outcomes by sequentially updating transition matrices over time. In each panel, for each occupational category, the actual shares in 2010 (in navy) are positioned first and immediately left to the counterfactual ones (in maroon). For example, in Scenario 5, the maroon bars are produced by applying the transition matrices up to the 1940-1950 birth cohort and again in the last period, instead of the 1960-1970 cohort's transition matrix. For clarity in our discussion, we denote the *counterfactual* distribution in Scenario k as $\mu_{6|k}$ with the share of each occupation $\mu_{6|k}(N)$, $\mu_{6|k}(M)$, and $\mu_{6|k}(F)$; and the actual 2010 distribution as μ_6 with shares $\mu_6(N)$, $\mu_6(M)$, and $\mu_6(F)$.

There are several common patterns we find for both racial groups. In Scenario 1, the

transition matrix is fixed at the 1860–1870 birth cohort, producing distributions heavily concentrated in farmers and manual labor—sharply contrasting with the actual 2010 distribution. That is, there is a significant gap between μ_6 and $\mu_{6|1}$. When the transition matrix evolves up to the 1880–1890 cohort (Scenario 2), occupational patterns begin to shift but still diverge noticeably from the actual ones in 2010. By contrast, Scenario 5, which incorporates the transition matrix from the 1940–1950 birth cohort, closely aligns with the 2010 distributions (i.e., $\mu_{6|5} \approx \mu_6$).

Figure 3: Counterfactual Occupational Distributions



Notes: The graph presents the counterfactual occupational distributions for White (left) and Black men (right) across five different scenarios based on Equation (5), which generates offspring outcomes by sequentially updating transition matrices over time. In each panel, for each occupational category, the actual shares in 2010 (in navy) are positioned first and immediately left to the counterfactual ones (in maroon). For example, in Scenario 5, the maroon bars are produced by applying the transition matrices up to the 1940-1950 birth cohort and again in the last period instead of that of the 1960-1970 cohort. For clarity in our discussion, we denote the *counterfactual* distribution in Scenario k as $\mu_{6|k}$ with the share of each occupation $\mu_{6|k}(N)$, $\mu_{6|k}(M)$, and $\mu_{6|k}(F)$; and the actual 2010 distribution as μ_6 with shares $\mu_6(N)$, $\mu_6(M)$, and $\mu_6(F)$. We add results estimated using counterfactual transition matrices, fixing the share of South and non-South at 1910 levels (in green bars) and the share of educational groups (in orange bars) at 1950 levels. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

However, important racial differences emerge when examining the role of each mobility regime. For White men, the gap between the counterfactual distributions and the 2010 distribution gradually decreases as we sequentially update the transition matrices. Notably, the mobility process of the 1920–1930 birth cohort achieves a counterfactual economy that closely resembles the 2010 distributions (Scenario 4), and incorporating the 1940–1950 cohort brings little additional change in these occupational shares (Scenario 5). For example, $\mu^W_{6|4}(N) - \mu^W_{6|3}(N) = 0.094$ is the highest increment in $\mu^W_{6|k}(N)$ across all periods.[31]

[31] Further analysis using 5-category occupational definitions (Figure A.8, top panel) shows that the role of the 1920-1930 cohort in increasing the share of "Non-Manual" occupations is mainly driven by growth in

For Black men, in contrast, the gap between the counterfactual distributions and the 2010 distribution remains substantial across the first three scenarios. Although the 1920–1930 cohort reduces this gap, the share of "Manual" occupations far exceeds their baseline levels in 2010 (Scenario 4)—marking a stark contrast with the patterns observed for White men. A sharp decline in the gap only occurs when we incorporate the 1940–1950 cohort's transition matrix (Scenario 5). In fact, $\mu^B_{6|5}(N) - \mu^B_{6|4}(N) = 0.165$ is the highest increment in $\mu^B_{6|k}(N)$ across all periods.[32]

Another key difference between the two racial groups concerns the role of the 1960-1970 birth cohort. For White men, the counterfactual outcomes in Scenario 5 show higher "Non-Manual" and lower "Manual" shares than the 2010 baseline, indicating that the mobility process of the 1960–1970 birth cohort stalled progress toward increasing (decreasing) "Non-Manual" ("Manual") shares. For Black men, this pattern does not hold: although smaller than the contribution of the 1940–1950 cohort, the 1960–1970 cohort continued this path of increasing (decreasing) "Non-Manual" ("Manual") shares. We find this consistent with Davis and Mazumder (2024), which documents a decline in intergenerational mobility for recent cohorts, particularly among White men, while Black men experienced modest but continued mobility gains over the same period.

To analyze the role of each mobility regime in explaining the racial gap in the occupational distributions, we calculate the occupational segregation index (Duncan and Duncan, 1955) for each counterfactual scenario and compare it with the 2010 baseline level (Figure A.7). The level of segregation across all counterfactual scenarios strictly exceeds the 2010 level, remaining high until Scenario 4 and then sharply falling in Scenario 5. Hence, the contribution of Black men from the 1940-1950 cohort significantly reduced the cross-sectional racial gap. Our findings align with Jácome et al. (2025), which uses a regression-based approach with household-level family income and also highlights the substantial role of the 1940-1950 cohort of Black Americans in enhancing income mobility.

We note that the mobility opportunities of this birth cohort are distinctive, as they experienced major institutional and demographic shifts that expanded economic opportunity. They reached adulthood in the wake of landmark federal legislation—including the GI Bill,

"Professionals and Managers." The 1940–1950 cohort also raises shares in these jobs associated with high skill levels and high earnings, but these gains are offset by declines in "Clerical and Sales" occupations—middle-skill routine-intensive jobs—leaving the overall "Non-Manual" shares largely unchanged. See Figure A.10 (top panel) for results using 7-category occupational definitions.

[32]To better understand this change, we again turn to the 5-category definitions (Figure A.8, top panel). The 1920–1930 cohort's contribution in increasing the share of "Non-Manual" and decreasing the share of "Manual" occupations is mainly driven by increases in "Professionals and Managers" and decreases in "Semi-Skilled and Unskilled Manual" occupations. The 1940–1950 cohort reinforces this trend and sharply narrows the gap with the 2010 distributions in these categories. See Figure A.10 (bottom panel) for results using 7-category occupational definitions.

the Civil Rights Act of 1964, the Higher Education Act of 1965, and the Voting Rights Act of 1965—which increased access to education and civil rights protections. Black individuals of this cohort were also part of the Second Great Migration (1940–1970), either as young adults or as children in migrant households, joining over five million who relocated from the rural South to urban centers in the North and West, where they gained exposure to broader labor market opportunities (Boustan, 2016).

Our final exercise in this section, therefore, examines the relative importance of these channels—namely, educational attainment and migration—in shaping the mobility process and the occupational outcomes of the 1940-1950 birth cohorts. These factors, though not the only determinants, are recognized as key investments that contributed significantly to the economic advances of Black men (Smith and Welch, 1989). Here, we iterate the counterfactual exercises of Equation (5) but use *counterfactual transition matrices*.

Specifically, for each birth cohort's transition matrix, we construct subgroup matrices—the weighted average of which is equivalent to the observed transition matrix—and reweight them using subgroup shares calculated from the initial sample period:

$$\widetilde{p}_{ij} = \sum_{g} \widetilde{\alpha}_i^g \, p_{ij}^g \tag{14}$$

where g indicates each subgroup, and $\widetilde{\alpha}_i^g$ is the counterfactual share of subgroup g among those whose fathers had occupation i.[33] This construction allows us to construct mobility regimes in the absence of compositional shifts in subgroups over time, while maintaining the actual subgroup-specific transition matrices as they vary over time.

We construct these counterfactual transition matrices $\widetilde{\mathbf{P}}_t$ separately for the subgroups based on the offspring's region of residence (South and non-South) and education (less than high school, high school, and any college) using $\widetilde{\alpha}_i^g$ obtained from the respective baseline years of 1910 and 1950, combined with the observed values of p_{ij}^g for each group.[34]

[33] Let c_{ij} denote the joint distribution of the father-son pair (contingency table). Let μ^g denote the overall share of each subgroup g, and c_{ij}^g denote the contingency table conditional on belonging to the subgroup g. Then $c_{ij} = \sum_g \mu^g c_{ij}^g$ holds. Let $f_i = \sum_k c_{ik}$ and $f_i^g = \sum_k c_{ik}^g$ denote the marginal distribution of father's occupation. Then it follows that $f_i = \sum_g \mu^g f_i^g$ since μ^g is common across son's occupation. Finally, $p_{ij} = \frac{c_{ij}}{f_i} = \frac{\sum_g \mu^g c_{ij}^g}{f_i} = \sum_g \frac{\mu^g f_i^g}{f_i} \cdot \frac{c_{ij}^g}{f_i^g} = \sum_g \alpha_i^g p_{ij}^g$, with $\alpha_i^g = \frac{\mu^g f_i^g}{f_i} = \frac{\mu^g f_i^g}{\sum_h \mu^h f_i^h}$. While this equation holds as identity when the contemporary α^g is used, we use counterfactual $\widetilde{\alpha}^g$ to construct the counterfactual $\widetilde{p}_{ij}^g$.

[34] The 1940 Decennial Census is the earliest source with reliable education data; earlier censuses report literacy, which is less informative for evaluating the education channel for more recent cohorts. Thus, we use information on education to construct the counterfactual transition matrices starting with the 1950 period. See Tables B.27 and B.28 (Tables B.29 and B.30) for counterfactual transition matrices based on the counterfactual location (education) scenario.

Using these $\widetilde{\mathbf{P}}_t$, we re-run the counterfactual exercise based on Equation (5). The resulting counterfactual distributions, $\widetilde{\mu}_{6|k,m}$ for $m \in \{L, E\}$, are presented in Figure 3 with green bars for location (L) and orange bars for education (E).[35]

Table 2 helps quantify the magnitude of each channel, with a focus on the contribution of the 1940-1950 birth cohorts. Columns (1) to (3) present occupational shares in Scenario 5 of Figure 3 shown in maroon, green, and orange bars, respectively. Columns (4) to (6) calculate the *change* in these shares relative to Scenario 4. Here, we define the impact of $\mathbf{P}_5$ as $\mu_{6|5} - \mu_{6|4}$, and that of counterfactual matrix $\widetilde{\mathbf{P}}_5$ specific to channel $m \in \{L, E\}$ as $\widetilde{\mu}_{6|5,m} - \widetilde{\mu}_{6|4,m}$. The role of channel m in explaining the contribution of the 1940-1950 cohort is then assessed using the ratio of these two differences.

Table 2: Counterfactual Occupational Distributions: The Role of 1940-1950 Cohorts

Occupation	Actual	Counterfactuals (Scenario 5)			Changes (Scenario 4 to 5)		
		(1) Baseline	(2) Location	(3) Education	(4) Baseline	(5) Location	(6) Education
Panel A: Whites							
Non-Manual	0.556	0.597	0.6	0.214	0.044	0.047	-0.077
	(.553,.56)	(.593,.601)	(.595,.604)	(.208,.223)	(.037,.052)	(.039,.056)	(-.087,-.066)
Manual	0.437	0.396	0.394	0.768	-0.042	-0.045	0.072
	(.433,.44)	(.392,.4)	(.389,.398)	(.759,.775)	(-.051,-.034)	(-.054,-.036)	(.06,.081)
Farmers	0.007	0.007	0.007	0.018	-0.002	-0.003	0.005
	(.006,.008)	(.006,.008)	(.006,.008)	(.013,.022)	(-.004,0)	(-.004,-.001)	(0,.011)
Panel B: Blacks							
Non-Manual	0.426	0.412	0.362	0.136	0.165	0.127	0.015
	(.412,.441)	(.397,.429)	(.343,.387)	(.115,.16)	(.142,.19)	(.092,.163)	(-.016,.042)
Manual	0.57	0.584	0.629	0.846	-0.158	-0.113	-0.017
	(.554,.584)	(.566,.598)	(.606,.647)	(.822,.869)	(-.18,-.132)	(-.148,-.075)	(-.042,.016)
Farmers	0.005	0.004	0.009	0.019	-0.007	-0.014	0.003
	(.003,.006)	(.002,.005)	(.004,.012)	(.012,.025)	(-.013,-.002)	(-.027,-.003)	(-.009,.013)

Notes: The table helps quantify the magnitude of each channel (location and education), focusing on the contribution of the 1940-1950 birth cohorts. Columns (1) to (3) correspond to occupational shares in Scenario 5 of Figure 3 presented in maroon, green, and orange bars, respectively. Columns (4) to (6) calculate changes in these shares relative to Scenario 4. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Comparing the results with fixed geographic shares (green bars) to the baseline counterfactual results (maroon bars), we find that outcomes for White men remain qualitatively the same. However, for Black men, while the overall results are qualitatively similar, the contribution of the 1940-1950 birth cohort notably decreases.

[35] By construction, the baseline counterfactual outcomes (maroon) and the counterfactual outcomes for location (green) in Scenario 1 are the same, given shares being fixed at 1910. Similarly, the baseline and counterfactual outcomes for education (orange) in Scenario 3 are the same, given shares being fixed at 1950.

Specifically, Column (2) of Table 2 Panel B shows that fixing the distribution of Black men between the South and non-South at 1910 levels, counterfactual shares in Scenario 5 would result in "Non-Manual" and "Manual" shares of $\widetilde{\mu}^{\mathcal{B}}_{6|5,L}(N) = 0.362$ and $\widetilde{\mu}^{\mathcal{B}}_{6|5,L}(M) = 0.629$, respectively. The contribution of the 1940–1950 cohort under this scenario, relative to the 1920–1930 cohort, is a $\widetilde{\mu}^{\mathcal{B}}_{6|5,L}(N) - \widetilde{\mu}^{\mathcal{B}}_{6|4,L}(N) = 0.127$ increase in "Non-Manual" a $\widetilde{\mu}^{\mathcal{B}}_{6|5,L}(N) - \widetilde{\mu}^{\mathcal{B}}_{6|4,L}(N) = 0.113$ decrease in "Manual" occupations (Column (5)). These magnitudes are smaller than the baseline changes of 0.165 for "Non-Manual" and -0.158 for "Manual" occupations (Column (4)). In essence, when the migration channel is suppressed, the impact of the 1940–1950 cohort on the distribution is smaller by 23 to 29 percent.

This result is consistent with Chetty et al. (2020) and related studies that emphasize the important role of moving to better locations or neighborhoods in improving the economic outcomes of Black Americans. Note that our results, even when the migration channel is held constant, still allow for broader changes in location-specific factors (e.g., the economic growth of Southern states, rural-to-urban migration within states, and institutional reforms that reduced labor market discrimination), which contribute to the continued progress toward the current cross-sectional distribution.

Substantial changes emerge when comparing the results with fixed educational group shares (orange bars) to the baseline counterfactual outcomes (maroon bars). For both racial groups, holding the shares constant at 1950 levels results in a pronounced decrease (increase) in the share of "Non-Manual" ("Manual") occupations. For Black men, the 1920-1930 and 1940-1940 birth cohorts contribute minimally, with counterfactual distributions across scenarios 3 to 5 remaining nearly identical. That is, had the distribution of education groups remained at 1950 levels, the significant contribution of 1940-1950 cohorts would not have manifested. For White men, as shown in Column(6) of Table 2 Panel A, the contribution of these cohorts even reverses the trend observed in the baseline scenario: the 1940–1950 cohort reduces (raises) "Non-Manual" ("Manual") occupations by $\widetilde{\mu}^{\mathcal{B}}_{6|5,E}(N) - \widetilde{\mu}^{\mathcal{B}}_{6|4,E}(N) = 0.077$ ($\widetilde{\mu}^{\mathcal{B}}_{6|5,E}(M) - \widetilde{\mu}^{\mathcal{B}}_{6|4,E}(M) = 0.072$).

The greater role of education we find for White men in explaining occupational outcomes than for Black men is consistent with the persistent racial gap—albeit narrowing—in both educational attainment and the returns to education, i.e., the ability to convert educational investments into economic outcomes (Smith and Welch, 1989).

Our findings collectively point to a relatively greater role of education than migration in explaining the mobility process of the 1940-1950 birth cohorts. Even the counterfactual outcomes fixing geographic shares partially subsumes the effect of education, as moving from South to North often facilitated opportunities to access higher-quality schooling.

6 Persistence of Black-White Inequality: Bottlenecks and Memory

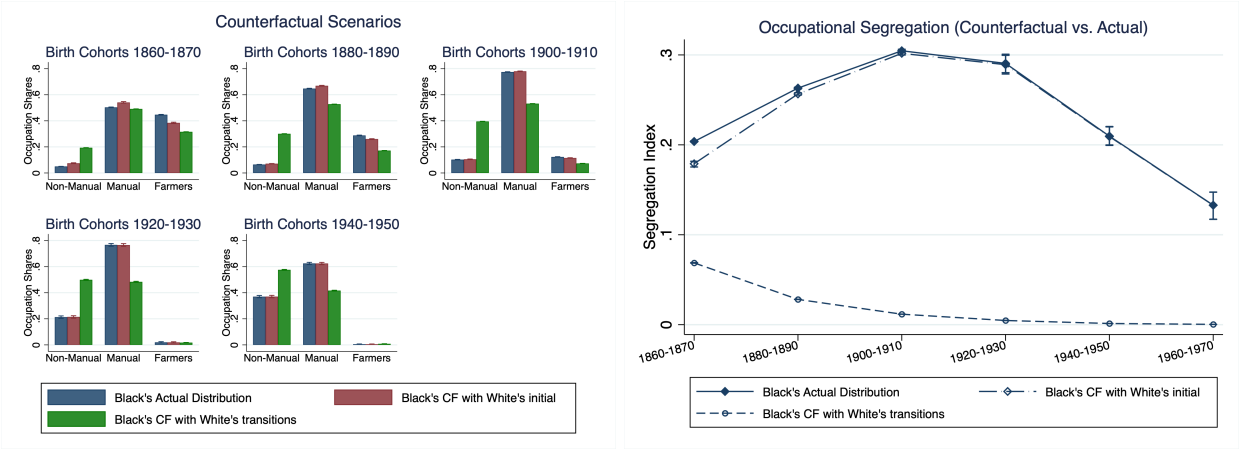
Analyses in the previous sections highlight the unique importance of changes in mobility experienced by the 1940–1950 birth cohort in shaping the current occupational distribution and reducing the racial gap. Despite important improvements, however, Black-White inequality in both the cross-sectional occupation distributions and intergenerational mobility persists, consistent with prior studies stressing the lack of Black-White convergence in economic status (Bound and Freeman, 1992; Collins and Wanamaker, 2022).

This section studies the role of mobility in explaining the degree of persistence of cross-sectional racial inequality and examines properties of persistence embedded within each mobility regime—as discussed in Section 2.2.

6.1 Persistence of Black-White Inequality

To examine the role of mobility in explaining the degree of persistence of cross-sectional racial disparities, we extend our counterfactual experiments in Equation (5) and allow Black men to experience either the *initial conditions* or the *mobility dynamics* of White men.

Figure 4: Counterfactual Occupational Distributions of Black Men



Notes: The left graph presents the occupational distributions of Black men in each period (μ_t^B, navy bars), and the corresponding counterfactual distributions using the initial conditions of White men ($\mu_t^{B'} = \mu_0^W \mathbf{P}_1^B \mathbf{P}_2^B ... \mathbf{P}_{t-1}^B \mathbf{P}_t^B$, maroon bars) and the mobility dynamics of White men ($\mu_t^{B''} = \mu_0^B \mathbf{P}_1^W \mathbf{P}_2^W ... \mathbf{P}_{t-1}^W \mathbf{P}_t^W$, green bars). The right graph shows changes in the degree of occupational segregation by race calculated using the actual distribution of White men (μ_t^W) and that of Black men generated in each scenario. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure 4 (left) presents the occupational distributions of Black men in each period (μ_t^B, navy bars), and the corresponding counterfactual distributions using the initial conditions of White men ($\mu_t^{B'} = \mu_0^W \mathbf{P}_1^B \mathbf{P}_2^B ... \mathbf{P}_{t-1}^B \mathbf{P}_t^B$, maroon bars) and the mobility dynamics of White

men ($\mu_t^{B''} = \mu_0^B \mathbf{P}_1^W \mathbf{P}_2^W ... \mathbf{P}_{t-1}^W \mathbf{P}_t^W$, green bars). Figure 4 (right) plots the degree of occupational segregation by race calculated using the actual distribution of White men (μ_t^W) and the distribution of Black men derived in each scenario: actual (solid lines), counterfactual initial conditions (long-dashed lines), and counterfactual mobility dynamics (dashed lines). For both counterfactual scenarios, the share of "Non-Manual" ("Manual") occupations increases (decreases) compared to the actual distribution of Black men across all periods—significantly larger differences are observed when Black men undergo the White men's mobility process than when they start at White men's initial conditions.[36]

Not surprisingly, the level of segregation is lower in these counterfactual scenarios than in the actual baseline. In particular, when Black men experience the White men's transition process, the segregation index immediately drops near zero in the 1900-1910 birth cohorts and remains low thereafter. That is, racial disparities in the *mobility dynamics* are critical in explaining the persistent Black-White gap in the occupational distributions in 2010—which is consistent with previous income-based mobility studies (Chetty et al., 2020; Collins and Wanamaker, 2022), highlighting the greater role of the racial mobility gap than initial conditions in explaining the cross-sectional inequality. Note that the racial mobility gap in part reflects how aggregate shocks have impacted racial groups differently, thereby shedding light on the importance of Black-White disparities in structural mobility.

In the following analyses, we make further progress by examining the properties of persistence embedded in each mobility regime.

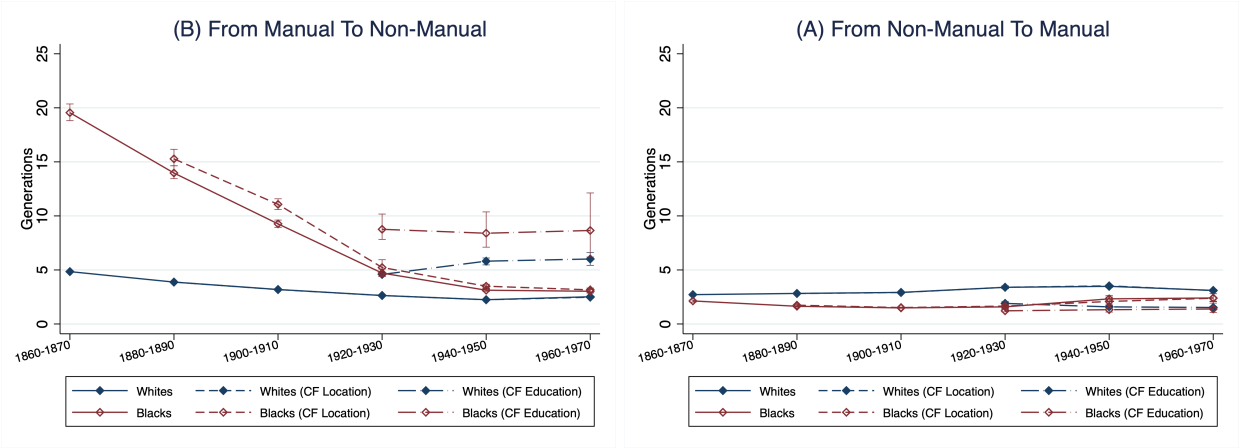
6.2 Bottlenecks in Mobility

We begin by assessing mobility bottlenecks described in Section 2.2.1. Figure 5 presents the mean first passage times (MFPTs)—the sequence of transitions needed to achieve a particular status for the first time—transitioning from "Manual" to "Non-Manual" occupations (left) and from "Non-Manual" to "Manual" occupations (right), estimated separately for each birth cohort of Black (in maroon) and White men (in navy). The estimates shown in solid lines are calculated using actual transition matrices; those in dashed lines and long-dash-dotted lines reflect results using counterfactual transition matrices introduced in Section 5.2.

The MFPTs from "Manual" to "Non-Manual" occupations exhibit significant changes over time, particularly for Black men. They initially face close to 20 generations, dropping below 10 by the 1900–1910 birth cohort, and reaching around 3 by the 1960–1970 cohort. In contrast, for White men, bottlenecks start at 4.8 generations and steadily decline to 2.5

[36] Results based on 5-category definitions (Figures A.12) show that the higher shares in "Non-Manual" are driven by both "Professionals and Managers" and "Clerical and Sales" occupations.

Figure 5: Bottlenecks in Mobility: Mean First Passage Times



Notes: The graphs show the mean first passage times transitioning from "Manual" to "Non-Manual" occupations (left) and from "Non-Manual" to "Manual" occupations (right), estimated separately for each birth cohort of Black (in maroon) and White men (in navy). The estimates connected by solid lines are calculated using actual transition matrices; those with dashed lines and long-dash-dotted lines reflect counterfactual transition matrices introduced in Section 5.2, where we shut down the migration channel and education channel, respectively. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

by the most recent cohort. The racial gap shrinks over time and becomes negligible for the 1960-1970 cohort. The MFPTs from "Non-Manual" to "Manual" occupations, on the other hand, remain stable across cohorts and racial groups, with estimates consistently lower for Black men (1.5 to 2.4) compared to White men (2.7 to 3.5). This racial gap, averaging about 1 generation, persists even in the most recent cohorts.

As emphasized in Section 2, MPFTs reveal aspects of the transition matrix not captured by conditional probabilities. Our results, in fact, show a significant difference between the two measures. For "Manual" to "Non-Manual" transitions, conditional probabilities rise from 0.1 to 0.3 for Black men and from 0.2 to 0.4 for White men (Figure 1, left). The MFPTs reveal that Black men initially faced constraints nearly four times greater than those of White men, which declined substantially over time. For "Non-Manual" to "Manual" transitions, conditional probabilities fall from 0.8 to 0.4 for Black men and from 0.4 to slightly below 0.4 for White men, pointing to a narrowing racial gap (Figure 1, right). In contrast, MFPTs remain stable across cohorts for both groups: the underlying constraints that make it easier for Black men to fall into manual work have persisted over time.

These persistent patterns warrant further investigation using more detailed definitions. To identify specific occupational categories where Black men experienced significant changes in mobility, we explore more nuanced trends using 5-category definitions. Tables B.31 and B.32 present the MFPTs for transitions out of "Semi-Skilled and Unskilled

Manual" occupations and "Professional and Manager" occupations, respectively. See Figure A.16 for estimates for all other occupations.[37]

For both racial groups, MFPTs for transitions from "Semi-Skilled and Unskilled Manual" to either "Professional and Managerial" or "Clerical and Sales" occupations are longer than for transitions to "Skilled Manual" jobs (Tables B.31). These estimates are mostly higher for Black men than White men, particularly for cohorts up to 1900–1910, with the racial gap ranging between 12 and 19 generations for transitions into "Professional and Managerial" roles, and 11 and 69 for "Clerical and Sales" occupations.[38] However, the gap begins to narrow for the 1920–1930 cohort, primarily driven by declines in Black men's MFPTs (from 16.9 to 8.8 for entry into "Professional and Managerial" and from 18.3 to 8.9 for "Clerical and Sales" jobs). This downward trend for Black men continues into the 1940–1950 cohort, with the most pronounced decline in "Professional and Managerial" roles (falling to 4.7), while estimates for White men remain relatively stable. Despite this convergence, a racial gap of about 1 generation persisted in the 1960–1970 cohort.

For sons of "Professional and Managerial" fathers, transitions to "Semi-Skilled and Unskilled Manual" jobs exhibit the lowest MFPTs for both Black and White men compared to other occupational transitions (Tables B.32). While White men consistently exhibit higher MFPTs than Black men, the racial gap notably decreases in the 1920–1930 and later birth cohorts. This convergence is driven primarily by a 70 percent increase in Black men's MFPTs in the 1940–1950 cohort relative to the preceding one. Nevertheless, a racial gap of approximately 2 generations persists into the most recent cohort.[39]

Finally, we turn to our estimates of the MFPTs using *counterfactual* transition matrices. Analysis of these counterfactual economies, which fix either the education or migration changes, shows that the estimates are higher (lower) for moving from "Manual" to "Non-Manual" ("Non-Manual" to "Manual") occupations across both racial groups. A comparison with baseline estimates reveals that education plays a more substantial

[37] Figure A.17 similarly presents results for the 7-category occupations.

[38] The MFPTs for transitioning to "Clerical and Sales" occupations are generally higher than others, which is partly due to their small shares in the occupational distributions (Figure A.1).

[39] Tables B.33 and B.34 similarly present results for 7-category definitions. A similar decline in MFPTs for Black men is observed in the transition from "Semi-Skilled and Unskilled Manual" to "Proprietors, Managers, and Officials" occupations. While these findings may reflect improvements in socioeconomic opportunities over time, they may also be influenced by the historical context, such as the growth of certain occupations during segregation. For example, African American proprietors notably thrived in Black communities between 1900 and 1930, a period Walker (2009) refers to as the "Golden Age of Black Business."

Moreover, this specific occupational group ("Proprietors, Managers, and Officials") warrants careful interpretation due to its inherent heterogeneity. The group encompasses a broad range of roles, from managerial and supervisory positions in various sectors to specialized functional roles, such as procurement and inspection. Furthermore, the residual category code 290 ("Managers, officials, and proprietors [n.e.c.]") includes business owners of greatly varying sizes. This suggests that a decline in MFPTs within this category could be driven by multiple factors, not all of which reflect uniform socioeconomic improvement.

role than location. Specifically, holding the geographic distribution at 1910 levels has a relatively small effect, while fixing the educational distributions at 1950 levels brings about significant changes: MFPTs approximately double for both groups when moving from "Manual" to "Non-Manual" occupations and fall by more than 50 percent for White men and slightly less for Black men when moving from "Non-Manual" to "Manual" occupations.

6.3 Memory in Mobility

Next, as discussed in Section 2.2.2, we assess the degree of memory in the mobility system and the rate at which it dissipates over time. We also study our second form of structural mobility, defined in Equation (13).

6.3.1 State of Independence of Origin

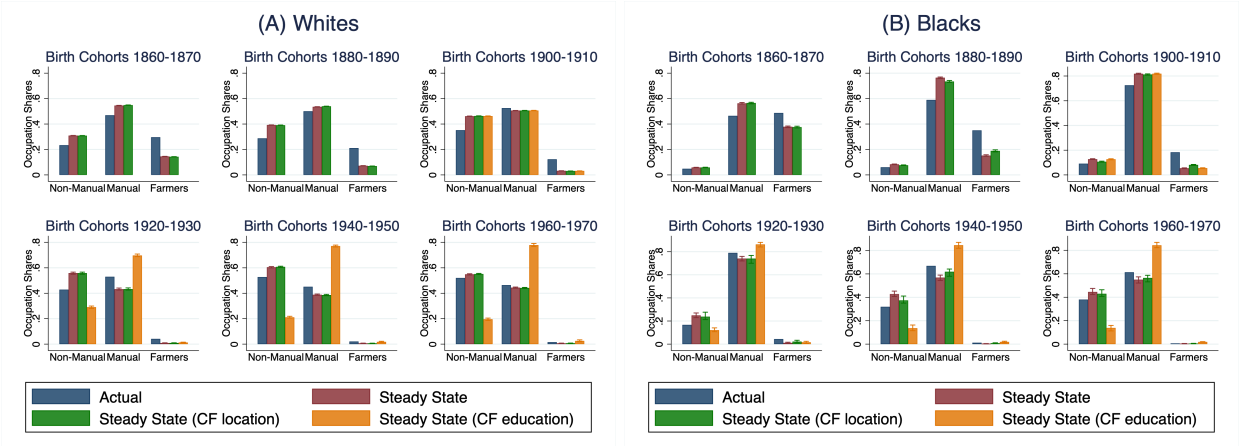
We begin by discussing the steady-state distributions to study how the state of *independence of origin* compares to the observed distributions—this is important when interpreting the results of our memory measures and connecting them to the discussion of racial inequality.

Figure 6 presents the occupational distributions for each birth cohort alongside their corresponding steady-state distributions, shown in navy and maroon bars, respectively. The figure also shows the counterfactual steady-state distributions constructed using the counterfactual transition matrices described in Section 5.2: one in green, derived by holding fixed changes in migration, and the other in orange, in education.

The steady-state distributions show broadly similar patterns for both racial groups. In the top panels (first three graphs), the steady state distributions have higher shares of "Non-Manual" and "Manual" occupations and a lower share of "Farming" work relative to the actual distribution. The bottom panels (last three graphs) show a higher steady-state share of "Non-Manual" occupations, and lower shares for both "Manual" and "Farming" work. These compositional changes unfold more gradually for White men than for Black men. Specifically, for Black men, the gap between the actual and steady-state distributions in the share of "Manual" occupations remains large up to the 1900-1910 birth cohort: a higher probability of sorting into "Manual" work in the steady state. This pattern reverses, beginning with the 1920–1930 cohort, and continues for subsequent cohorts.

To assess the implied occupational segregation by race at steady state, Figure A.18 presents segregation index estimates based on both the actual and steady-state distributions for our sample of birth cohorts. We find that, for cohorts born up to 1900–1910, segregation levels are higher in the steady state than in the actual distribution. By contrast, for the 1940–1950 and 1960–1970 cohorts, steady-state segregation falls below the actual level—

Figure 6: Occupational Distribution at Steady States



Notes: The graphs present the occupational distributions for each birth cohort alongside their corresponding steady-state distributions, shown in navy and maroon bars, respectively. They also show the counterfactual steady-state distributions constructed using the counterfactual transition matrices described in Section 5.2: one in green, derived by shutting down the migration channel, and the other in orange, the education channel. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

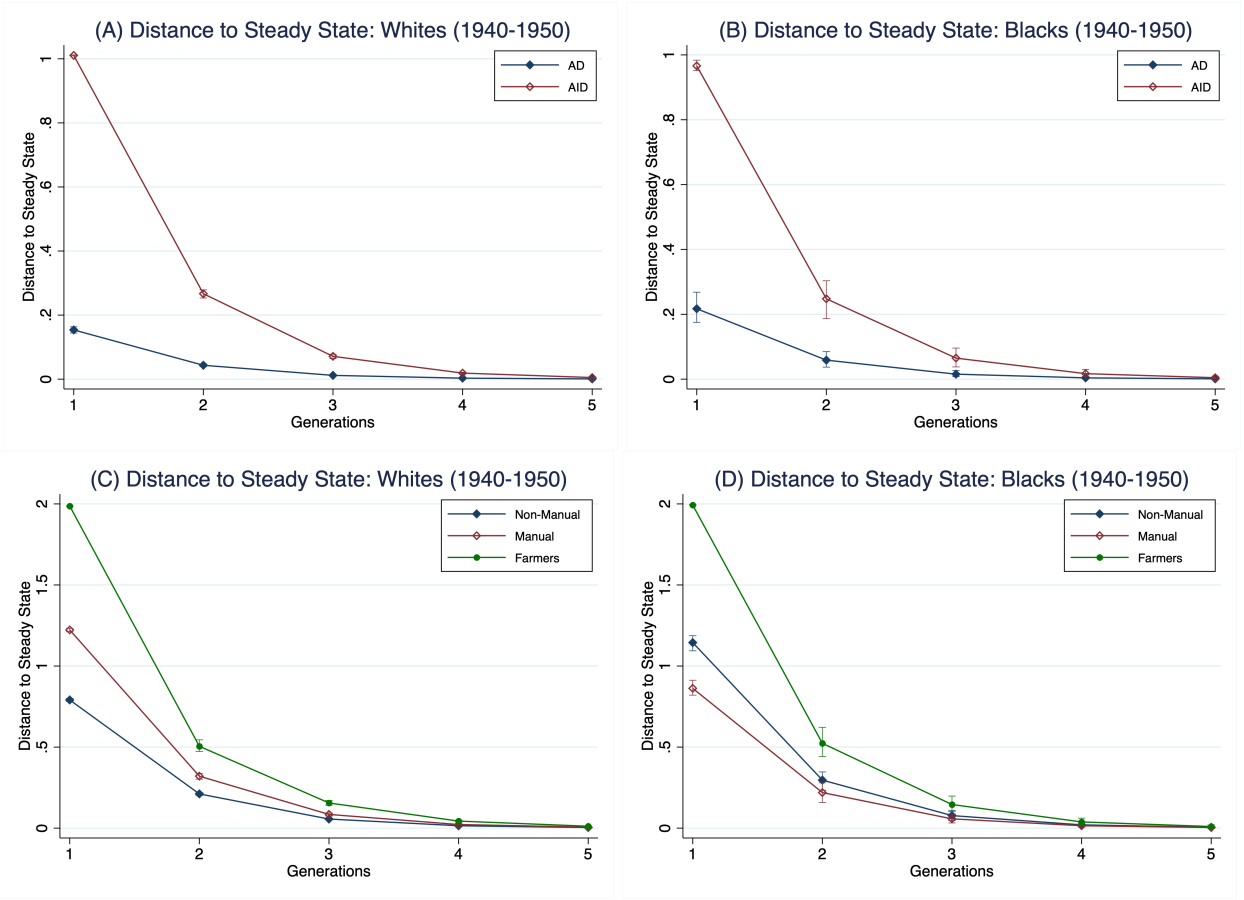
largely reflecting compositional shifts of Black men into "Non-Manual" occupations, which narrows the cross-sectional racial gap.

The steady states derived for the counterfactual economies deliver two main takeaways. First, the counterfactual steady states with fixed geographic shares closely mirror the baseline steady states, though discrepancies are more pronounced for Black men than for White men. This pattern aligns with previous sections, highlighting the greater importance of migration in shaping occupational outcomes for Black men compared to White men. Under these counterfactuals, Black men exhibit higher shares in "Manual" occupations and lower shares in "Non-Manual" occupations relative to the baseline. Second, the counterfactual steady states with fixed educational shares diverge sharply from the baseline, exhibiting substantially higher shares in "Manual" and lower shares in "Non-Manual" occupations for both racial groups. This is not surprising because the educational attainment in the past (1950), which was used as the counterfactual weights, was lower than in more recent periods, and less skilled workers are more likely to sort into "Manual" occupations in all periods. This is consistent with our previous exercises, showing how compositional shifts in educational attainment have been central to shaping occupational outcomes.

6.3.2 Memory and Dissipation of Memory

We next present estimates of our memory measures constructed based on the *distance* to the steady state. For clarity of exposition, we focus on the 1940–1950 birth cohort, whose pivotal role in shaping the current occupational distributions and narrowing racial gaps has been clearly demonstrated in previous sections.

Figure 7: Memory in Mobility (1940-1950 Birth Cohorts)



Notes: The graphs present estimates of our memory measures. The top panel shows estimates of Aggregate Deviations (AD, navy lines) and Aggregated Individual Deviations (AID, maroon lines); the bottom panel displays Individual Deviation (ID) estimates by occupation. Each measure is plotted across generations $s = 1, 2, 3, 4, 5$. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure 7 presents results. The top panel presents estimates of Aggregate Deviations (AD, navy lines) and Aggregated Individual Deviations (AID, maroon lines); and the bottom panel displays Individual Deviation (ID) estimates, which unmask heterogeneity across parental occupational groups. Each measure is plotted across generations $s = 1, 2, 3, 4, 5$. Note that AID consistently exceeds AD for all s, which is a property discussed in

Section 2. These results should not be interpreted as predicted future dynamics, but rather as counterfactuals that illuminate the degree of persistence embedded in the mobility process, as also articulated in Chetty et al. (2020).

We highlight three key points. First, all measures converge to their respective steady states (as measured by when AD or AID falls below 0.01) by generation $s = 5$ for both racial groups.[40] That is, given initial conditions and the transition matrix of the 1940-1950 birth cohorts, their parental memory is estimated to persist for about 125 to 150 years.

Second, AD is higher for Black men than for White men, whereas the opposite holds for the AID. This suggests that, in aggregate, Black men exhibit stronger systemic memory. However, once individual heterogeneity is accounted for, White men show greater AID. In fact, when examining differences across parental occupation groups in their offspring's sorting probabilities (i.e., each row of $\mathbf{P}^s$), White men show greater heterogeneity than Black men. Thus, the magnitude of memory across parental occupation groups is more heterogeneous for White men than for Black men. These echo recent findings studying within-race variances, which highlight similar contrasting patterns between Black and White Americans for younger cohorts (Chetty et al., 2023).[41]

Third, unpacking heterogeneity using ID, both Black and White men from farming backgrounds exhibit the strongest parental memory in occupational outcomes. For White men, the second most persistent parental influence is observed among those from "Manual" backgrounds, while for Black men, it is found in the "Non-Manual" group.[42] This heterogeneity in the magnitude of parental memory likely results from differences in how offspring's exposure to occupation-specific environments shapes their sorting opportunities. These environments can either facilitate or hinder access to relevant capital, networks, and specialized human capital. The racial differences in these patterns, in turn, likely reflect systematic differences in the nature of these occupation-specific environments (due to differences in neighborhoods, family structures, and more), and their intergenerational transmissions (e.g., Sharkey and Faber, 2014; Chetty et al., 2020).

We now present estimates of Aggregate Mobility (AM, navy lines) and Aggregated Individual Mobility (AIM, maroon lines), which are the rate of change in AD and AID, respectively—capturing how quickly memory dissipates. Here, we discuss results for all birth cohorts, which allows us to trace out the dynamics in these rates. Figure 8 (top panels)

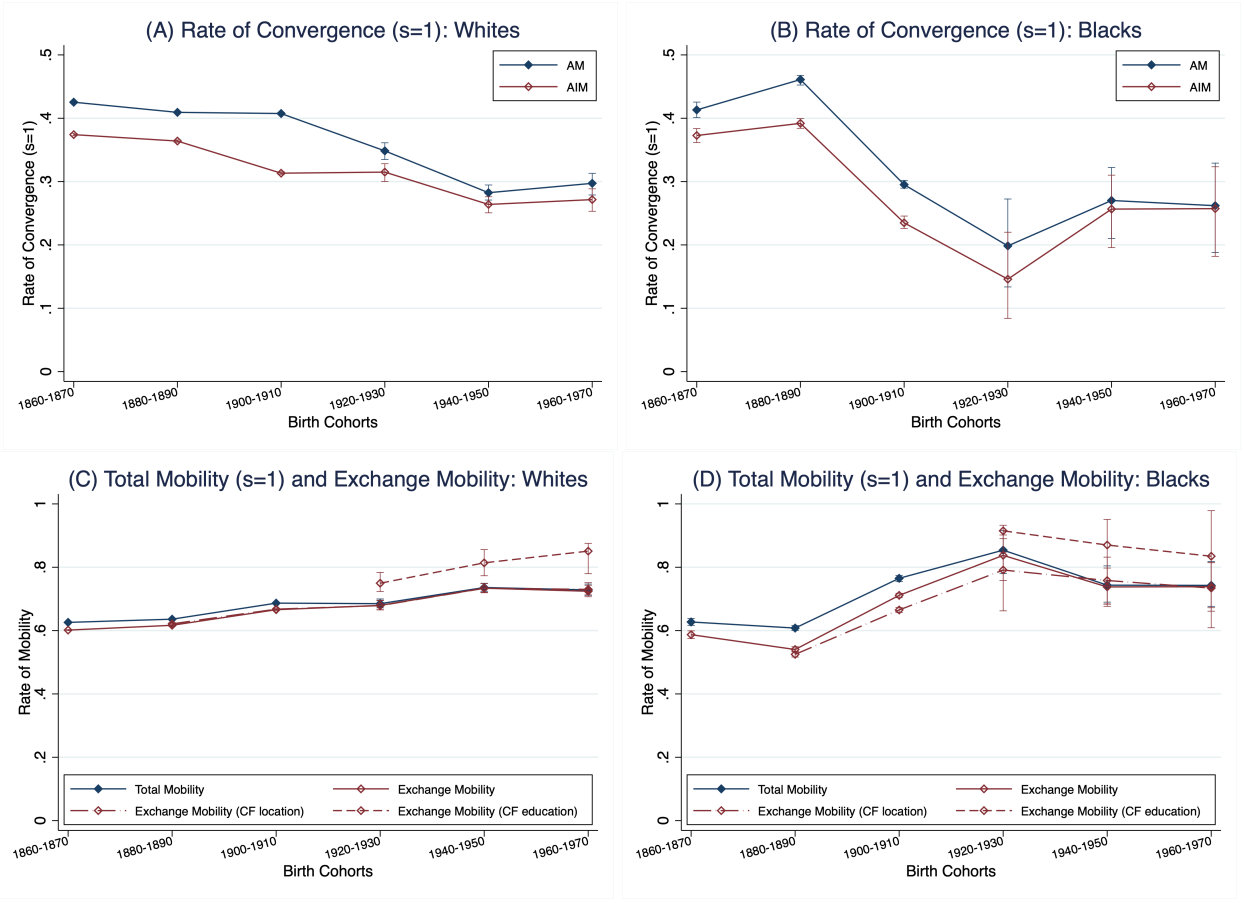
[40] Figure A.19 presents, for each birth cohort group, the number of generations required for AD and AID to fall below 0.01.

[41] Appendix C uses variations of our individual deviation measures to study within-race and between-race-group inequality.

[42] Further examining 5-category definitions (Figure A.21), we find that, for both racial groups, medium-skilled occupations intensive in routine tasks—"Clerical and Sales" and "Skilled Manual"—exhibit large parental memory next to "Farmers," which is consistent with Blume et al. (2025).

presents estimates of AM and AIM, where smaller values correspond to faster dissipation and, thus, greater mobility rates. We present short-run estimates with $s = 1$.[43]

Figure 8: Dissipation of Memory and Exchange Mobility (All Birth Cohorts)



Notes: The graphs present mobility estimates based on mobility as independence of origin. The top panel shows estimates of Aggregate Mobility (AM, navy lines) and Aggregated Individual Mobility (AIM, maroon lines) in the short run ($s = 1$). Smaller values correspond to faster dissipation and, thus, greater mobility rates. The bottom panel shows total mobility rates (1-AIM, navy lines) evaluated in the short-run ($s = 1$), exchange mobility rates (1-EM, maroon lines), where the difference between the two captures our second form of structural mobility rates. Our results plot 1-AIM and 1-EM so that larger values indicate higher mobility rates for easier interpretation. We also include exchange mobility rates calculated using the counterfactual transition matrices described in Section 5.2: one in long-dashed-dotted lines, derived by shutting down the migration channel, and the other in dashed lines, the education channel. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

For White men, both AM and AIM show downward trends across birth cohorts with a modest uptick in the 1960-1970 birth cohort, which suggests that memory dissipation rates have generally increased over time. On the contrary, for Black men, estimates of AM and

[43]When checking estimates of AM and AIM evaluated in the medium run ($s = 3$) across birth cohorts, the overall trends closely resemble the short-run (Figure A.20). The values of AM and AIM converge in the medium run, particularly for the relatively younger cohorts in our sample (1920-1930 to 1960-1970).

AIM decrease from the 1880-1890 birth cohort but begin to rise with the 1940-1950 birth cohort. That is, while parental memory of Black men dissipates at an increasingly faster rate over time, the rate slows markedly for the 1940-1950 and 1960-1970 birth cohorts, returning to levels comparable to those observed for the 1900-1910 birth cohort.

Unlike White men, who demonstrate an overall improvement in these memory dissipation rates over time, progress stalls for Black men—particularly among younger cohorts. That is, beginning with the 1940–1950 cohort—whose roles was central in shaping the current cross-sectional distribution and narrowing racial gaps—Black men experience a marked slowdown in the convergence toward a state of no parental influence, even as this steady state to which they converge has become increasingly desirable, characterized by higher "Non-Manual" and lower "Manual" shares and lower degrees of occupational segregation by race. These findings uncover a previously underexplored dimension of racial inequality, emphasizing differences in the dynamics of memory dissipation rates.

6.3.3 Structural versus Exchange Mobility Redux

Finally, we present estimates of our measures for structural versus exchange mobility. Figure 8 (bottom panels) presents the results based on Equations (11) and (12) for all birth cohorts in our sample. For easier interpretation, we present our results using 1-*AIM* and 1-*EM*, where larger values indicate *higher* mobility rates. We show total mobility rates (1-*AIM*, in solid navy) evaluated in the short-run ($s = 1$) and exchange mobility rates (1-*EM* in solid maroon); the difference between the two captures our second form of structural mobility rates. We also include exchange mobility rates calculated using the counterfactual transition matrices described in Section 5.2: one (in long-dashed-dotted lines) holds changes in migration fixed, and the other (in dashed lines), education.

For both racial groups, the differences between total and exchange mobility rates—which capture mobility produced in the process of reaching its steady state for a given mobility regime (i.e., our second form of *structural mobility*)—are quite small.[44] These differences are relatively larger for earlier birth cohorts (1860–1870 to 1900–1910) but become minimal for later ones. Such patterns are more pronounced for Black men than for White men. Still, the role of structural mobility—defined within each cohort's specific mobility regime—remains limited for both racial groups, and total mobility rates are largely accounted for by exchange mobility rates. Consistent with the evolution of memory dissipation rates across birth cohorts, our results for exchange mobility rates suggest a

[44] Figures A.22 and A.23 show total and exchange mobility rates estimated across generations $s = 1, 2, 3, 4, 5$ for our sample of birth cohorts. Before converging, total mobility rates gradually decrease for some mobility regimes, while they slow down first and then accelerate for others. The differences between total and exchange mobility rates range from values of less than 0.01 to 0.05 at $s = 1$ and converge to zero by $s = 5$.

steady improvement for White men. In contrast, Black men do not show a consistently upward trajectory, as the trend flattens beginning with the 1940–1950 birth cohort.

It is important to clarify that we do not claim structural factors are inconsequential for mobility. In fact, our analyses in Section 5 establish our *first* form of structural mobility—capturing changes in the mobility regime across birth cohorts—as a significant driver of changes in cross-sectional distributions and a key determinant of the racial gap. Here, we show that our *second* form of structural mobility, the mobility produced in the process of reaching a steady state, is quantitatively small; this suggests its limited role in explaining total mobility or the racial gap in these mobility rates.

Finally, our results for exchange mobility rates produced using counterfactual transition matrices further show that the role of education is greater than location for both racial groups. Specifically, counterfactuals with fixed geographic shares bring minimal changes relative to the baseline for White men. For Black men, these estimates are slightly lower than the baseline for birth cohorts up to 1920-1930, though these differences diminish in more recent cohorts. By contrast, counterfactuals with fixed educational composition yield substantially different, in fact, higher rates relative to the baseline for both racial groups—parental memory dissipates faster. This is because the counterfactual transition matrices have similar rows (Tables B.29 and B.30), making the system highly mobile regardless of initial conditions, and thereby converging fast. Together with the corresponding counterfactual steady states (Figure 6), it implies a fast convergence to a state with about an 80 percent chance of sorting into "Manual" occupations (again, since the education attainment of the period being used for the weights was lower), regardless of family backgrounds.

7 Concluding Remarks

We study the evolution of Black-White inequality over a long time horizon, focusing on the racial gap in occupational mobility. Our analyses using a Markov-Chains-based measurement approach, in combination with an extensive dataset that combines linked historical census and contemporary large-scale survey data, produce a range of empirical conclusions that confirm and augment existing studies on the racial gap in mobility.

We underscore the critical role of structural mobility measured using changes in the mobility regimes, particularly among the 1940-1950 birth cohort, in shaping the contemporary occupational distribution and contributing to a reduction in racial disparities. We also show that, despite these improvements, substantial racial disparities persist across cross-sectional distributions, largely due to differences in mobility dynamics.

Our approach to further investigating persistence within each mobility regime high-

lights new dimensions of Black-White inequality, with two key insights. First, mobility bottlenecks reveal evidence of enduring constraints faced by Black men. This highlights a persistence in underlying structural constraints that is masked when examining transition probabilities alone. Second, while the rate of parental memory dissipation and exchange mobility steadily improved for White men, this progress stalled for Black men. Further investigation into mechanisms through which racial disparity in mobility bottlenecks or memory in mobility persists—possibly arising from, for example, discrimination, access to education, or information networks—constitutes important avenues of future work.

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Appendix

FOR ONLINE PUBLICATION

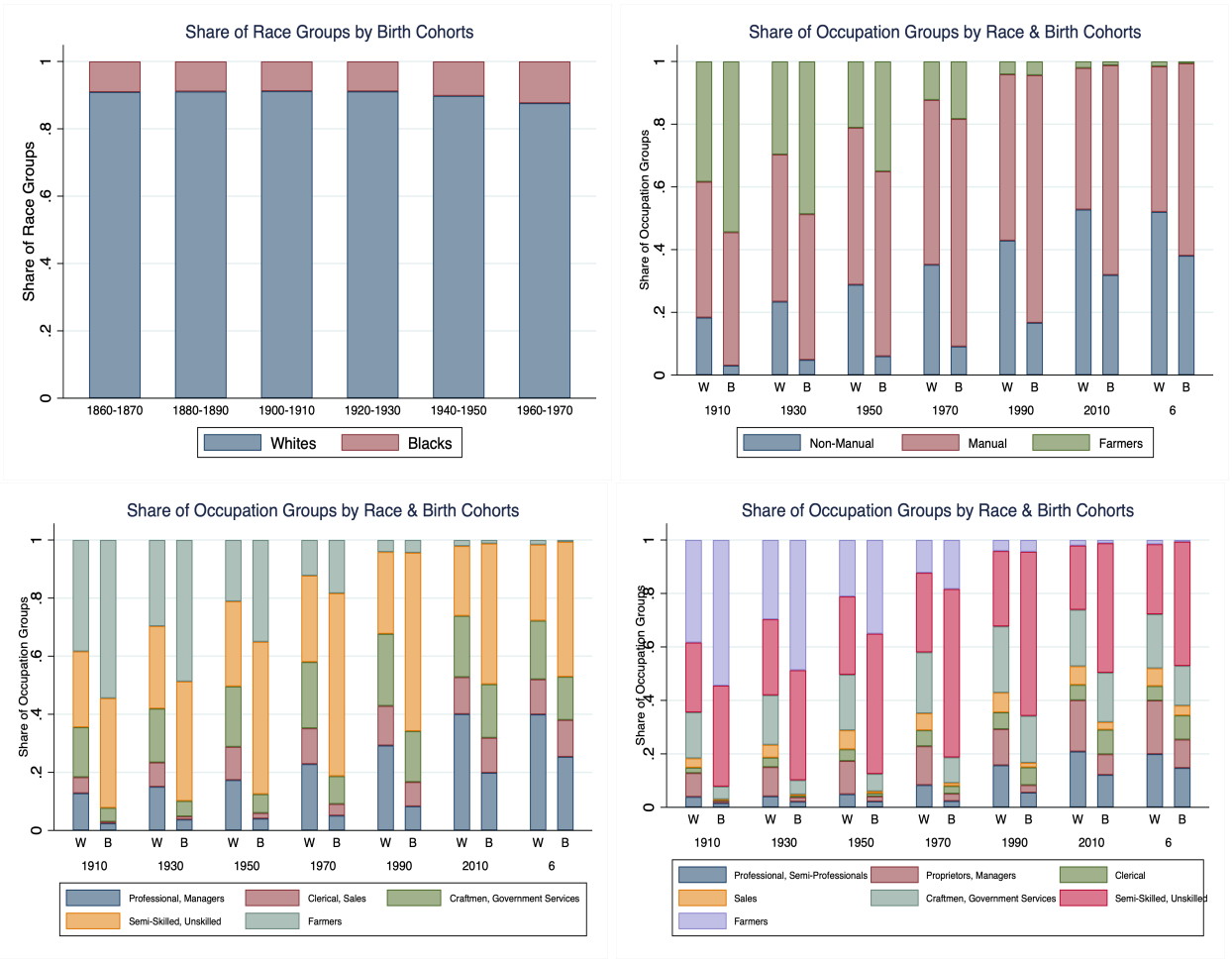
The Evolution of Black-White Differences in Occupational Mobility Across Post Civil War America

Steven Durlauf Gueyon Kim Dohyeon Lee Xi Song

Appendices

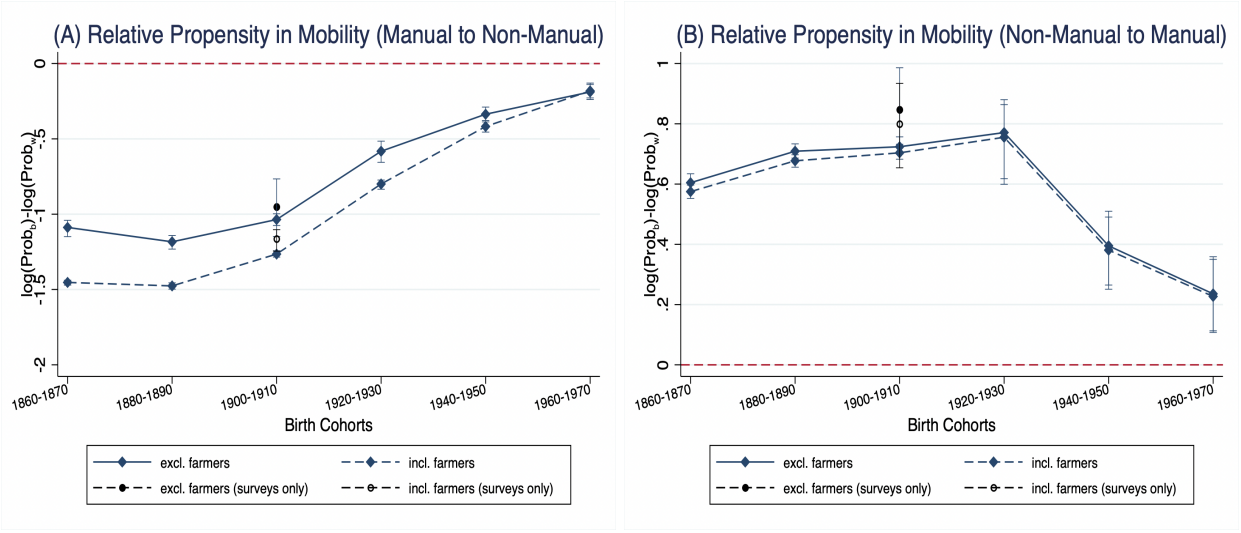
A Additional Figures

Figure A.1: Distribution of Race and Occupations



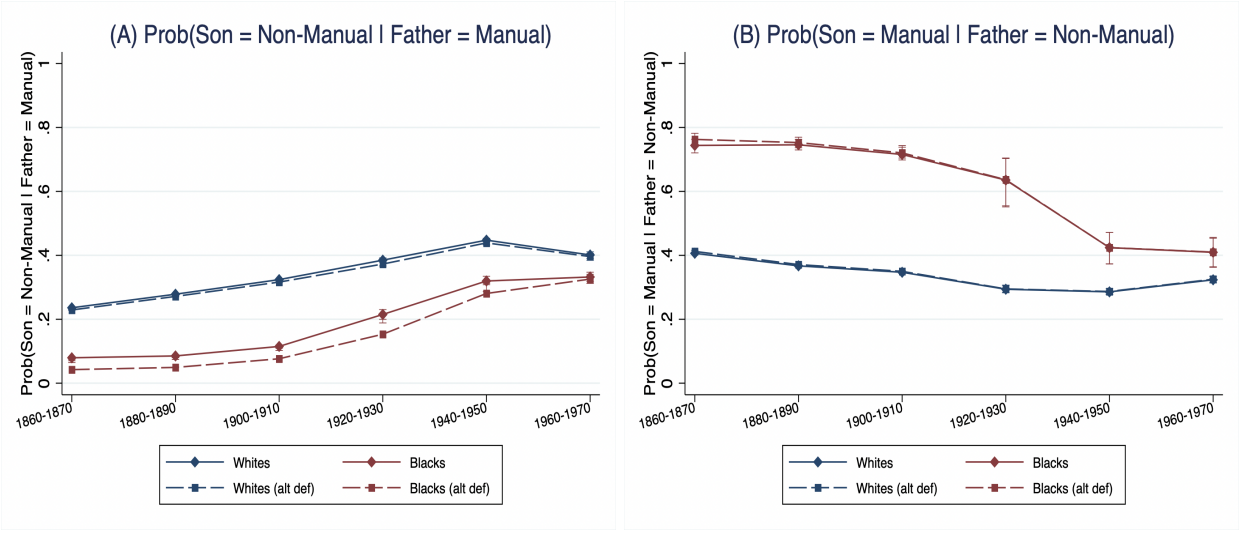
Notes: The graphs show the distribution of race (top, left) and the distribution of race and occupational groups (top right and bottom) for our sample of birth cohorts.

Figure A.2: Relative Propensities in Mobility (3 categories)



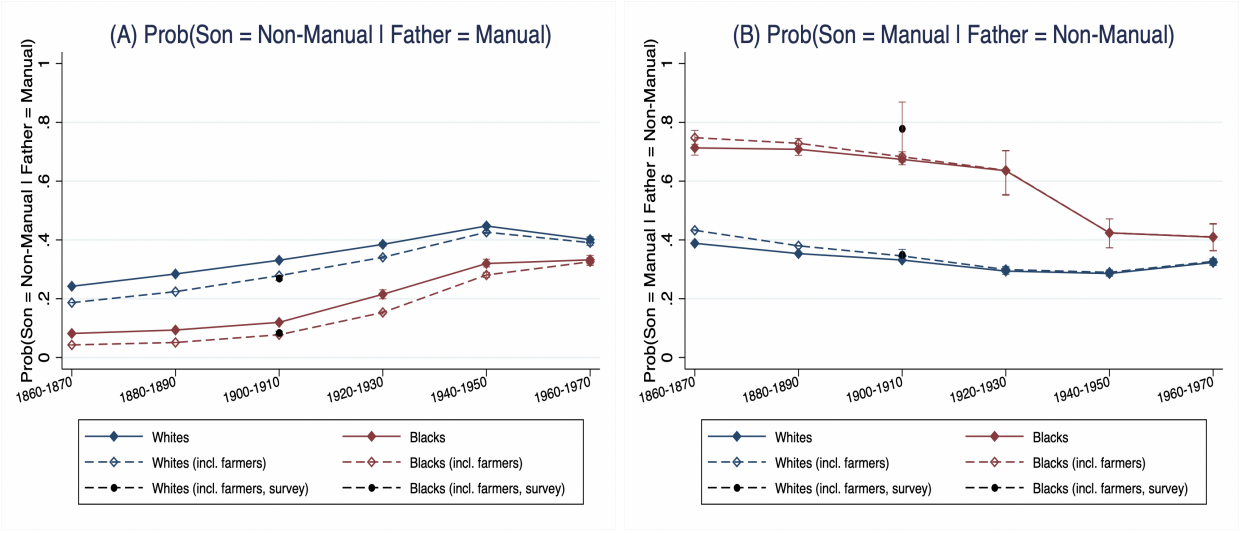
Notes: The graphs show trends in the log differences in transition probabilities ($\log(Prob_{black}) - \log(Prob_{white})$), capturing the mobility rates of Black men relative to White men. The point estimates connected by solid lines show trends in transitions from "Manual" to "Non-Manual" occupations (left) and from "Non-Manual" to "Manual" occupations (right). The point estimates connected by dashed lines show trends in transitions from "Farming" or "Manual" to "Non-Manual" occupations (left) and from "Non-Manual" to "Farming" or "Manual" occupations (right). Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.3: Mobility Patterns (3 categories) with Alternative Definitions



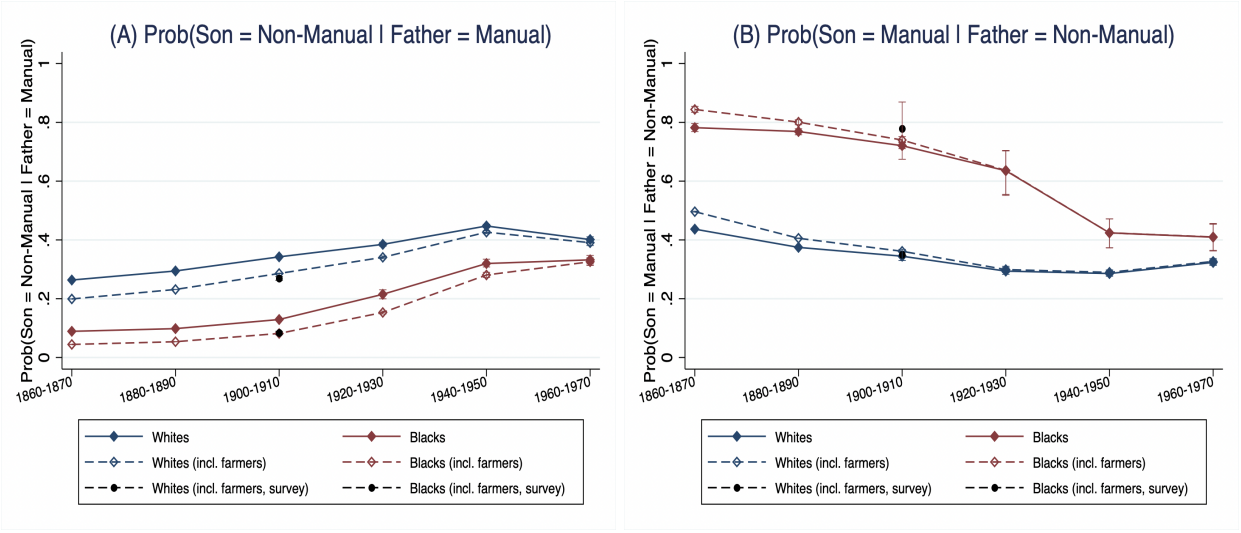
Notes: The graph presents results for White (in navy) and Black men (in maroon) using contingency tables constructed for the 3-category occupations. The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. The dashed lines connect the point estimates of the probability of moving from "Farming" or "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Farming" or "Manual" (right) across our sample of birth cohorts. Our results are based on our alternative 3-category definitions, where we include farm laborers (occ1950 codes 810-840) in "Manual" occupations instead of "Farming." Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.4: Mobility Patterns (3 categories) with MLP



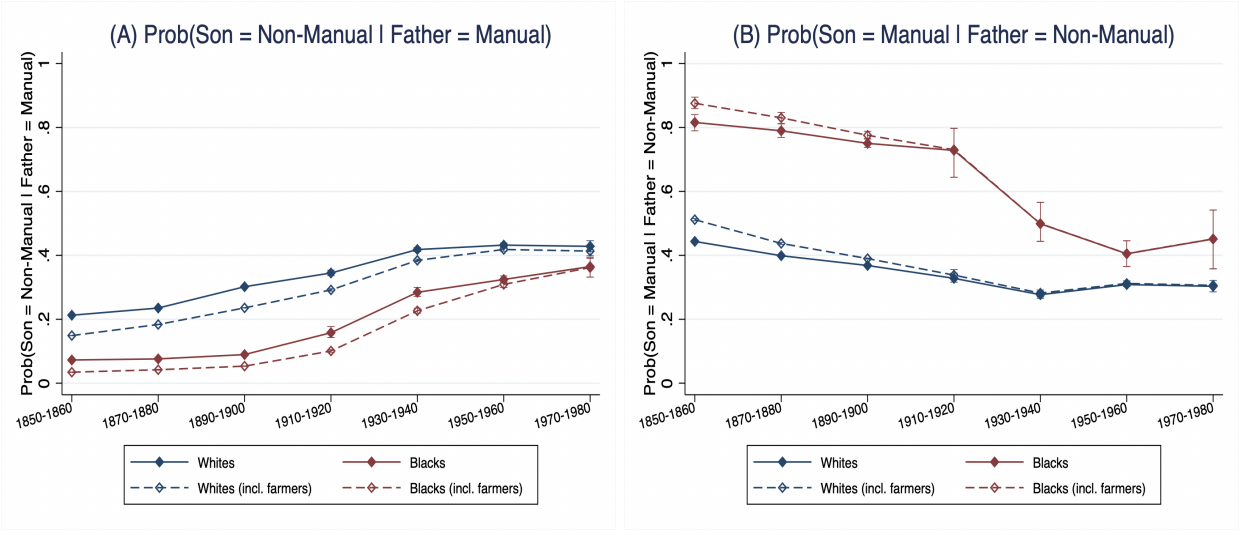
Notes: The graph presents results for White (in navy) and Black men (in maroon) using contingency tables constructed for the 3-category occupations. The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. The dashed lines connect the point estimates of the probability of moving from "Farming" or "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Farming" or "Manual" (right) across our sample of birth cohorts. The point estimates with black solid and hollow circles use survey data to estimate transitions from "Farming" or "Manual" to "Non-Manual" (left) and "Non-Manual" to "Farming" or "Manual" (right). Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.5: Mobility Patterns (3 categories) with Census Tree Data



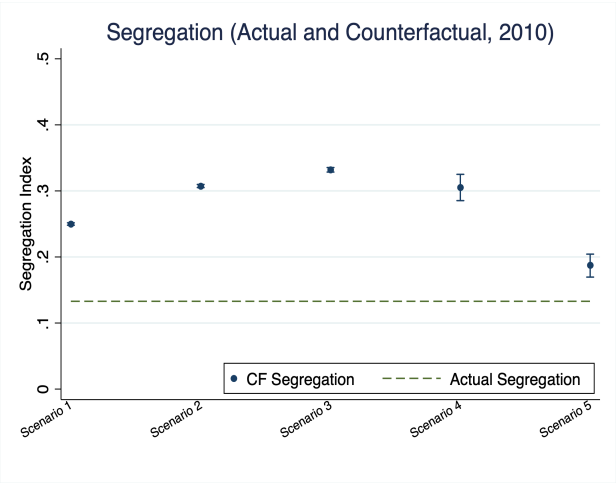
Notes: The graph presents results for White (in navy) and Black men (in maroon) using contingency tables constructed for the 3-category occupations. The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. The dashed lines connect the point estimates of the probability of moving from "Farming" or "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Farming" or "Manual" (right) across our sample of birth cohorts. The point estimates with black solid and hollow circles use survey data to estimate transitions from "Farming" or "Manual" to "Non-Manual" (left) and "Non-Manual" to "Farming" or "Manual" (right). Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.6: Mobility Patterns (3 categories) with Alternative Birth Cohort Definitions



Notes: The graph presents results for White (in navy) and Black men (in maroon) using contingency tables constructed for the 3-category occupations. The solid lines connect the point estimates of the probability of moving from "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Manual" (right) across our sample of birth cohorts. The dashed lines connect the point estimates of the probability of moving from "Farming" or "Manual" to "Non-Manual" (left) and from "Non-Manual" to "Farming" or "Manual" (right) across our sample of birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.7: Segregation (Actual and Counterfactual, 2010): 3 categories



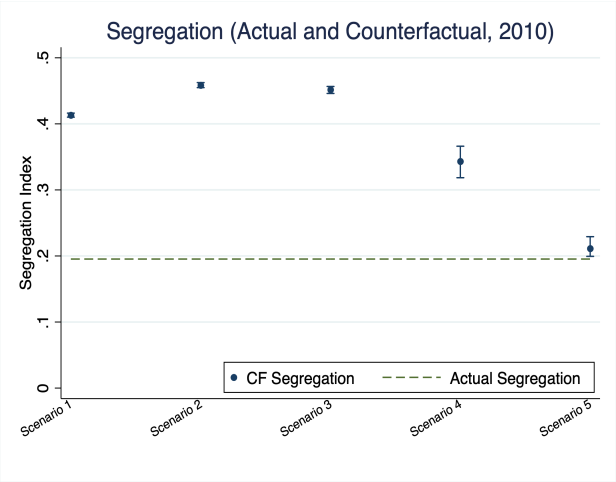
Notes: The graph shows the level of occupational segregation by race for each counterfactual scenario, which we calculate using the corresponding counterfactual distributions in Figure 3 separately obtained for Black and White men. The dashed horizontal line indicates the actual segregation level in 2010. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.8: Counterfactual Occupational Distributions: 5 categories



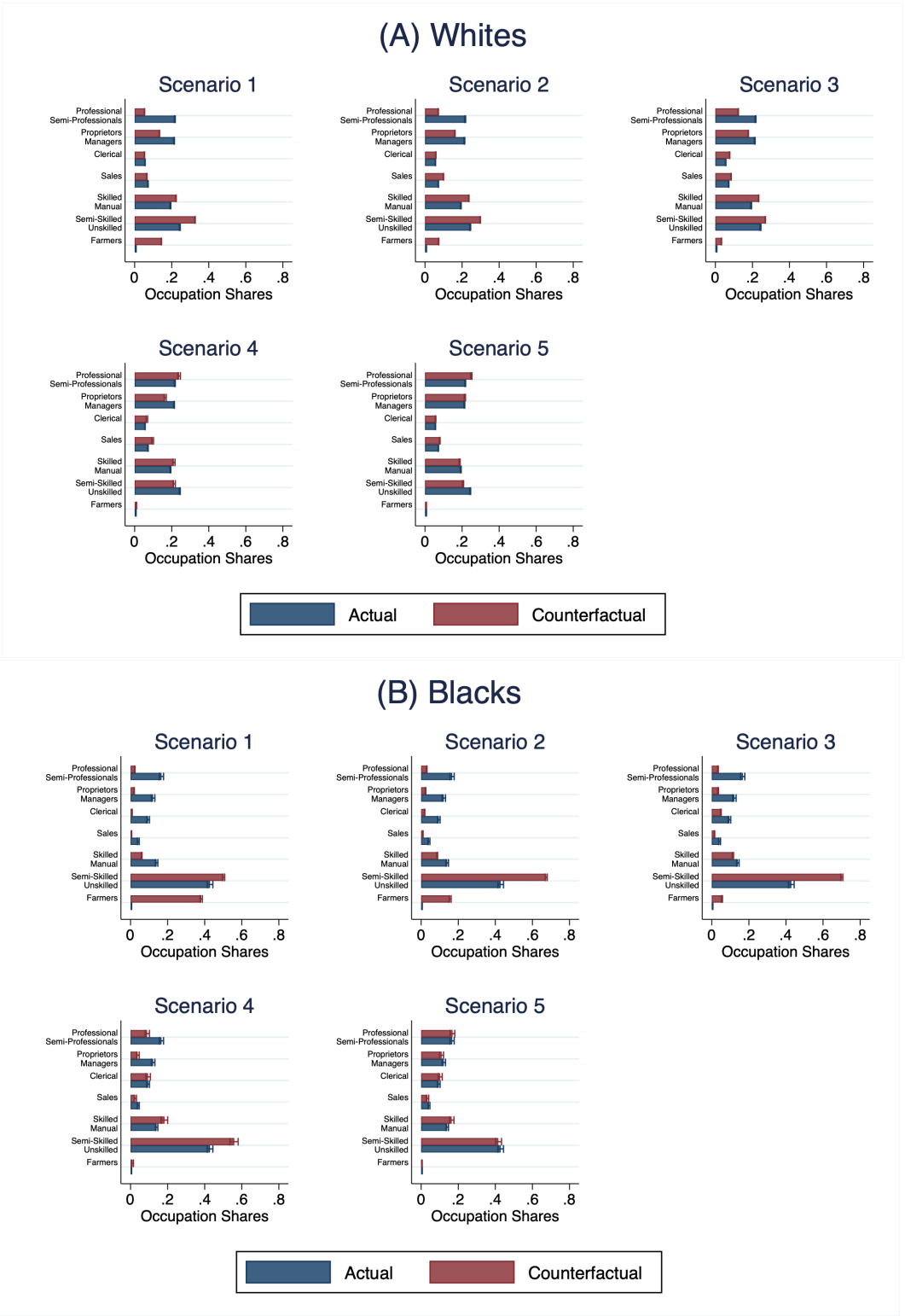
Notes: The graphs show the counterfactual occupational distributions for White (top) and Black men (bottom) across five scenarios based on Equation (5), which generates offspring outcomes by sequentially updating transition matrices over time. In each case, the counterfactual distribution (maroon bars) is compared to the actual distribution in 2010 (navy bars), which is achieved when the transition matrices fully evolve up to the 1960-1970 birth cohort. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.9: Segregation (Actual and Counterfactual, 2010): 5 categories



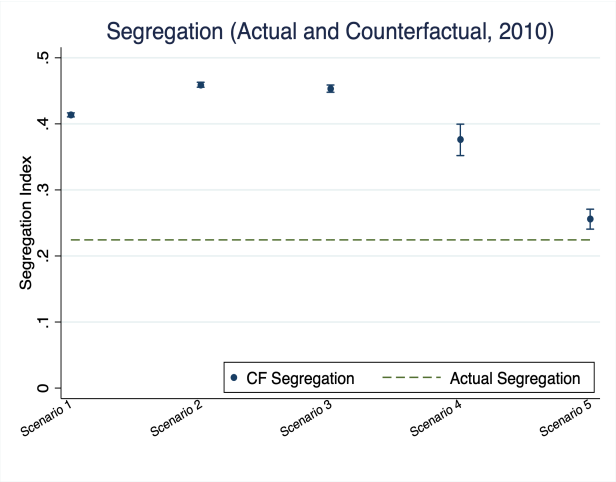
Notes: The graph shows the level of occupational segregation by race for each counterfactual scenario, which we calculate using the corresponding counterfactual distributions in Figure A.8 separately obtained for Black and White men. The dashed horizontal line indicates the actual segregation level in 2010. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.10: Counterfactual Occupational Distributions: 7 categories



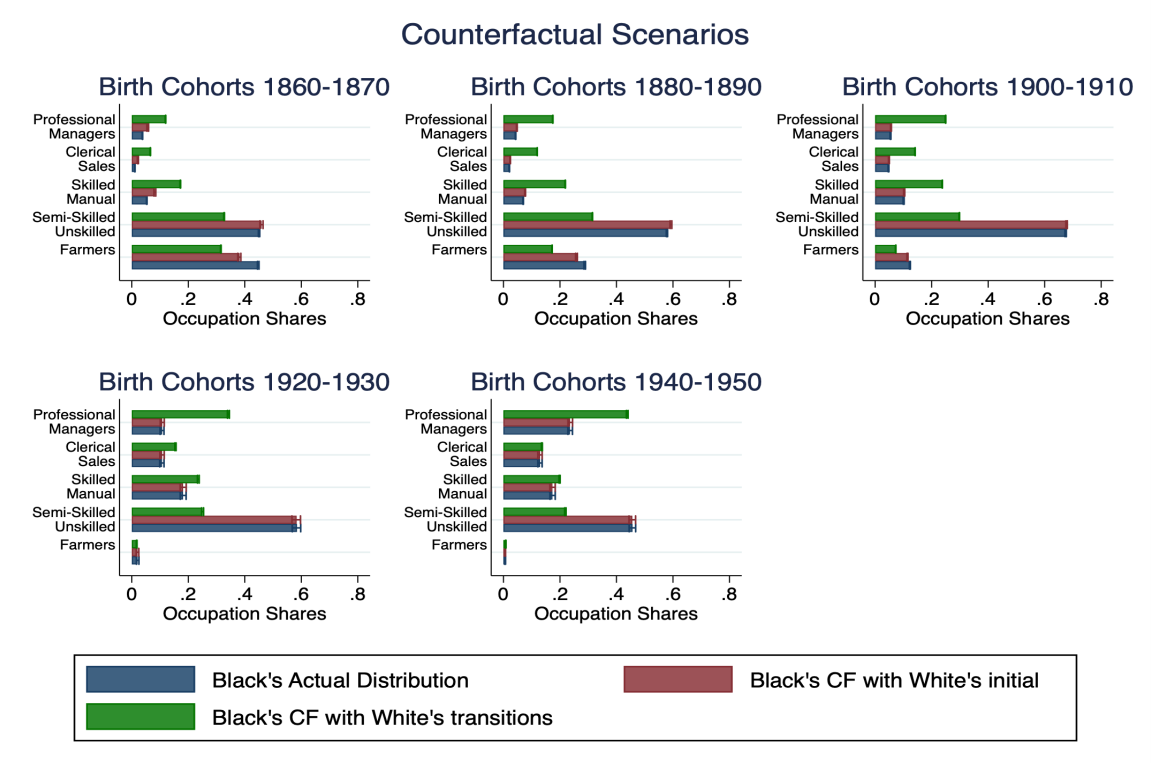
Notes: The graphs show the counterfactual occupational distributions for White (top) and Black men (bottom) across five scenarios based on Equation (5), which generates offspring outcomes by sequentially updating transition matrices over time. In each case, the counterfactual distribution (maroon bars) is compared to the actual distribution in 2010 (navy bars), which is achieved when the transition matrices fully evolve up to the 1960-1970 birth cohort. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.11: Segregation (Actual and Counterfactual, 2010): 7 categories



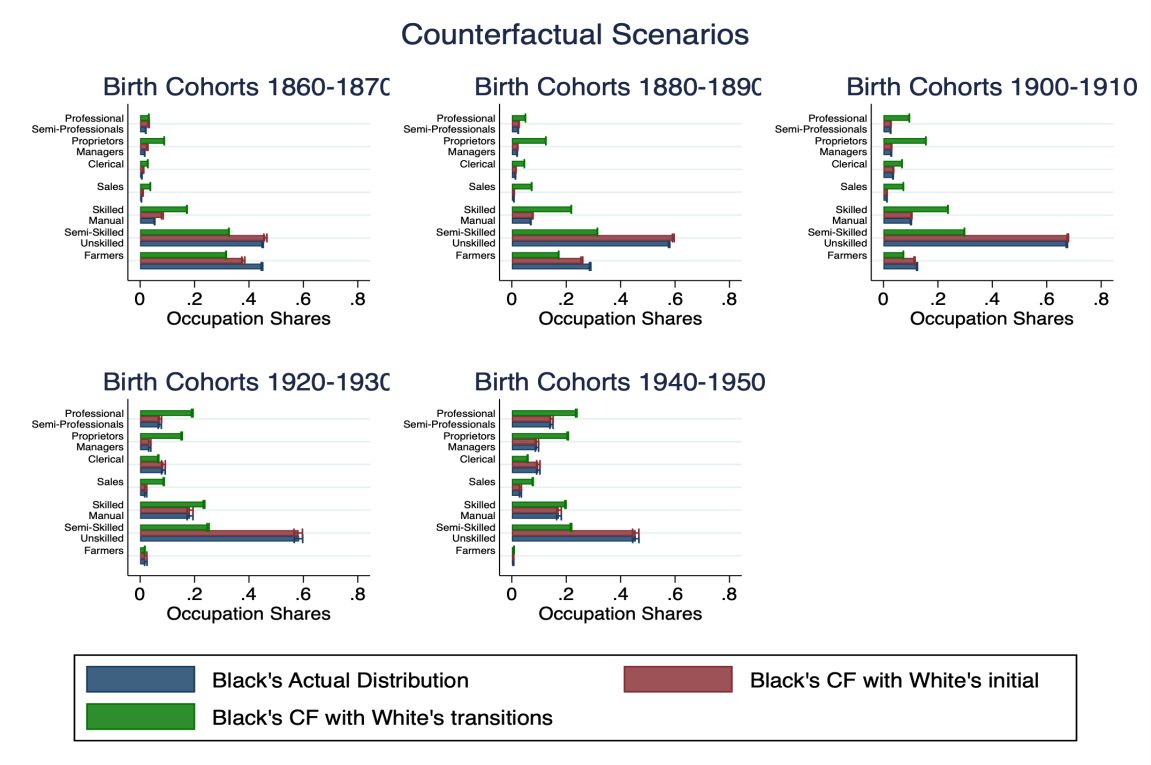
Notes: The graph shows the level of occupational segregation by race for each counterfactual scenario, which we calculate using the corresponding counterfactual distributions in Figure A.10 separately obtained for Black and White men. The dashed horizontal line indicates the actual segregation level in 2010. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.12: Counterfactual Occupational Distributions (Black Men): 5 categories



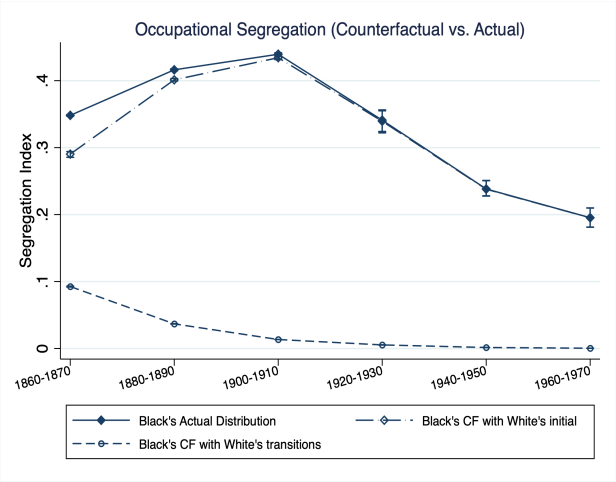
Notes: The graph presents the occupational distributions of Black men in each time period (μ_t^B, navy bars), and the corresponding counterfactual distributions using the initial conditions of White men ($\mu_t^{B'} = \mathbf{P}_{t-1}^B \mathbf{P}_{t-2}^B ... \mathbf{P}_1^B \mathbf{P}_0^B \mu_0^W$, maroon bars) and the mobility dynamics of White men ($\mu_t^{B''} = \mathbf{P}_{t-1}^W \mathbf{P}_{t-2}^W ... \mathbf{P}_1^W \mathbf{P}_0^W \mu_0^B$, green bars). Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.13: Counterfactual Occupational Distributions (Black Men): 7 categories



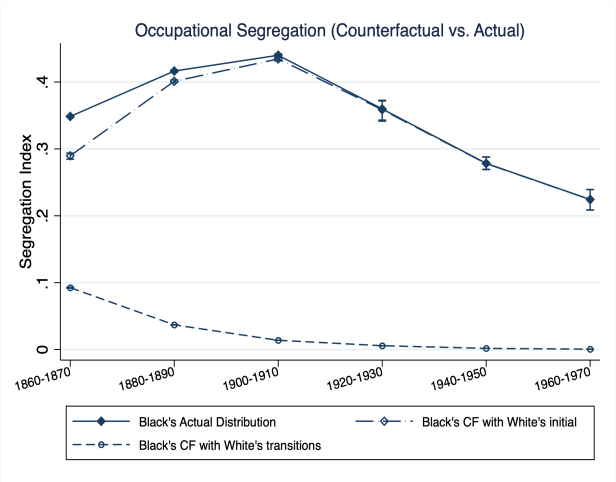
Notes: The graph presents the occupational distributions of Black men in each time period (μ_t^B, navy bars), and the corresponding counterfactual distributions using the initial conditions of White men ($\mu_t^{B'} = \mathbf{P}_{t-1}^B \mathbf{P}_{t-2}^B ... \mathbf{P}_1^B \mathbf{P}_0^B \mu_0^W$, maroon bars) and the mobility dynamics of White men ($\mu_t^{B''} = \mathbf{P}_{t-1}^W \mathbf{P}_{t-2}^W ... \mathbf{P}_1^W \mathbf{P}_0^W \mu_0^B$, green bars). Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.14: Occupational Segregation with Counterfactuals: 5 categories



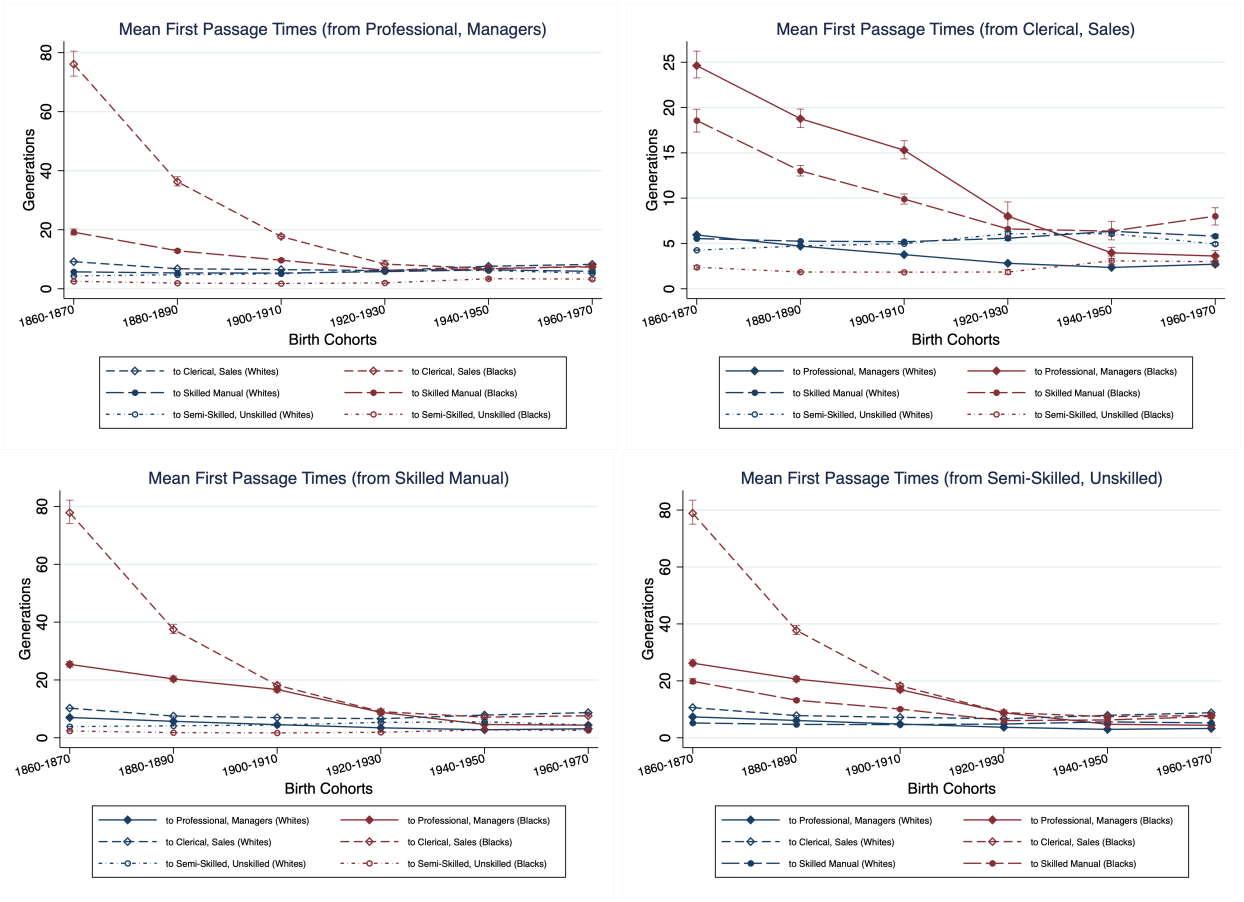
Notes: The graph shows changes in the degree of occupational segregation by race calculated using the actual distribution of White men (μ_t^W) and that of Black men generated in each scenario presented in Figure A.12. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.15: Occupational Segregation with Counterfactuals: 7 categories



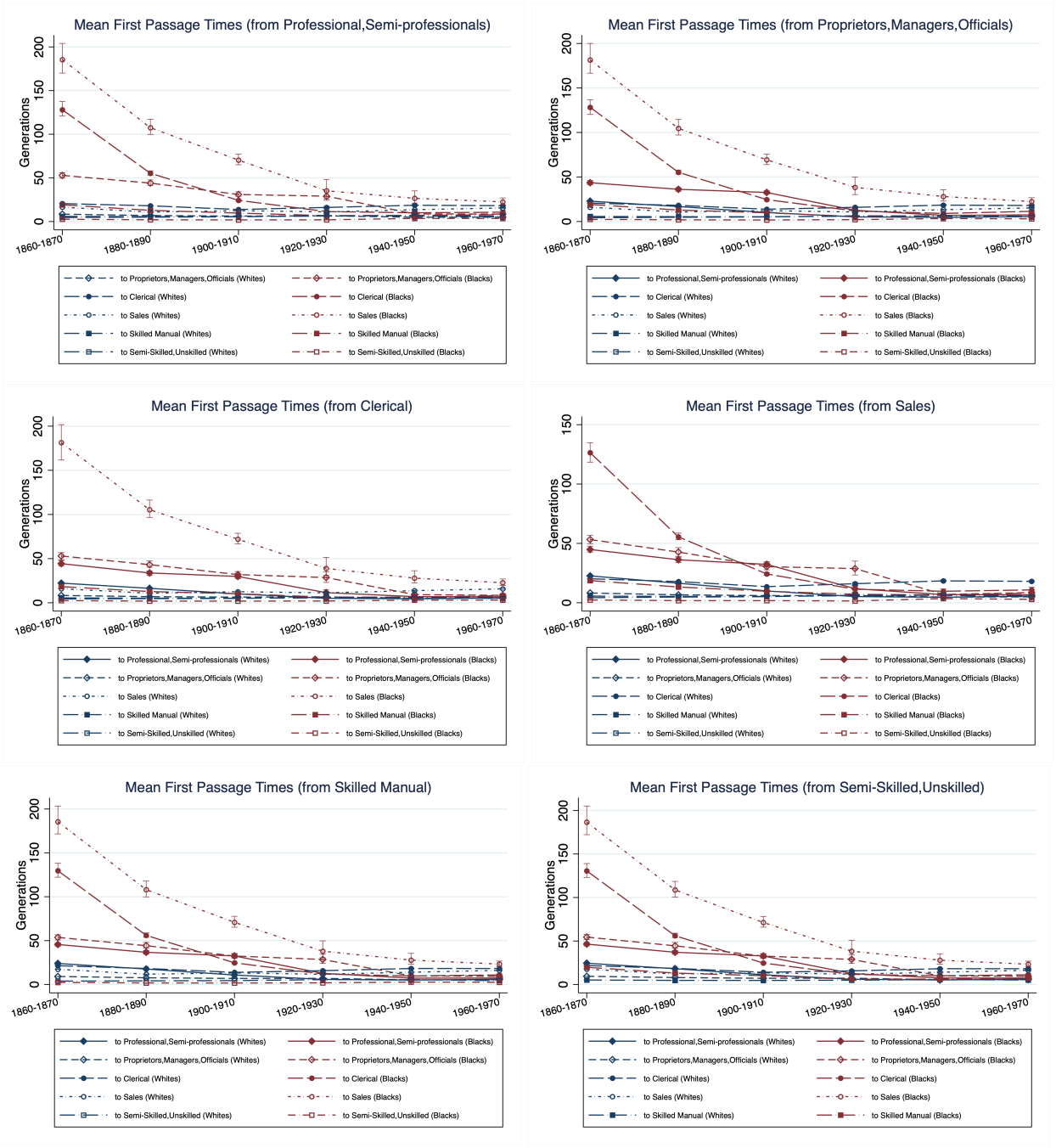
Notes: The graph shows changes in the degree of occupational segregation by race calculated using the actual distribution of White men (μ_t^W) and that of Black men generated in each scenario presented in Figure A.13. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.16: Mean First Passage Times: 5 categories except Farmers



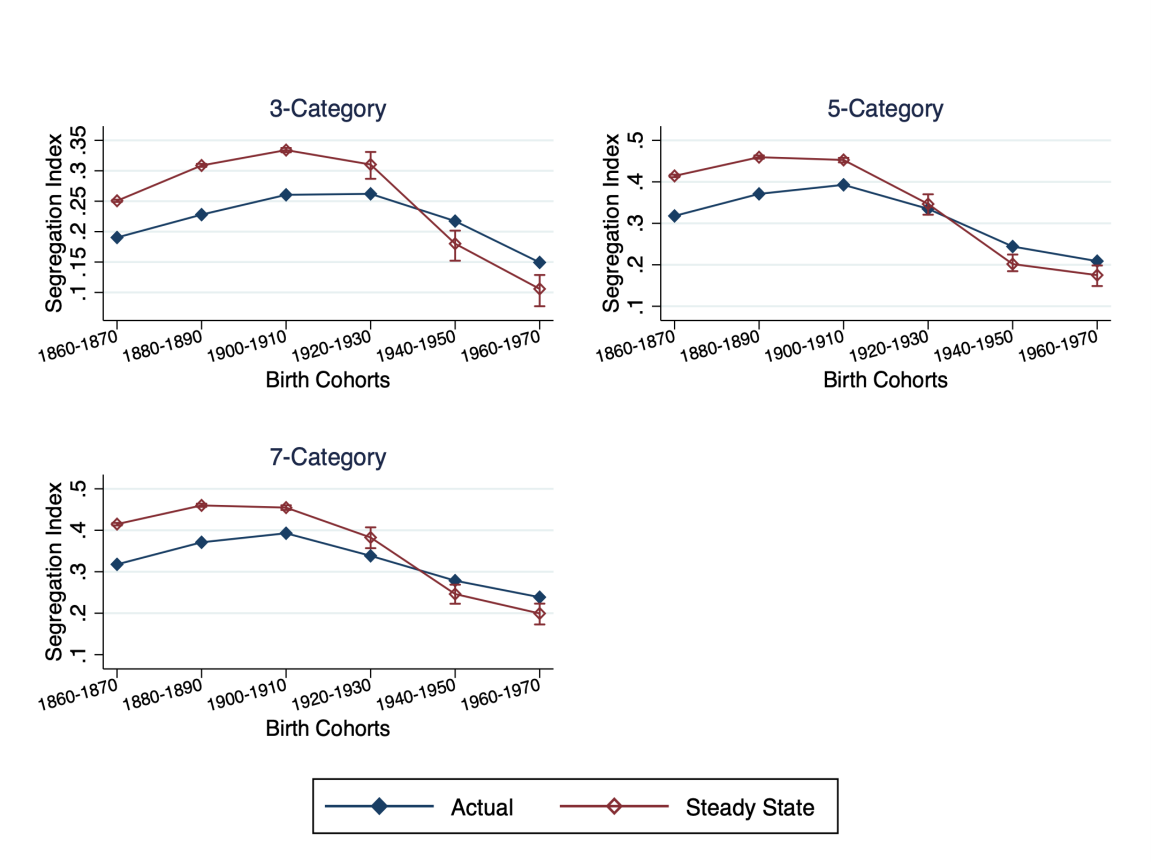
Notes: The graphs show the mean first passage times transitioning from Professional and Managerial occupations to others (top left); Clerical and Sales occupations to others (top right); Skilled Manual occupations to others (bottom left); Semi-Skilled and Unskilled Manual occupations to others (bottom right), estimated using period-specific transition matrices for Black and White men. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.17: Mean First Passage Times: 7 categories except Farmers



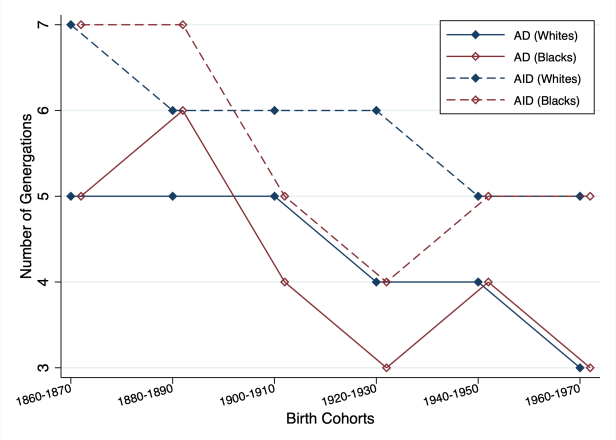
Notes: The graphs show the mean first passage times transitioning from Professional and Semi-professional occupations to others (top left); Proprietors, Managers, Officials to others (top right); Clerical occupations to others (middle left); Sales occupations to others (middle right); Skilled Manual (bottom left); and Semi-Skilled and Unskilled Manual occupations to others (bottom right) estimated using period-specific transition matrices for Black and White men. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.18: Trends in Occupational Segregation by Race



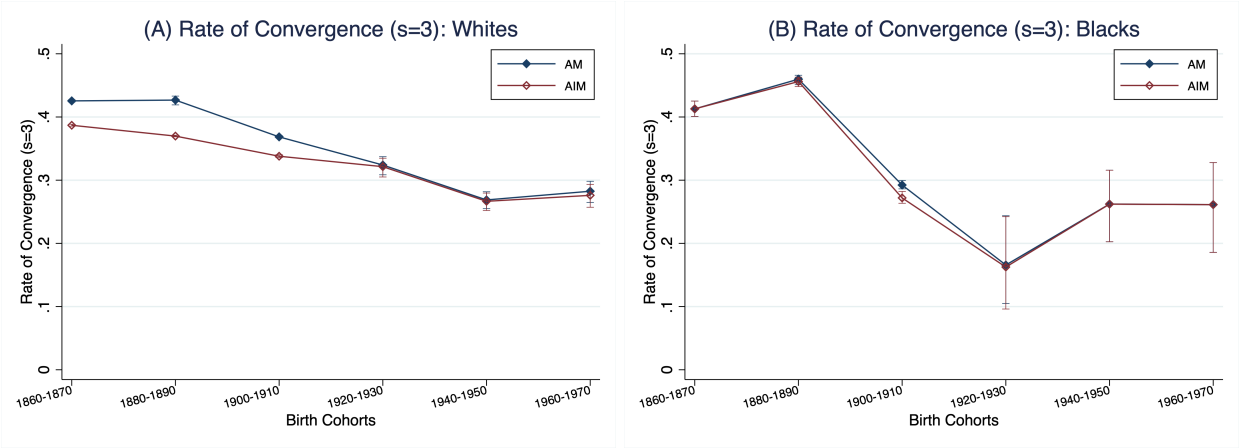
Notes: The graphs show trends in occupational segregation by race for each birth cohort group using the actual and the steady-state distributions.

Figure A.19: Number of Generations Required in Convergence to Steady State



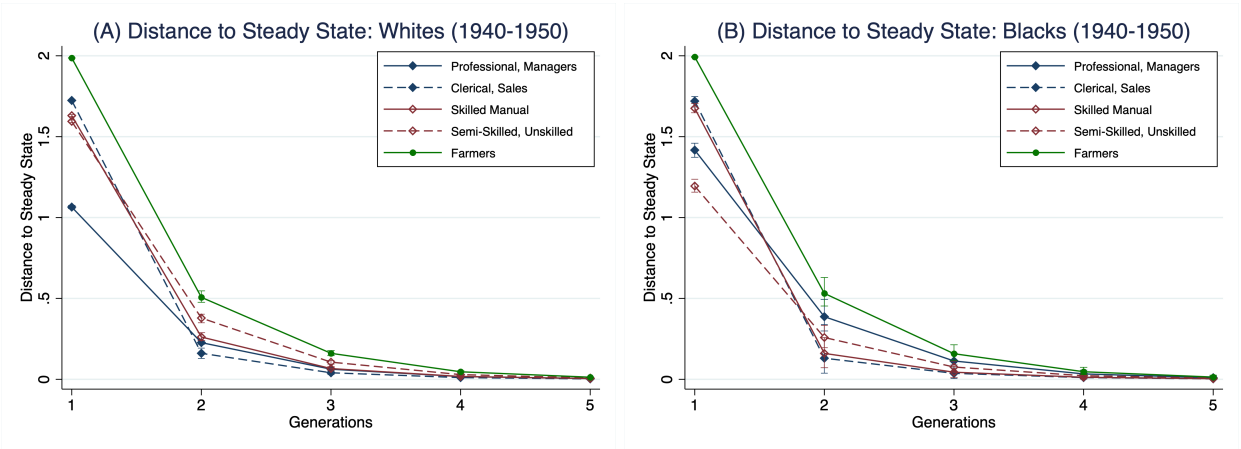
Notes: The graph presents the number of generations required for *AD* and *AID* to fall below 0.01. Our results are based on 3-category occupations.

Figure A.20: Dissipation of Memory (All Birth Cohorts, Medium-Run)



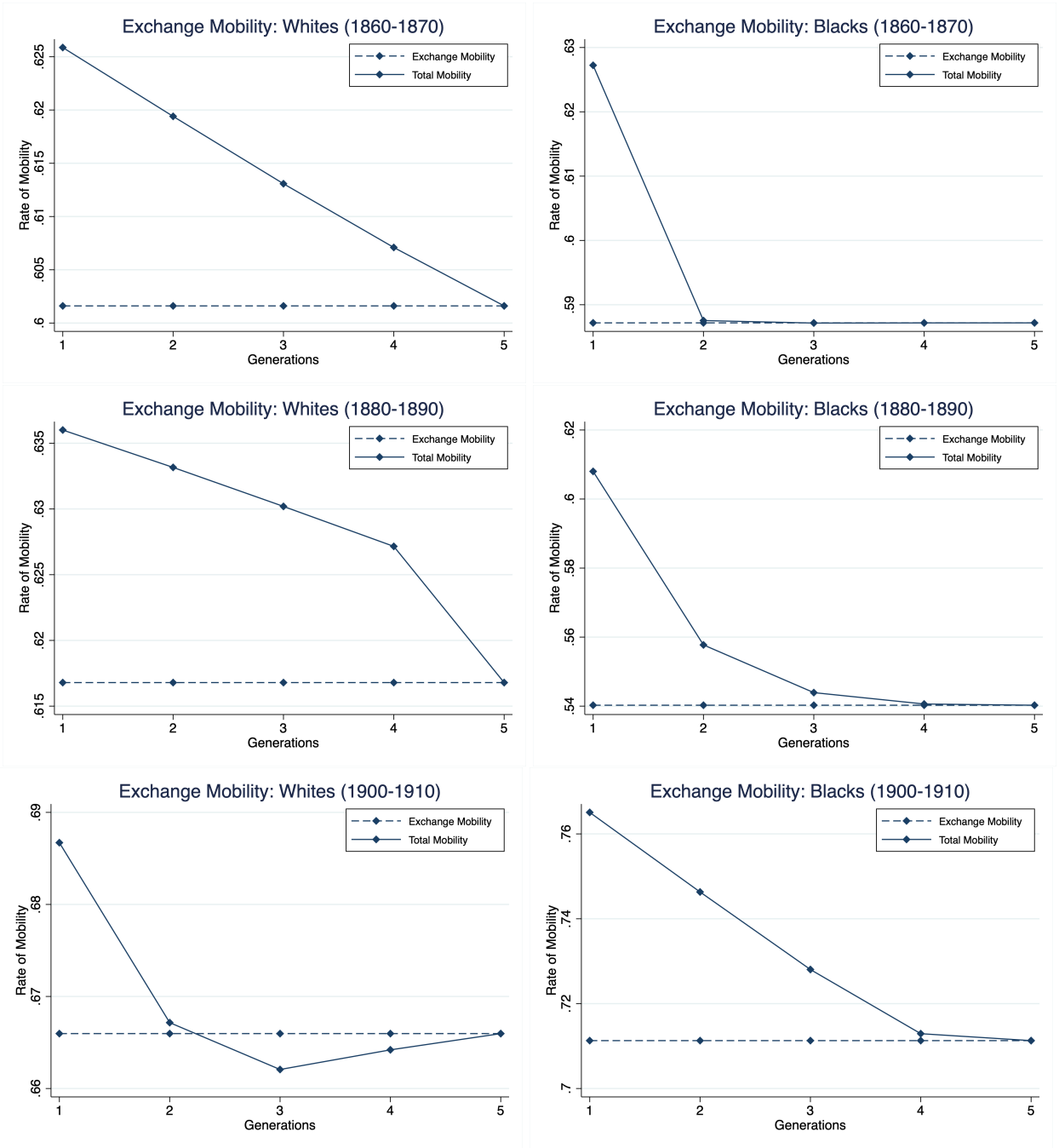
Notes: The graphs present mobility estimates based on mobility as independence of origin—estimates of AM and AIM in the medium run ($s = 3$). Smaller values correspond to faster dissipation and, thus, greater mobility rates. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.21: Memory in Mobility (1940-1950 Birth Cohorts)



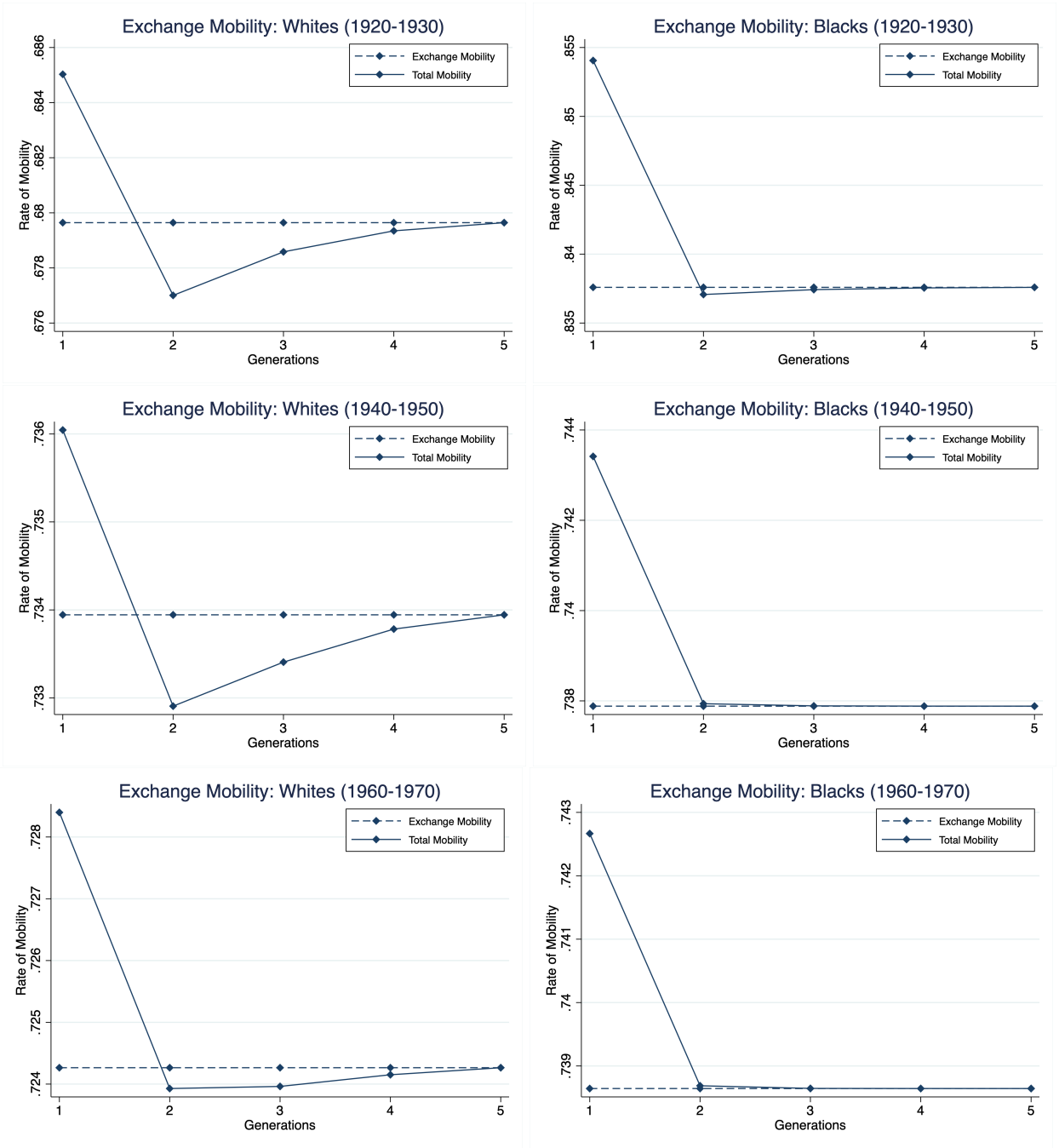
Notes: The graphs present estimates of Individual Deviation (ID) by occupation. Each measure is plotted across generations $s = 1, 2, 3, 4, 5$. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.22: Exchange versus Structural Mobility (Birth Cohorts 1860-1910)



Notes: The graphs present total mobility rates (1-AIM, in solid navy) and exchange mobility rates (1-EM in dashed navy) estimated across generations $s = 1, 2, 3, 4, 5$ for our sample of White and Black men (birth cohorts 1860-1910). Our results are based on 3-category occupations.

Figure A.23: Exchange versus Structural Mobility (Birth Cohorts 1920-1970)



Notes: The graphs present total mobility rates (1-AIM, in solid navy) and exchange mobility rates (1-EM in dashed navy) estimated across generations $s = 1, 2, 3, 4, 5$ for our sample of White and Black men (birth cohorts 1920-1970). Our results are based on 3-category occupations.

B Additional Tables

Table B.1: Matching Rates by Linking Methods

Linking Method	Year	Whites				Blacks			
		Linked	IG Linked			Linked	IG Linked		
			Any	w/Occ$_s$	w/Occ$_{sf}$		Any	w/Occ$_s$	w/Occ$_{sf}$
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CLP	1910	0.244	0.097	0.090	0.071	0.138	0.036	0.034	0.029
	1920	0.273	0.095	0.088	0.065	0.134	0.032	0.030	0.023
	1930	0.303	0.108	0.101	0.074	0.142	0.033	0.031	0.024
	1940	0.232	0.125	0.118	0.089	0.101	0.040	0.037	0.026
MLP	1910	0.647	0.184	0.173	0.154	0.405	0.057	0.055	0.047
	1920	0.669	0.178	0.166	0.142	0.389	0.054	0.052	0.043
	1930	0.694	0.195	0.184	0.157	0.385	0.056	0.054	0.044
	1940	0.547	0.216	0.207	0.181	0.279	0.064	0.060	0.049
Census Tree	1910	0.810	0.323	0.303	0.270	0.657	0.147	0.140	0.120
	1920	0.823	0.311	0.291	0.243	0.635	0.147	0.141	0.116
	1930	0.854	0.409	0.386	0.339	0.644	0.191	0.184	0.160
	1940	0.782	0.501	0.480	0.447	0.551	0.240	0.225	0.205

Notes: The table reports various definitions of linking rates for each census year from 1910 onward for each of the three linking methods (CLP, MLP, and Census Tree). This starting point corresponds to our sample's earliest cohort, born between 1860 and 1870, who were aged 35 to 55 in 1910. Note that the linked censuses 1850-1900 are also used for the linking process. We focus on Black and White men in their prime age (35 to 55) in each census year for constructing these rates. Columns (1) and (5) show the probability of men linked across different censuses; Columns (2) and (6) show the probability of men matched to their fathers; Columns (3) and (7) show the probability of men with valid occupation information matched to their fathers; and Columns (4) and (8) show the probability of men with valid occupation information matched to their fathers with valid occupation information.

Table B.2: Period and Birth Cohort Definitions

Period (Benchmark Year)	Birth Years (Data)	Birth Cohorts (Definition)
1910	1856-1875	1860-1870
1930	1876-1895	1880-1890
1950	1896-1915	1900-1910
1970	1916-1935	1920-1930
1990	1936-1955	1940-1950
2010	1956-1975	1960-1970

Notes: The table shows how our definitions of periods and birth cohorts of individuals correspond to one another. To construct our sample, we restrict to Black and White men born between 1856 and 1975. We group them into six birth cohorts (1856-1875, 1876-1895, 1896-1915, 1916-1935, 1936-1955, and 1956-1975), which are labeled in our analysis by midyears (1860-1870, 1880-1890, 1900-1910, 1920-1930, 1940-1950, and 1960-1970). This is equivalent to focusing on individuals aged between 35 and 55 in six snapshot years: 1910, 1930, 1950, 1970, 1990, and 2010.

Table B.3: Occupational Groupings

Occupation Groups (3)	Occupation Groups (5)	Occupation Groups (7)	Census 1950 Occupation Codes (269)
White-Collar	Professional & Managerial	Professional, Semi-professionals	0-99
		Proprietors, Managers, Officials	200-290
	Clerical & Sales	Clerical	300-390
		Sales	400-490
Blue-Collar	Skilled Manual	Skilled Manual	500-594, 762, 773, 781, 782
	Semi-Skilled, Unskilled Manual	Semi-Skilled, Unskilled Manual	595, 600-690, 700-790, 910-970
Farming	Farming	Farming	100, 123, 810-840

Notes: The table shows the mapping of the 3-digit Census occupation codes to our 3-, 5-, and 7-category occupational groups.

Table B.4: Summary Statistics

Race	Birth Cohorts	Counts	Region of Residence		Education Groups		
			Non-South	South	Less than HS	HS Grads	Any College
Whites	1860-1870	9027300	0.806	0.194			
	1880-1890	13264290	0.795	0.205			
	1900-1910	16600957	0.765	0.235	0.885	0.061	0.054
	1920-1930	19538700	0.814	0.186	0.398	0.322	0.280
	1940-1950	24944226	0.701	0.299	0.110	0.292	0.598
	1960-1970	30215466	0.666	0.334	0.089	0.371	0.540
Blacks	1860-1870	902891	0.208	0.792			
	1880-1890	1302202	0.320	0.680			
	1900-1910	1607281	0.424	0.576	0.963	0.021	0.017
	1920-1930	1911500	0.676	0.324	0.693	0.198	0.109
	1940-1950	2841132	0.558	0.442	0.220	0.362	0.418
	1960-1970	4277868	0.498	0.502	0.096	0.442	0.462

Notes: This table presents the summary statistics for our sample of birth cohorts by race: number of observations, share of individuals by region of residence (non-South, South), and education group (less than HS, HS graduates, any college).

Table B.5: Transition Probabilities: 3-Category Occupations (Whites, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.545	0.373	0.081
		(0.543, 0.548)	(0.370, 0.376)	(0.080, 0.082)
	Manual	0.216	0.699	0.085
		(0.214, 0.217)	(0.698, 0.701)	(0.084, 0.086)
	Farmers	0.157	0.335	0.508
		(0.156, 0.158)	(0.334, 0.336)	(0.507, 0.510)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.605	0.351	0.043
		(0.603, 0.607)	(0.349, 0.353)	(0.043, 0.044)
	Manual	0.267	0.691	0.042
		(0.266, 0.268)	(0.690, 0.692)	(0.042, 0.043)
	Farmers	0.166	0.381	0.452
		(0.165, 0.167)	(0.380, 0.383)	(0.451, 0.453)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.638	0.339	0.023
		(0.637, 0.640)	(0.337, 0.341)	(0.022, 0.023)
	Manual	0.317	0.660	0.023
		(0.316, 0.318)	(0.659, 0.661)	(0.023, 0.023)
	Farmers	0.212	0.473	0.315
		(0.211, 0.213)	(0.472, 0.475)	(0.314, 0.316)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.701	0.292	0.007
		(0.689, 0.710)	(0.283, 0.304)	(0.005, 0.009)
	Manual	0.382	0.610	0.009
		(0.376, 0.389)	(0.602, 0.616)	(0.007, 0.010)
	Farmers	0.263	0.602	0.135
		(0.253, 0.274)	(0.590, 0.612)	(0.131, 0.139)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.710	0.284	0.006
		(0.702, 0.718)	(0.277, 0.292)	(0.004, 0.007)
	Manual	0.445	0.549	0.006
		(0.438, 0.452)	(0.542, 0.555)	(0.005, 0.007)
	Farmers	0.352	0.526	0.122
		(0.336, 0.367)	(0.511, 0.542)	(0.116, 0.128)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.673	0.322	0.005
		(0.663, 0.683)	(0.312, 0.333)	(0.003, 0.007)
	Manual	0.399	0.595	0.007
		(0.390, 0.409)	(0.584, 0.604)	(0.005, 0.008)
	Farmers	0.326	0.500	0.174
		(0.297, 0.358)	(0.463, 0.527)	(0.157, 0.192)

Notes: The table shows the transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.6: Transition Probabilities: 3-Category Occupations (Blacks, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.192	0.558	0.250
		(0.173, 0.215)	(0.527, 0.593)	(0.225, 0.274)
	Manual	0.062	0.719	0.219
		(0.059, 0.065)	(0.711, 0.726)	(0.211, 0.228)
	Farmers	0.033	0.332	0.635
		(0.031, 0.034)	(0.327, 0.337)	(0.630, 0.640)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.223	0.656	0.121
		(0.207, 0.239)	(0.639, 0.675)	(0.107, 0.135)
	Manual	0.079	0.844	0.078
		(0.075, 0.082)	(0.838, 0.849)	(0.074, 0.082)
	Farmers	0.031	0.425	0.544
		(0.029, 0.033)	(0.421, 0.429)	(0.539, 0.548)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.269	0.676	0.055
		(0.253, 0.289)	(0.654, 0.693)	(0.047, 0.064)
	Manual	0.111	0.854	0.035
		(0.107, 0.115)	(0.850, 0.858)	(0.033, 0.037)
	Farmers	0.045	0.618	0.336
		(0.042, 0.048)	(0.614, 0.623)	(0.333, 0.340)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.363	0.633	0.003
		(0.292, 0.437)	(0.557, 0.701)	(0, 0.013)
	Manual	0.212	0.775	0.012
		(0.196, 0.227)	(0.758, 0.791)	(0.007, 0.019)
	Farmers	0.094	0.825	0.081
		(0.081, 0.107)	(0.811, 0.841)	(0.074, 0.087)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.576	0.424	0
		(0.525, 0.622)	(0.378, 0.475)	(0, 0)
	Manual	0.318	0.676	0.006
		(0.306, 0.330)	(0.663, 0.689)	(0.003, 0.008)
	Farmers	0.166	0.795	0.039
		(0.135, 0.199)	(0.763, 0.826)	(0.031, 0.047)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.590	0.409	0.001
		(0.531, 0.647)	(0.352, 0.469)	(0, 0.005)
	Manual	0.330	0.663	0.007
		(0.316, 0.349)	(0.644, 0.678)	(0.004, 0.008)
	Farmers	0.258	0.720	0.022
		(0.149, 0.356)	(0.603, 0.834)	(0, 0.056)

Notes: The table shows the transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.7: Transition Probabilities: 5-Category Occupations (Whites, 1860-1910)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1860-1870	Professional, Managers	0.369	0.179	0.154	0.210	0.088
		(0.366, 0.372)	(0.176, 0.181)	(0.152, 0.157)	(0.207, 0.213)	(0.087, 0.090)
	Clerical, Sales	0.269	0.268	0.182	0.224	0.057
		(0.264, 0.275)	(0.263, 0.275)	(0.177, 0.187)	(0.219, 0.230)	(0.054, 0.060)
	Skilled Manual	0.148	0.101	0.370	0.297	0.084
		(0.146, 0.150)	(0.099, 0.102)	(0.368, 0.373)	(0.295, 0.300)	(0.083, 0.085)
	Semi-Skilled, Unskilled	0.114	0.076	0.224	0.501	0.085
		(0.112, 0.115)	(0.075, 0.078)	(0.222, 0.226)	(0.498, 0.503)	(0.084, 0.087)
	Farmers	0.109	0.048	0.119	0.216	0.508
		(0.108, 0.109)	(0.048, 0.049)	(0.118, 0.120)	(0.215, 0.217)	(0.507, 0.510)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1880-1890	Professional, Managers	0.405	0.204	0.162	0.181	0.048
		(0.403, 0.407)	(0.202, 0.206)	(0.160, 0.163)	(0.179, 0.183)	(0.047, 0.049)
	Clerical, Sales	0.318	0.279	0.180	0.190	0.033
		(0.315, 0.322)	(0.275, 0.282)	(0.176, 0.182)	(0.186, 0.195)	(0.032, 0.034)
	Skilled Manual	0.177	0.133	0.365	0.288	0.037
		(0.176, 0.178)	(0.132, 0.134)	(0.363, 0.367)	(0.286, 0.290)	(0.037, 0.038)
	Semi-Skilled, Unskilled	0.128	0.106	0.250	0.470	0.046
		(0.127, 0.129)	(0.105, 0.107)	(0.249, 0.252)	(0.469, 0.472)	(0.045, 0.046)
	Farmers	0.105	0.061	0.136	0.245	0.452
		(0.104, 0.106)	(0.061, 0.062)	(0.135, 0.137)	(0.244, 0.246)	(0.451, 0.453)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1900-1910	Professional, Managers	0.461	0.188	0.160	0.166	0.025
		(0.459, 0.464)	(0.187, 0.190)	(0.158, 0.162)	(0.164, 0.168)	(0.024, 0.025)
	Clerical, Sales	0.361	0.254	0.181	0.185	0.019
		(0.357, 0.365)	(0.251, 0.257)	(0.178, 0.184)	(0.182, 0.188)	(0.018, 0.020)
	Skilled Manual	0.216	0.140	0.348	0.277	0.019
		(0.214, 0.218)	(0.139, 0.141)	(0.346, 0.350)	(0.275, 0.279)	(0.019, 0.020)
	Semi-Skilled, Unskilled	0.168	0.117	0.259	0.430	0.026
		(0.167, 0.169)	(0.116, 0.118)	(0.257, 0.260)	(0.428, 0.432)	(0.026, 0.027)
	Farmers	0.150	0.062	0.177	0.296	0.315
		(0.148, 0.151)	(0.062, 0.063)	(0.176, 0.179)	(0.295, 0.297)	(0.314, 0.316)

Notes: The table shows the transition probabilities for the 1860-1910 birth cohorts. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.8: Transition Probabilities: 5-Category Occupations (Whites, 1920-1970)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1920-1930	Professional, Managers	0.532	0.185	0.140	0.135	0.008
		(0.518, 0.547)	(0.173, 0.197)	(0.129, 0.152)	(0.123, 0.146)	(0.006, 0.011)
	Clerical, Sales	0.445	0.219	0.178	0.151	0.006
		(0.418, 0.471)	(0.197, 0.239)	(0.158, 0.199)	(0.131, 0.168)	(0.003, 0.010)
	Skilled Manual	0.284	0.136	0.318	0.253	0.009
		(0.274, 0.296)	(0.127, 0.146)	(0.305, 0.330)	(0.242, 0.265)	(0.007, 0.011)
	Semi-Skilled, Unskilled	0.221	0.130	0.272	0.369	0.009
		(0.214, 0.232)	(0.122, 0.136)	(0.263, 0.280)	(0.358, 0.381)	(0.006, 0.011)
	Farmers	0.175	0.088	0.255	0.347	0.135
		(0.166, 0.184)	(0.083, 0.095)	(0.245, 0.264)	(0.334, 0.358)	(0.131, 0.139)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1940-1950	Professional, Managers	0.579	0.140	0.134	0.141	0.005
		(0.569, 0.591)	(0.132, 0.147)	(0.127, 0.142)	(0.133, 0.150)	(0.004, 0.007)
	Clerical, Sales	0.494	0.192	0.145	0.163	0.007
		(0.474, 0.513)	(0.174, 0.207)	(0.131, 0.158)	(0.148, 0.179)	(0.003, 0.011)
	Skilled Manual	0.357	0.118	0.281	0.237	0.007
		(0.346, 0.367)	(0.110, 0.126)	(0.273, 0.292)	(0.228, 0.247)	(0.005, 0.008)
	Semi-Skilled, Unskilled	0.301	0.116	0.240	0.337	0.006
		(0.291, 0.313)	(0.109, 0.124)	(0.231, 0.249)	(0.329, 0.348)	(0.005, 0.008)
	Farmers	0.259	0.093	0.221	0.305	0.122
		(0.244, 0.272)	(0.083, 0.103)	(0.210, 0.236)	(0.291, 0.320)	(0.116, 0.128)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1960-1970	Professional, Managers	0.549	0.139	0.148	0.159	0.004
		(0.538, 0.564)	(0.129, 0.146)	(0.138, 0.157)	(0.151, 0.170)	(0.003, 0.006)
	Clerical, Sales	0.439	0.184	0.158	0.210	0.008
		(0.413, 0.462)	(0.165, 0.203)	(0.141, 0.178)	(0.190, 0.232)	(0.004, 0.012)
	Skilled Manual	0.324	0.102	0.270	0.297	0.007
		(0.309, 0.342)	(0.092, 0.114)	(0.258, 0.282)	(0.282, 0.310)	(0.005, 0.009)
	Semi-Skilled, Unskilled	0.274	0.096	0.238	0.385	0.006
		(0.259, 0.290)	(0.088, 0.106)	(0.226, 0.250)	(0.370, 0.399)	(0.004, 0.009)
	Farmers	0.248	0.078	0.170	0.330	0.174
		(0.217, 0.280)	(0.058, 0.096)	(0.142, 0.193)	(0.293, 0.365)	(0.157, 0.192)

Notes: The table shows the transition probabilities for the 1920-1970 birth cohorts. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.9: Transition Probabilities: 5-Category Occupations (Blacks, 1860-1910)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1860-1870	Professional, Managers	0.145	0.046	0.088	0.457	0.265
		(0.121, 0.171)	(0.034, 0.058)	(0.070, 0.105)	(0.419, 0.493)	(0.236, 0.296)
	Clerical, Sales	0.094	0.104	0.113	0.493	0.197
		(0.059, 0.127)	(0.075, 0.138)	(0.076, 0.155)	(0.432, 0.557)	(0.150, 0.251)
	Skilled Manual	0.067	0.024	0.211	0.499	0.199
		(0.055, 0.078)	(0.018, 0.029)	(0.195, 0.227)	(0.473, 0.525)	(0.177, 0.216)
	Semi-Skilled, Unskilled	0.041	0.014	0.057	0.663	0.224
		(0.038, 0.045)	(0.012, 0.016)	(0.053, 0.062)	(0.653, 0.673)	(0.215, 0.233)
	Farmers	0.027	0.005	0.034	0.298	0.635
		(0.026, 0.029)	(0.005, 0.006)	(0.032, 0.036)	(0.294, 0.303)	(0.630, 0.640)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1880-1890	Professional, Managers	0.150	0.064	0.106	0.547	0.133
		(0.134, 0.169)	(0.053, 0.074)	(0.090, 0.121)	(0.519, 0.575)	(0.116, 0.150)
	Clerical, Sales	0.131	0.117	0.092	0.573	0.088
		(0.104, 0.165)	(0.094, 0.139)	(0.069, 0.115)	(0.539, 0.617)	(0.062, 0.114)
	Skilled Manual	0.061	0.033	0.210	0.601	0.094
		(0.051, 0.074)	(0.027, 0.040)	(0.193, 0.227)	(0.579, 0.619)	(0.082, 0.107)
	Semi-Skilled, Unskilled	0.049	0.027	0.080	0.770	0.074
		(0.045, 0.052)	(0.025, 0.029)	(0.076, 0.085)	(0.763, 0.776)	(0.069, 0.079)
	Farmers	0.024	0.008	0.039	0.386	0.544
		(0.022, 0.025)	(0.007, 0.009)	(0.037, 0.041)	(0.381, 0.391)	(0.539, 0.548)
		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1900-1910	Professional, Managers	0.167	0.083	0.133	0.557	0.060
		(0.145, 0.187)	(0.070, 0.097)	(0.114, 0.154)	(0.533, 0.587)	(0.051, 0.071)
	Clerical, Sales	0.138	0.177	0.111	0.531	0.043
		(0.113, 0.170)	(0.148, 0.206)	(0.084, 0.138)	(0.494, 0.568)	(0.029, 0.055)
	Skilled Manual	0.064	0.059	0.233	0.603	0.040
		(0.054, 0.075)	(0.049, 0.069)	(0.214, 0.253)	(0.579, 0.624)	(0.034, 0.046)
	Semi-Skilled, Unskilled	0.054	0.054	0.097	0.760	0.034
		(0.051, 0.057)	(0.051, 0.058)	(0.093, 0.103)	(0.753, 0.766)	(0.032, 0.037)
	Farmers	0.030	0.016	0.070	0.548	0.336
		(0.028, 0.032)	(0.014, 0.017)	(0.066, 0.074)	(0.543, 0.553)	(0.333, 0.340)

Notes: The table shows the transition probabilities for the 1860-1910 birth cohorts. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.10: Transition Probabilities: 5-Category Occupations (Blacks, 1920-1970)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1920-1930	Professional, Managers	0.211	0.162	0.145	0.477	0.005
		(0.137, 0.284)	(0.084, 0.240)	(0.081, 0.205)	(0.370, 0.589)	(0, 0.020)
	Clerical, Sales	0.189	0.157	0.095	0.559	0
		(0.101, 0.290)	(0.074, 0.249)	(0.024, 0.166)	(0.453, 0.674)	(0, 0)
	Skilled Manual	0.106	0.093	0.271	0.526	0.004
		(0.074, 0.135)	(0.063, 0.132)	(0.205, 0.334)	(0.450, 0.601)	(0, 0.015)
	Semi-Skilled, Unskilled	0.104	0.111	0.181	0.589	0.014
		(0.093, 0.118)	(0.095, 0.128)	(0.164, 0.203)	(0.558, 0.609)	(0.008, 0.023)
	Farmers	0.045	0.049	0.158	0.667	0.081
		(0.036, 0.052)	(0.039, 0.059)	(0.141, 0.174)	(0.646, 0.688)	(0.074, 0.087)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1940-1950	Professional, Managers	0.457	0.168	0.122	0.253	0
		(0.381, 0.516)	(0.125, 0.231)	(0.078, 0.162)	(0.199, 0.312)	(0, 0)
	Clerical, Sales	0.344	0.142	0.173	0.341	0
		(0.257, 0.439)	(0.070, 0.217)	(0.093, 0.252)	(0.255, 0.424)	(0, 0)
	Skilled Manual	0.211	0.151	0.194	0.438	0.005
		(0.178, 0.254)	(0.120, 0.190)	(0.156, 0.235)	(0.389, 0.483)	(0.001, 0.010)
	Semi-Skilled, Unskilled	0.187	0.115	0.175	0.517	0.006
		(0.173, 0.208)	(0.100, 0.128)	(0.161, 0.192)	(0.496, 0.541)	(0.004, 0.009)
	Farmers	0.080	0.086	0.226	0.569	0.039
		(0.057, 0.100)	(0.063, 0.109)	(0.195, 0.253)	(0.537, 0.608)	(0.031, 0.047)

		Professional, Managers	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1960-1970	Professional, Managers	0.455	0.151	0.131	0.261	0.002
		(0.382, 0.532)	(0.106, 0.187)	(0.092, 0.174)	(0.197, 0.323)	(0, 0.007)
	Clerical, Sales	0.370	0.186	0.083	0.360	0
		(0.267, 0.468)	(0.121, 0.268)	(0.044, 0.138)	(0.253, 0.475)	(0, 0.001)
	Skilled Manual	0.206	0.139	0.180	0.469	0.006
		(0.164, 0.247)	(0.107, 0.170)	(0.152, 0.220)	(0.417, 0.514)	(0, 0.015)
	Semi-Skilled, Unskilled	0.208	0.115	0.148	0.523	0.007
		(0.183, 0.232)	(0.100, 0.131)	(0.132, 0.164)	(0.498, 0.552)	(0.002, 0.010)
	Farmers	0.221	0.037	0.142	0.578	0.022
		(0.123, 0.326)	(0.006, 0.087)	(0.076, 0.208)	(0.458, 0.704)	(0, 0.056)

Notes: The table shows the transition probabilities for the 1920-1970 birth cohorts. Our results are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.11: Transition Probabilities: 7-Category Occupations (Whites, 1860-1910)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1860-1870	Professional, Semi-Profs	0.248	0.168	0.075	0.087	0.143	0.162	0.117
		(0.242, 0.254)	(0.162, 0.173)	(0.072, 0.079)	(0.083, 0.090)	(0.138, 0.148)	(0.157, 0.169)	(0.113, 0.120)
	Proprietors, Managers	0.070	0.283	0.072	0.112	0.158	0.226	0.079
		(0.068, 0.072)	(0.280, 0.287)	(0.070, 0.074)	(0.110, 0.114)	(0.156, 0.161)	(0.222, 0.229)	(0.077, 0.080)
	Clerical	0.094	0.180	0.163	0.115	0.191	0.209	0.048
		(0.088, 0.099)	(0.172, 0.189)	(0.156, 0.171)	(0.109, 0.122)	(0.183, 0.199)	(0.200, 0.220)	(0.044, 0.052)
	Sales	0.079	0.188	0.091	0.172	0.177	0.232	0.061
		(0.075, 0.083)	(0.181, 0.194)	(0.086, 0.095)	(0.165, 0.178)	(0.170, 0.184)	(0.224, 0.241)	(0.058, 0.065)
	Skilled Manual	0.038	0.110	0.048	0.052	0.370	0.297	0.084
		(0.037, 0.039)	(0.108, 0.112)	(0.047, 0.049)	(0.051, 0.054)	(0.368, 0.373)	(0.295, 0.300)	(0.083, 0.085)
	Semi-Skilled, Unskilled	0.024	0.090	0.036	0.040	0.224	0.501	0.085
		(0.023, 0.025)	(0.088, 0.091)	(0.035, 0.037)	(0.039, 0.041)	(0.222, 0.226)	(0.498, 0.503)	(0.084, 0.087)
	Farmers	0.029	0.079	0.018	0.030	0.119	0.216	0.508
		(0.029, 0.030)	(0.078, 0.080)	(0.018, 0.018)	(0.030, 0.031)	(0.118, 0.120)	(0.215, 0.217)	(0.507, 0.510)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1880-1890	Professional, Semi-Profs	0.256	0.199	0.067	0.131	0.145	0.146	0.057
		(0.251, 0.260)	(0.194, 0.204)	(0.065, 0.069)	(0.128, 0.135)	(0.141, 0.148)	(0.141, 0.151)	(0.054, 0.059)
	Proprietors, Managers	0.084	0.307	0.061	0.145	0.166	0.191	0.046
		(0.083, 0.086)	(0.304, 0.309)	(0.060, 0.062)	(0.143, 0.147)	(0.164, 0.168)	(0.189, 0.194)	(0.045, 0.047)
	Clerical	0.108	0.200	0.127	0.137	0.195	0.203	0.029
		(0.105, 0.112)	(0.196, 0.205)	(0.123, 0.130)	(0.133, 0.141)	(0.190, 0.200)	(0.197, 0.210)	(0.027, 0.031)
	Sales	0.100	0.225	0.075	0.213	0.170	0.182	0.035
		(0.097, 0.103)	(0.221, 0.229)	(0.073, 0.078)	(0.210, 0.217)	(0.165, 0.173)	(0.178, 0.188)	(0.034, 0.037)
	Skilled Manual	0.052	0.125	0.058	0.075	0.365	0.288	0.037
		(0.051, 0.053)	(0.123, 0.126)	(0.057, 0.059)	(0.074, 0.076)	(0.363, 0.367)	(0.286, 0.290)	(0.037, 0.038)
	Semi-Skilled, Unskilled	0.031	0.097	0.047	0.059	0.250	0.470	0.046
		(0.031, 0.032)	(0.096, 0.098)	(0.046, 0.048)	(0.058, 0.060)	(0.249, 0.252)	(0.469, 0.472)	(0.045, 0.046)
	Farmers	0.027	0.078	0.022	0.039	0.136	0.245	0.452
		(0.027, 0.028)	(0.077, 0.078)	(0.022, 0.023)	(0.038, 0.039)	(0.135, 0.137)	(0.244, 0.246)	(0.451, 0.453)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1900-1910	Professional, Semi-Profs	0.334	0.199	0.077	0.097	0.135	0.133	0.025
		(0.329, 0.340)	(0.194, 0.204)	(0.075, 0.080)	(0.094, 0.100)	(0.130, 0.139)	(0.129, 0.136)	(0.023, 0.026)
	Proprietors, Managers	0.129	0.311	0.074	0.119	0.168	0.175	0.025
		(0.127, 0.130)	(0.308, 0.313)	(0.073, 0.075)	(0.117, 0.120)	(0.166, 0.170)	(0.173, 0.178)	(0.024, 0.025)
	Clerical	0.143	0.191	0.141	0.104	0.198	0.204	0.018
		(0.140, 0.147)	(0.186, 0.196)	(0.137, 0.145)	(0.101, 0.107)	(0.193, 0.203)	(0.199, 0.209)	(0.017, 0.020)
	Sales	0.144	0.237	0.092	0.169	0.167	0.171	0.019
		(0.140, 0.148)	(0.233, 0.242)	(0.089, 0.094)	(0.166, 0.173)	(0.164, 0.171)	(0.167, 0.174)	(0.018, 0.020)
	Skilled Manual	0.085	0.131	0.075	0.064	0.348	0.277	0.019
		(0.083, 0.086)	(0.130, 0.133)	(0.075, 0.076)	(0.063, 0.065)	(0.346, 0.350)	(0.275, 0.279)	(0.019, 0.020)
	Semi-Skilled, Unskilled	0.058	0.110	0.065	0.052	0.259	0.430	0.026
		(0.057, 0.059)	(0.108, 0.111)	(0.064, 0.066)	(0.052, 0.053)	(0.257, 0.260)	(0.428, 0.432)	(0.026, 0.027)
	Farmers	0.047	0.102	0.029	0.034	0.177	0.296	0.315
		(0.046, 0.048)	(0.102, 0.103)	(0.028, 0.029)	(0.033, 0.034)	(0.176, 0.179)	(0.295, 0.297)	(0.314, 0.316)

Notes: The table shows the transition probabilities for the 1860-1910 birth cohorts. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.12: Transition Probabilities: 7-Category Occupations (Whites, 1920-1970)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1920-1930	Professional, Semi-Profs	0.445	0.170	0.054	0.103	0.116	0.106	0.007
		(0.417, 0.476)	(0.150, 0.189)	(0.040, 0.067)	(0.083, 0.124)	(0.098, 0.135)	(0.085, 0.125)	(0.003, 0.010)
	Proprietors, Managers	0.236	0.259	0.063	0.134	0.151	0.148	0.008
		(0.217, 0.254)	(0.245, 0.276)	(0.052, 0.072)	(0.123, 0.145)	(0.137, 0.167)	(0.135, 0.165)	(0.005, 0.012)
	Clerical	0.270	0.163	0.098	0.093	0.207	0.162	0.006
		(0.240, 0.299)	(0.140, 0.186)	(0.079, 0.121)	(0.074, 0.114)	(0.176, 0.240)	(0.133, 0.191)	(0.002, 0.011)
	Sales	0.229	0.227	0.055	0.189	0.154	0.141	0.006
		(0.197, 0.251)	(0.200, 0.259)	(0.042, 0.069)	(0.160, 0.216)	(0.131, 0.180)	(0.119, 0.167)	(0.002, 0.010)
	Skilled Manual	0.152	0.132	0.068	0.068	0.318	0.253	0.009
		(0.144, 0.162)	(0.124, 0.139)	(0.062, 0.076)	(0.061, 0.076)	(0.305, 0.330)	(0.242, 0.265)	(0.007, 0.011)
	Semi-Skilled, Unskilled	0.120	0.101	0.073	0.057	0.272	0.369	0.009
		(0.113, 0.130)	(0.095, 0.107)	(0.068, 0.078)	(0.051, 0.061)	(0.263, 0.280)	(0.358, 0.381)	(0.006, 0.011)
	Farmers	0.081	0.094	0.046	0.043	0.255	0.347	0.135
		(0.075, 0.088)	(0.088, 0.102)	(0.041, 0.050)	(0.038, 0.047)	(0.245, 0.264)	(0.334, 0.358)	(0.131, 0.139)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1940-1950	Professional, Semi-Profs	0.397	0.227	0.045	0.080	0.122	0.126	0.004
		(0.381, 0.415)	(0.209, 0.244)	(0.037, 0.053)	(0.069, 0.091)	(0.108, 0.132)	(0.111, 0.135)	(0.002, 0.006)
	Proprietors, Managers	0.241	0.304	0.054	0.098	0.143	0.153	0.007
		(0.228, 0.254)	(0.291, 0.317)	(0.047, 0.062)	(0.089, 0.109)	(0.132, 0.153)	(0.140, 0.164)	(0.004, 0.009)
	Clerical	0.274	0.204	0.091	0.072	0.163	0.185	0.010
		(0.248, 0.302)	(0.178, 0.230)	(0.077, 0.110)	(0.055, 0.091)	(0.143, 0.184)	(0.161, 0.208)	(0.004, 0.019)
	Sales	0.254	0.254	0.052	0.164	0.129	0.144	0.004
		(0.230, 0.275)	(0.232, 0.274)	(0.041, 0.063)	(0.147, 0.187)	(0.111, 0.147)	(0.125, 0.164)	(0.001, 0.007)
	Skilled Manual	0.186	0.171	0.059	0.059	0.281	0.237	0.007
		(0.176, 0.195)	(0.162, 0.179)	(0.055, 0.065)	(0.053, 0.065)	(0.273, 0.292)	(0.228, 0.247)	(0.005, 0.008)
	Semi-Skilled, Unskilled	0.151	0.150	0.063	0.053	0.240	0.337	0.006
		(0.143, 0.159)	(0.142, 0.158)	(0.059, 0.069)	(0.047, 0.059)	(0.231, 0.249)	(0.329, 0.348)	(0.005, 0.008)
	Farmers	0.132	0.128	0.046	0.047	0.221	0.305	0.122
		(0.119, 0.142)	(0.116, 0.141)	(0.039, 0.053)	(0.039, 0.054)	(0.210, 0.236)	(0.291, 0.320)	(0.116, 0.128)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1960-1970	Professional, Semi-Profs	0.351	0.242	0.054	0.073	0.131	0.145	0.004
		(0.333, 0.376)	(0.225, 0.262)	(0.045, 0.062)	(0.062, 0.084)	(0.117, 0.144)	(0.130, 0.160)	(0.002, 0.007)
	Proprietors, Managers	0.220	0.280	0.061	0.092	0.168	0.176	0.004
		(0.203, 0.235)	(0.260, 0.300)	(0.051, 0.072)	(0.080, 0.102)	(0.150, 0.181)	(0.160, 0.195)	(0.002, 0.007)
	Clerical	0.241	0.194	0.070	0.069	0.186	0.233	0.007
		(0.203, 0.287)	(0.164, 0.228)	(0.051, 0.086)	(0.048, 0.090)	(0.156, 0.219)	(0.194, 0.270)	(0.001, 0.013)
	Sales	0.203	0.240	0.058	0.158	0.138	0.195	0.008
		(0.170, 0.228)	(0.205, 0.279)	(0.042, 0.073)	(0.135, 0.190)	(0.117, 0.164)	(0.169, 0.222)	(0.003, 0.014)
	Skilled Manual	0.151	0.173	0.051	0.051	0.270	0.297	0.007
		(0.136, 0.162)	(0.160, 0.190)	(0.044, 0.059)	(0.043, 0.062)	(0.258, 0.282)	(0.282, 0.310)	(0.005, 0.009)
	Semi-Skilled, Unskilled	0.127	0.147	0.055	0.040	0.238	0.385	0.006
		(0.117, 0.139)	(0.134, 0.161)	(0.049, 0.063)	(0.035, 0.047)	(0.226, 0.250)	(0.370, 0.399)	(0.004, 0.009)
	Farmers	0.114	0.134	0.031	0.047	0.170	0.330	0.174
		(0.092, 0.139)	(0.105, 0.159)	(0.020, 0.043)	(0.032, 0.062)	(0.142, 0.193)	(0.293, 0.365)	(0.157, 0.192)

Notes: The table shows the transition probabilities for the 1920-1970 birth cohorts. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.13: Transition Probabilities: 7-Category Occupations (Blacks, 1860-1910)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1860-1870	Professional, Semi-Profs	0.084	0.049	0.028	0.010	0.090	0.430	0.310
		(0.055, 0.109)	(0.032, 0.067)	(0.016, 0.041)	(0.003, 0.020)	(0.067, 0.116)	(0.374, 0.475)	(0.262, 0.357)
	Proprietors, Managers	0.076	0.080	0.024	0.030	0.086	0.483	0.221
		(0.055, 0.101)	(0.057, 0.101)	(0.015, 0.036)	(0.018, 0.043)	(0.062, 0.109)	(0.441, 0.538)	(0.181, 0.258)
	Clerical	0.059	0.043	0.088	0.029	0.123	0.463	0.194
		(0.017, 0.099)	(0.009, 0.083)	(0.052, 0.135)	(0.007, 0.059)	(0.066, 0.193)	(0.373, 0.564)	(0.109, 0.267)
	Sales	0.049	0.039	0.038	0.057	0.106	0.513	0.199
		(0.024, 0.081)	(0.011, 0.070)	(0.019, 0.060)	(0.029, 0.094)	(0.054, 0.169)	(0.430, 0.589)	(0.148, 0.272)
	Skilled Manual	0.035	0.032	0.014	0.010	0.211	0.499	0.199
		(0.026, 0.042)	(0.023, 0.040)	(0.010, 0.019)	(0.007, 0.013)	(0.195, 0.227)	(0.473, 0.525)	(0.177, 0.216)
	Semi-Skilled, Unskilled	0.021	0.020	0.009	0.005	0.057	0.663	0.224
		(0.019, 0.024)	(0.018, 0.023)	(0.008, 0.010)	(0.004, 0.006)	(0.053, 0.062)	(0.653, 0.673)	(0.215, 0.233)
	Farmers	0.016	0.011	0.002	0.003	0.034	0.298	0.635
		(0.015, 0.018)	(0.010, 0.012)	(0.002, 0.003)	(0.002, 0.003)	(0.032, 0.036)	(0.294, 0.303)	(0.630, 0.640)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1880-1890	Professional, Semi-Profs	0.137	0.032	0.034	0.018	0.111	0.524	0.144
		(0.111, 0.161)	(0.018, 0.047)	(0.025, 0.043)	(0.010, 0.028)	(0.088, 0.133)	(0.493, 0.564)	(0.121, 0.168)
	Proprietors, Managers	0.048	0.085	0.033	0.043	0.101	0.567	0.123
		(0.035, 0.062)	(0.066, 0.106)	(0.023, 0.043)	(0.029, 0.058)	(0.081, 0.121)	(0.534, 0.600)	(0.102, 0.147)
	Clerical	0.106	0.047	0.096	0.034	0.106	0.545	0.066
		(0.073, 0.141)	(0.021, 0.073)	(0.072, 0.126)	(0.015, 0.055)	(0.076, 0.140)	(0.497, 0.604)	(0.041, 0.092)
	Sales	0.046	0.060	0.030	0.072	0.074	0.605	0.113
		(0.022, 0.076)	(0.033, 0.093)	(0.015, 0.047)	(0.042, 0.103)	(0.041, 0.108)	(0.549, 0.675)	(0.072, 0.161)
	Skilled Manual	0.035	0.026	0.021	0.012	0.210	0.601	0.094
		(0.027, 0.044)	(0.019, 0.034)	(0.016, 0.026)	(0.007, 0.017)	(0.193, 0.227)	(0.579, 0.619)	(0.082, 0.107)
	Semi-Skilled, Unskilled	0.026	0.023	0.019	0.008	0.080	0.770	0.074
		(0.024, 0.029)	(0.020, 0.025)	(0.018, 0.021)	(0.007, 0.009)	(0.076, 0.085)	(0.763, 0.776)	(0.069, 0.079)
	Farmers	0.012	0.012	0.003	0.004	0.039	0.386	0.544
		(0.010, 0.013)	(0.011, 0.013)	(0.003, 0.004)	(0.003, 0.005)	(0.037, 0.041)	(0.381, 0.391)	(0.539, 0.548)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1900-1910	Professional, Semi-Profs	0.118	0.073	0.059	0.024	0.141	0.519	0.067
		(0.098, 0.139)	(0.045, 0.094)	(0.040, 0.079)	(0.013, 0.038)	(0.113, 0.171)	(0.485, 0.562)	(0.055, 0.083)
	Proprietors, Managers	0.030	0.118	0.045	0.038	0.127	0.586	0.056
		(0.022, 0.041)	(0.089, 0.144)	(0.032, 0.060)	(0.026, 0.051)	(0.103, 0.152)	(0.546, 0.620)	(0.044, 0.069)
	Clerical	0.102	0.043	0.213	0.003	0.092	0.519	0.027
		(0.072, 0.134)	(0.015, 0.077)	(0.176, 0.260)	(0, 0.010)	(0.050, 0.129)	(0.470, 0.574)	(0.015, 0.044)
	Sales	0.037	0.092	0.058	0.070	0.135	0.545	0.062
		(0.018, 0.058)	(0.052, 0.136)	(0.030, 0.088)	(0.039, 0.105)	(0.089, 0.185)	(0.490, 0.616)	(0.040, 0.087)
	Skilled Manual	0.033	0.032	0.041	0.019	0.233	0.603	0.040
		(0.027, 0.040)	(0.023, 0.040)	(0.033, 0.049)	(0.013, 0.027)	(0.214, 0.253)	(0.579, 0.624)	(0.034, 0.046)
	Semi-Skilled, Unskilled	0.027	0.027	0.041	0.013	0.097	0.760	0.034
		(0.024, 0.029)	(0.024, 0.031)	(0.039, 0.045)	(0.011, 0.015)	(0.093, 0.103)	(0.753, 0.766)	(0.032, 0.037)
	Farmers	0.012	0.018	0.009	0.006	0.070	0.548	0.336
		(0.011, 0.014)	(0.015, 0.020)	(0.008, 0.011)	(0.005, 0.007)	(0.066, 0.074)	(0.543, 0.553)	(0.333, 0.340)

Notes: The table shows the transition probabilities for the 1860-1910 birth cohorts. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.14: Transition Probabilities: 7-Category Occupations (Blacks, 1920-1970)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1920-1930	Professional, Semi-Profs	0.181	0.029	0.102	0.094	0.094	0.500	0
		(0.105, 0.253)	(0, 0.054)	(0.025, 0.200)	(0.032, 0.175)	(0.032, 0.172)	(0.365, 0.637)	(0, 0)
	Proprietors, Managers	0.078	0.134	0.076	0.018	0.247	0.432	0.015
		(0, 0.166)	(0.033, 0.258)	(0, 0.190)	(0, 0.069)	(0.136, 0.373)	(0.254, 0.594)	(0, 0.061)
	Clerical	0.155	0.042	0.177	0	0.130	0.496	0
		(0.049, 0.280)	(0, 0.102)	(0.087, 0.305)	(0, 0)	(0.033, 0.237)	(0.369, 0.637)	(0, 0)
	Sales	0.131	0.037	0.103	0	0	0.730	0
		(0, 0.333)	(0, 0.151)	(0, 0.276)	(0, 0)	(0, 0)	(0.411, 0.905)	(0, 0)
	Skilled Manual	0.063	0.043	0.064	0.029	0.271	0.526	0.004
		(0.036, 0.087)	(0.026, 0.064)	(0.038, 0.096)	(0.008, 0.048)	(0.205, 0.334)	(0.450, 0.601)	(0, 0.015)
	Semi-Skilled, Unskilled	0.072	0.032	0.091	0.020	0.181	0.589	0.014
		(0.060, 0.083)	(0.026, 0.041)	(0.078, 0.106)	(0.012, 0.026)	(0.164, 0.203)	(0.558, 0.609)	(0.008, 0.023)
	Farmers	0.027	0.018	0.040	0.009	0.158	0.667	0.081
		(0.020, 0.034)	(0.013, 0.023)	(0.030, 0.051)	(0.003, 0.015)	(0.141, 0.174)	(0.646, 0.688)	(0.074, 0.087)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1940-1950	Professional, Semi-Profs	0.365	0.152	0.081	0.067	0.094	0.241	0
		(0.258, 0.442)	(0.085, 0.232)	(0.044, 0.140)	(0.027, 0.112)	(0.037, 0.154)	(0.170, 0.324)	(0, 0)
	Proprietors, Managers	0.174	0.208	0.171	0.022	0.157	0.268	0
		(0.100, 0.258)	(0.127, 0.300)	(0.068, 0.279)	(0, 0.049)	(0.089, 0.229)	(0.187, 0.366)	(0, 0)
	Clerical	0.178	0.127	0.123	0.029	0.177	0.366	0
		(0.121, 0.272)	(0.052, 0.219)	(0.060, 0.200)	(0, 0.083)	(0.090, 0.267)	(0.274, 0.463)	(0, 0)
	Sales	0.179	0.367	0.092	0	0.148	0.213	0
		(0, 0.361)	(0.151, 0.608)	(0, 0.241)	(0, 0)	(0.022, 0.326)	(0.051, 0.403)	(0, 0)
	Skilled Manual	0.140	0.071	0.118	0.034	0.194	0.438	0.005
		(0.114, 0.172)	(0.049, 0.098)	(0.085, 0.149)	(0.017, 0.055)	(0.156, 0.235)	(0.389, 0.483)	(0.001, 0.010)
	Semi-Skilled, Unskilled	0.115	0.072	0.086	0.029	0.175	0.517	0.006
		(0.102, 0.128)	(0.061, 0.084)	(0.072, 0.098)	(0.022, 0.037)	(0.161, 0.192)	(0.496, 0.541)	(0.004, 0.009)
	Farmers	0.044	0.036	0.068	0.018	0.226	0.569	0.039
		(0.030, 0.060)	(0.021, 0.051)	(0.049, 0.089)	(0.008, 0.030)	(0.195, 0.253)	(0.537, 0.608)	(0.031, 0.047)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
1960-1970	Professional, Semi-Profs	0.344	0.152	0.116	0.057	0.119	0.207	0.003
		(0.256, 0.441)	(0.085, 0.208)	(0.056, 0.175)	(0.020, 0.101)	(0.072, 0.175)	(0.130, 0.304)	(0, 0.014)
	Proprietors, Managers	0.125	0.281	0.061	0.065	0.146	0.323	0
		(0.064, 0.197)	(0.187, 0.373)	(0.021, 0.100)	(0.020, 0.116)	(0.089, 0.210)	(0.219, 0.413)	(0, 0.001)
	Clerical	0.198	0.173	0.138	0.052	0.089	0.351	0
		(0.118, 0.274)	(0.083, 0.266)	(0.067, 0.206)	(0.014, 0.112)	(0.042, 0.145)	(0.238, 0.464)	(0, 0.001)
	Sales	0.213	0.158	0.111	0.060	0.063	0.396	0
		(0.042, 0.424)	(0, 0.338)	(0, 0.253)	(0, 0.207)	(0, 0.152)	(0.176, 0.658)	(0, 0.001)
	Skilled Manual	0.122	0.085	0.104	0.034	0.180	0.469	0.006
		(0.090, 0.152)	(0.057, 0.111)	(0.078, 0.131)	(0.017, 0.049)	(0.152, 0.220)	(0.417, 0.514)	(0, 0.015)
	Semi-Skilled, Unskilled	0.127	0.081	0.082	0.033	0.148	0.523	0.007
		(0.107, 0.146)	(0.065, 0.099)	(0.069, 0.097)	(0.024, 0.042)	(0.132, 0.164)	(0.498, 0.552)	(0.002, 0.010)
	Farmers	0.134	0.087	0.037	0	0.142	0.578	0.022
		(0.044, 0.220)	(0.021, 0.162)	(0.006, 0.087)	(0, 0)	(0.076, 0.208)	(0.458, 0.704)	(0, 0.056)

Notes: The table shows the transition probabilities for the 1920-1970 birth cohorts. Our results are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.15: Transition Probabilities: 8-Category Occupations (Whites, 1860-1890)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1860-1870	Professional, Semi-Profs	0.248	0.168	0.075	0.087	0.143	0.162	0.012	0.105
		(0.242, 0.254)	(0.162, 0.173)	(0.072, 0.079)	(0.083, 0.090)	(0.138, 0.148)	(0.157, 0.169)	(0.011, 0.013)	(0.101, 0.108)
	Proprietors, Managers	0.070	0.283	0.072	0.112	0.158	0.226	0.008	0.070
		(0.068, 0.072)	(0.280, 0.287)	(0.070, 0.074)	(0.110, 0.114)	(0.156, 0.161)	(0.222, 0.229)	(0.008, 0.009)	(0.068, 0.072)
	Clerical	0.094	0.180	0.163	0.115	0.191	0.209	0.008	0.040
		(0.088, 0.099)	(0.172, 0.189)	(0.156, 0.171)	(0.109, 0.122)	(0.183, 0.199)	(0.200, 0.220)	(0.006, 0.009)	(0.036, 0.044)
	Sales	0.079	0.188	0.091	0.172	0.177	0.232	0.009	0.052
		(0.075, 0.083)	(0.181, 0.194)	(0.086, 0.095)	(0.165, 0.178)	(0.170, 0.184)	(0.224, 0.241)	(0.008, 0.011)	(0.049, 0.056)
	Skilled Manual	0.038	0.110	0.048	0.052	0.370	0.297	0.011	0.073
		(0.037, 0.039)	(0.108, 0.112)	(0.047, 0.049)	(0.051, 0.054)	(0.368, 0.373)	(0.295, 0.300)	(0.010, 0.011)	(0.072, 0.075)
	Semi-Skilled, Unskilled	0.024	0.090	0.036	0.040	0.224	0.501	0.015	0.070
		(0.023, 0.025)	(0.088, 0.091)	(0.035, 0.037)	(0.039, 0.041)	(0.222, 0.226)	(0.498, 0.503)	(0.015, 0.015)	(0.069, 0.072)
	Farm Laborer	0.015	0.055	0.016	0.021	0.146	0.318	0.086	0.341
		(0.014, 0.017)	(0.052, 0.058)	(0.015, 0.019)	(0.020, 0.023)	(0.142, 0.152)	(0.311, 0.325)	(0.083, 0.089)	(0.335, 0.347)
	Farmers (others)	0.030	0.081	0.018	0.031	0.118	0.210	0.072	0.441
		(0.030, 0.031)	(0.080, 0.081)	(0.018, 0.018)	(0.030, 0.031)	(0.117, 0.119)	(0.209, 0.211)	(0.072, 0.072)	(0.440, 0.442)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1880-1890	Professional, Semi-Profs	0.256	0.199	0.067	0.131	0.145	0.146	0.007	0.050
		(0.251, 0.260)	(0.194, 0.204)	(0.065, 0.069)	(0.128, 0.135)	(0.141, 0.148)	(0.141, 0.151)	(0.006, 0.008)	(0.047, 0.051)
	Proprietors, Managers	0.084	0.307	0.061	0.145	0.166	0.191	0.006	0.040
		(0.083, 0.086)	(0.304, 0.309)	(0.060, 0.062)	(0.143, 0.147)	(0.164, 0.168)	(0.189, 0.194)	(0.006, 0.007)	(0.039, 0.041)
	Clerical	0.108	0.200	0.127	0.137	0.195	0.203	0.005	0.024
		(0.105, 0.112)	(0.196, 0.205)	(0.123, 0.130)	(0.133, 0.141)	(0.190, 0.200)	(0.197, 0.210)	(0.004, 0.006)	(0.022, 0.026)
	Sales	0.100	0.225	0.075	0.213	0.170	0.182	0.005	0.030
		(0.097, 0.103)	(0.221, 0.229)	(0.073, 0.078)	(0.210, 0.217)	(0.165, 0.173)	(0.178, 0.188)	(0.005, 0.006)	(0.028, 0.032)
	Skilled Manual	0.052	0.125	0.058	0.075	0.365	0.288	0.007	0.031
		(0.051, 0.053)	(0.123, 0.126)	(0.057, 0.059)	(0.074, 0.076)	(0.363, 0.367)	(0.286, 0.290)	(0.006, 0.007)	(0.030, 0.032)
	Semi-Skilled, Unskilled	0.031	0.097	0.047	0.059	0.250	0.470	0.010	0.036
		(0.031, 0.032)	(0.096, 0.098)	(0.046, 0.048)	(0.058, 0.060)	(0.249, 0.252)	(0.469, 0.472)	(0.010, 0.011)	(0.035, 0.036)
	Farm Laborer	0.018	0.060	0.022	0.032	0.163	0.349	0.085	0.271
		(0.017, 0.020)	(0.058, 0.063)	(0.020, 0.023)	(0.029, 0.034)	(0.158, 0.168)	(0.343, 0.356)	(0.083, 0.088)	(0.266, 0.275)
	Farmers (others)	0.028	0.079	0.022	0.039	0.134	0.238	0.074	0.385
		(0.027, 0.028)	(0.078, 0.080)	(0.022, 0.023)	(0.039, 0.040)	(0.133, 0.135)	(0.237, 0.239)	(0.074, 0.075)	(0.384, 0.386)

Notes: The table shows the transition probabilities for the 1860-1890 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.16: Transition Probabilities: 8-Category Occupations (Whites, 1900-1930)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1900-1910	Professional, Semi-Profs	0.334	0.199	0.077	0.097	0.135	0.133	0.004	0.020
		(0.329, 0.340)	(0.194, 0.204)	(0.075, 0.080)	(0.094, 0.100)	(0.130, 0.139)	(0.129, 0.136)	(0.004, 0.005)	(0.019, 0.022)
	Proprietors, Managers	0.129	0.311	0.074	0.119	0.168	0.175	0.005	0.020
		(0.127, 0.130)	(0.308, 0.313)	(0.073, 0.075)	(0.117, 0.120)	(0.166, 0.170)	(0.173, 0.178)	(0.004, 0.005)	(0.019, 0.021)
	Clerical	0.143	0.191	0.141	0.104	0.198	0.204	0.004	0.015
		(0.140, 0.147)	(0.186, 0.196)	(0.137, 0.145)	(0.101, 0.107)	(0.193, 0.203)	(0.199, 0.209)	(0.003, 0.004)	(0.014, 0.016)
	Sales	0.144	0.237	0.092	0.169	0.167	0.171	0.004	0.016
		(0.140, 0.148)	(0.233, 0.242)	(0.089, 0.094)	(0.166, 0.173)	(0.164, 0.171)	(0.167, 0.174)	(0.003, 0.004)	(0.015, 0.016)
	Skilled Manual	0.085	0.131	0.075	0.064	0.348	0.277	0.005	0.014
		(0.083, 0.086)	(0.130, 0.133)	(0.075, 0.076)	(0.063, 0.065)	(0.346, 0.350)	(0.275, 0.279)	(0.005, 0.005)	(0.014, 0.014)
	Semi-Skilled, Unskilled	0.058	0.110	0.065	0.052	0.259	0.430	0.008	0.018
		(0.057, 0.059)	(0.108, 0.111)	(0.064, 0.066)	(0.052, 0.053)	(0.257, 0.260)	(0.428, 0.432)	(0.008, 0.009)	(0.017, 0.018)
	Farm Laborer	0.036	0.078	0.031	0.030	0.215	0.398	0.063	0.148
		(0.034, 0.039)	(0.074, 0.082)	(0.029, 0.033)	(0.028, 0.032)	(0.209, 0.220)	(0.393, 0.406)	(0.061, 0.065)	(0.145, 0.152)
	Farmers (others)	0.048	0.104	0.029	0.034	0.174	0.288	0.054	0.269
		(0.047, 0.049)	(0.103, 0.105)	(0.028, 0.029)	(0.033, 0.034)	(0.173, 0.176)	(0.286, 0.289)	(0.053, 0.054)	(0.268, 0.270)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1920-1930	Professional, Semi-Profs	0.445	0.170	0.054	0.103	0.116	0.106	0.001	0.006
		(0.417, 0.476)	(0.150, 0.189)	(0.040, 0.067)	(0.083, 0.124)	(0.098, 0.135)	(0.085, 0.125)	(0, 0.002)	(0.003, 0.009)
	Proprietors, Managers	0.236	0.259	0.063	0.134	0.151	0.148	0.002	0.006
		(0.217, 0.254)	(0.245, 0.276)	(0.052, 0.072)	(0.123, 0.145)	(0.137, 0.167)	(0.135, 0.165)	(0.000, 0.004)	(0.004, 0.010)
	Clerical	0.270	0.163	0.098	0.093	0.207	0.162	0.001	0.005
		(0.240, 0.299)	(0.140, 0.186)	(0.079, 0.121)	(0.074, 0.114)	(0.176, 0.240)	(0.133, 0.191)	(0, 0.005)	(0.001, 0.010)
	Sales	0.229	0.227	0.055	0.189	0.154	0.141	0	0.006
		(0.197, 0.251)	(0.200, 0.259)	(0.042, 0.069)	(0.160, 0.216)	(0.131, 0.180)	(0.119, 0.167)	(0, 0)	(0.002, 0.010)
	Skilled Manual	0.152	0.132	0.068	0.068	0.318	0.253	0.003	0.006
		(0.144, 0.162)	(0.124, 0.139)	(0.062, 0.076)	(0.061, 0.076)	(0.305, 0.330)	(0.242, 0.265)	(0.001, 0.005)	(0.004, 0.008)
	Semi-Skilled, Unskilled	0.120	0.101	0.073	0.057	0.272	0.369	0.005	0.004
		(0.113, 0.130)	(0.095, 0.107)	(0.068, 0.078)	(0.051, 0.061)	(0.263, 0.280)	(0.358, 0.381)	(0.003, 0.007)	(0.003, 0.005)
	Farm Laborer	0.060	0.063	0.044	0.039	0.258	0.443	0.055	0.038
		(0.044, 0.077)	(0.048, 0.077)	(0.031, 0.060)	(0.025, 0.059)	(0.235, 0.287)	(0.408, 0.474)	(0.038, 0.074)	(0.026, 0.049)
	Farmers (others)	0.084	0.099	0.046	0.043	0.254	0.332	0.029	0.112
		(0.078, 0.092)	(0.092, 0.106)	(0.040, 0.051)	(0.038, 0.049)	(0.243, 0.265)	(0.320, 0.345)	(0.026, 0.034)	(0.108, 0.117)

Notes: The table shows the transition probabilities for the 1900-1930 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.17: Transition Probabilities: 8-Category Occupations (Whites, 1940-1970)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1940-1950	Professional, Semi-Profs	0.397	0.227	0.045	0.080	0.122	0.126	0.001	0.003
		(0.381, 0.415)	(0.209, 0.244)	(0.037, 0.053)	(0.069, 0.091)	(0.108, 0.132)	(0.111, 0.135)	(0.000, 0.002)	(0.001, 0.005)
	Proprietors, Managers	0.241	0.304	0.054	0.098	0.143	0.153	0.002	0.005
		(0.228, 0.254)	(0.291, 0.317)	(0.047, 0.062)	(0.089, 0.109)	(0.132, 0.153)	(0.140, 0.164)	(0.001, 0.003)	(0.003, 0.008)
	Clerical	0.274	0.204	0.091	0.072	0.163	0.185	0.003	0.007
		(0.248, 0.302)	(0.178, 0.230)	(0.077, 0.110)	(0.055, 0.091)	(0.143, 0.184)	(0.161, 0.208)	(0.000, 0.006)	(0.001, 0.016)
	Sales	0.254	0.254	0.052	0.164	0.129	0.144	0.002	0.002
		(0.230, 0.275)	(0.232, 0.274)	(0.041, 0.063)	(0.147, 0.187)	(0.111, 0.147)	(0.125, 0.164)	(0.000, 0.005)	(0, 0.004)
	Skilled Manual	0.186	0.171	0.059	0.059	0.281	0.237	0.002	0.004
		(0.176, 0.195)	(0.162, 0.179)	(0.055, 0.065)	(0.053, 0.065)	(0.273, 0.292)	(0.228, 0.247)	(0.001, 0.004)	(0.003, 0.006)
	Semi-Skilled, Unskilled	0.151	0.150	0.063	0.053	0.240	0.337	0.003	0.003
		(0.143, 0.159)	(0.142, 0.158)	(0.059, 0.069)	(0.047, 0.059)	(0.231, 0.249)	(0.329, 0.348)	(0.002, 0.004)	(0.002, 0.004)
	Farm Laborer	0.114	0.085	0.035	0.024	0.247	0.411	0.061	0.023
		(0.091, 0.143)	(0.059, 0.112)	(0.020, 0.049)	(0.010, 0.040)	(0.213, 0.281)	(0.376, 0.453)	(0.047, 0.080)	(0.012, 0.037)
	Farmers (others)	0.135	0.137	0.049	0.051	0.216	0.282	0.024	0.105
		(0.122, 0.148)	(0.123, 0.152)	(0.040, 0.056)	(0.044, 0.059)	(0.203, 0.232)	(0.267, 0.300)	(0.020, 0.029)	(0.099, 0.112)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1960-1970	Professional, Semi-Profs	0.351	0.242	0.054	0.073	0.131	0.145	0.002	0.002
		(0.333, 0.376)	(0.225, 0.262)	(0.045, 0.062)	(0.062, 0.084)	(0.117, 0.144)	(0.130, 0.160)	(0.001, 0.004)	(0.001, 0.004)
	Proprietors, Managers	0.220	0.280	0.061	0.092	0.168	0.176	0.002	0.002
		(0.203, 0.235)	(0.260, 0.300)	(0.051, 0.072)	(0.080, 0.102)	(0.150, 0.181)	(0.160, 0.195)	(0.001, 0.004)	(0.001, 0.004)
	Clerical	0.241	0.194	0.070	0.069	0.186	0.233	0.004	0.003
		(0.203, 0.287)	(0.164, 0.228)	(0.051, 0.086)	(0.048, 0.090)	(0.156, 0.219)	(0.194, 0.270)	(0, 0.009)	(0, 0.006)
	Sales	0.203	0.240	0.058	0.158	0.138	0.195	0.005	0.004
		(0.170, 0.228)	(0.205, 0.279)	(0.042, 0.073)	(0.135, 0.190)	(0.117, 0.164)	(0.169, 0.222)	(0.001, 0.009)	(0.000, 0.008)
	Skilled Manual	0.151	0.173	0.051	0.051	0.270	0.297	0.005	0.002
		(0.136, 0.162)	(0.160, 0.190)	(0.044, 0.059)	(0.043, 0.062)	(0.258, 0.282)	(0.282, 0.310)	(0.003, 0.007)	(0.001, 0.004)
	Semi-Skilled, Unskilled	0.127	0.147	0.055	0.040	0.238	0.385	0.003	0.003
		(0.117, 0.139)	(0.134, 0.161)	(0.049, 0.063)	(0.035, 0.047)	(0.226, 0.250)	(0.370, 0.399)	(0.002, 0.006)	(0.001, 0.004)
	Farm Laborer	0.068	0.067	0.047	0.050	0.226	0.393	0.125	0.024
		(0.029, 0.116)	(0.022, 0.114)	(0.017, 0.077)	(0.017, 0.095)	(0.158, 0.301)	(0.301, 0.484)	(0.080, 0.175)	(0.005, 0.052)
	Farmers (others)	0.125	0.149	0.028	0.046	0.158	0.316	0.070	0.109
		(0.098, 0.153)	(0.111, 0.180)	(0.016, 0.041)	(0.031, 0.063)	(0.125, 0.185)	(0.278, 0.353)	(0.055, 0.087)	(0.095, 0.125)

Notes: The table shows the transition probabilities for the 1940-1970 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.18: Transition Probabilities: 8-Category Occupations (Blacks, 1860-1890)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1860-1870	Professional, Semi-Profs	0.084	0.049	0.028	0.010	0.090	0.430	0.060	0.250
		(0.055, 0.109)	(0.032, 0.067)	(0.016, 0.041)	(0.003, 0.020)	(0.067, 0.116)	(0.374, 0.475)	(0.039, 0.081)	(0.203, 0.292)
	Proprietors, Managers	0.076	0.080	0.024	0.030	0.086	0.483	0.073	0.148
		(0.055, 0.101)	(0.057, 0.101)	(0.015, 0.036)	(0.018, 0.043)	(0.062, 0.109)	(0.441, 0.538)	(0.053, 0.098)	(0.111, 0.175)
	Clerical	0.059	0.043	0.088	0.029	0.123	0.463	0.024	0.169
		(0.017, 0.099)	(0.009, 0.083)	(0.052, 0.135)	(0.007, 0.059)	(0.066, 0.193)	(0.373, 0.564)	(0, 0.054)	(0.101, 0.243)
	Sales	0.049	0.039	0.038	0.057	0.106	0.513	0.042	0.157
		(0.024, 0.081)	(0.011, 0.070)	(0.019, 0.060)	(0.029, 0.094)	(0.054, 0.169)	(0.430, 0.589)	(0.015, 0.076)	(0.102, 0.229)
	Skilled Manual	0.035	0.032	0.014	0.010	0.211	0.499	0.053	0.146
		(0.026, 0.042)	(0.023, 0.040)	(0.010, 0.019)	(0.007, 0.013)	(0.195, 0.227)	(0.473, 0.525)	(0.044, 0.062)	(0.126, 0.162)
	Semi-Skilled, Unskilled	0.021	0.020	0.009	0.005	0.057	0.663	0.061	0.163
		(0.019, 0.024)	(0.018, 0.023)	(0.008, 0.010)	(0.004, 0.006)	(0.053, 0.062)	(0.653, 0.673)	(0.056, 0.066)	(0.154, 0.171)
	Farm Laborer	0.012	0.009	0.002	0.002	0.032	0.316	0.147	0.480
		(0.009, 0.014)	(0.007, 0.011)	(0.001, 0.003)	(0.001, 0.003)	(0.027, 0.037)	(0.304, 0.331)	(0.139, 0.156)	(0.468, 0.492)
	Farmers (others)	0.018	0.012	0.002	0.003	0.035	0.292	0.147	0.491
		(0.016, 0.020)	(0.010, 0.013)	(0.002, 0.003)	(0.003, 0.004)	(0.032, 0.037)	(0.285, 0.298)	(0.144, 0.151)	(0.486, 0.497)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1880-1890	Professional, Semi-Profs	0.137	0.032	0.034	0.018	0.111	0.524	0.027	0.117
		(0.111, 0.161)	(0.018, 0.047)	(0.025, 0.043)	(0.010, 0.028)	(0.088, 0.133)	(0.493, 0.564)	(0.018, 0.038)	(0.096, 0.139)
	Proprietors, Managers	0.048	0.085	0.033	0.043	0.101	0.567	0.022	0.101
		(0.035, 0.062)	(0.066, 0.106)	(0.023, 0.043)	(0.029, 0.058)	(0.081, 0.121)	(0.534, 0.600)	(0.015, 0.032)	(0.079, 0.124)
	Clerical	0.106	0.047	0.096	0.034	0.106	0.545	0.022	0.044
		(0.073, 0.141)	(0.021, 0.073)	(0.072, 0.126)	(0.015, 0.055)	(0.076, 0.140)	(0.497, 0.604)	(0.009, 0.038)	(0.023, 0.069)
	Sales	0.046	0.060	0.030	0.072	0.074	0.605	0.026	0.086
		(0.022, 0.076)	(0.033, 0.093)	(0.015, 0.047)	(0.042, 0.103)	(0.041, 0.108)	(0.549, 0.675)	(0.012, 0.044)	(0.050, 0.126)
	Skilled Manual	0.035	0.026	0.021	0.012	0.210	0.601	0.024	0.070
		(0.027, 0.044)	(0.019, 0.034)	(0.016, 0.026)	(0.007, 0.017)	(0.193, 0.227)	(0.579, 0.619)	(0.019, 0.030)	(0.059, 0.081)
	Semi-Skilled, Unskilled	0.026	0.023	0.019	0.008	0.080	0.770	0.021	0.053
		(0.024, 0.029)	(0.020, 0.025)	(0.018, 0.021)	(0.007, 0.009)	(0.076, 0.085)	(0.763, 0.776)	(0.019, 0.024)	(0.049, 0.058)
	Farm Laborer	0.008	0.012	0.003	0.005	0.042	0.436	0.135	0.359
		(0.005, 0.011)	(0.009, 0.015)	(0.002, 0.004)	(0.002, 0.007)	(0.037, 0.049)	(0.419, 0.451)	(0.127, 0.145)	(0.343, 0.375)
	Farmers (others)	0.012	0.012	0.004	0.004	0.038	0.376	0.114	0.440
		(0.011, 0.014)	(0.010, 0.014)	(0.003, 0.004)	(0.003, 0.005)	(0.036, 0.041)	(0.370, 0.382)	(0.111, 0.116)	(0.435, 0.445)

Notes: The table shows the transition probabilities for the 1860-1890 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.19: Transition Probabilities: 8-Category Occupations (Blacks, 1900-1930)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1900-1910	Professional, Semi-Profs	0.118	0.073	0.059	0.024	0.141	0.519	0.018	0.048
		(0.098, 0.139)	(0.045, 0.094)	(0.040, 0.079)	(0.013, 0.038)	(0.113, 0.171)	(0.485, 0.562)	(0.013, 0.025)	(0.036, 0.062)
	Proprietors, Managers	0.030	0.118	0.045	0.038	0.127	0.586	0.018	0.038
		(0.022, 0.041)	(0.089, 0.144)	(0.032, 0.060)	(0.026, 0.051)	(0.103, 0.152)	(0.546, 0.620)	(0.013, 0.023)	(0.028, 0.050)
	Clerical	0.102	0.043	0.213	0.003	0.092	0.519	0.008	0.020
		(0.072, 0.134)	(0.015, 0.077)	(0.176, 0.260)	(0, 0.010)	(0.050, 0.129)	(0.470, 0.574)	(0.003, 0.014)	(0.008, 0.035)
	Sales	0.037	0.092	0.058	0.070	0.135	0.545	0.018	0.044
		(0.018, 0.058)	(0.052, 0.136)	(0.030, 0.088)	(0.039, 0.105)	(0.089, 0.185)	(0.490, 0.616)	(0.011, 0.029)	(0.025, 0.065)
	Skilled Manual	0.033	0.032	0.041	0.019	0.233	0.603	0.013	0.027
		(0.027, 0.040)	(0.023, 0.040)	(0.033, 0.049)	(0.013, 0.027)	(0.214, 0.253)	(0.579, 0.624)	(0.010, 0.016)	(0.022, 0.033)
	Semi-Skilled, Unskilled	0.027	0.027	0.041	0.013	0.097	0.760	0.016	0.018
		(0.024, 0.029)	(0.024, 0.031)	(0.039, 0.045)	(0.011, 0.015)	(0.093, 0.103)	(0.753, 0.766)	(0.014, 0.017)	(0.017, 0.020)
	Farm Laborer	0.011	0.016	0.016	0.008	0.067	0.612	0.126	0.145
		(0.008, 0.015)	(0.010, 0.022)	(0.010, 0.021)	(0.004, 0.012)	(0.052, 0.078)	(0.590, 0.630)	(0.119, 0.136)	(0.133, 0.159)
	Farmers (others)	0.013	0.018	0.008	0.006	0.071	0.537	0.094	0.254
		(0.011, 0.014)	(0.015, 0.021)	(0.007, 0.010)	(0.005, 0.007)	(0.066, 0.075)	(0.530, 0.542)	(0.091, 0.096)	(0.251, 0.258)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1920-1930	Professional, Semi-Profs	0.181	0.029	0.102	0.094	0.094	0.500	0	0
		(0.105, 0.253)	(0, 0.054)	(0.025, 0.200)	(0.032, 0.175)	(0.032, 0.172)	(0.365, 0.637)	(0, 0)	(0, 0)
	Proprietors, Managers	0.078	0.134	0.076	0.018	0.247	0.432	0.015	0
		(0, 0.166)	(0.033, 0.258)	(0, 0.190)	(0, 0.069)	(0.136, 0.373)	(0.254, 0.594)	(0, 0.061)	(0, 0)
	Clerical	0.155	0.042	0.177	0	0.130	0.496	0	0
		(0.049, 0.280)	(0, 0.102)	(0.087, 0.305)	(0, 0)	(0.033, 0.237)	(0.369, 0.637)	(0, 0)	(0, 0)
	Sales	0.131	0.037	0.103	0	0	0.730	0	0
		(0, 0.333)	(0, 0.151)	(0, 0.276)	(0, 0)	(0, 0)	(0.411, 0.905)	(0, 0)	(0, 0)
	Skilled Manual	0.063	0.043	0.064	0.029	0.271	0.526	0.004	0
		(0.036, 0.087)	(0.026, 0.064)	(0.038, 0.096)	(0.008, 0.048)	(0.205, 0.334)	(0.450, 0.601)	(0, 0.015)	(0, 0)
	Semi-Skilled, Unskilled	0.072	0.032	0.091	0.020	0.181	0.589	0.013	0.001
		(0.060, 0.083)	(0.026, 0.041)	(0.078, 0.106)	(0.012, 0.026)	(0.164, 0.203)	(0.558, 0.609)	(0.007, 0.021)	(0.000, 0.003)
	Farm Laborer	0.040	0.023	0.059	0.010	0.203	0.594	0.063	0.009
		(0.019, 0.064)	(0.012, 0.038)	(0.032, 0.091)	(0, 0.024)	(0.148, 0.254)	(0.530, 0.653)	(0.036, 0.097)	(0.003, 0.018)
	Farmers (others)	0.024	0.017	0.035	0.009	0.148	0.684	0.061	0.022
		(0.016, 0.031)	(0.011, 0.023)	(0.025, 0.047)	(0.002, 0.016)	(0.131, 0.168)	(0.660, 0.710)	(0.051, 0.071)	(0.019, 0.024)

Notes: The table shows the transition probabilities for the 1900-1930 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.20: Transition Probabilities: 8-Category Occupations (Blacks, 1940-1970)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1940-1950	Professional, Semi-Profs	0.365	0.152	0.081	0.067	0.094	0.241	0	0
		(0.258, 0.442)	(0.085, 0.232)	(0.044, 0.140)	(0.027, 0.112)	(0.037, 0.154)	(0.170, 0.324)	(0, 0)	(0, 0)
	Proprietors, Managers	0.174	0.208	0.171	0.022	0.157	0.268	0	0
		(0.100, 0.258)	(0.127, 0.300)	(0.068, 0.279)	(0, 0.049)	(0.089, 0.229)	(0.187, 0.366)	(0, 0)	(0, 0)
	Clerical	0.178	0.127	0.123	0.029	0.177	0.366	0	0
		(0.121, 0.272)	(0.052, 0.219)	(0.060, 0.200)	(0, 0.083)	(0.090, 0.267)	(0.274, 0.463)	(0, 0)	(0, 0)
	Sales	0.179	0.367	0.092	0	0.148	0.213	0	0
		(0, 0.361)	(0.151, 0.608)	(0, 0.241)	(0, 0)	(0.022, 0.326)	(0.051, 0.403)	(0, 0)	(0, 0)
	Skilled Manual	0.140	0.071	0.118	0.034	0.194	0.438	0.003	0.002
		(0.114, 0.172)	(0.049, 0.098)	(0.085, 0.149)	(0.017, 0.055)	(0.156, 0.235)	(0.389, 0.483)	(0.001, 0.007)	(0, 0.006)
	Semi-Skilled, Unskilled	0.115	0.072	0.086	0.029	0.175	0.517	0.006	0.000
		(0.102, 0.128)	(0.061, 0.084)	(0.072, 0.098)	(0.022, 0.037)	(0.161, 0.192)	(0.496, 0.541)	(0.003, 0.009)	(0, 0.001)
	Farm Laborer	0.028	0.026	0.047	0.004	0.271	0.576	0.042	0.005
		(0.010, 0.046)	(0.005, 0.052)	(0.018, 0.079)	(0, 0.014)	(0.198, 0.333)	(0.514, 0.644)	(0.023, 0.062)	(0, 0.013)
	Farmers (others)	0.051	0.040	0.077	0.024	0.206	0.566	0.024	0.011
		(0.034, 0.070)	(0.022, 0.061)	(0.053, 0.106)	(0.009, 0.042)	(0.166, 0.251)	(0.524, 0.611)	(0.017, 0.035)	(0.007, 0.016)

		Professional, Semi-Profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled, Unskilled	Farm Laborer	Farmers (others)
1960-1970	Professional, Semi-Profs	0.344	0.152	0.116	0.057	0.119	0.207	0.003	0
		(0.256, 0.441)	(0.085, 0.208)	(0.056, 0.175)	(0.020, 0.101)	(0.072, 0.175)	(0.130, 0.304)	(0, 0.013)	(0, 0.001)
	Proprietors, Managers	0.125	0.281	0.061	0.065	0.146	0.323	0	0
		(0.064, 0.197)	(0.187, 0.373)	(0.021, 0.100)	(0.020, 0.116)	(0.089, 0.210)	(0.219, 0.413)	(0, 0)	(0, 0.001)
	Clerical	0.198	0.173	0.138	0.052	0.089	0.351	0	0
		(0.118, 0.274)	(0.083, 0.266)	(0.067, 0.206)	(0.014, 0.112)	(0.042, 0.145)	(0.238, 0.464)	(0, 0)	(0, 0.001)
	Sales	0.213	0.158	0.111	0.060	0.063	0.396	0	0
		(0.042, 0.424)	(0, 0.338)	(0, 0.253)	(0, 0.207)	(0, 0.152)	(0.176, 0.658)	(0, 0)	(0, 0.001)
	Skilled Manual	0.122	0.085	0.104	0.034	0.180	0.469	0.004	0.003
		(0.090, 0.152)	(0.057, 0.111)	(0.078, 0.131)	(0.017, 0.049)	(0.152, 0.220)	(0.417, 0.514)	(0, 0.011)	(0, 0.005)
	Semi-Skilled, Unskilled	0.127	0.081	0.082	0.033	0.148	0.523	0.007	0
		(0.107, 0.146)	(0.065, 0.099)	(0.069, 0.097)	(0.024, 0.042)	(0.132, 0.164)	(0.498, 0.552)	(0.002, 0.010)	(0, 0.001)
	Farm Laborer	0.083	0	0.029	0	0.178	0.677	0.033	0
		(0, 0.211)	(0, 0)	(0, 0.081)	(0, 0)	(0.058, 0.322)	(0.462, 0.841)	(0, 0.107)	(0, 0.001)
	Farmers (others)	0.158	0.128	0.041	0	0.125	0.532	0	0.017
		(0.047, 0.280)	(0.030, 0.234)	(0, 0.106)	(0, 0)	(0.046, 0.208)	(0.384, 0.669)	(0, 0)	(0, 0.046)

Notes: The table shows the transition probabilities for the 1940-1970 birth cohorts. Our results are based on 8-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.21: Transition Probabilities: 3-Category Occupations (Farmer Laborers in Manual, Whites, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.545	0.383	0.072
		(0.543, 0.548)	(0.379, 0.385)	(0.071, 0.073)
	Manual	0.208	0.701	0.090
		(0.207, 0.210)	(0.700, 0.702)	(0.089, 0.091)
	Farmers	0.159	0.400	0.441
		(0.159, 0.161)	(0.398, 0.401)	(0.440, 0.442)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.605	0.357	0.037
		(0.603, 0.607)	(0.355, 0.359)	(0.037, 0.038)
	Manual	0.258	0.693	0.048
		(0.257, 0.259)	(0.693, 0.694)	(0.048, 0.049)
	Farmers	0.168	0.447	0.385
		(0.167, 0.169)	(0.446, 0.448)	(0.384, 0.386)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.638	0.343	0.018
		(0.637, 0.640)	(0.342, 0.345)	(0.018, 0.019)
	Manual	0.309	0.668	0.023
		(0.308, 0.310)	(0.667, 0.669)	(0.023, 0.023)
	Farmers	0.215	0.516	0.269
		(0.214, 0.216)	(0.515, 0.517)	(0.268, 0.270)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.701	0.293	0.006
		(0.689, 0.710)	(0.284, 0.305)	(0.004, 0.008)
	Manual	0.370	0.623	0.007
		(0.365, 0.377)	(0.616, 0.629)	(0.006, 0.008)
	Farmers	0.272	0.616	0.112
		(0.261, 0.282)	(0.604, 0.627)	(0.108, 0.117)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.710	0.286	0.004
		(0.702, 0.718)	(0.278, 0.294)	(0.003, 0.006)
	Manual	0.437	0.559	0.004
		(0.431, 0.443)	(0.552, 0.565)	(0.003, 0.005)
	Farmers	0.372	0.523	0.105
		(0.352, 0.391)	(0.502, 0.540)	(0.099, 0.112)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.673	0.324	0.002
		(0.663, 0.683)	(0.315, 0.335)	(0.001, 0.003)
	Manual	0.395	0.602	0.003
		(0.387, 0.405)	(0.592, 0.611)	(0.002, 0.004)
	Farmers	0.347	0.544	0.109
		(0.312, 0.381)	(0.505, 0.572)	(0.095, 0.125)

Notes: The table shows the transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.22: Transition Probabilities: 3-Category Occupations (Farmer Laborers in Manual, Blacks, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.192	0.618	0.190
		(0.173, 0.215)	(0.589, 0.650)	(0.163, 0.213)
	Manual	0.049	0.681	0.270
		(0.047, 0.051)	(0.675, 0.687)	(0.264, 0.276)
	Farmers	0.035	0.473	0.491
		(0.033, 0.038)	(0.467, 0.479)	(0.486, 0.497)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.223	0.680	0.096
		(0.207, 0.239)	(0.661, 0.700)	(0.082, 0.109)
	Manual	0.067	0.810	0.122
		(0.065, 0.070)	(0.804, 0.815)	(0.118, 0.128)
	Farmers	0.032	0.528	0.440
		(0.030, 0.034)	(0.522, 0.533)	(0.435, 0.445)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.269	0.692	0.039
		(0.253, 0.289)	(0.672, 0.709)	(0.032, 0.046)
	Manual	0.102	0.860	0.038
		(0.099, 0.106)	(0.856, 0.863)	(0.036, 0.040)
	Farmers	0.045	0.701	0.254
		(0.041, 0.048)	(0.696, 0.705)	(0.251, 0.258)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.363	0.637	0
		(0.292, 0.437)	(0.563, 0.708)	(0, 0)
	Manual	0.200	0.798	0.002
		(0.186, 0.213)	(0.785, 0.812)	(0.001, 0.004)
	Farmers	0.085	0.893	0.022
		(0.069, 0.100)	(0.878, 0.909)	(0.019, 0.024)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.576	0.424	0
		(0.525, 0.622)	(0.378, 0.475)	(0, 0)
	Manual	0.299	0.700	0.001
		(0.287, 0.312)	(0.688, 0.712)	(0, 0.002)
	Farmers	0.193	0.797	0.011
		(0.153, 0.234)	(0.755, 0.835)	(0.007, 0.016)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.590	0.410	0
		(0.531, 0.647)	(0.352, 0.469)	(0, 0.001)
	Manual	0.326	0.673	0.001
		(0.312, 0.344)	(0.656, 0.687)	(0, 0.002)
	Farmers	0.326	0.657	0.017
		(0.178, 0.492)	(0.498, 0.800)	(0, 0.046)

Notes: The table shows the transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.23: Occupational Mobility Estimates (Survey Data I)

Data Source	Birth Cohorts	Whites			Blacks		
		P(M to N)	P(N to M)	Obs.	P(M to N)	P(N to M)	Obs
GSS	1920-1930	.389 (.365,.411)	.326 (.284,.359)	2316	.230 (.183,.283)	.729 (.417,.933)	250
	1940-1950	.448 (.436,.462)	.295 (.279,.312)	5993	.314 (.279,.349)	.464 (.371,.577)	590
	1960-1970	.403 (.385,.420)	.322 (.305,.337)	4555	.334 (.299,.362)	.454 (.343,.537)	559
OCG1	1920-1930	.368 (.355,.382)	.279 (.258,.299)	8451	.215 (.168,.259)	.636 (.366,.849)	550
	1940-1950	.407 (.356,.446)	.259 (.201,.318)	660	.330 (.147,.469)	1 (1,1)	70
OCG2	1920-1930	.391 (.381,.401)	.297 (.279,.315)	9652	.214 (.192,.238)	.574 (.464,.672)	1154
	1940-1950	.446 (.435,.458)	.269 (.253,.285)	7161	.310 (.274,.338)	.373 (.277,.481)	811
NSFH	1920-1930	.325 (.276,.374)	.278 (.174,.376)	345	.149 (.055,.258)	.519 (.252,.845)	69
	1940-1950	.472 (.440,.499)	.309 (.265,.349)	1305	.290 (.253,.352)	.327 (.169,.541)	231
	1960-1970	.428 (.388,.472)	.346 (.310,.393)	974	.318 (.248,.372)	.348 (.180,.489)	156
NLS-Young Men	1940-1950	.435 (.412,.454)	.312 (.289,.339)	2780	.311 (.279,.338)	.307 (.196,.422)	690
NLS-Older Men	1920-1930	.411 (.383,.444)	.314 (.271,.362)	1258	.216 (.173,.257)	.736 (.526,.919)	478
NLSY	1960-1970	.411 (.390,.435)	.333 (.306,.358)	2652	.329 (.305,.353)	.377 (.285,.477)	858

Notes: This table reports mobility estimates for the probability of moving from "Manual" to "Non-Manual," P(M to N); the probability of moving from "Non-Manual" to "Manual," P(N to M); and the number of father-son pairs included in the sample, separately calculated by survey, birth cohort, and race. The surveys include: General Social Survey (1972–2021), Occupational Changes in a Generation I and II (1962, 1973), National Survey of Families and Households (1987-1988, 1992-1994, 2001-2003), National Longitudinal Study–Young Men (1966–1981), National Longitudinal Study–Older Men (1966–1990), and National Longitudinal Study of Youth (1979-2012).

Table B.24: Occupational Mobility Estimates (Survey Data II)

Data Source	Birth Cohorts	Whites			Blacks		
		P(M to N)	P(N to M)	Obs.	P(M to N)	P(N to M)	Obs
PSID	1920-1930	.388	.346	432	.151	0	24
		(.339,.443)	(.246,.434)		(0,.296)	(0,.)	
	1940-1950	.470	.312	1349	.339	.507	82
		(.445,.495)	(.274,.345)		(.278,.419)	(.197,.870)	
	1960-1970	.405	.329	2176	.360	.541	169
		(.380,.424)	(.305,.351)		(.319,.398)	(.399,.686)	
SIPP	1920-1930	.392	.295	2844	.248	.735	192
		(.374,.409)	(.262,.326)		(.202,.319)	(.407,.934)	
	1940-1950	.448	.286	7198	.336	.534	456
		(.438,.460)	(.271,.301)		(.305,.361)	(.413,.616)	
	1960-1970	.378	.310	3268	.341	.408	208
		(.357,.397)	(.295,.329)		(.266,.396)	(.262,.551)	
NSBA	1920-1930				.206	.506	126
					(.165,.260)	(0,.885)	
	1940-1950				.355	.585	196
					(.318,.399)	(.338,.800)	
AVTMH	1920-1930	.378	.296	182	.496	1	12
		(.300,.456)	(.167,.418)		(0,1)	(1,.)	
	1940-1950	.452	.189	298	.451	1	22
		(.406,.499)	(.117,.259)		(.350,.550)	(1,.)	

Notes: This table reports mobility estimates for the probability of moving from "Manual" to "Non-Manual," P(M to N); the probability of moving from "Non-Manual" to "Manual," P(N to M); and the number of father-son pairs included in the sample, separately calculated by survey, birth cohort, and race. The surveys include: Panel Study of Income Dynamics (1968-2019), Survey of Income and Program Participation (1986-1988), National Survey of Black Americans (1979-1980, 1987-1988, 1988-1989, 1992), and Americans View Their Mental Health (1957, 1976).

Table B.25: Kitagawa-Oaxaca-Blinder Decomposition of occupational distributions (Farmers)

Occupation (Initial Share)	Cohorts (from)	Cohorts (to)	(1) ΔOcc Shares	(2) ΔDistribution	(3) ΔTransitions
Panel A: **Whites**					
Farmers (0.297)	1860-1870	1880-1890	-0.082	-0.037	-0.045
			(-.083, -.082)	(-.037, -.037)	(-.046, -.045)
	1880-1890	1900-1910	-0.08	-0.035	-0.045
			(-.08, -.079)	(-.035, -.035)	(-.045, -.044)
	1900-1910	1920-1930	-0.061	-0.026	-0.035
			(-.062, -.06)	(-.026, -.026)	(-.036, -.034)
	1920-1930	1940-1950	-0.013	-0.01	-0.003
			(-.014, -.012)	(-.011, -.01)	(-.004, -.001)
	1940-1950	1960-1970	-0.002	-0.002	0.001
			(-.003, -.001)	(-.003, -.002)	(0, .002)
Panel B: **Blacks**					
Farmers (0.487)	1860-1870	1880-1890	-0.14	-0.023	-0.117
			(-.143, -.137)	(-.024, -.023)	(-.12, -.113)
	1880-1890	1900-1910	-0.165	-0.063	-0.102
			(-.167, -.162)	(-.064, -.062)	(-.104, -.099)
	1900-1910	1920-1930	-0.118	-0.05	-0.068
			(-.121, -.114)	(-.051, -.049)	(-.072, -.064)
	1920-1930	1940-1950	-0.018	-0.01	-0.007
			(-.022, -.014)	(-.012, -.009)	(-.013, -.003)
	1940-1950	1960-1970	-0.001	-0.002	0.001
			(-.003, .001)	(-.002, -.002)	(-.001, .003)

Notes: The table shows the results of the decomposition exercise shown in Equation (4) for Farming occupations, where each row represents changes in the occupational shares from one period to another; and how much each component contributes to the occupation-specific change in shares. We report the initial shares of each occupation in the first column in parentheses. Our calculations are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.26: Kitagawa-Oaxaca-Blinder Decomposition of occupational distributions (All)

Occupation (Initial Share)	Cohorts (from)	Cohorts (to)	(1) ΔOcc Shares	(2) ΔDistribution	(3) ΔTransitions
Non-Manual (0.217)	1860-1870	1880-1890	0.059	0.021	0.037
			(.058, .059)	(.021, .022)	(.037, .038)
	1880-1890	1900-1910	0.068	0.026	0.042
			(.068, .069)	(.026, .027)	(.041, .043)
	1900-1910	1920-1930	0.095	0.03	0.065
			(.092, .098)	(.03, .03)	(.062, .068)
	1920-1930	1940-1950	0.079	0.036	0.042
			(.075, .082)	(.035, .037)	(.038, .047)
	1940-1950	1960-1970	-0.008	0.03	-0.039
			(-.013, -.005)	(.029, .031)	(-.043, -.035)
Manual (0.469)	1860-1870	1880-1890	0.029	0.016	0.014
			(.029, .03)	(.015, .016)	(.013, .014)
	1880-1890	1900-1910	0.018	0.011	0.007
			(.018, .019)	(.011, .011)	(.006, .008)
	1900-1910	1920-1930	-0.029	-0.002	-0.027
			(-.032, -.026)	(-.002, -.002)	(-.03, -.024)
	1920-1930	1940-1950	-0.065	-0.026	-0.039
			(-.069, -.061)	(-.027, -.024)	(-.044, -.035)
	1940-1950	1960-1970	0.01	-0.028	0.038
			(.007, .014)	(-.029, -.027)	(.034, .042)

Notes: The table shows the results of the decomposition exercise shown in Equation (4) combining both racial groups (for "Non-Manual" and "Manual" occupations), where each row represents changes in the occupational shares, and how much each component contributes to the occupation-specific change in shares. We report the initial shares of each occupation in the first column in parentheses. Our calculations are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.27: Transition Probabilities: 3-Category Occupations (Counterfactual Location, Whites, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.545	0.374	0.081
		(0.542, 0.549)	(0.370, 0.377)	(0.079, 0.082)
	Manual	0.214	0.703	0.083
		(0.213, 0.216)	(0.702, 0.704)	(0.082, 0.083)
	Farmers	0.158	0.334	0.508
		(0.157, 0.159)	(0.333, 0.335)	(0.507, 0.509)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.605	0.352	0.043
		(0.603, 0.607)	(0.350, 0.354)	(0.042, 0.043)
	Manual	0.264	0.696	0.040
		(0.263, 0.265)	(0.694, 0.697)	(0.040, 0.041)
	Farmers	0.170	0.383	0.448
		(0.169, 0.171)	(0.382, 0.384)	(0.447, 0.448)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.639	0.339	0.022
		(0.637, 0.641)	(0.337, 0.341)	(0.021, 0.022)
	Manual	0.317	0.661	0.022
		(0.316, 0.318)	(0.660, 0.662)	(0.022, 0.022)
	Farmers	0.215	0.481	0.304
		(0.214, 0.216)	(0.480, 0.483)	(0.303, 0.304)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.701	0.292	0.008
		(0.688, 0.711)	(0.282, 0.304)	(0.006, 0.009)
	Manual	0.381	0.611	0.009
		(0.375, 0.388)	(0.603, 0.617)	(0.007, 0.010)
	Farmers	0.267	0.599	0.134
		(0.255, 0.277)	(0.588, 0.609)	(0.130, 0.139)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.712	0.282	0.005
		(0.704, 0.720)	(0.275, 0.291)	(0.004, 0.007)
	Manual	0.447	0.547	0.006
		(0.441, 0.454)	(0.540, 0.553)	(0.005, 0.007)
	Farmers	0.352	0.525	0.123
		(0.335, 0.366)	(0.510, 0.541)	(0.118, 0.130)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.672	0.323	0.005
		(0.661, 0.682)	(0.313, 0.334)	(0.004, 0.007)
	Manual	0.404	0.589	0.007
		(0.396, 0.415)	(0.578, 0.598)	(0.005, 0.009)
	Farmers	0.321	0.497	0.182
		(0.285, 0.357)	(0.462, 0.528)	(0.163, 0.201)

Notes: The table shows the counterfactual transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.28: Transition Probabilities: 3-Category Occupations (Counterfactual Location, Blacks, 1860-1970)

		Non-Manual	Manual	Farmers
1860-1870	Non-Manual	0.189	0.558	0.253
		(0.170, 0.209)	(0.529, 0.592)	(0.227, 0.278)
	Manual	0.062	0.718	0.221
		(0.058, 0.066)	(0.709, 0.725)	(0.214, 0.230)
	Farmers	0.034	0.338	0.628
		(0.032, 0.035)	(0.334, 0.343)	(0.624, 0.632)
		Non-Manual	Manual	Farmers
1880-1890	Non-Manual	0.215	0.638	0.146
		(0.200, 0.231)	(0.617, 0.661)	(0.128, 0.163)
	Manual	0.073	0.833	0.094
		(0.069, 0.077)	(0.826, 0.839)	(0.088, 0.100)
	Farmers	0.030	0.394	0.576
		(0.029, 0.032)	(0.389, 0.399)	(0.572, 0.580)
		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.250	0.671	0.079
		(0.233, 0.274)	(0.649, 0.693)	(0.067, 0.089)
	Manual	0.094	0.856	0.050
		(0.090, 0.099)	(0.850, 0.861)	(0.047, 0.053)
	Farmers	0.040	0.564	0.395
		(0.037, 0.043)	(0.559, 0.570)	(0.391, 0.400)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.388	0.602	0.009
		(0.256, 0.515)	(0.475, 0.727)	(0, 0.039)
	Manual	0.194	0.782	0.023
		(0.171, 0.221)	(0.750, 0.809)	(0.013, 0.036)
	Farmers	0.071	0.812	0.116
		(0.054, 0.086)	(0.792, 0.833)	(0.106, 0.129)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.520	0.480	0
		(0.457, 0.600)	(0.400, 0.543)	(0, 0)
	Manual	0.288	0.700	0.012
		(0.273, 0.304)	(0.683, 0.716)	(0.006, 0.018)
	Farmers	0.132	0.818	0.051
		(0.105, 0.159)	(0.787, 0.846)	(0.036, 0.067)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.580	0.420	0.000
		(0.515, 0.643)	(0.357, 0.485)	(0.000, 0.002)
	Manual	0.317	0.674	0.009
		(0.301, 0.338)	(0.654, 0.693)	(0.005, 0.011)
	Farmers	0.224	0.745	0.032
		(0.124, 0.331)	(0.624, 0.845)	(0.000, 0.085)

Notes: The table shows the counterfactual transition probabilities for the 1860-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.29: Transition Probabilities: 3-Category Occupations (Counterfactual Education, Whites, 1900-1970)

		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.606	0.371	0.023
		(0.603, 0.608)	(0.369, 0.373)	(0.023, 0.024)
	Manual	0.346	0.632	0.022
		(0.345, 0.347)	(0.631, 0.634)	(0.022, 0.022)
	Farmers	0.228	0.465	0.307
		(0.226, 0.229)	(0.464, 0.467)	(0.306, 0.308)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.468	0.523	0.009
		(0.440, 0.491)	(0.501, 0.551)	(0.005, 0.013)
	Manual	0.219	0.769	0.012
		(0.212, 0.228)	(0.760, 0.776)	(0.009, 0.015)
	Farmers	0.161	0.703	0.135
		(0.150, 0.171)	(0.691, 0.714)	(0.130, 0.141)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.357	0.629	0.014
		(0.323, 0.391)	(0.593, 0.663)	(0.006, 0.024)
	Manual	0.173	0.810	0.017
		(0.164, 0.184)	(0.800, 0.820)	(0.012, 0.021)
	Farmers	0.136	0.736	0.128
		(0.118, 0.151)	(0.714, 0.759)	(0.115, 0.142)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.320	0.653	0.027
		(0.272, 0.365)	(0.609, 0.705)	(0.007, 0.049)
	Manual	0.169	0.812	0.019
		(0.153, 0.186)	(0.796, 0.829)	(0.011, 0.028)
	Farmers	0.073	0.719	0.209
		(0.034, 0.128)	(0.648, 0.777)	(0.164, 0.258)

Notes: The table shows the counterfactual transition probabilities for the 1900-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.30: Transition Probabilities: 3-Category Occupations (Counterfactual Education, Blacks, 1900-1970)

		Non-Manual	Manual	Farmers
1900-1910	Non-Manual	0.237	0.702	0.060
		(0.215, 0.257)	(0.682, 0.724)	(0.053, 0.068)
	Manual	0.114	0.850	0.036
		(0.110, 0.119)	(0.845, 0.855)	(0.033, 0.038)
	Farmers	0.051	0.620	0.329
		(0.047, 0.055)	(0.615, 0.625)	(0.326, 0.333)
		Non-Manual	Manual	Farmers
1920-1930	Non-Manual	0.172	0.820	0.007
		(0.102, 0.261)	(0.730, 0.891)	(0, 0.031)
	Manual	0.115	0.869	0.016
		(0.099, 0.129)	(0.851, 0.887)	(0.007, 0.025)
	Farmers	0.067	0.842	0.091
		(0.055, 0.077)	(0.830, 0.855)	(0.085, 0.098)
		Non-Manual	Manual	Farmers
1940-1950	Non-Manual	0.244	0.756	0
		(0.091, 0.421)	(0.579, 0.909)	(0, 0.000)
	Manual	0.120	0.860	0.021
		(0.096, 0.142)	(0.837, 0.886)	(0.012, 0.028)
	Farmers	0.098	0.827	0.075
		(0.064, 0.134)	(0.790, 0.863)	(0.062, 0.091)
		Non-Manual	Manual	Farmers
1960-1970	Non-Manual	0.278	0.721	0.000
		(0.061, 0.482)	(0.518, 0.939)	(0.000, 0.017)
	Manual	0.116	0.862	0.022
		(0.081, 0.164)	(0.814, 0.896)	(0.017, 0.025)
	Farmers	0.093	0.901	0.006
		(0.003, 0.309)	(0.682, 0.993)	(0.000, 0.022)

Notes: The table shows the counterfactual transition probabilities for the 1900-1970 birth cohorts. Our results are based on 3-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.31: Mean First Passage Times: Semi-Skilled and Unskilled Manual

Birth Cohorts	Professional, Managers	Clerical, Sales	Skilled Manual	Farmers
Panel A: **Whites**				
1860-1870	7.341	10.604	5.201	12.203
	(7.294, 7.398)	(10.54, 10.653)	(5.172, 5.238)	(12.077, 12.323)
1880-1890	6.082	7.804	4.711	23.709
	(6.057, 6.107)	(7.777, 7.832)	(4.686, 4.732)	(23.506, 23.967)
1900-1910	4.823	7.192	4.624	43.747
	(4.797, 4.841)	(7.162, 7.219)	(4.606, 4.645)	(43.216, 44.225)
1920-1930	3.701	6.681	4.835	125.211
	(3.635, 3.778)	(6.521, 6.865)	(4.684, 4.962)	(109.804, 149.959)
1940-1950	2.957	7.89	5.593	168.218
	(2.902, 3.002)	(7.749, 8.06)	(5.485, 5.731)	(145.81, 201.398)
1960-1970	3.295	8.782	5.226	176.615
	(3.191, 3.407)	(8.581, 9.041)	(5.084, 5.402)	(149.806, 215.147)
Panel B: **Blacks**				
1860-1870	26.205	78.86	19.839	4.469
	(25.257, 27.373)	(75.046, 83.485)	(18.977, 20.84)	(4.32, 4.65)
1880-1890	20.629	37.733	13.194	12.478
	(19.77, 21.596)	(36.286, 39.504)	(12.672, 13.746)	(11.805, 13.034)
1900-1910	16.911	18.291	10.091	26.765
	(16.083, 17.739)	(17.573, 19.049)	(9.665, 10.51)	(25.211, 28.497)
1920-1930	8.807	8.862	6.034	104.185
	(7.95, 9.753)	(8.03, 9.775)	(5.414, 6.641)	(68.218, 188.506)
1940-1950	4.748	7.427	6.269	295.095
	(4.478, 4.976)	(6.824, 8.047)	(5.588, 6.996)	(211.918, 508.196)
1960-1970	4.378	7.802	7.466	235.889
	(4.13, 4.695)	(7.345, 8.5)	(6.842, 8.278)	(170.853, 335.705)

Notes: The table shows the mean first passage times transitioning from "Semi-Skilled and Unskilled Manual" to other occupations. Our calculations are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.32: Mean First Passage Times: Professional, Managers

Birth Cohorts	Clerical, Sales	Skilled Manual	Semi-Skilled, Unskilled	Farmers
Panel A: **Whites**				
1860-1870	9.182	5.738	4.348	12.214
	(9.126, 9.24)	(5.703, 5.777)	(4.314, 4.382)	(12.088, 12.342)
1880-1890	6.781	5.365	4.776	23.646
	(6.756, 6.814)	(5.34, 5.391)	(4.74, 4.806)	(23.425, 23.902)
1900-1910	6.495	5.323	5.099	43.836
	(6.461, 6.527)	(5.295, 5.354)	(5.07, 5.126)	(43.285, 44.291)
1920-1930	6.159	5.818	6.217	125.369
	(5.921, 6.425)	(5.571, 6.048)	(5.954, 6.474)	(110.104, 149.772)
1940-1950	7.629	6.438	6.219	168.386
	(7.431, 7.858)	(6.258, 6.631)	(6.023, 6.425)	(145.619, 201.627)
1960-1970	8.27	5.908	5.237	177.066
	(8.057, 8.561)	(5.751, 6.11)	(5.051, 5.389)	(150.032, 215.57)
Panel B: **Blacks**				
1860-1870	76.077	19.154	2.524	4.276
	(72.03, 80.503)	(18.24, 20.264)	(2.399, 2.65)	(4.094, 4.47)
1880-1890	36.252	12.878	1.927	11.644
	(34.83, 37.946)	(12.395, 13.357)	(1.863, 1.995)	(11.053, 12.272)
1900-1910	17.729	9.691	1.784	25.96
	(17.069, 18.387)	(9.263, 10.186)	(1.724, 1.842)	(24.38, 27.697)
1920-1930	8.345	6.311	2.007	105.324
	(6.985, 9.679)	(5.509, 7.228)	(1.737, 2.328)	(68.813, 190.411)
1940-1950	6.907	6.73	3.409	297.821
	(5.814, 7.977)	(5.786, 7.909)	(3.014, 3.892)	(214.241, 511.023)
1960-1970	7.427	7.654	3.289	237.52
	(6.635, 8.469)	(6.681, 8.783)	(2.864, 3.865)	(171.405, 338.358)

Notes: The table shows the mean first passage times transitioning from "Professional and Managers" to other occupations. Our calculations are based on 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.33: Mean First Passage Times: Semi-Skilled and Unskilled Manual

Birth Cohorts	Professional Semi-profs	Proprietors, Managers	Clerical	Sales	Skilled Manual	Farmers
Panel A: **Whites**						
1860-1870	24.49	9.435	21.802	17.705	5.201	12.193
	(24.233, 24.761)	(9.365, 9.511)	(21.682, 21.954)	(17.572, 17.846)	(5.173, 5.238)	(12.057, 12.308)
1880-1890	18.174	8	18.564	12.105	4.725	23.564
	(18.086, 18.283)	(7.965, 8.036)	(18.437, 18.658)	(12.049, 12.156)	(4.701, 4.748)	(23.359, 23.828)
1900-1910	11.207	7.151	14.03	13.435	4.668	43.72
	(11.148, 11.262)	(7.113, 7.191)	(13.965, 14.087)	(13.368, 13.509)	(4.646, 4.69)	(43.157, 44.227)
1920-1930	6.069	7.263	15.657	11.905	4.991	128.141
	(5.94, 6.226)	(7.029, 7.521)	(14.87, 16.56)	(11.339, 12.486)	(4.817, 5.154)	(109.482, 154.047)
1940-1950	5.235	5.488	18.152	14.112	5.65	174.168
	(5.14, 5.32)	(5.383, 5.616)	(17.641, 18.743)	(13.707, 14.548)	(5.543, 5.798)	(150.768, 206.341)
1960-1970	6.231	5.613	18.124	16.334	5.202	176.682
	(6.074, 6.441)	(5.458, 5.775)	(17.635, 18.532)	(15.837, 16.946)	(5.058, 5.386)	(149.365, 214.387)
Panel B: **Blacks**						
1860-1870	46.422	54.479	130.607	186.579	19.819	4.467
	(44.291, 48.582)	(51.575, 57.617)	(123.065, 139.049)	(172.149, 205.127)	(18.931, 20.765)	(4.315, 4.638)
1880-1890	37.056	44.462	56.064	108.705	13.163	12.488
	(34.891, 39.013)	(41.625, 48.367)	(53.952, 58.94)	(100.501, 118.481)	(12.629, 13.698)	(11.8, 13.075)
1900-1910	32.758	32.645	24.703	71.293	10.141	27.069
	(30.928, 34.837)	(30.138, 35.61)	(23.763, 25.784)	(65.881, 78.23)	(9.688, 10.586)	(25.571, 28.937)
1920-1930	12.641	28.869	11.609	38.344	6.029	105.113
	(11.06, 14.717)	(24.203, 34.32)	(10.357, 13.129)	(30.564, 50.863)	(5.381, 6.632)	(68.357, 189.04)
1940-1950	7.485	9.921	10.037	27.956	6.324	297.825
	(6.92, 7.979)	(8.933, 11.229)	(8.973, 11.204)	(23.376, 35.266)	(5.632, 7.038)	(214.83, 512.983)
1960-1970	7.374	9.432	11.165	23.357	7.508	234.501
	(6.788, 8.225)	(8.575, 10.762)	(10.161, 12.428)	(20.646, 26.813)	(6.915, 8.366)	(168.745, 341.879)

Notes: The table shows the mean first passage times transitioning from "Semi-Skilled and Unskilled Manual" to other occupations. Our calculations are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Table B.34: Mean First Passage Times: Professional, Semi-Professionals

Birth Cohorts	Proprietors, Managers	Clerical	Sales	Skilled Manual	Semi-Skilled Unskilled Manual	Farmers
Panel A: **Whites**						
1860-1870	8.395	20.552	16.436	5.868	4.63	11.761
	(8.315, 8.493)	(20.387, 20.723)	(16.279, 16.604)	(5.829, 5.928)	(4.583, 4.671)	(11.636, 11.89)
1880-1890	6.841	18.016	10.81	5.534	5.027	23.235
	(6.774, 6.902)	(17.879, 18.148)	(10.721, 10.88)	(5.498, 5.577)	(4.979, 5.068)	(23.015, 23.518)
1900-1910	6.22	13.764	12.485	5.601	5.423	43.793
	(6.142, 6.279)	(13.648, 13.86)	(12.381, 12.605)	(5.552, 5.651)	(5.381, 5.466)	(43.2, 44.322)
1920-1930	6.527	16.125	11.037	6.289	6.776	128.498
	(6.16, 6.953)	(14.946, 17.403)	(10.204, 11.844)	(5.929, 6.631)	(6.361, 7.228)	(109.392, 154.87)
1940-1950	4.931	18.608	13.556	6.634	6.444	174.75
	(4.742, 5.109)	(17.944, 19.485)	(13.029, 14.173)	(6.429, 6.885)	(6.239, 6.69)	(151, 207.767)
1960-1970	4.925	18.138	15.555	6.016	5.332	177.163
	(4.736, 5.091)	(17.667, 18.677)	(15.041, 16.314)	(5.853, 6.222)	(5.134, 5.483)	(149.748, 214.859)
Panel B: **Blacks**						
1860-1870	52.846	128.017	185.406	19.148	2.63	4.065
	(49.679, 55.879)	(120.841, 137.545)	(170.014, 204.01)	(18.174, 20.21)	(2.477, 2.816)	(3.824, 4.318)
1880-1890	43.998	55.26	107.461	12.778	1.984	11.485
	(41.304, 47.574)	(53.094, 58.071)	(99.803, 117.05)	(12.26, 13.328)	(1.888, 2.068)	(10.773, 12.136)
1900-1910	30.963	24.264	70.368	9.647	1.857	26.057
	(28.922, 34.003)	(23.199, 25.278)	(65.018, 77.172)	(9.149, 10.254)	(1.766, 1.926)	(24.52, 27.991)
1920-1930	28.996	11.403	35.187	6.719	1.938	106.843
	(24.312, 34.886)	(9.357, 13.506)	(25.996, 48.15)	(5.808, 7.673)	(1.628, 2.352)	(70.245, 190.92)
1940-1950	8.724	10.013	26.563	7.04	3.541	300.71
	(7.172, 10.771)	(8.39, 11.475)	(21.162, 35.096)	(6.074, 8.262)	(3.104, 4.106)	(217.351, 516.018)
1960-1970	8.505	10.704	22.508	7.832	3.494	235.831
	(7.202, 10.474)	(9.167, 12.847)	(19.163, 27.058)	(6.755, 9.104)	(2.967, 4.16)	(168.263, 344.93)

Notes: The table shows the mean first passage times transitioning from "Professional and Semi-Professionals" to other occupations. Our calculations are based on 7-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

C Additional Exercises: Within- and Between-Race Inequality

We examine within- and between-race inequality using various deviation measures in mixing analysis defined in Equation (9). Specifically, for each racial group, we calculate differences in the occupational sorting opportunities of offspring with fathers from two distinct occupational groups,

$$ID^{wn}(P, j, k, s) = \|e_j \mathbf{P}'^s - e_k \mathbf{P}'^s\|. \tag{15}$$

The measure evaluated at $s = 1$ reveals differences in the predicted occupational sorting probabilities among offspring within the same racial group. Examining the differences between "Professional, Managers" and "Semi-Skilled and Unskilled" occupations, for example, captures the within-race variance in their offspring's sorting opportunities.

We also examine the between-race inequality by comparing offspring from different racial groups with their fathers in the same occupations,

$$ID^{bn}(P_W, P_B, j, t) = \|e_j \mathbf{P}_W^t - e_j \mathbf{P}_B^t\|. \tag{16}$$

Likewise, this measure captures the between-race variance in offspring's sorting opportunities to maintain the same occupation as their fathers or to move into other occupations.

Figure A.24: Within and Between Group Convergences (Short-Run)



Notes: The graphs show the within-race deviations between "Professional and Managers" and "Semi-Skilled and Unskilled" groups (left); and the between-race deviations for "Professional and Managers" and "Semi-Skilled and Unskilled" groups separately (right). We use transition matrices for 5-category occupations. Bootstrapped 95 percent confidence intervals based on 200 draws are included.

Figure A.24 (left) shows the within-race differences in sorting probabilities for families

of "Professional and Managers" and "Semi-Skilled and Unskilled" occupations. We find that the trends are similar to the dynamics of the rate of convergences shown in Figure 7 using *AIM*—which reflects within-group heterogeneity in mobility across families. For Black men, the within-race differences show a significant increase for the 1940-1950 birth cohort, followed by a decline for the most recent cohort. The opposite trend for these two birth cohort groups holds for White men—albeit with estimates that are more stable across birth cohorts compared to Black men.

Figure A.24 (right) shows the between-race differences in their sorting opportunities for families of "Professional and Managers" and "Semi-Skilled and Unskilled" occupations. We show that the trend closely follows the dynamics in the degree of occupational segregation (Figure A.18), which is initially high but dramatically falls for the 1940-1950 birth cohorts. Our measurements further highlight that, while the between-race gap falls by a greater magnitude for "Professional and Managers" compared to "Semi-Skilled and Unskilled" occupations over time, the downward trend tapers off with the most recent birth cohort.

D Data Sources

General Social Survey (GSS) (Davern et al., 2022) is a large-scale, cross-sectional survey that has been implemented since 1972 by the National Opinion Research Center (NORC) at the University of Chicago. The survey was conducted annually in most years before 1994 and changed to a biennial basis thereafter. It is designed to be representative of all adults in US households aged 18 and older. The data have been widely used in studies on societal changes in individual attributes and attitudes and population composition. Our analysis relies on data from the years 1972 to 2018 and applies sample weight (wtssall) to account for the multistage sampling design. We keep oversamples of Black respondents in GSS 1982 and 1987. Respondents were asked to report their own occupation and education at the time of the survey and their father's occupation and education while they "were growing up." The data are publicly available and can be downloaded from the GSS website: `http://gss.norc.org/get-the-data/`.

Occupational Change in a Generation (OCG) I and II (Blau et al., 1994). OCG I is a large-scale survey of U.S. social mobility, implemented as a supplement to the March 1962 Current Population Survey (CPS). The target population of OCG I was U.S. males aged 20 to 64 in the civilian, noninstitutional population. We applied a sample weight using V24 to account for the multistage sampling design (see OCG I codebook Introduction p.3 for a description of the construction of sample weight). Occupational Changes in a Generation II (OCG II) was collected in 1973 as a supplement to the March 1973 Current Population Survey. It was designed as a strict replication of OCG I, but also incorporated some new questions about social background and career development. In both OCG I & II, Respondents were asked to report their own occupations at the time of the survey and their fathers' occupations when the respondent was 16 years old. Individuals were also asked to report their own education at the time of the survey and their fathers' education when the respondent was 16 years old. The data are publicly available and can be downloaded from the OCG website: `http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/6162`.

National Survey of Families and Households (NSFH) was a nationally representative household survey designed to provide information on family life. It was conducted in 3 waves: 1987–1988 (Bumpass et al., 2017), 1992–1994 (Bumpass and Sweet, 2018a), and 2001–2002 (Bumpass and Sweet, 2018b). Households were randomly selected from 1,700 selection units that resulted from 17 enumeration districts within each of the 100 primary sampling units. For the first wave of data collection, a primary respon-

dent at least 19 years of age was randomly selected from each household to participate in a personal interview. We used data from waves 1 to 3 and applied sample weight (WEIGHT) to account for the multistage sampling design. Respondents were asked to report their own occupations in each wave and their fathers' occupations when the respondent was 16 years old. Respondents were also asked to report their own education and their fathers' education when the respondent was 16 years old in the 1987–1988 survey. The data are publicly available and can be downloaded from the NSFH website: `http://www.ssc.wisc.edu/nsfh/home2.htm`.

Panel Study of Income Dynamics (PSID) carried out at the Survey Research Center at the University of Michigan, is a longitudinal panel household survey in the US (Social Research Center, 2020). The survey collects extensive economic, social, and health items on individuals and their household members over the life course and across generations. Begun in 1968, the PSID follows over 18,000 household members from roughly 5,000 US families. The study interviewed individuals annually until 1997 and biannually thereafter. All original 1968 PSID respondents and their offspring are considered to carry the PSID "gene" and thus are permanent PSID respondents. Their demographic and socioeconomic information, such as age and occupation, is gathered in each wave of the PSID survey and can be linked across years. The PSID project also provides a "Family Identification Mapping System" (FIMS) tool designed to link family members across generations. The data consist of 2 distinct samples: SRC (Survey Research Center) is a nationally representative household sample based on a stratified, multistage selection of the civilian noninstitutional population of the US; SEO (Survey of Economic Opportunity) is a national sample of low-income families with household heads under age 60 in 1968. Occupation is collected for household heads and their spouses in all PSID waves.

We first harmonized all the occupation variables by converting them to the 1950 Census scheme and then chose individuals' occupations measured in the year closest to age 40 as the lifetime occupation. That is, if occupation at age 40 was unavailable, we then looked for occupation at ages 41, 39, 42, 38, and so forth. For individuals whose fathers were not PSID respondents and thus were not directly observed, we relied on the question that asked household heads to report the father's occupation in waves 1997–2019. If the father's occupation was reported multiple times, we chose the mode of the data values. The level of education was asked for household heads in all PSID waves. For individuals whose fathers were not PSID respondents and thus were not directly observed, we relied on the question that asked household heads to report the father's education. We chose the highest level of education for individuals and their fathers across

waves. The data are publicly available and can be downloaded from the PSID website: https://simba.isr.umich.edu/data/data.aspx.

National Longitudinal Survey of Youth 1979 (NLSY79) (Bureau of Labor Statistics, U.S. Department of Labor, 2014) was another longitudinal cohort study conducted by the Bureau of Labor Statistics under the United States Department of Labor. The project followed the lives of a nationally representative sample of 12,686 respondents born between 1957 and 1964. The respondents were aged 14—22 when first interviewed in 1979 and revisited annually until 1994 and biennially thereafter. We used data from 1979 to 2012 and applied sample weight (R0216100) to account for the multistage sampling design. Respondents were asked to report their occupations in each survey year and their fathers' (or stepfathers') longest jobs in 1978 during the first wave. Individuals were also asked to report their own education in each survey year and their fathers' (or stepfathers') education in 1979. We relied on respondents' highest education across survey years. The data are publicly available and can be downloaded from the NLS website: http://www.nlsinfo.org/investigator/pages/login.jsp.

National Longitudinal Survey of Young Men (NLS–YM) (Bureau of Labor Statistics, U.S. Department of Labor, 1992) was another dataset among the several longitudinal cohort studies conducted by the Bureau of Labor Statistics under the United States Department of Labor between 1966 and 1981. The project began with a nationally representative sample of 5,225 American males aged 14 to 24 in 1966 and was discontinued in 1981 when the respondents were 29 to 39, at the time of their last interview. Respondents were surveyed annually between 1966 and 1971, and in the subsequent years of 1973, 1975, 1976, 1978, 1980, and 1981. The data have been used to study the education and labor market experiences of men during their early careers, such as their educational attainment and expectations, school-to-work transitions, labor market attachment, and activities related to crime, delinquency, and school discipline. We used data from the years 1966 to 1981 (12 rounds) and applied the sample weight (R0000200) to account for the multistage sampling design. Respondents were asked to report their current or the last occupations and those of their fathers in each survey year between 1966 and 1969. To make the data comparable with other datasets used in the analysis, we relied on respondents' occupations reported in the last wave of the survey and their fathers' occupations reported in 1966. If the father's information was missing in the first wave, occupation in the next available year was used. Respondents were asked to report their highest levels of education in each survey year and those of their fathers in 1966. We relied on respondents' highest education ever reported

across survey years. The data are publicly available and can be downloaded from the NLS website: http://www.nlsinfo.org/investigator/pages/login.jsp.

National Longitudinal Survey of Older Men (NLS-OM) (Bureau of Labor Statistics, U.S. Department of Labor, 1999) is one of a set of longitudinal cohort studies conducted by the Bureau of Labor Statistics under the United States Department of Labor from 1966 to 1990. The project began with a nationally representative sample of 5,020 American men aged 45 to 59 in 1966 and was discontinued when respondents were 69 to 83 at the time of their last interviews in 1990. Respondents were surveyed annually between 1966 and 1969, and in the subsequent years of 1971, 1973, 1975, 1976, 1978, 1980, 1981, 1983, and 1990. The final interview was conducted with both living older male respondents and widows or other family members of deceased respondents. The data have mainly been used to study labor market activities of middle-aged men and men close to retirement, such as their work and unemployment experiences, retirement planning, work and health insurance, and job evaluation and satisfaction. We used data from the years 1966 to 1976 (8 rounds) and applied the sample weight variable R0000200 to account for the multistage sampling design. Respondents were asked to report their own occupations in each survey year, and in the year 1966, they were asked about their fathers' occupations when the respondents were 15 years old. Respondents who did not live with their fathers at age 15 were asked to report household heads' occupations. The mobility analysis relies on respondents' occupations reported in the year 1966. If this information was missing, occupation in the next available year was used. The data are publicly available and can be downloaded from the NLS website: http://www.nlsinfo.org/investigator/pages/login.jsp.

Survey of Income and Program Participation (SIPP), conducted by the United States Census Bureau, is a longitudinal panel survey that is designed to provide income of individuals and households and their participation in income transfer programs (Bureau of the Census, U.S. Department of Commerce, 2008). Other topics include education, occupation, family dynamics, health insurance, childcare, and food security. The SIPP survey design is a continuous series of national panels, with the sample size ranging from approximately 14,000 to 52,000 interviewed households. The original goal was to have all panels participate for a 32-month period (8 waves), with each panel randomly divided into one of 4 rotation groups. Each rotation group is interviewed in a separate month. Four rotation groups constitute one wave of interviewing. At each interview, respondents provide information covering the 4 months since the previous interview. The first interview began in October 1983 for the 1984 panel. Subsequent panels began

interviews in February of each year. We used data from survey years 1986, 1987, and 1988 because the information about fathers' occupations and education was collected only in a topical module in wave 2 during these years. We applied the sample weight ($FNLWGT_5$) to account for the multistage sampling design and kept respondents aged 25 to 64. Respondents were asked to report their own occupations during each survey year as well as their fathers' occupations when the respondent was 16 years old. Respondents were also asked to report their own education during each survey year as well as their fathers' education when the respondent was 16 years old. The data are publicly available and can be downloaded from the SIPP website: `http://www.census.gov/sipp/`. These files are also accessible in STATA format from the NBER SIPP data archive page: `https://www.nber.org/research/data/survey-income-and-program-participation-sipp`.

Americans View Their Mental Health (Veroff et al., 2005) was sponsored by the US Congress Joint Commission on Mental Illness and Health, and the first survey was conducted in 1957 by the Survey Research Center at the University of Michigan. A sample of Americans were interviewed on marriage, parenthood, employment, and general social relationships. The second survey was implemented in 1976 with the sponsorship of the National Institute of Mental Health. All the variables used in our project are taken from the publicly available data set (Americans View Their Mental Health, 1957 and 1976: Selected Variables (ICPSR 7949)). The dataset includes variables for respondents' occupation (V133) and respondents' father's occupation (V256) from the 1976 survey round. Both variables code occupation in the 1970 US Census Classification System. We recode the 1970 Census occupation codes into the 1950 Census occupation codes using the IPUMS crosswalk. Race and ethnicity variable in the dataset (V244) classifies respondents into three groups (White, Black, and others). We use the same grouping and only recode the group numbers (1 for White, 2 for Black, and 3 for others). The data are freely available to data users at the ICPSR member institutions: `https://www.icpsr.umich.edu/web/ICPSR/studies/3503` and `https://www.icpsr.umich.edu/web/ICPSR/studies/7948`

National Survey of Black Americans (Jackson and Neighbors, 2005) is a series of surveys conducted in 4 waves (1979-1980, 1987-1988, 1988-1989, and 1992). The survey's target population is Black US citizens 18 years of age or older. Our project uses Wave-1 variables from a publicly available data set (National Survey of Black Americans, Waves 1-4, 1979-1980, 1987-1988, 1988-1989, 1992 (ICPSR 6668)). Respondent's occupation variable (V307) classifies respondents' occupation into the 1970 Census 3-digit codes. We recoded this variable into the 1950 Census occupation codes using the IPUMS crosswalk. The data set

also includes variables for the occupation of the respondents' father (V1471) and mother (V1477). The parents' occupation variables assign two-digit codes and have substantially fewer categories than the 1970 US Census occupation classification. We mapped these variables to a new occupation variable (occ_b) that we constructed by collapsing the 1950 Census occupation codes. The data are publicly available and can be downloaded from: https://www.icpsr.umich.edu/web/NACDA/studies/6668.

E Theory and Proofs

E.1 Mixing Analysis: Example

To illustrate our measures of mixing calculations (AD, AID), this section provides a simple example. Let $P_\alpha = \alpha I + (1-\alpha)\frac{ii'}{N}$, where I is the identity matrix with dimension N, i is an N-dimensional column vector consisting of 1's, and $\alpha \in [0,1)$. Note that $\frac{ii'}{N}$ is the transition matrix that makes the next period's distribution equal to i', since $\mu_0 \cdot \frac{ii'}{N} = (\mu_0 i)\cdot \frac{i'}{N} = \frac{i'}{N}$, where the last equation uses $\sum_k \mu_{0,k} = 1$ for any distribution μ_0. In other words, P_α is a combination of maintaining the original distribution with probability α and fully randomizing with probability $(1-\alpha)$.

Claim: $P_\alpha \cdot P_\beta = P_{\alpha\beta}$

Proof:

$$\begin{aligned} P_\alpha \cdot P_\beta &= \left(\alpha I + (1-\alpha)\frac{ii'}{N}\right)\left(\beta I + (1-\beta)\frac{ii'}{N}\right) \\ &= \alpha\beta I + \left(\alpha(1-\beta) + \beta(1-\alpha) + (1-\alpha)(1-\beta)\right)\frac{ii'}{N} \\ &= \alpha\beta I + (1-\alpha\beta)\frac{ii'}{N} \end{aligned}$$

where the second equation uses the fact that $\frac{ii'}{N}\cdot\frac{ii'}{N} = \frac{1}{N}\cdot i \cdot (\frac{i'i}{N})\cdot i' = \frac{1}{N} ii'$.

A corollary of this is that $P_\alpha^t = P_{(\alpha^t)}$. That is, $P_\alpha^t = \alpha^t I + (1-\alpha^t)\frac{ii'}{N}$. Also, $\lim_{t\to\infty} P_\alpha^t = \frac{ii'}{N}$, which implies that the steady-state distribution is $\mu^* = \frac{i'}{N}$.[45]

Now to characterize the measures related to mixing using this $P = P_\alpha$,

$$\begin{aligned} (AD) &= \|\mu_0 P^t - \mu^*\| \\ &= \|\alpha^t \mu_0 + (1-\alpha^t)\frac{i'}{N} - \frac{i'}{N}\| \\ &= \alpha^t \|\mu_0 - \frac{i'}{N}\| \end{aligned}$$

[45] Note that $\alpha \neq 1$ is important because $\alpha = 1$ will result in $\mu^* = \mu_0 \neq \frac{i'}{N}$. This is because $\lim_{t\to\infty}\lim_{\alpha\to 1}\alpha^t = 0$, but $\lim_{\alpha\to 1}\lim_{t\to\infty}\alpha^t = 1$, resulting in a discontinuity at $\alpha = 1$.

$$
\begin{aligned}
(AID) &= \sum_k m_k \| e_k P^t - \frac{i'}{N} \| \\
&= \sum_k m_k \alpha^t \| e_k - \frac{i'}{N} \| \\
&= \alpha^t \| e_1 - \frac{i'}{N} \|
\end{aligned}
$$

where the last equation is due to the symmetry across k, and $\sum_k m_k = 1$. Note that (AM) depends on μ_0 but (AIM) doesn't,[46] and they both converge to zero at rate α. Finally,

$$
(AID) - (AD) = \alpha^t \left(\| e_1 - \frac{i'}{N} \| - \| \mu_0 - \frac{i'}{N} \| \right) \geq 0
$$

E.2 Mixing Analysis: Bounds

Let $\mu_0 = (m_1, \cdots, m_N)$ where m_j's are scalar, and $P^t = (r_1; \cdots; r_N)$ where r_j's are row vectors for which the sum of N elements is equal to 1. Let e_j denote the row vector with j-th element equal to 1 and 0 otherwise. Then the following equations hold:

$$
e_j P^t = r_j
$$

$$
\mu_0 = \sum_k m_k e_k
$$

$$
\mu_0 P^t = \sum_k m_k e_k P^t = \sum_k m_k r_k
$$

Then

$$
AD = \| \mu_0 P^t - \mu^* \| = \left\| \sum_k m_k r_k - \mu^* \right\| \in [0, M]
$$

$$
ID = \| e_j P^t - \mu^* \| = \| r_j - \mu^* \| \in [0, M]
$$

$$
AID = \sum_k m_k \| e_k P^t - \mu^* \| = \sum_k m_k \| r_k - \mu^* \| \in [0, M]
$$

where M is the upper bound of the norm, e.g., $\|(1,0,0) - (0,1,0)\| = \ say, \ 2$.

[46] That (AIM) does not depend on μ_0 is an artifact of the symmetry assumed in this example in terms of P, and is clearly not a general property.

Examining the difference between AID and AD,

$$
\begin{aligned}
AID - AD = & \\
&= \sum_k m_k \| \underbrace{r_k - \mu^*}_{v_k} \| - \left\| \sum_k m_k r_k - \mu^* \right\| \\
&= \sum_k m_k \|v_k\| - \left\| \sum_k m_k v_k \right\| \\
&\geq 0 \ \text{ by triangular inequality (Minkowski)}
\end{aligned}
$$

For the bound in the other direction,

$$
\begin{aligned}
AID - AD &= \sum_j m_j \left(\|r_j - \mu^*\| - \left\| \sum_k m_k r_k - \mu^* \right\| \right) \\
&\leq \sum_j m_j \left\| r_j - \sum_k m_k r_k \right\| \ \text{ by triangular inequality (Minkowski)} \\
&= \sum_j m_j \left\| \sum_k m_k (r_j - r_k) \right\| \\
&\leq \sum_{j,k} m_j m_k \|r_j - r_k\| \ \text{ by triangular inequality (Minkowski)} \\
&= \sum_{j \neq k} m_j m_k \|r_j - r_k\| \ \ (\because \|r_j - r_j\| = 0) \\
&\leq \sum_{j \neq k} m_j m_k \cdot M \ \ (\text{M is the upper bound of the norm, e.g., 2}) \\
&= M \Bigg(\underbrace{(\sum_j m_j)^2}_{=1} - \underbrace{\sum_j m_j^2}_{\geq \frac{1}{N}(\sum_j m_j)^2 \ \text{by Cauchy-Schwarz inequality}} \Bigg) \\
&\leq (1 - \frac{1}{N}) M = (1 - \frac{1}{N}) \cdot 2
\end{aligned}
$$