CLASS STRUCTURE AND INCOME INEQUALITY IN THE UNITED STATES

By

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DEDICATION

This dissertation is dedicated to my parents, Ken Wodtke and Patti Lechmaier.

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ABSTRACT

Income inequality in America has increased substantially since the early 1980s. Although sociological theory suggests an important impact for social classes on recent changes in income distribution, prior research has largely ignored the link between class structure and growing aggregate income inequality. This study delineates a theory of class based on antagonistic social relations within the workplace and investigates the relationship between class structure and trends in aggregate income inequality from 1983 to 2010. The proposed theory defines four distinct class positions based on unequal ownership and authority relations within production: workers, who are excluded from the means of production and do not control the activities of others; proprietors, who own the means of production and control the activities of workers; managers, who do not own the means of production but have delegated control over the activities of workers; and independent producers, who own and operate small firms by themselves. These positions are called class positions because unequal ownership and authority relations are thought to engender intergroup conflict between those with and without property and authority in production.

Growth in aggregate income inequality is affected by (1) changes in between-class income differences, (2) compositional changes in the relative size of different classes, and (3) changes in residual, or within-class, income dispersion. With data from the General Social Survey and the Current Population Survey, this study investigates each of these trends in turn and provides a formal decomposition that evaluates their relative impact on growth in aggregate

income inequality. Results indicate that between-class income differences increased by at least 50 percent since the 1980s. This increase was driven by growing incomes for managers and especially proprietors together with stagnating incomes for workers. Results also indicate that, since the mid-1980s, the proportion of workers and independent producers increased, while the proportion of proprietors and managers declined. Finally, a formal decomposition analysis suggests that changes in the relative size of different classes had a small dampening effect and that growth in between-class income differences had a large inflationary effect on trends in aggregate income inequality, particularly during the 1990s.

CHAPTER I

Introduction

The distribution of personal income in the United States has become substantially more unequal since the early 1980s, reversing a general trend of declining inequality that dates back to the 1930s. During the 1980s, incomes in the lower half of the distribution stagnated and then declined, while incomes at the top of the distribution increased. These trends largely persisted during the 1990s, as incomes in the lower tail of the distribution continued to decline and incomes at the top of the distribution increased rapidly. During the 2000s, incomes in the lower part of the distribution ceased declining but did not rebound from the losses of previous decades, while top incomes continued their rapid ascent (McCall and Percheski 2010; Morris and Western 1999; Piketty and Saez 2003; Piketty and Saez 2006; Ryscavage 1999).

These trends have been variously described as "the most important problem that we are facing now today" (Christoffersen 2013), "the defining challenge of our time" (Kuhnhenn 2013), and "one of the most spectacular social developments in the recent history of the United States" (Weeden, Kim, Di Carlo, and Grusky 2007). Greater income inequality is thought to have a number of negative economic, social, and political consequences. It is associated with lower levels of trust, empathy, cooperation, and civic engagement; lower levels of health and psychological well-being; higher levels of property crime and violence; and higher risk of financial crises (Braun 1991; de Vries, Gosling, and Potter 2011; Elgar 2010; Kumhof and Ranciere 2010; Lederman, Fajnzylber, and Loayza 2002; Pickett and Wilkinson 2011).

Theory suggests that an individual's position within the social relations of production—that is, an individual's position within the ownership and authority structure of an economic organization—is a central determinant of income in modern industrial societies (Dahrendorf 1959; Marx 1978; Proudhon 1994; Proudhon 2011; Robinson and Kelley 1979; Weber 2008; Wright 1979; Wright and Perrone 1977). At a simple level, there are four distinct positions defined by unequal ownership and authority relations in the workplace: workers, who are excluded from the means of production and do not control the activities of others; proprietors, who own the means of production and control the activities of workers; managers, who do not own the means of production but have delegated control over the production process and the actions of workers; and independent producers, who own and operate small firms by themselves (Robinson and Kelley 1979; Wodtke 2013; Wright and Perrone 1977). These positions are called class positions because unequal ownership and authority relations are thought to engender intergroup conflict between those with and without property and authority in production. They are linked to the distribution of income through supply and demand for different factors of production, economic rents that emerge from market distortions and incentive problems, and the balance of intergroup bargaining power in the political conflict over division of net output (Proudhon 2011b; Wright 1979; Wright 1985).

Despite the centrality of classes and class conflict in sociological theories of income distribution, they have not played an important role in empirical attempts to explain recent growth in aggregate income inequality. Prior studies of trends in population-level income inequality have instead focused on the effects of disaggregate occupations (Kim and Sakamoto 2008; Mouw and Kalleberg 2010), skill-biased technical change and increasing returns to education (Autor, Levy, and Murnane 2003; Juhn 1999; Lemieux 2006), institutional change and

its impact on low wage workers (Card, Lemieux, and Riddell 2004; DiNardo, Fortin, and Lemieux 1996), and demographic shifts (Borjas 1994; Easternlin 1980). No definitive explanation for recent changes in aggregate income inequality has emerged from this extensive volume of research on growing inequality, and most prior models of distributional change leave substantial room for improvement (McCall and Percheski 2010; Morris and Western 1999).

Although prior studies of class structure and the personal distribution of income are rare, several studies investigate changes in the functional distribution of income using national accounts data and find that the labor share of income has declined relative to the capital share since the early 1980s (Elsby, Hobijn, Sahin 2013; Kristal 2010, 2013; Lin and Tomaskovic-Devey 2013).[1] In addition, prior studies of executive compensation reveal a pattern of strong earnings growth for managers throughout this period (Frydman and Jenter 2010; Goldstein 2012), and research on economic elites at the very top of the distribution indicates that earnings from financial investments have become an increasingly important source of income for this group in the past two decades (Nau 2013; Volscho and Kelly 2012). Taken together, these

[1] The personal distribution of income shows how income, regardless of its source, is divided between individuals, while the functional distribution of income shows the division of payments between the productive factors of labor and capital. Although it is frequently interpreted as a measure of class inequality or even aggregate income inequality, the functional distribution of income is a poor measure of both of these concepts for several reasons. First, as a measure of aggregate income inequality, the functional distribution is limited because it contains no information about the distribution of factor income across individuals, meaning that stability or change in the aggregate payments to different factors of production need not translate into stability or change in the personal distribution of income. Indeed, the decline in labor's share over the past several decades has been more pronounced in countries with slow growth in aggregate income inequality and less pronounced in countries with rapid growth in aggregate income inequality (Kristal 2010). Second, as a measure of class inequality, the functional distribution is limited because it includes all salaries, benefits, and bonuses paid to firm executives in the labor share. This is problematic not only because managers are thought to occupy a class position distinct from that of non-managerial production workers but also because many of these executives are majority shareholders—that is, capitalists—and isolating the components of their income that accrue to labor versus capital is fundamentally ambiguous. This is especially troubling in the U.S. because owner-executives of C-corporations, one of the most common corporate legal structures in this country, are incentivized to withdraw money from their company in the form of salaries, benefits, and bonuses, rather than dividends, in order to avoid double taxation at both the corporate and individual level. More detailed analyses of labor's share show that it has been "buoyed up" over time by large compensation payments to executives and managers, many of whom likely own part or all of the business they operate, indicating that these measurement limitations may result in a serious understatement of growth in class inequality as indicated by changes in the functional distribution of income (Elsby, Hobijn, Sahin 2013).

studies suggest a potentially important relationship between class structure and growing aggregate income inequality, but they do not link well-defined class typologies based on ownership and authority relations to long-term growth in the dispersion of personal incomes nor do they even provide a precise accounting of how the particular trends mentioned here contributed to growth in income inequality at the population level. For example, because increases in inequality among labor incomes dwarf the decline in labor's share, it remains unclear whether movements in the functional distribution of income had an appreciable impact on changes in aggregate income inequality (Elsby, Hobijn, Sahin 2013).

Several other studies have directly linked growth in aggregate income inequality to class typologies defined in terms of large occupational groups with similar employment contracts, skill requirements, job tasks, and career trajectories (Morgan and Cha 2007; Morgan and Tang 2007; Weeden, Kim, Di Carlo, and Grusky 2007). These occupational class typologies, however, have only a tangential link to property and authority relations in production. The few empirical studies of personal income distribution that explicitly model the returns to ownership and authority rely exclusively on cross-sectional data that predate the recent increase in inequality (Halaby and Weakliem 1993; Kalleberg and Griffin 1980; Robinson and Kelley 1979; Wright 1978; Wright 1979). As a result, previous research provides little to no information about the link between social relational classes and growth in aggregate income inequality since the early 1980s.

Not only has the concept of social class—defined in terms of ownership and authority in production—been largely ignored in empirical research on trends in aggregate income inequality, it has also recently come under attack as a number of social scientists increasingly question its relevance to modern systems of social stratification (Clark and Lipset 1991; Nisbet 1959; Pakulski and Waters 1996; Pakulski 2005). According to post-class theory, the link between

class structure and patterns of inequality has declined over time. Class divisions may have been important historically, but in postindustrial society, class is no longer a salient explanatory category, and other social distinctions, such as those based on race, gender, and citizenship, are now the primary determinants of group-based inequality (Pakulski 2005). Although the strong claims of post-class theorists have elicited spirited rebuttals reasserting the contemporary importance of class divisions (Hout, Brooks, and Manza 1993; Wright 1996), neither side of this debate provides a rigorous empirical assessment of long-term trends in material inequalities and their link to class structure.

This study posits that a class-analytic theory based on property and authority relations within production can provide an improved understanding of growth in aggregate income inequality since the early 1980s. The theoretical framework guiding this analysis is closely informed by anarchist and neo-Marxist theories of the dynamics of capitalism and class conflict (Proudhon 2007; Wodtke 2013; Wodtke 2014; Wright 1979; Wright and Perrone 1977).[2] Briefly, it posits that changes in technology, the competitive environment, and the scope of class political mobilization have led to a substantial increase in between-class income differences and a comparatively modest change in the relative size of different classes. Widespread adoption of labor-displacing technologies (Autor, Levy, and Murnane 2003; Bluestone and Harrison 1982), growing monopolization (Foster, McChesney, and Jonna 2011; Lynn 2011), heightened capital mobility (Bluestone and Harrison 1982; Harrison and Bluestone 1988), and escalating political activism on the part of large businesses (Dumenil and Levy 2004a; Useem 1984) are thought to

[2] Few social theories have been as disputed, confused, and misunderstood as anarchism. In popular discourse, the term anarchism is often haphazardly equated with chaos or disorder, while in the Marxist tradition, anarchist theory is frequently misrepresented as solely a critique of the state (McKay 2011; Schmidt and van der Walt 2009). In fact, anarchism contains a coherent social theory with an elaborate and incisive analysis of the causes of economic inequality, the most important of which are thought to be property, authority, and the conflict generated by these antagonistic social relations.

have substantially undermined the bargaining power of workers, and consequently, the benefits of economic growth are thought to have become more unevenly distributed, shifting heavily towards a shrinking group of high-earning proprietors and managers.

Growth in aggregate income inequality is governed by (1) changes in between-class income differences, (2) compositional changes in the relative size of different classes, and (3) changes in residual, or within-class, income dispersion. This study investigates each of these trends in turn and provides a formal decomposition that evaluates their relative impact on growth in aggregate income inequality. Results from the General Social Survey (GSS) and the Current Population Survey (CPS) indicate that income differences between classes grew substantially throughout the period from 1983 to 2010. Estimates from a novel semi-parametric regression method that adjusts for the potentially confounding influence of measured skills, social background, and demographic characteristics indicate that mean income differences between classes increased by at least 50 percent since the 1980s. Growth in between-class income differences was driven by rapidly increasing incomes for managers and especially proprietors together with stagnating incomes for workers. Quantile regression analyses further indicate that these divergent trends primarily reflect strong income growth among the highest-earning proprietors and managers, and estimates based on more discriminating gradational measures of property and authority suggest that the incomes of proprietors in control of large businesses and managers near the top of organizational hierarchies grew considerably faster than those of their counterparts who own smaller businesses and have less extensive control over production operations. With respect to compositional changes in the relative size of different classes, results indicates that, since the mid-1980s, the proportion of workers and independent producers increased modestly, while the proportion of proprietors and managers declined slightly.

A formal decomposition analysis suggests that these between-class and compositional changes had a large inflationary effect and a small dampening effect, respectively, on trends in aggregate income inequality, particularly during the 1990s. Although growth in residual, or within-class, income dispersion consistently had the largest inflationary effect, growth in between-class income differences explains 10 to 20 percent of the overall increase in aggregate income inequality since the early 1980s. Additional analyses of more specific time periods indicate that between-class effects may explain as much as 30 percent of the increase in aggregate income inequality during the 1990s, and analyses that take account of gradational distinctions in property and authority put this figure as high as 50 percent.

This study extends previous theory and research on income inequality in the United States by outlining a class-analytic theory of recent changes in personal income distribution and testing several key implications of this theoretical framework with time-series data from two nationally representative surveys. Its findings suggest that class-analytic theory remains essential for understanding contemporary patterns of social stratification and that models of class based on property and authority relations within production capture changes in the distribution of personal income that are obscured by models based only on human capital, demographics, or occupations. It extends previous research on executive compensation and changes in the functional distribution of income by integrating these trends within an individual-level model of earnings and providing a precise accounting of their impact on growth in personal income inequality at the population level.

In the sections that follow, Chapter II reviews the current debate on trends in aggregate income inequality, and Chapter III summarizes and critiques extant sociological theories of class structure. Next, Chapter IV outlines the theoretical foundations of the class typology guiding this

analysis, and Chapter V describes competing theories of the underlying mechanisms, such as technological development and market competition, that are thought to generate changes in class structure and class inequality. Then, Chapters VI, VII, and VIII test the competing predictions of these theories by estimating changes in between-class income differences and changes in the relative size of different classes, and by decomposing growth in aggregate income inequality to evaluate the impact of these trends. Chapter IX concludes with a discussion of key implications for theory, future research, and policy.

CHAPTER II

The Debate on Growing Income Inequality

Prior to the 1970s, income tax data reveal a general trend of declining inequality since the beginning of The Great Depression (Piketty and Saez 2003; Piketty and Saez 2006). Between 1950 and the 1970s, median real earnings nearly doubled and gains in the lower quartile of the distribution were equally dramatic. However, in the mid-1970s, growth in median income stagnated, and in the 1980s, real incomes began to decline for a substantial part of the population. At the same time, incomes at the top of the distribution, and especially among the top one percent of earners, continued to grow. This trend accelerated in the 1990s and 2000s, and the resulting increase in aggregate income inequality has continued right through the most recent period for which data are available (McCall and Percheski 2010; Morris and Western 1999; Piketty and Saez 2003; Piketty and Saez 2006; Ryscavage 1999).

Although the empirical literature is saturated with descriptions of recent changes in income distribution, they are not without limitations. One problem is that estimates frequently focus only on employed individuals and exclude the self-employed (e.g., Card and DiNardo 2002; Juhn, Murphy, and Pierce 1993; Mouw and Kalleberg 2010), a diverse group which includes freelancers, independent contractors, limited partners, small business owners, and even large employers. That is, many recent studies of income distribution exclude those who own the means of production, potentially concealing an important dimension of growing aggregate inequality. Although they make up a relatively small proportion of the population, if the earnings

of the self-employed are markedly different from those of employed individuals, estimates of growth in aggregate income inequality may be understated. Despite these limitations, the empirical record clearly indicates that the distribution of income underwent a remarkable polarization over the past several decades.

Supply-side Theories

Explanations for changes in income distribution are primarily based on neoclassical economic theory, which contends that changes in labor supply and demand are driving the recent increase in inequality. The first set of explanations for growing inequality focuses on changes in the demographic composition of the labor force. According to this perspective, the decline in real incomes at the lower end of the distribution was due to an influx of low-skill workers to the American labor force during the 1970s and 1980s.

One variant of the shifting labor supply argument attributes declining real incomes to high fertility following World War II. As large baby-boom cohorts entered the labor force, the supply of young, inexperienced workers increased, and this is thought to have exerted downward pressure on wages and increased the income returns to experience (Easternlin 1980). A number of studies, however, indicate that the baby boom had little impact on growing inequality. First, baby boom cohorts entered the labor force between 1960 and 1970, well before the major decline in real wages (Morris and Western 1999). Second, although there is some evidence of rising returns to experience (Bloom, Freeman, and Korenman 1987), studies indicate that the growth in earnings inequality was substantially greater within experience groups than between them (Dooley and Gottschalk 1982). Finally, studies of the labor market impact of declining fertility following the baby boom, which would be expected to raise the wages of young and

inexperienced workers, indicate that these later cohorts are comparatively worse off than baby boomers at similar points in their work careers (Schrammel 1998).

A second supply-side demographic explanation for growing inequality contends that the massive increase in female labor force participation between 1950 and 1990 depressed incomes for workers at the lower end of the distribution. The rapid influx of female workers with low levels of experience is expected to drive down wages for comparable low-wage workers and thus increase aggregate income inequality. Research on occupational sex segregation has demonstrated that there are separate labor markets for men and women (Reskin 1993), so according to supply-side logic, increases in female labor force participation should depress wages among female workers relative to men. Earnings data, however, show a notable convergence between the wages of male and female workers since the 1970s (Bernhardt, Morris, and Handcock 1995; Blau and Kahn 1994). And, while women were moving closer to wage parity with men, income inequality also increased substantially among both male and female workers (Bernhardt, Morris, and Handcock 1995).

A third demographic explanation for rising income inequality posits that high volume immigration of Latino and Asian workers is responsible for declines in real wages among low-skill workers (Borjas 1994; Borjas 2003). Most empirical studies of the association between immigration and wage rates among native-born workers have failed to support this hypothesis. Metropolitan-level data consistently show no association between immigration and local wages (Altonji and Card 1991; LaLonde and Topel 1991), and a natural experiment examining the impact of changes in local migrant stock on the labor market prospects of native workers also failed to reveal appreciable effects of immigration on wages (Card 1990). Studies based on spatial variation in immigrant stock, however, may yield biased estimates of the labor market

impact of immigration because immigrants are drawn to metropolitan areas with thriving economies and native workers can themselves migrate in response to immigrant job competition (Borjas 1994). These confounding factors potentially obscure harmful effects of immigration on the earnings of native workers. Several studies that attempt to overcome these problems find a nontrivial impact of immigration on the wages of poorly educated native workers, where conservative estimates indicate that about 10 percent of the decline for this group can be attributed to immigration (Borjas 2003; Borjas 2006).

Demand-side Theories

Another set of explanations for rising income inequality focus on shifts in labor demand. The most prominent demand-side explanation for growing earnings inequality claims that the introduction of new technologies, such as automation and especially personal computers, has increased demand for analytical skills while simultaneously displacing large numbers of manual and service workers (Autor, Katz, and Kearney 2008; Autor, Levy, and Murnane 2003; Bound and Johnson 1992; Juhn, Murphy, and Pierce 1993). Because workers with higher levels of education are thought to have their relative productivity raised by the introduction of computers, the well-documented increase in the income returns to education is frequently cited as evidence of skill-biased technical change (Autor, Katz, and Kearney 2008; Juhn 1999). In addition, empirical studies find that workers who use computers on the job earn higher wages than comparable workers who do not use computers (Krueger 1993), that educated workers are much more likely to use computers on the job (Card and DiNardo 2002), and that occupation-based measures of skill reveal increasing demand for abstract reasoning abilities and declining demand for routine manual skills (Autor, Katz, and Kearney 2008; Autor, Levy, and Murnane 2003).

Although some empirical patterns in earnings and employment data are consistent with the skill-biased technical change hypothesis, other findings are difficult to reconcile with this perspective. First, studies that have examined the income trajectories of workers with advanced qualifications in destination occupations thought to require advanced analytical skills, such as engineers and computer scientists, have found that wages have been stagnant for these highly technical positions (Card and DiNardo 2002). Second, the evidence of a causal link between higher wages and computer use at work is highly disputed (DiNardo and Pischke 1997). Third, technical change linked to computerization has been ongoing since at least the 1970s, but evidence indicates that the rate of technical change did not truly accelerate until later in the 1980s, well after a pronounced increase in income inequality (Card and DiNardo 2002). Finally, trends in income inequality are not uniform across different industrialized nations that have similar levels of computerization and automation. Thus, the empirical record indicates that skill-biased technical change is likely an important determinant of growing income inequality, but these limitations and inconsistencies also suggest other social and economic forces may be at work.

A second demand-side explanation attributes rising income inequality to deindustrialization, that is, to broad shifts in employment patterns whereby the proportion of workers employed in the goods-producing sector has declined and the proportion employed in the service sector has increased (Bluestone and Harrison 1982; Harrison and Bluestone 1988). These macroeconomic changes in the industrial structure represent the substitution of low-wage jobs in the service sector for well-paid jobs in manufacturing, a process that is hypothesized to have "hollowed" the middle of the income distribution in the United States. Data from the Current Population Survey show a strong inverse correlation between earnings and employment

growth at the industry level, and they indicate that wage dispersion within the growing service sector is higher than in the shrinking manufacturing sector (Meisenheimer II 1998). The expected consequence of deindustrialization is thus increasing aggregate income inequality. Strong effects of industrial shifts on inequality, however, are not consistently documented in empirical research. Some studies report that industrial employment shifts account for about 20 percent of the change in earnings inequality (Harrison and Bluestone 1988), but others find virtually no connection between these two trends (Raffalovich 1990). Growing inequality is not simply a matter of bad service jobs displacing good manufacturing jobs, as earnings inequality has also increased substantially within these sectors of the economy (Blackburn 1990; Grubb and Wilson 1989).

Increases in the transnational flow of goods, services, and capital—social developments often absorbed under the umbrella term "globalization"—are a third factor thought to have reduced demand for low-wage American workers, leading to the collapse of the bottom of the income distribution. Globalization perspectives on growing wage inequality highlight the effects of foreign imports and outsourcing on the domestic labor force. In theory, imports from foreign countries with lower wages than the United States represents an increase in the implicit supply of less-skilled laborers, which is anticipated to lower demand and depress wages for less-skilled domestic workers. Studies of the impact of trade on wages are mixed, with some studies reporting very large effects (Leamer 1994; Wood 1995) and others rejecting anything more than a trivial role for trade in the takeoff of wage inequality (Berman, Bound, and Griliches 1994; Krugman 1995; Krugman and Lawrence 1994). Foreign outsourcing, on the other hand, which involves delegating specific tasks in the production process to foreign companies, is estimated to have a larger effect on wages (Feenstra and Hanson 1996).

Institutional Theories

A third set of explanations for growing income inequality focus on changes in labor market institutions, such as unions and the minimum wage, which support the lower end of the income distribution and promote a more equal occupational wage structure. Between 1980 and 1990, the federal minimum wage was frozen at $3.35 per hour. As a result, the real value of the minimum wage declined by about 30 percent. Although only 10 percent of the workforce was directly affected by the minimum wage rate, this decline is estimated to explain between 25 and 30 percent of the overall increase in income inequality during the 1980s (DiNardo, Fortin, and Lemieux 1996), and nearly 20 percent of the increase in the college graduate versus high school dropout wage differential may be due to the minimum wage freeze (Blackburn, Bloom, and Freeman 1990). In addition, the legislated increases in the minimum wage that occurred from 1990 to 1991 are estimated to have erased about 30 percent of the previous decade's growth in earnings inequality (Card and Krueger 1995). Thus, the weight of the evidence indicates that the declining real value of the minimum wage was an important determinant of the collapse of the lower tail of the earnings distribution during the 1980s, resulting in substantial growth in aggregate income inequality.

Other studies of labor market institutions and income inequality focus on declining union representation. About 30 percent of all workers were represented by a labor union in 1970, but by 2008, union representation had declined to about 12 percent (Schmitt and Zipperer 2009). A large body of empirical evidence has documented how unions reduce income inequality by compressing wage dispersion within firms, standardizing pay across firms within industries, and raising the wages of low-skill workers (Card, Lemieux, and Riddell 2004; Freeman 1985).

Although estimates vary depending on the particular methodology employed, empirical analyses indicate that declines in union representation since the 1970s explain somewhere between 10 and 20 percent of the growth in income inequality (Card 2001; Freeman 1993).

In addition to deunionization and the minimum wage freeze, changing employment relations is another institutional factor that may have contributed to growing earnings inequality (Kalleberg 2011). According to this perspective, many employers have abandoned the employment system characterized by internal labor markets and lifetime jobs, moving instead toward a system of "market-mediated" employment with greater reliance on part-time, contingent, and temporary workers. Because the contingent labor force typically has lower earnings than permanent workers, the growth in market-mediated employment may underlie the increase in aggregate earnings inequality. Studies consistently reveal an increase in the number of contingent workers during the 1980s, although estimates of the size of this workforce vary widely owing to different conceptual and operational definitions of contingent work used in empirical research (Belous 1989; Kalleberg 2011; Mishel, Bernstein, and Shierholz 2009; Polivka 1996a; Polivka 1996b). The link between changes in employment relations and growing income inequality has not been extensively studied.

Summary

Despite the enormous volume of theorizing and research on growing income inequality, no definitive explanation has emerged. Supply-side explanations for rising inequality have some intuitive appeal, but there is little empirical evidence to support claims that the entry of large birth cohorts, women, or immigrants to the American labor force has had anything more than a modest impact on income inequality. In addition, none of these perspectives account for the

strong growth in incomes at the top of the distribution that has driven the increase in inequality since the 1990s. The evidence for demand-side explanations of rising inequality is inconclusive. Since the 1970s, trade and capital flows were liberalized, computers revolutionized the production process, and manufacturing employment declined precipitously, but empirical research about the impact of these social transformations on income inequality is highly inconsistent. Institutional explanations of growing wage inequality—deunionizaiton and the minimum wage freeze in particular—are consistently supported by empirical research. But although these perspectives provide a compelling account of income declines at the bottom of the distribution, they do not provide an explanation for the strong growth in top incomes. Furthermore, institutional perspectives are devoid of a broader theoretical framework that can explain the social and political forces responsible for changes in these institutions.

Most prior models of changes in aggregate income inequality leave substantial room for improvement in terms of explanatory power (McCall and Percheski 2010; Morris and Western 1999). Many of the unresolved issues with extant explanations of growing income inequality concern the role of nonmarket forces in generating institutional change and shaping the effects of shifts in labor supply and demand. Both the direction and consequences of technical and institutional change are not determined by unmediated market forces but rather are shaped by the relative influence and power of different social actors. For example, depending on the distribution of political and economic power, the costs of an increasing supply of unskilled labor and falling demand for domestic production workers could be absorbed by employers and shareholders in the form of lower profits, by workers through wage cuts, or by consumers in the form of higher prices (Morris and Western 1999). Alternatively, these changes could simply have a neutral effect on aggregate inequality if market competition drives competing enterprises

to lower prices in response to their reduced labor costs. This study posits that a class-analytic framework based on property and authority relations within production can provide a theoretical apparatus capable of unifying seemingly disjoint market-based and institutional explanations, leading to an improved understanding of growth in aggregate income inequality since the early 1980s.

CHAPTER III

The Debate on Classes

Social class is perhaps the most diverse and contested concept in sociology. The term "class" has been deployed with reference to so many different social collectivities that it is impossible to critically engage the concept without imposing some limitations of scope. This section therefore focuses on generative approaches to class rather than confused and often vague descriptive usages of the term. When class is used merely as a taxonomic or descriptive term, it typically refers to arbitrarily defined groups of people with similar income, status, or education levels (Mayer and Buckley 1970; Parsons 1970). For example, descriptive conceptions of class use terms like "the rich," "the poor," and "the middle class" to describe the income distribution. They enter most prominently in popular discourse on inequality, where, for example, claims about the declining "middle class" in the United States simply reflect growing income inequality (Tavernise 2011).

In contrast to descriptive conceptions of class that merely categorize individuals according to their quantitative differences, generative approaches to class analysis focus on how relationships between different social actors at the site of production or in the market engender inequalities in material welfare, shape economic interests, and promote intergroup conflict. In this context, class refers to specific structural positions in society that give rise to detectable patterns of inequality, group clustering, social distance, and conflict. The extent of class-based

inequality, clustering, and conflict—that is, the degree to which class positions structure society—is the central focus of empirical class analysis.

When the concept of class is marshaled to explain social conflict and inequality, it is primarily an economic concept defined in terms of different positions within the social relations of production, the technical division of labor, or the market. The social relations of production refer to patterns of exclusionary control over different factors involved in the production process. The technical division of labor, by contrast, consists of the specialized occupations, jobs, and tasks into which the production process is divided. Markets are the collection of social institutions and procedures whereby individuals engage in competitive exchange of commodities. In this chapter, I briefly review different generative approaches to class analysis, outline some of their more important limitations, and summarize several challenging critiques of class-analytic research.

Marxist Approaches to Class Analysis

Class theory is most often associated with the Marxist tradition (Marx 1971; Marx 1978; Wright 1979; Wright 1985; Wright 1997), although there is actually very little sustained theoretical reflection on the concept in Marx's original work. For Marx, class was an objective economic phenomena based on differences in the ownership of productive property. Classes had clear boundaries whose contours defined the main social divisions in society. They were thought to be closely linked to individual interests and personal identities. And, most importantly, classes were thought be collective actors with the capacity to transform society.

Exploitation, in Marx's theoretical framework, was the mechanism that shaped class interests, conflict, and inequality. The concept, for Marx, was premised on the labor theory of

value. According to this perspective, all commodities, including labor power, are remunerated at exactly their exchange value, defined as the amount of socially necessary labor time required to produce them. When control of the means of production is concentrated in the hands of a select few individuals, those without access to the means of production must sell their labor power to property owners, and in return, workers receive wages equivalent to the socially necessary labor time required to reproduce their own labor power. Within this seemingly equal exchange, however, an uncompensated transfer of labor from one group to another occurs in the process of production: workers are paid according to the socially necessary labor time needed to reproduce their own labor power, but because this amount is less than the total number of hours they are required to work—and, by extension, less than the total number of hours embodied in the product of their labor—the difference, termed surplus value, accrues to their employer. This uncompensated transfer of labor from workers to employers constitutes exploitation.

Marxist exploitation arises when the social relations of production are unequal, that is, when rights and powers over productive assets, such as land, natural resources, machines, tools, and so on, are distributed unequally between individuals. In this context, exploitation generates intergroup conflict, polarized interests, and material inequalities between those occupying different social positions within the production process. Thus, for Marx, classes are defined in terms of the structural positions occupied by individuals within the social relations of production.

In capitalist economies, the traditional Marxist conception of class focused on three dimensions underlying the social relations of production: ownership of the physical means of production, the purchase of others' labor power, and the sale of one's own labor power. The manner in which an individual enters these social relations defines their class position. The bourgeoisie own the means of production and purchase the labor power of others, and are thus

exploiters; proletarians do not own the means of production and sell their labor power to the bourgeoisie, and are thus exploited; and the petty bourgeoisie control their own small means of production but do not purchase the labor power of others, and are thus neither exploiters nor exploited.

The traditional Marxist conception of class is thought to be inadequate for a variety of reasons. The main limitations involve critical flaws in the labor theory of value and thus in the theory of exploitation as well as its inability to account for the perceived emergence of "middle classes" that are, within the Marxist framework, classified as workers but appear to possess some of the same powers as capitalists.

In an attempt to overcome these problems with the traditional Marxist framework, Wright (1978; 1979; 1977) developed a more elaborate class typology that included a domination-based criterion for class membership—whether or not an individual controls the activities of labor at the point of production—in addition to ownership of the means of production and the buying and selling of labor power. This typology allowed certain class positions to be positively privileged on one or more the aforementioned criteria while being disadvantaged on others. These positions were termed "contradictory locations within class relations" because they lie between polarized positions in the class structure.

Based on these refinements, Wright's (1979) resulting class schema contained the familiar bourgeoisie, proletarians, and petty bourgeoisie, defined as above. Between these polarized classes were the contradictory class locations: small employers, who are situated between the grand and petty bourgeoisie; managers, who occupy a contradictory location between proletarians and the bourgeoisie because they control the labor power of others but do not own the means of production; and semi-autonomous employees (i.e., employed

professionals), who fall between the petty bourgeoisie and proletarians because they sell their labor power to employers but retain control over their own work activities.

The theoretical foundations of this new class typology remained unsatisfactory because it still relied on the flawed labor theory of value to account for exploitative relations between capitalists and workers. To resolve these problems, Wright (1984; 1985; 1994; 1997) developed an alternative conceptualization of exploitation that was divorced from the labor theory of value and also able to account for the emergence of perceived "middle classes." This conception is based on a game-theoretic approach that does not rely on the labor theory of value (Roemer 1982). Specifically, exploitation is said to exist when (1) the material welfare of one group, the exploiters, depends upon the material deprivation of another group, the exploited; (2) the inverse interdependence of the material welfare of the exploiters and the exploited depends upon the exclusion of the exploited from access to different productive resources; and (3) exclusion from productive resources generates material advantages to the exploiters because it enables them to appropriate part of the surplus produced by the exploited (Burawoy and Wright 2002; Wright 1994).

The defining feature of exploitation is that the exploiters depend on the labor effort of the exploited. This differs from non-exploitative forms of economic domination in which one group may have exclusive access to the productive resources of society but does not require the participation of subordinate groups in the production process (Burawoy and Wright 2002). Exploitation thus describes a form of antagonistic interdependence between social groups in which actors with conflicting economic interests are bound together in the production process. It defines the mechanism that links inequalities in the distribution of productive assets to intergroup conflict.

Classes, for this theoretical framework, are equated with distinct positions in a given set of exploitative social relations. The foregoing discussion conceived of class relations at a very simple level: classes consist of two perfectly polarized groups, the exploiters and the exploited, defined in terms of their control over productive assets or lack thereof. In pure capitalist economies, this simple conceptualization results in a two class typology: capitalists and workers, representing the exploiters and the exploited, respectively. Class structures, however, appeared to be more complicated than this convenient binarism. Wright (1984; 1985) accounts for this perceived complexity by making a qualitative distinction between different types of productive assets, the distribution of which underlies a more complicated class typology.

According to this perspective, the principal categories of productive assets that underlie both contemporary and historical class structures are the physical means of production (i.e., land, tools, machines, and so on), organizational assets (i.e., the power to control the technical division of labor), and skill assets (i.e., special laboring abilities, advanced training, and credentials). Individuals may be exploiters along one dimension of the class structure, for example, if they possess skills that others lack, while being simultaneously exploited along another dimension, such as ownership of the physical means of production, if they do not possess capital and thus must sell their labor power. For this theoretical framework, positions within the social relations of production that are simultaneously exploited and exploiting are said to be "contradictory class locations" (Wright 1984; Wright 1985).

By subdividing the social stock of productive assets into categories based on skills, organizational assets, and the physical means of production, this theoretical approach yields a highly complex class typology. Specifically, Wright's cross-classification of the three principle assets thought to underlie exploitative social relations of production produces a schema with

twelve distinct class positions. The primary class division is between owners and non-owners of the physical means of production. Owners are then internally differentiated into large employers, small employers, and the petty bourgeoisie, while non-owners are subdivided into nine classes based on their organizational assets and skill assets. These classes consist of expert managers, expert supervisors, expert non-managers, semi-credentialed managers, semi-credentialed supervisors, semi-credentialed workers, uncredentialed managers, uncredentialed supervisors, and finally, proletarians.

In addition to reformulating the concept of exploitation and elaborating increasingly complex class typologies, contemporary theorists in the Marxist tradition have also tempered a number of the explanatory claims of class analysis (Hout, Brooks, and Manza 1993; Wright 1984; Wright 1996). Rather than viewing class structure as necessarily engendering transformative social collectivities, the distribution of rights and powers over productive resources is thought to have only a probabilistic influence on class formation, identity, and interests. In other words, just because a group of unskilled workers objectively exist in an economy does not mean that they constitute a self-conscious, culturally homogenous, and politically active social group. By virtue of their common class location, however, the probability of unskilled workers forming such a collectivity is thought to be greater than the probability of, for example, an amalgam of unskilled workers and managers forming a cohesive and enduring social group. The central concern of class analysis, then, is investigating empirically the degree to which class positions influence inequality, attitudes, behaviors, and patterns of collective action.

Neo-Marxist models of exploitation and class structure provide a promising framework for analyzing changes in aggregate income inequality, but the approach outlined above still

suffers from several limitations and inconsistencies. First, within this framework, classes are defined as positions within exploitative social relations. But it remains unclear whether differential possession of skills constitutes an exploitative relationship because the rewards that accrue to skilled workers may not depend on the material deprivation or the labor effort of unskilled workers in the production process. Second, while neo-Marxist class typologies are purportedly based on social relationships and not on quantitative or gradational differences between individuals, they nevertheless use quantitative distinctions to define intermediate class positions, such as small versus large employers or semi-credentialed versus expert managers. This practice is also inconsistent with the relational theory of exploitation, at least as currently formulated.

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Weberian Approaches to Class Analysis

In the Weberian tradition, market relations, or differential control by individuals over opportunities for income, form the basis of class divisions. Specifically, Weber (1978:927-28) writes that "we may speak of a 'class' when (1) a number of people have in common a specific causal component of their life chances, insofar as (2) this component is represented exclusively by economic interests in the possession of goods and opportunities for income, and (3) is represented under the conditions of the commodity or labor markets…class situation is, in this sense, ultimately market situation." Thus, members of a class share common "life chances" as a result of the resources individuals bring to exchange in the market. In contrast to Marx, then, Weberian approaches to class analysis focus on relations in the market rather than in production.

According to Weber, the resources generating unequal life chances through the operation of the market are property, skills, and labor power. Variations in market situations, and by extension in class positions, are based on different combinations of these assets. Individuals that

own property in the means of production, investments, and capital funds constitute a "positively privileged property class." Those that do not possess property, on the other hand, fall into either the "middle classes," who command larger incomes by virtue of their skills, credentials, and other marketable abilities, or the working class, which is composed of unskilled individuals completely dependent on the sale of crude labor power without a regular occupation. Furthermore, Weber emphasizes a highly pluralistic conception of class, highlighting how both property owners and workers are internally differentiated based on the type of property they own, the skills they possess, and the industry in which they operate (Giddens 1973; Weber 1978).

The most prominent Weberian class typology used in contemporary stratification research is that of Goldthorpe and colleagues (Erikson and Goldthorpe 1992; Goldthorpe 1980). This schema aims to classify individuals on the basis of their market position, that is, "to differentiate positions within labor markets and production units…in terms of the employment relations that they entail (Erikson and Goldthorpe 1992, p. 37)." For this approach, classes are intended to capture the distinction between the self-employed and those who are employed by others, and among those who are employed by others, the distinction between occupations strictly regulated by a labor contract and occupations based on a long-term "service relationship." The difference between highly regulated jobs and service occupations is held to distinguish positions requiring more limited skills from those that demand specific abilities, expertise, and knowledge (Breen 2005).

Based on these criteria, the resulting class schema in its most aggregated form consists of four different classes: the manual class, the intermediate class, the service class, and the petty bourgeoisie (Breen 2005; Erikson and Goldthorpe 1992). The petty bourgeoisie consists of the

self-employed, small employers, and farmers. This class demarcates property owners from employees without an ownership stake in the means of production. Employees are divided into the manual, intermediate, or service class based on their type of occupation. These classes are distinguished by the different skills and employment relationships that characterize the constituent occupations. The service class consists of professionals, administrators, and managerial workers—occupations thought to require specific skills and rely on highly autonomous employment relationships. The manual class, by contrast, includes workers in occupations that require few specific skills and have rigid labor contracts with employers. Members of the intermediate class are employed in occupations that require lower skill levels but lack the rigid employment relationships typical of occupations in the manual class.

Goldthorpe and colleagues (1992; 1980) also present several highly disaggregated class typologies. In these more complex schemas, the petty bourgeoisie is subdivided on the basis of size and industrial sector, and the manual, intermediate, and service classes are subdivided according to more narrow skill distinctions. For example, the maximally disaggregated class schema consists of eleven class categories: the upper service class, the lower service class, higher-grade routine non-manual employees, lower-grade routine non-manual employees, small proprietors with employees, small proprietors without employees, farmers and self-employed workers, lower-grade technicians and supervisors, skilled manual workers, unskilled manual workers in primary production, and finally, unskilled manual workers in agriculture. The most widely-used schema consists of seven classes and is obtained from the above categories by combining the different types of unskilled workers, proprietors, and routine non-manual employees into larger classes.

Weberian approaches to class analysis provide highly flexible class typologies that have been used extensively in empirical research, but they suffer from a number of severe limitations. The most important problem with the Weberian framework is that it lacks a theory of the mechanisms generating class conflict, differences in life chances, and differences in political behavior. That is, aside from differences in the personal characteristics of the individuals that select into different occupations, the Weberian framework does not provide any systematic explanation for why unskilled workers in agriculture and lower-grade technicians in primary production, for example, might have conflicting political agendas or fundamentally different life chances. Many of the class divisions in this framework are simply crude proxies for differences in individual tastes, aptitudes, and abilities.

There are also problems with the methods used to operationalize Weberian conceptions of class structure. First, although class positions are defined in terms of their control over the means of production, skills, and employment relationships, the Goldthorpe typology has never been implemented in practice by directly measuring these characteristics. Instead, individuals are assigned to different classes based on their occupation. This practice is problematic because occupational divisions in the technical division of labor are imprecise proxies for different types of employment relationships (Evans and Mills 2000). Second, the most disaggregated Goldthorpe typology with eleven classes is frequently collapsed to generate more parsimonious typologies with fewer class categories, but this practice is completely without a theoretical rationale.

Durkheimian Approaches to Class Analysis

In contrast to Marxist and Weberian conceptions of class, which respectively view production relations and market relations as defining the contours of class structure, some theorists contend that class divisions are based primarily on the myriad occupational positions that compose the technical division of labor (Bell 1973; Grusky 2005; Grusky and Sorensen 1998). According to this perspective, disaggregate occupations form the basis of classes because they are more closely associated with conditions of work, life chances, personal identities, and political interests. Class theories that focus on positions in the technical division of labor are sometimes associated with the Durkheimian theoretical tradition, in which small occupational associations are privileged over large industrial classes as the most important form of social organization (Durkheim 1984).

For Durkheim, large industrial classes based on the social relations of production were purely transitory phenomena that would be supplanted by smaller occupational groups engaged in comparatively harmonious social interaction. Institutionalized occupations were thought to engender distinct subcultures through the self-selection of similar individuals into the same technical positions. The concomitant interactions between similar individuals working in the same job as well as the common pursuit of occupational advancement were thought to reinforce shared interests, attitudes, and values at the occupational level. Durkheim hypothesized that this "localization of the collective conscience" together with increasing occupational differentiation and growing interdependence of positions in the technical division of labor would ultimately undermine the long-term cohesion of large industrial classes (Durkheim 1984; Grusky 2005).

Many class typologies are based on occupations. As discussed previously, neo-Weberian approaches to class analysis use occupations as proxies for different types of employment

contracts (Erikson and Goldthorpe 1992; Goldthorpe 1980), and neo-Marxist approaches use occupational distinctions to operationalize the concept of skill assets (Wright 1985). For the Durkheimian approach, classes are simply equated with disaggregate positions in the technical division of labor (Grusky 2005; Grusky and Sorensen 1998).

According to this perspective, "the starting point for a modern Durkheimian [class] analysis is…the 'unit occupation,' which may be defined as a grouping of technically similar jobs that is institutionalized in the labor market through such means as (a) an association or union, (b) licensing or certification requirements, or (c) widely diffused understandings… regarding efficient or otherwise preferred ways of organizing production and dividing labor" (Grusky 2005, p. 66). Because of long-term growth in the professional sector of the economy; the rise of new occupations built around abstract skills; the growing use of licensure, registration, and certification to erect clear job boundaries; and the strengthening of local labor unions, occupational fractionalization of the labor market is thought to have increased substantially over time, leading to the demise of large industrial classes and the emergence of localized class formations at the occupation level.

Within this framework, disaggregate occupational groups are thought to have an important influence on personal identification, group closure, political attitudes and behaviors, and collective action. For example, while large industrial classes appear to have only a weak connection to personal identity in many modern societies, occupations have come to be an important component of an individual's master identity (Emmison and Western 1990). Differentiation in the technical division of labor also may lead to occupational self-selection processes and patterns of intra-occupational social interaction that promote common interests, class awareness, and distinct subcultures among individuals working in the same job. In addition,

occupations are frequently at the center of social closure efforts aimed at securing monopoly power in the market, which may have important effects on income distribution (Weeden 2008; Weeden, Kim, Di Carlo, and Grusky 2007). As a result, disaggregate occupations are thought to be closely linked to political attitudes, behaviors, conflict, and changes in income distribution.

Approaches to class analysis that identify class structure with disaggregate occupations are unsatisfactory for a number of reasons. First, much like Weberian approaches to class analysis, occupational approaches lack a systematic theory of the mechanisms underlying class divisions and instead rely on ad hoc or individual-level selection processes to explain the differences in attitudes, behaviors, and interests observed between positions in the technical division of labor. In general, self-selection processes that lead to within-group homogeneity and social closure are not unique to positions in the technical division of labor but rather characterize many different types of group formation. The distinction between classes and other types of social groups is therefore arbitrary. Second, the main problem with the Durkheimian approach is that it simply conflates two separate concepts—occupation and class—and thereby denies the existence of classes as a distinct analytic category as a matter of definitional fiat. However, social relational and occupation-based approaches to class analysis are not mutually exclusive: classes defined as positions in the social relations of production and occupations defined as positions in the technical division of labor are distinct phenomena that likely have independent effects on individual interests, political behavior, material inequalities, and so on. Occupation-based class models may complement and enhance, but not supplant, social relational class models.

Rent-based Approaches to Class Analysis

Similar to Marxist approaches, rent-based approaches to class analysis share an emphasis on the concept of exploitation: without specifying or assuming an explicit mechanism that generates antagonistic interests, it is unclear why classes, however defined, should have any unique explanatory power in stratification research. In order for class structuration to occur, there must be a unique underlying mechanism that engenders intergroup conflict and promotes different patterns of group behavior and political action. The rent-based perspective, like its Marxist counterparts, provides a theory of the generative mechanism underlying class divisions. This mechanism is also termed exploitation, but it is a fundamentally different concept from Marxist exploitation. The rent-based approach views exploitation as grounded in the concept of economic rent extraction (Sorensen 2000; Sorensen 2005), and the distribution of economic rents defines the class structure of society.

Economic rents are the income returns to ownership of productive assets, including property, skills, information, and so on, that exceed the returns to that asset that would occur under conditions of perfect competition in the market. In other words, the difference between the actual price of a commodity, such as skilled labor power, and the counterfactual competitive price is the rent component of income. Rents emerge for assets that are in fixed supply and are needed by others to maximize their own productivity (Sorensen 2005). In this situation, price increases do not affect asset supply, and substantial income gains may accrue to the owners of rent-producing assets at the expense of consumers.

Exploitation, according to this perspective, describes the inequality generated by economic rents. Exploiters have rights and powers over rent-producing assets, while the exploited must consume these assets and are thus compelled to pay rents to exploiters. Consistent

with the neo-Marxist conception of exploitation (Wright 1985; Wright 1994), rent-based exploitation generates antagonistic interests between the exploiters and the exploited because the material advantages that accrue to exploiters in the form of rents depend on the material deprivation of the exploited. Furthermore, this inverse welfare dependence is based on the exclusion of the exploited from access to certain productive resources, namely, rent-producing assets. Unlike the neo-Marxist conception of exploitation, however, the rent-based perspective does not require that exploiters depend on the labor effort of the exploited.

Classes within the rent-based framework, then, are defined as "structural locations that provide rights to rent-producing assets" (Sorensen 2000, p. 4). Certain types of enduring rents that generate significant material inequalities are thought to be especially important for class formation and conflict. These include monopoly rents, composite rents, and rents on individual endowments (Sorensen 2000; Sorensen 2005). First, monopoly rents arise from social constraints on production. Prohibitively high costs of entering an extant market niche; government patents and licensing; and industry, occupational, and labor associations can all yield a monopolistic market positions and thus endow certain individuals with the ability to dictate prices. In these situations, rents will accrue to monopolies until they are broken. This type of rent extraction may lead to class conflict between different occupational associations and their employers or between large manufacturing cartels and their customers, for example.

Second, composite rents emerge when "two separate assets or resources are so specific to each other that payment to their joint use exceeds the payment to each resource in separate use" (Sorensen 2005, p. 141). One of the more important types of composite rent is based on worker-firm asset specificity. Workers may be more productive in one firm compared to another because they develop firm-specific skills and knowledge that are not transferable to other potential

employers. As a result, composite rents arise and are divided between the worker and employer, with both parties trying to capture a maximal share for themselves.

Finally, rents on individual endowments arise from natural or artificial scarcities of certain individual abilities. For example, talented athletes and entertainers may capitalize on this form of rent if their abilities are based on scarce genetic endowments. In addition, if "general ability" leads to greater productivity and has a genetic component that is unequally distributed, rents based on individual endowments are thought to emerge and persist indefinitely (Sorensen 2005). Education and credentialization may also generate this type of rent by artificially restricting the supply of certain skills that are produced through training.

The rent-based approach to class analysis provides a theory of the mechanism underlying class structuration—exploitation through rent extraction—but this framework has a number of counterintuitive and potentially problematic implications that seem to conflict with observed patterns of intergroup conflict. For example, according to the rent-based framework, capitalist property relations, characterized by a highly unequal distribution of the physical means of production, do not by themselves engender class divisions and conflict: under conditions of perfect competition in a capitalist economy, there is no exploitation, and classes do not exist. Even in the absence of rents, however, differential control over the physical means of production may still generate class antagonism because the material welfare of capitalists simultaneously depends on the exclusion, deprivation, and active cooperation of workers (Roemer 1982; Wright 2000).

Another counterintuitive implication of the rent-based approach is that it is possible for highly disadvantaged segments of the population to exploit far more advantaged and powerful social actors. For example, according to the rent-based framework, poor workers whose wages

are held above competitive prices as a result of labor market institutions, like the minimum wage or collective bargaining, exploit wealthy employers who incur the costs of these higher wages in the form of lower profits.

Finally, the most troubling aspect of the rent-based approach to class analysis is that it is impossible to define and observe the classes that extract rents and the classes that pay rents. Because classes are defined with reference to a particular type of counterfactual economy that will likely never be observed or even approximated anywhere in the real world, this theoretical approach precludes observation and measurement of its central concept.

CHAPTER IV

Property, Authority, and Social Class

Building on prior approaches to class analysis, this study proposes a theory of class structure based on the social relations of production that attempts to overcome some of the inconsistencies and limitations that afflict existing theoretical frameworks. The proposed theory is closely informed by several interrelated approaches within the conflict theoretical framework (Dahrendorf 1959; Marx 1978; Proudhon 1994; Proudhon 2011; Wright 1979; Wright and Perrone 1977), including anarchist and neo-Marxist theories of class. Briefly, it conceives of social classes as conflict groups with objectively antagonistic interests grounded in exploitative and oppressive social relations of production. The social relations of production refer to patterns of exclusionary control over different factors involved in the production process. Property relations refer to control over the means of production, and authority relations refer to exclusionary control over individuals involved in the production process.

Unequal property and authority relations are assumed to engender exploitation and domination between those who own and control the workplace and those who do not. Exploitation and domination are defined counterfactually. They refer to the effects of restructuring the social relations of production on the material welfare and self-determination of different sets of social actors involved in production. Specifically, unequal ownership and authority relations within a workplace are said to be exploitative and oppressive if equalizing or

democratizing these relations would increase the material welfare and self-determination of those who were formerly denied participation in ownership and management, and reduce the material welfare and self-determination of those who formerly had exclusionary control over the means and processes of production. A class, then, is a set of social actors who would experience a similar increase or reduction in their material welfare and self-determination as a result of this counterfactual transformation of workplace social relations. In other words, a class is composed of actors who are similarly exploited and dominated (or exploiting and dominating) by virtue of the shared advantages and disadvantages that accompany their position in the social relations of production.

Property and Authority in Anarchist Theory

Anarchist theories of class focus on the social relations of production. Production requires the deployment of a variety of factors: the means of production, including raw materials, land, tools, machines, and so on, combined with labor power of different types. It also requires decisions about the manner in which this deployment is executed. The production process can be described from both a technical and a social relational perspective (Wright 2005). A technical description of the production process uses a production function to describe how inputs of different kind and quantity combine to produce specific outputs. A social relational description of the production process focuses on effective control over different factors of production and over decisions regarding the nature of their deployment.

Effective control over productive assets and over decisions in the production process involves relationships between different people, not relationships between people and things. To control a parcel of land, for example, means that an individual or group can exclude other

individuals from its use and disposition. Similarly, effective control over the production process that takes place on this piece of land refers to the ability of an individual or group to exclude others from the great variety of decisions about land utilization, the type and volume of inputs and outputs, and the deployment of technology and labor power. The totality of these different relationships of control constitutes the social relations of production.

In traditional anarchist theory, property ownership refers to exclusionary control over the means of production. It is a "right of domain" over a thing (e.g., a piece of land, a building, a machine, or even an idea) that allows certain individuals to control whether and how it is accessed and used by others (Proudhon 1994:36). Property ownership establishes a social relation among individuals that is different from mere possession, which refers to individual use of a thing without an accompanying "right." Property relations are said to be unequal when ownership and possession are decoupled such that individuals who possess the means of production (i.e., use them) do not have property rights in the means of production (i.e., own them).

Unequal property relations are held to generate exploitative and oppressive relationships between owners and users of the means of production. Proudhon (1994) argues that "neither land nor labor nor capital is productive…production results from the combination of all three of these equally necessary elements, which, taken separately, are equally sterile…the proprietor who asks to be rewarded for the use of a tool or the productive power of his land makes a fundamentally false assumption, namely, that capital by itself produces something and that, in being paid for this imaginary product, he receives literally something for nothing" (126-127). According to anarchist theory, then, unequal property relations result in "exploitation" because they allow owners to "consume without producing," and this transfer of resources from a productive group

of workers to an unproductive group of proprietors contributes to "the poverty of the laborer, the luxury of idleness, and the inequality of conditions" (92, 159).

In addition to exploitation, unequal property relations also lead to domination within the workplace, according to traditional anarchist theory. Domination is a second source of antagonism between those with and without property rights in the means of production because it is thought to violate an individual's natural proclivity for greater self-determination. For example, Proudhon (1994) contends that "property necessarily engenders despotism" because owners can "impose [their] will as law" within the sphere of their property (210-211). That is, during working hours, those who would otherwise lack access to the means of production must submit to the direction of property owners in order to produce and consume for themselves. Thus, anarchist theory conceives of unequal property relations, or exclusionary control over the means of production, as generating exploitation and domination, which in turn lead to intergroup antagonism between those with and without control over the assets needed for production.

In the anarchist framework, another type of social relation is also thought to engender intergroup inequality and conflict—authority. For example, Bakunin (1953a:249) asserts that "anyone invested with authority must…become an oppressor and exploiter of society". Similar to the distinction between property and possession, anarchist theory establishes a distinction between authority and influence. Authority represents power or control over others that derives from the hierarchical organization of institutions. It requires that some individuals "submit at all times to…a wisdom and a justice, which in one way or another, is imposed on them from above" (Bakunin 2013:25). Influence, on the other hand, refers to persuasive sway over others deriving from competency and knowledge. Authority is ultimately an exclusionary social relation that limits the influence of subordinates over institutional decisions that affect their own lives.

Anarchist analyses of authority involve a variety of hierarchical institutions and relationships, but this review draws specifically on analyses of authority in production as typified by critiques of statist economies with centralized control of economic decision-making. For the anarchist framework, authority relations in production—defined in terms of exclusionary control over the direction, organization, and execution of the production process—engender exploitation and domination, even without unequal property rights in the means of production. Responding to the traditional Marxist argument for consolidation of production operations under the control of a worker-dominated state (e.g., Marx 1978b), anarchist theory contends that "the state organization, having been the force to which minorities resorted for establishing and organizing their power over the masses, cannot be the force which will serve to destroy these privileges" (Kropotkin 1970:170). This hierarchical approach to organizing production is held to perpetuate the class inequalities it purports to abolish: "when all the other classes have exhausted themselves, the state becomes the patrimony of the bureaucratic class" (Bakunin 1972:318).

According to this theoretical framework, individuals in positions of institutionalized authority depend, at least in part, on the production of others for their own consumption. Ordering, directing, coordinating, and other managerial decisions contribute to production only through their combination with the directly productive activities of workers (Bakunin 1953). When control of the production process is organized hierarchically, these tasks are exclusively controlled by a select subset of individuals, and they consume by virtue of appropriating part of the product directly produced by their subordinates.

Hierarchical organization of production is also thought to promote domination. Within statist economies, this type of domination is particularly severe because those in positions of state authority possess a level of control over subordinates that extends beyond working hours.

For example, Kropotkin (1970:171) argues that "if the state became the owner of all the land, the mines, the factories, the railways, and so on, and the great organizer and manager of agriculture and all the industries…if these powers were added to those which the state already possesses…we should create a new tyranny even more terrible than the old." Even in the absence of unequal property relations, when workers are denied "the rights and prerogatives of associates and managers" and lack "a deliberative voice in the council" of the workplace, anarchist theory anticipates the emergence of a "new aristocracy" based on "another form of monopoly" (Proudhon 2011b:213-216). This approach to class analysis, then, contends that authority within production leads to exploitation and domination between those in positions of authority and those subject to that authority.

Absent property and authority relations, skill differences are not generally thought to engender exploitation or domination within anarchist theory. Possessing or lacking skills does not constitute an exploitative or oppressive social relation because skills are inalienable; because skill differences alone cannot enable a subset of workers to consume without producing; and because skills do not immediately translate into control over others at the point of production. For example, Proudhon (1994:96-7) argues that "the strong cannot be prevented from using all their advantages," and the result for the stronger worker is "a natural inequality, but not a social inequality, since no one has suffered for his strength and productive energy." Despite the many tensions and ambiguities in anarchist theory about differences in individual capacities, skill inequality by itself is not held to generate exploitation, domination, and the consequent antagonistic interests that define class divisions for this theoretical framework.

In sum, anarchist theory conceives of social classes as conflict groups with objectively antagonistic interests grounded in exploitative and oppressive social relations of production.

Exploitation and domination are thought to emanate from unequal property and authority relations, which establish exclusionary control over the means and processes of production, but not from individual attributes or skills. The shared advantages and disadvantages linked to exploitation and domination shape the interests of different social actors and generate intergroup antagonism, and thereby define class divisions.

A Counterfactual Theory of Exploitation, Domination, and Class

In traditional anarchist theory, exploitation and domination are vague and poorly defined concepts. For example, as in classical Marxist theory, the traditional anarchist concept of exploitation is based on the flawed labor theory of value and problematic distinctions between productive and unproductive labor. Moreover, the assumptions needed to translate patterns of exploitation and domination into patterns of intergroup conflict are not clearly articulated. Building on the approaches of Roemer (1982), Wright (1984; 1985), and Screpanti (2003), this study defines exploitation and domination counterfactually, that is, in terms of the effects of restructuring workplace property and authority relations on the material well-being and self-determination of different sets of social actors. This definition is intended to precisely identify situations in which one group benefits at the expense of another by virtue of their exclusionary control over the means and processes of production.

Roemer (1982) constructed a theory of exploitation based on a game theoretic analysis of the distributional effects of alternative types of property rights in competitive market economies. For this approach, rational social actors are thought to generate income according to a competitive model under a particular set of property constraints, where rights and powers over different factors of production are unequally distributed. The “game” or strategic decision that

different coalitions of actors face is whether to withdraw from the current economy with unequal property rights to a counterfactual alternative economy in which effective control over productive assets has been redistributed. Within this framework, a coalition of actors is said to be exploited, and a complementary coalition is said to be exploiting, if there is a counterfactual alternative economy in which the exploited coalition would be better off in terms of income available for consumption, and the exploiting coalition would be worse off. In other words, exploitation describes a situation where transforming the social relations of production would make some actors better off and other actors worse off in terms of their material welfare.

The game theoretic approach is unsatisfactory because virtually any inequality can be defined to constitute an exploitative relationship according to the "withdrawal" criteria outlined above. Consider the scenario of two island societies that neither interact nor trade with each other. One island society controls a large amount of physical assets and the other controls only the minimum amount of capital needed for survival. Based on the game theoretic withdrawal criteria, the rich island society exploits the poor island society, even though the exploited and exploiting groups in question have no social interaction: if the coalition from the poor island were to withdraw to a counterfactual alternative economy with their per-capita share of physical assets, they would be materially better off, while the coalition from the rich island would be worse off. The withdrawal criterion therefore designates as exploitative any situation in which some productive asset is distributed unequally, but without some type of social interaction, it is unlikely that inequalities in productive assets would generate the type of antagonistic interests that the concept of exploitation is intended to capture (Wright 1984; 1985).

Extending the game theoretic approach, Wright (1984; 1985) attempted to avoid this limitation by adding an additional criterion for identifying exploitation: not only does

exploitation involve an inverse relationship between the material welfare of different actors based on exclusionary social relations of production, it also involves an appropriation of labor effort. According to this perspective, the exploiting coalition of actors must depend on the labor effort of the exploited for their material advantages. This conception of exploitation identifies the unique combination of material inequalities and interdependency that is thought to have a powerful impact on intergroup conflict.

Based on these theoretical foundations, exploitation and domination are here defined in terms of counterfactual comparisons between feasible alternative economies. An economy is feasible when it can be implemented without changing technologies or resource endowments but merely by changing the way productive enterprises are socially organized. Specifically, exploitation is said to transpire in an economy with unequal property and authority relations if the following conditions are satisfied. First, democratizing or otherwise equalizing workplace property and authority relations (e.g., by transforming a privately owned and hierarchically managed firm into a worker-owned and horizontally managed cooperative) would increase the material welfare of individuals who had formerly lacked participation in ownership and management and would decrease the material welfare of those who formerly had exclusionary control over the means and processes of production. Second, withholding labor effort on the part of individuals who lack ownership and authority in production (e.g., by going on strike) would not only reduce their own material welfare but also would reduce the material welfare of those with exclusionary control over the means and processes of production. Together, these counterfactuals formally define the inverse welfare relationship and interdependence between different coalitions of actors that are thought to emerge from exclusionary social relations of production.

Domination is similarly defined in counterfactual terms, except the outcome of interest is not material welfare but rather the scope for self-determination. Specifically, domination is said to transpire in an economy with unequal property and authority relations if democratizing or otherwise equalizing these relations would increase the self-determination of those who were formerly denied participation in ownership and management and reduce the self-determination of those who formerly had exclusionary control over the means and processes of production. In other words, domination occurs at the point of production when one set of social actors, by virtue of their position in the workplace property and authority structure, can make decisions that govern the activities of others without any input from those directly impacted by these decisions.

For some theorists in the class-analytic tradition (e.g., Marx 1978; Proudhon 1994), it appeared self-evident that unequal property and authority relations are exploitive and oppressive, but the counterfactual approach outlined here highlights the contingent nature of these phenomena. Conventional economic models of utility maximizing agents imply that, other things being equal, the earnings of individuals in a worker-owned and managed cooperative would exceed their earnings in a capitalist firm where those who supply the firm's capital and manage the company enjoy the residual returns (Craig and Pencavel 1992, 1995). By extension, these models also imply that, other things being equal, the owners and managers of capitalist firms would have lower earnings if their enterprises were reorganized as cooperatives. Consistent with these models, empirical research comparing cooperative firms to capitalist firms suggests that members of cooperative firms are more productive and tend to have higher levels of compensation, job security, and job satisfaction (Bartlett et al. 1992; Blasi, Conte, and Kruse 1996; Burdin and Dean 2009; Craig and Pencavel 1992, 1995; Levine and Tyson 1990; Kruse and Blasi 1995; Kruse, Freeman, and Blasi 2010; Meyers 2006).

Nevertheless, the counterfactual approach calls attention to situations in which democratizing or otherwise equalizing the social relations of production may not affect the material welfare and self-determination of different social actors in the anticipated direction. For example, worker participation in management may introduce inexperienced and unqualified personnel to the decision-making process, slowing it down and potentially resulting in decisions that substantially harm a firm's performance. Because of inefficiencies in collective decision-making, the material welfare of individuals who formerly lacked participation in ownership and management may not increase in response to workplace democratization.

Similarly, the self-determination of individual workers may not be appreciably enhanced by supplanting hierarchical with horizontal management if cooperative enterprises require excessive peer monitoring, supervision, and control in order to sustain the same level of productivity. Finally, because individual incentives for technological innovation are endogenous to the strength of property rights, an economy based on collective ownership of firms by workers may innovate and grow at a slower rate than an economy based on private ownership of firms by individuals. As a result, it is possible that equalizing or democratizing property and authority relations within production would reduce long-term earnings for everyone and not just for those individuals in positions of ownership and control. Given the inherent contingency of the counterfactual contrasts that define exploitation and domination, it is only ever appropriate to characterize social actors who lack control over the means and processes of production as vulnerable to, but not necessarily subjected to, exploitation and domination. Analogously, social actors with exclusionary control over the means and processes of production must be characterized as capable of, but not necessarily perpetrators of, exploitation and domination.

Positions within the social relations of production that are merely vulnerable to or capable of exploitation and domination, however, are still thought to give rise to detectable patterns of intergroup conflict under the following assumptions. First, individuals are assumed to have an interest in improving their material well-being and enhancing their capacity to make choices that affect their own lives. Second, individuals are assumed to be able to conceive of feasible alternatives to the current economy. Third, individuals are assumed to be capable of recognizing that an alternative economy is likely to be better or worse than the current economy in terms of their material well-being and capacity to make choices that affect their lives.

Under these assumptions, different coalitions of individuals have some level of awareness of the shared advantages or disadvantages they are likely to incur by virtue of the current social relations of production and their position in them. In this situation, these different coalitions are anticipated to engage in conflicting courses of action, as those who are capable of exploitation work to maintain the social relations from which they are likely to benefit and those who are vulnerable to exploitation attempt to transform the social relations from which they are likely to suffer. The extent of this type of intergroup conflict is thought to be a function of (1) the degree to which individuals desire to enhance their material welfare and self-determination, (2) the magnitude of the gains and losses in material welfare and self-determination associated with transforming workplace social relations relative to the costs of such a transformation, and (3) the accuracy with which different coalitions of actors recognize these gains, losses, and costs.

The definition of exploitation and domination outlined here is non-normative. It makes no claim about the injustice of exploitative and oppressive social relations of production. Rather, it simply provides an analytic device for explaining why individuals that occupy different positions in the social relations of production are expected to think and behave in conflicting

ways. To issue ethical judgments about different modes of organizing production and their consequences for the distribution of material welfare and self-determination requires a corresponding normative theory of justice, which is beyond the scope of this study.

In sum, unequal property and authority relations (potentially) engender exploitation and domination, and social classes are defined as positions within these social relations that are similarly advantaged or disadvantaged in terms of their prospects for material well-being and self-determination. At a high level of abstraction, then, class structures are composed of proprietors, managers, workers, and independent producers. Proprietors own the means of production and control the activities of workers. Managers do not own the means of production, but they direct the production process and control the activities of workers. Workers lack control over the means of production and over the production process, and they labor under the direction of proprietors and managers. Finally, independent producers own the means of production and direct the production process within a self-operated enterprise, but they do not control the activities of other workers.[3] Proprietors and managers are capable of exploiting and dominating workers; workers are vulnerable to be exploited and dominated by proprietors and managers; and independent producers are neither capable of nor vulnerable to exploitation and domination.

These class positions are fundamentally relational. This relational conception of class, however, does not preclude internal heterogeneity among classes. In particular, gradational differences in property and authority—for example, the difference between a chief executive officer and a line supervisor, or between a proprietor with a majority stake in a large company and a small business owner—are also thought to shape intergroup antagonism because they determine the magnitude of the effects on material welfare and self-determination of a

[3] Although this class typology is based on different theoretical foundations, it resembles a simple typology that was used in several early studies of class structure but then subsequently abandoned in favor of more complex class schemas (Robinson and Kelley 1979; Wright and Perrone 1977).

counterfactual transformation of workplace social relations. In general, for large proprietors and high-level managers, the consequences of restructuring the exclusionary social relations from which they benefit are much more pronounced, and thus their interest in maintaining these social relations and the degree to which their behavior reflects these interests are likely stronger. These gradational distinctions within class positions that are capable of exploitation and domination are termed class strata.

The conception of class outlined in this study differs from other theoretical approaches to class analysis in several ways. It differs from neo-Durkheimian (Grusky 2005; Grusky and Sorensen 1998) and neo-Weberian theories (Breen 2005; Erikson and Goldthorpe 1992; Featherman and Hauser 1978) in that it views occupational groups based on the technical division of labor and conflict groups based on the social relations of production as distinct phenomena with unique and separable effects on individual lives. The fundamental difference between classical Marxism (Marx 1971) and the approach to class analysis outlined in this study lies in their conflicting views on authority, which for Marx was not viewed as an independent basis for class divisions. On this point, the anarchist approach has much in common with neo-Marxist class theory (Wright 1979; Wright 1984; Wright 1985), whose emphasis on rights and powers over both the means of production and the technical division of labor (i.e., "organizational assets") resonates with the anarchist framework's focus on property and authority relations. Yet despite this similarity, the anarchist approach outlined in this study differs from other elements of neo-Marxist theory—in particular, its equation of skill inequalities with class divisions (Wright 1985).

Absent unequal property and authority relations, skill inequality is not thought to be exploitative or oppressive for several reasons. First, possessing or lacking skills is not a social

relation because skills are inalienable. Thus, a counterfactual economy with equalized skills does not satisfy the feasibility criterion because it could only be implemented by changing resource endowments—in particular, the supply of skills—and not simply by changing social relations within the workplace.

Second, even if the feasibility problem is ignored, skill inequality does not engender interdependence between skilled and unskilled producers because the former group does not depend on the labor effort of the latter for their material advantages. If unskilled producers were to withhold their labor effort from production, the likely consequence would be an increase, not a decrease, in earnings for skilled producers owing to a general shortage of labor power.

Finally, it remains unclear whether equalizing skills would increase the self-determination of unskilled producers and decrease that of skilled producers because enhanced laboring abilities need not translate into control over others at the point of production. Exploitation and domination, therefore, are not directly linked to skill inequalities. Skills are an individual productive attribute that may have pronounced effects on material welfare and political behavior, but differences in laboring abilities should not be characterized as class divisions. Despite the many tensions and ambiguities in anarchist theory about individual differences in capacities, this conception of skill inequality resonates with Proudhon's (1994:96-7) argument that "since the strong cannot be prevented from using all their advantages," the result is "a natural inequality, but not a social inequality, since no one has suffered [from their] strength and productive energy."

CHAPTER V

Class Structure and Income Distribution

The link between class structure and growing aggregate income inequality must not be assumed but rather subjected to rigorous empirical investigation. The mere existence of unequal property and authority relations alongside growth in aggregate income inequality does not by itself provide evidence for the continuing relevance of class. This argument confuses changes in income inequality at the population level with changes in inequality between subgroups that comprise the population. There are two mechanisms through which class structure is linked to changes in aggregate income inequality: compositional changes in the relative size of different classes and changes in between-class income differences. In addition, trends in aggregate income inequality are also a function of changes in residual, or within-class, income dispersion. To develop hypotheses about the direction and magnitude of compositional, between-class, and within-class effects, this section synthesizes theory and prior research about changes in class structure and class inequality since the early 1980s.

In state capitalist economies, a variety of mechanisms link property and authority to income, including supply and demand for different factors of production, economic rents that emerge from market distortions and incentive problems, the balance of bargaining power between classes, and state institutions. Income returns to factors of production are determined, at least in part, by the forces of supply and demand. Individuals with property rights in land, raw materials, machinery, and so on garner income according to the unit price of these factors, which

is linked to supply and demand and is equivalent to their marginal productivity in a perfectly competitive market at equilibrium. When ownership of the physical means of production is highly unequal, very large incomes accrue to proprietors owing to the marginal contribution of their physical assets to production. For those without property rights in the physical means of production, income is largely based on the price of their labor power, which is also equal to its marginal productivity in a perfectly competitive market at equilibrium.

Apart from factor productivity, property and authority are often linked to market distortions and incentive problems that generate rent income. Two types of economic rents are particularly important: monopoly rents and loyalty rents. When proprietors monopolize a particular physical asset, industry, or market—even if only at a local or regional level—they can extract additional income through price fixing. A different type of rent accrues to individuals in positions of authority within the production process. When ownership and authority are separated within a production unit, proprietors develop incentive structures to ensure that managers direct the production process in a way that maximizes profits. These incentives take the form of compensation packages that include a "loyalty rent" designed to secure responsible and effective performance from managers (Wright 1997:21).

Another important determinant of income distribution is the balance of power between different classes in the conflict over the division of net output. Because property and authority relations entangle proprietors, managers, and workers in an interdependent relationship within production, where proprietors and managers depend directly on the labor effort of workers and workers depend on proprietors and managers for access to the means of production, these different class positions are endowed with a particular form of power based on their ability to withdraw from the production process (Wright 1985; Wright 1994).

For proprietors and managers, their power to enforce demands on workers derives from their ability to withhold access to the means of production. This power is reflected in plant closings and relocations, lockouts, and other forms divestment. The magnitude of this power depends on the strength of property rights and managerial hierarchies as well as the degree to which capital is mobile relative to labor. For workers, the power to enforce demands on proprietors is based on their ability to withhold labor effort. This power is reflected in actions like individual shirking, organized slowdowns, worksite occupations, and striking. The magnitude of this power is proportional to the extent of worker organization. Different forms of capital and labor divestment can be leveraged to exact distributional changes or to achieve institutional reforms more or less favorable to different classes.

In addition to divestment, state institutions, such as tax and transfer programs, price controls, business subsidization, regulation, monetary and trade policies, and labor legislation, can have disparate distributional consequences for different classes. These policies and institutions are thought to be highly sensitive to different manifestations of class power. In many cases, state interventions in the economy may come about as resolutions to the type of overt class conflict discussed previously, where, for example, business subsidies are introduced by local government after an industry threatens to relocate. Class-based political activism may also shift state policy. For example, the formation and support of political organizations, information campaigns, policy lobbying, and electoral fundraising may influence state interventions in the economy with distributional effects that favor one class over another.

A Class-analytic Approach to Growing Aggregate Income Inequality

The class-analytic approach guiding this analysis suggests three interrelated social changes have the potential to modify the distributional mechanisms discussed previously and transform the relative size of different classes: changes in market competition, technological development, and class-based political activism.

Anarchist theory holds that market competition has a paradoxical tendency to reduce the number of competitors and to promote concentration of the means of production among an increasingly selective group of proprietors and managers. Consistent with classical economic theory, Proudhon (2011b) argues that competition, in principle, is essential for determining prices and therefore absolutely necessary for maximizing efficiency and overall well-being: "competition is necessary to the constitution of value…as long as a product is supplied only by a single manufacturer, its real value remains a mystery…either through…misrepresentation or through…inability to reduce the cost of production to its extreme limit" (196).

However, Proudhon (2011b) also cautions that, in practice, competition has a tendency to resolve itself in monopolies rather than an efficient allocation of resources and general well-being: "competition kills competition…the more competition develops, the more it tends to reduce the number of competitors," and thus "monopoly is the inevitable end of competition" (200, 208). Because competitors control vastly different resources upon entering the market, the best-equipped proprietors and managers use all their advantages to eliminate or absorb inferior businesses, while inferiors consolidate and merge together in an attempt to survive. This perspective suggests that periods of heightened competition are followed by a paradoxical shift toward consolidation, centralization, and monopoly control—a process that is thought to reduce

the relative number of proprietors and managers, generate rent income for large proprietors and high-level managers, and weaken the bargaining position of workers.

The sudden emergence and rapid escalation of foreign competition with American business during the 1970s is well documented (Bluestone and Harrison 1982; Harrison and Bluestone 1988). For example, between 1969 and 1979, the value of total manufacturing imports as a percentage of gross national product in the manufacturing sector increased from 13.9 percent to 37.8 percent (Harrison and Bluestone 1988:9). Following this sudden increase in market competition during the 1970s, most indicators show that the pace of industrial monopolization accelerated (Foster, McChesney, and Jonna 2011; Kerbo 2009). This suggests that foreign competitive pressure in the 1970s and 1980s eliminated smaller firms and provided the impetus for larger firms to merge and consolidate. For example, between 1960 and 1980, the share of industrial assets held by the top 100 corporations increased slowly from about 46 percent to 55 percent, but thereafter, asset concentration increased to about 75 percent by the early 1990s (Kerbo 2009:190).

Technological development may also promote economic concentration and undermine worker bargaining power. Although in classical economic theory, technology is expected to yield greater output, lower costs, and a general increase in material welfare, anarchist theory posits that technological development may have paradoxical effects on the material welfare of different classes. Specifically, technological development, like competition, is thought to promote monopolization. For example, Proudhon (2011b:172) argues that "if a machine is invented, it will first extinguish the fires of its rivals; then, a monopoly established, and the worker made dependent on the employer, profits and wages will be inversely proportional." In addition, technology is often intentionally used to subvert collective action the part of workers, and

technological advances may enhance the scope for capital mobility, which is thought to enhance competition among workers and shift the fulcrum of bargaining power in favor of proprietors and managers (Bluestone and Harrison 1982; Harrison and Bluestone 1988; Proudhon 2011b).

Finally, because technological development often displaces workers and because it is an incessant process, innovation is thought to yield a chronic oversupply of labor, which suppresses wages and further undermines worker bargaining power. With the introduction of labor-saving technology, Proudhon (2011b:191) argues that "after a lapse of time, the demand for the product having increased in proportion to the reduction of price, labor in turn will come finally to be in greater demand than ever…with time [emphasis in original], the equilibrium will be restored; but…the equilibrium will be no sooner restored at this point than it will be disturbed at another, because…invention never stops." Anarchist theory therefore implies that periods of rapid technological development will be characterized by growing monopolization, an enhanced capacity for proprietors and managers to subvert worker bargaining power, and a persistent oversupply of workers. In addition, technological rationalization may also be used to control workers at the point of production while avoiding the necessity of human surveillance, which may exert downward pressure on the growth of managerial hierarchies.

The recent period of growing aggregate inequality is marked by two types of technological change thought to be particularly important for changes in the relative size of classes and for changes in income differences between classes: (1) improvements in transportation and communication, such as advances in high-speed air travel and high-volume shipping, construction of the interstate highway system, and new telecommunication capabilities, and (2) the development of advanced automation and microcomputers. The development of transportation and communication technology provided an environment within which production

operations could be widely dispersed in space and rapidly relocated. Growth in the scope of capital mobility since the early 1970s is evidenced by increased employment losses due to plant relocations, shutdowns, and cutbacks; the disproportionate increase in foreign versus domestic investment by American-based companies; and the transfer of manufacturing employment from the Northeast and Midwest to the South and Southwest (Bluestone and Harrison 1982; Harrison and Bluestone 1988). Advances in automation and computers are also linked to worker displacement in a wide variety of occupations, with evidence indicating that the introduction of these technologies during the 1970s and 1980s lowered aggregate demand for workers performing routine manual or routine cognitive tasks (Autor, Levy, and Murnane 2003).

Thus, along with simple cost reductions and productivity gains for individual firms, the class-analytic perspective outlined here posits that periods of rapid technological development are characterized by growing monopolization, a chronic oversupply of workers, and a stronger bargaining position for proprietors and managers relative to workers—all leading to greater concentration of income among a shrinking group of high-earning proprietors and managers at the expense of an expanding number workers.

In addition to shifts in the competitive environment and technological development, the escalation or abatement of group organization, direct action, and other political activities on the part of different classes may result in distributional change through their influence on state policy and the institutional landscape. This type of class conflict is a central determinant of distributional change, according to anarchist theory: "the general facts which govern the relations of profits to wages and determine their oscillations…are the most salient episodes and the most remarkable phases of the war between labor and capital" (Proudhon 2011b:179).

Research on class-based forms of collective action indicates that the 1970s and 1980s were a period of unprecedented political mobilization by proprietors and managers in America (Dumenil and Levy 2004a; Harvey 2005; Mizruchi 2013; Useem 1984). Business political activity, including use of anti-union tactics, subvention of political candidates, establishment of nonprofit policy organizations, and issue advertising, greatly intensified during this period. For example, worker firings during union election campaigns increased roughly threefold between 1976 and 1986 (Schmitt and Zipperer 2009), and between the late 1960s and early 1980s, the number of corporate political action committees increased from about one hundred to more than one thousand (Useem 1984).

Although it is difficult to draw direct causal connections between shifts in class-based political activity and institutional change, evidence indicates a strong correspondence. The political mobilization of proprietors and managers during the 1970s and 1980s was closely followed by a set of institutional changes thought to depress worker compensation and shift income toward those with property and authority in production. For example, unionization rates were halved in just two decades, declining from about 30 percent of the private sector workforce in 1970 to about 15 percent by the end of the 1980s (Morris and Western 1999), and between 1970 and 1990, the federal minimum wage lost 30 percent of its real value (DiNardo, Fortin, and Lemieux 1996).

The Declining Significance of Class Perspective

In contrast to class-analytic theory, the declining significance of class perspective contends that technological, cultural, and political changes have attenuated, rather than amplified, between-class income differences, and they have expanded, rather than contracted, the

relative number of proprietors and managers (Bell 1973; Pakulski and Waters 1996; Pakulski 2005).[4]

First, technological development is thought to have transformed production from a system based on large capital-intensive enterprises into a system in which small firms flourish, scale economies are less important, and innovation within highly competitive industrial sectors is the primary driver of economic growth (Bell 1973; Pakulski and Waters 1996). These changes, in turn, are held to have promoted a progressive redistribution of productive wealth and a "reduction in the saliency of property in [structuring]…patterns of economic allocation" (Pakulski and Waters 1996:75). Technological development is also thought to have dramatically enhanced demand for complex managerial decision making. Thus, for the declining significance of class perspective, ownership of the means of production has become more decentralized, a large number of different firms have entered new and increasingly competitive markets, and demand for managerial tasks has increased, leading to a decline in incomes for proprietors, an increase in incomes for managers, and an increase in the proportion of proprietors, managers, and independent producers relative to workers.

The declining significance of class perspective also contends that changes in organizational culture have spawned a new corporate environment in which employee well-being is viewed as more important than short-term profitability. According to this approach, modern corporations "are no longer exclusively committed to profitability and now pay much more attention to quality of working life and employee loyalty" (Bell 1973; Pakulski and Waters

[4] In addition to the effects of changes in technology, organizational culture, and political behavior on modern class structures, post-class and post-industrial theories highlight a number of other changes purportedly linked to the dissolution of social classes in modern society, including the attenuation of class effects on personal identities, ideology, tastes, lifestyles, and consumption. Post-class and post-industrial theories also emphasize the fracturing effects of changes in the technical division of labor, skill composition of work, and market segmentation on the social cohesion of workers. This study focuses more narrowly on post-class arguments about changes in technology, organizational culture, and class politics because they have the most clearly defined and pertinent implications for income shifts in between classes and compositional shifts in the relative size of different class positions.

1996:74). Because of the increasing importance of human capital to firms and the declining role of institutions traditionally responsible for insuring against personal economic hardship, proprietors and top managers have re-conceptualized the corporation as an organization responsible not only for the production of goods and services but also for the welfare of workers. Although post-class theory does not outline an explicit set of predictions about the impact of changes in organizational culture on between-class income differences, it can be reasonably inferred that income shares for proprietors and top managers would tend to decline, while income shares for workers would tend to increase, if modern enterprises have become less concerned about profitability and more concerned with the well-being of employees.

Finally, in sharp contrast to the class-analytic approach, this perspective argues that "the significance of class as a basis for political identification and behavior and as a force for change has been declining" (Pakulski and Waters 1996:132). More specifically, the declining significance of class perspective holds that the effects of class-based politics on social institutions intensified during the early twentieth century and peaked during the 1950s, but after this high point, "a reversal of this trend took shape between 1960 and 1990" (133). Because of a decoupling of class and partisanship, a decline in class-based political organizations, and the rise of new and more influential political actors organized around racial, gender, and religious issues, "politics…is ceasing to be a distributive game monopolized by corporate actors" (142). If the ability of proprietors and managers to influence income distribution through political activism and institutional reform has waned rather than intensified since the early 1980s, it is reasonable to infer that their income shares would have declined as the state policy apparatus became less responsive to their economic interests.

Hypotheses

Several hypotheses about trends in class income inequality emerge from the foregoing discussion of theory and research on technology, market competition, and class political activity. The class-analytic approach posits a substantial increase in between-class income differences due primarily to growing incomes for proprietors and managers together with stagnating or declining incomes for workers. In addition, divergent income trajectories for proprietors and managers, relative to that for workers, are anticipated to be even more pronounced for the highest-earning upper strata of these classes because monopolization, technological change, and institutional reforms are thought to be most consequential for larger enterprises and higher levels of the managerial hierarchy. These changes imply a notable inflationary between-class effect on trends in aggregate income inequality since the early 1980s.

The class-analytic approach also posits a modest decline in the relative number of proprietors and managers, and a nontrivial increase in the relative number workers. These changes imply a small dampening compositional effect on trends in aggregate income inequality because they involve shifts in the composition of the population away from classes that typically earn highly variable incomes well above the population average and toward a class that typically earns less variable incomes much closer to the population average.

To the extent that economic concentration, technological development, and class political mobilization have been more consequential for certain subgroups within the same class position, this perspective is also consistent with an inflationary residual, or within-class, effect. Although it does not preclude a notable impact for growing income dispersion within classes, this perspective does insist that trends in aggregate income inequality are not solely due to within-class changes.

An essential component of the class-analytic perspective is that the anticipated changes in between-class income differences and their impact on aggregate income inequality are not simply due to confounding social processes like increasing income returns to education and other skills. Because education is associated with class attainment and its effect on income has been increasing over time, inequality between classes would increase even if property and authority relations have not become more important determinants of income. All of the hypothesized trends outlined here are expected to be highly robust to confounding by educational and demographic differences between classes.

The declining significance of class perspective, by contrast, hypothesizes a nontrivial decline in between-class income differences owing to stagnant or falling incomes for proprietors and growing incomes for managers and workers. These changes imply a notable dampening between-class effect on trends in aggregate income inequality. This perspective also anticipates an increase in the relative number of proprietors, managers, and independent producers together with a decline in the relative number workers. These changes imply a small inflationary compositional effect on growth in aggregate income inequality because they involve shifts in the composition of the population away from a class that typically earns less variable incomes near the population average and toward classes that typically earn highly variable incomes above the population average. In addition, this perspective implies an overwhelming inflationary effect of within-class income dispersion on growth in aggregate income inequality. Indeed, a central tenet of post-class theory is that contemporary changes in material inequalities are almost entirely due to the internal fracturing of classes (Pakulski and Waters 1996; Pakulski 2005).

CHAPTER VI

Trends in Between-class Income Differences

This chapter analyzes between-class changes in the distribution of income from 1983 to 2010. Specifically, it investigates whether income differences between positions in the property and authority structure of the workplace changed during the recent period of growing aggregate income inequality, and if so, which class-specific income trajectories have driven changes in overall class inequality.

Methods

Data and Measures

For this analysis, I use data from the 1983 to 2010 waves of the GSS and the Annual Social and Economic Supplement of the CPS. The GSS contains demographic, employment, and income data from nationally representative samples of non-institutionalized adults in the United States. During the period under consideration, it was conducted annually from 1983 to 1994—except in 1992—and biennially after 1994 (Smith et al 2011). The CPS is based on annual nationally representative samples of the non-institutionalized population and includes data on basic employment and demographic characteristics as well as detailed information on personal income (King et al 2010). This analysis uses two data sources to attenuate the limitations of each survey taken separately. The GSS contains more precise measurements of property and authority relations than the CPS, but it contains a less accurate interval measure of income and is based on

smaller samples. Parallel analyses performed with both data sources allow for a more complete assessment of class structure and income distribution over time.

This analysis focuses on data from 1983 to 2010 because it is the period for which both surveys provide suitable measures of property, authority, and personal income. The analytic sample for this study includes respondents who were 18 to 65 years old at the time of the interview and worked full-time during the previous calendar year. This definition yields a total sample of 20,577 respondents in the GSS and 1,539,568 respondents in the CPS. Supplemental analyses of data that include both full- and part-time respondents yield similar results (see Appendix A). Additional sample restrictions are necessary in some analyses because the requisite data are only available in select survey waves.

In the GSS, respondents are asked whether they are self-employed or whether they work for someone else. This question is used to distinguish between employees who do not own the means of production and individuals with sufficient assets to at least gainfully employ themselves. Respondents to the GSS are also asked whether their main job involves supervising other workers.[5] These GSS items are used to classify respondents as proprietors (self-employed and supervise others), independent producers (self-employed and do not supervise others), managers (work for someone else and supervise others), or workers (work for someone else and do not supervise others).[6]

Like the GSS, the CPS also records a respondent's self-employment status, but it does not directly inquire about a respondent's authority at work. Instead, it asks about a respondent's

[5] The GSS uses a split-ballot survey design, and questions about supervisory responsibilities are typically asked of a random 50 to 75 percent subset of respondents.

[6] Similar approaches to measuring property and authority in production with self-employment and supervisory data are used by Wright and Perrone (1977), Robinson and Kelley (1979), and Halaby and Weakliem (1993). In the GSS, nurses and teachers report an unusually high level of supervisory responsibility at work. This suggests that respondents in these occupations answered this survey question with their responsibilities for students and patients in mind as opposed to their authority over subordinate workers, as is intended. These responses are treated as erroneous, and all teachers and nurses are coded as either workers or independent producers.

occupation, which indirectly provides some information about supervisory and other managerial powers, and together with information on self-employment, these data can be used to assign respondents to different classes. CPS respondents are classified as proprietors if they are self-employed in an occupation that typically involves supervisory or managerial responsibilities; as independent producers if they are self-employed in an occupation that does not typically involve supervisory or managerial responsibilities; as managers if they work for someone else in an occupation that typically involves supervisory or managerial responsibilities; and as workers if they are employed by someone else in an occupation that does not typically involve supervisory or managerial responsibilities.[7] Appendix B provides a detailed explanation of the procedures used to identify occupations that typically involve supervisory and managerial responsibilities, and it investigates the properties of this occupational proxy measure.

This analysis also investigates gradational differences in property and authority among proprietors and managers. The CPS and GSS, since 1992 and 1994 respectively, include a question about the number of employees at a respondent's workplace. This provides an approximate measure of the amount of physical assets controlled by proprietors. Based on this survey item, large versus small proprietors are differentiated according to whether they own a business that employs more versus less than ten workers.

To measure gradational differences in workplace authority, the GSS asks respondents who report supervising others whether any of their subordinates are themselves supervisors. High-level managers are distinguished from low-level managers based on whether their subordinates also have supervisory responsibilities, indicating that they occupy a position closer to the top of the workplace authority structure.

[7] In the CPS, individuals who report being state officials or public administrators are coded as managers regardless of their self-employment status.

With the CPS, the occupational classification system distinguishes between professional managers and executives, and lower level managers and supervisors. These occupational distinctions are used to differentiate high- versus low-level managers among CPS respondents. Analyses of class strata in the CPS are limited to the 1992 to 2002 survey waves because the occupational classification system was revised in 2003 and several large managerial categories were disaggregated to better capture authority distinctions. This increase in measurement precision for managerial strata over time would inflate estimates of income growth for high-level managers. Note that the 2003 revision of the occupational classification system only effects consistent measurement of gradational strata within classes; no evidence indicates that this change appreciably impacts measurement of relational class boundaries.

Personal market income is the dependent variable of interest. This includes income earned during the previous year from an individual's job, business, or investments. It does not include earnings from other family members, transfer income, capital gains, or the value of in-kind benefits. In the GSS, personal income is measured in intervals, and dollar values are imputed based on interval midpoints. For the last open-ended interval capturing the highest incomes, nominal values are estimated using a Pareto approximation (Hout 2004).

The CPS, by contrast, uses an extensive battery of questions to measure income in nominal dollars from employment, businesses, farm operations, and different types of investments. These amounts are then summed to arrive at a measure of personal market income. In the public release of these data, very high incomes are topcoded to protect respondent anonymity. To adjust for this type of right censoring, topcoded incomes are replaced with group means of the uncensored income values above the top-coding threshold, which were computed from internal CPS data and publically reported with special permission by Larrimore et al

(2008). Appendix C provides additional information about income measurement in the GSS and CPS as well as a detailed description of the imputation procedures for topcoded incomes.[8] Nominal incomes are adjusted for price inflation over time using the Consumer Price Index, with all values henceforth expressed in 2011 real dollars. Following convention with self-reported income data (e.g., Card and DiNardo 2002), a small number of full-time respondents who report implausibly low annual incomes are truncated (<5000 real dollars). All analyses are based on untransformed income values. Parallel analyses based on the natural log transformation of income yield results similar to those based on untransformed income data. For simplicity, estimates are displayed on the untransformed scale.[9]

The covariates included in multivariate analyses of both the GSS and CPS are age, race, gender, education, and geographic region. Analyses based on the GSS also include measures of parental education and respondent cognitive ability. These covariates are all commonly included in conventional earnings functions and potentially confound income differences between classes over time. Age is expressed in years; race is coded 1 for black and 0 for nonblack; and gender is coded 1 for female and 0 for male. Geographic region is expressed as a series of dummy variables for Northeast, Midwest, South, and West. Both respondent and parental education are measured in years and recoded as a series of dummy variables for "less than high school," "high

[8] In both the GSS and CPS, I also preformed parallel analyses using a constant multiple adjustment for topcoding in which topcoded incomes are replaced with 1.4 times the topcode threshold. A comparison of imputed values from this procedure with values given by group mean imputation based on uncensored incomes from internal CPS data indicates that constant multiple imputation understates top incomes from the mid-1990s onward, and the problem grows more severe over time. Nevertheless, these analyses produced similar results to those based on the Pareto and group mean imputation procedures reported in the main text, although they suggest slower growth in between-class inequality in the CPS.

[9] Research on income measurement suggests that self-employment income may be underreported by as much as 30 percent in some surveys (Hurst, Li, and Pugsley 2010). This type of measurement error would result in substantial underestimation of between-class income differences at any single point in time, but it would only impact an analysis of trends if its magnitude changed over time. There is some evidence that underreporting of business income is more prevalent at higher income levels, so it is possible that this problem became more severe since the early 1980s as incomes for proprietors substantially increased. If this were indeed the case, it would likely lead to underestimating overall growth in between-class income differences. Thus, the results presented in this chapter may be conservative.

school graduate," "some college," and "college graduate" to account for potential nonlinearities. Cognitive ability is measured with scores on an abbreviated version of the Gallup-Thorndike verbal intelligence test, which ranges from 1 to 10 correct answers (Thorndike 1942). Multiple imputation with five replications is used to fill in missing values for all variables (Rubin 1987).

Analyses

To investigate trends in income differences between classes, I first use local linear regression, a nonparametric curve-fitting technique that avoids strong assumptions about functional form and the error distribution of the outcome (DiNardo and Tobias 2001; Kvam and Vidakovic 2007). The nonparametric regression function is expressed as

$$E(Y|C = j, t) = m_j(t), \quad j = 1, \dots, 4 , \tag{6.1}$$

where $E(Y|C = j, t)$ is the expected income for class $C = j$ at wave t, and $m_j(t)$ is a nonparametric function of time that permits different income trends for each class. The local linear estimator for $m_j(t)$ is given by

$$\widehat{m}_j(t) = \sum_{i=1}^{n_j} a_{ij} y_{ij} = \sum_{i=1}^{n_j} \left(\frac{1}{n_j}\right) \frac{\left(S_2(t) - S_1(t)(t_{ij} - t)\right) K_b(t_{ij} - t)}{S_2(t) S_0(t) - S_1(t)^2} y_{ij}. \tag{6.2}$$

In Equation 6.2, y_{ij} is the real income of individual i in class j, and a_{ij} is a local weight assigned to the income of each respondent, where $S_v(t) = \sum_{i=1}^{n_j} \left(\frac{1}{n_j}\right) (t_{ij} - t)^v K_b(t_{ij} - t)$ and $K_b(t_{ij} - t) = \frac{1}{b} K\left(\frac{t_{ij} - t}{b}\right)$ represents a kernel function with bandwidth b.

This estimator proceeds by computing locally-weighted least squares estimates of a simple linear regression model at each wave t, where observations located farther away from the focal time point receive lower weight than observations close to that time point. The kernel function spreads or concentrates weight around the focal time point depending on its shape and

bandwidth size. Pointwise estimates are obtained from this series of weighted linear regressions, which together characterize the entire conditional expectation function. They are plotted graphically to display time trends in mean income by class. This analysis uses a Gaussian kernel with the bandwidth selected via experimentation in each analysis to achieve a balance between mean squared error and trend parsimony.

The nonparametric regression analysis described here estimates overall changes in mean income by class. Any divergent income trends observed in this analysis, however, may simply be due to changes in the demographic composition of different classes or changes in the income returns to education or other skills that are correlated with class attainment. To adjust income trends for these potentially confounding factors, this study combines inverse probability (IP) weighting with local linear regression. This method involves reweighting observations by the inverse of the conditional probability that they are members of their observed class given their measured characteristics. Weighting by this inverse probability creates a standardized pseudo-population with the distribution of measured covariates balanced across classes at each time point. Local linear regression is then applied to the weighted pseudo-population to estimate trends in mean income that are unconfounded by compositional differences between classes.[10]

This approach to covariate adjustment has several important advantages over more conventional methods. First, IP-weighted local linear regression adjusts for potential confounding of class income differences while remaining nonparametric about the functional form of the relationship between income, class, and covariates over time. Second, this approach

[10] Inverse probability weighting is a flexible method of covariate adjustment developed primarily to draw causal inferences about the effects of treatments in observational studies (Robins, Hernan, and Brumback 2000). This method has other applications, however. At a basic level, it is simply a form of direct standardization—a widely-used technique in demography—that treats the marginal distribution of covariates as the standard to which classes (or treatment groups) are transformed via weighting. This form of standardization addresses the following type of counterfactual question: if, for example, workers and proprietors had the same educational distribution as the overall population at each time point, how would these groups differ in terms of mean income over time?

improves on both fully nonparametric multivariate regression techniques and semi-parametric partial linear models (e.g., DiNardo and Tobias 2001; Yatchew 1998) by avoiding the severe dimensionality problems these techniques suffer when the number of covariates is large.

The IP weight for individual i in class j is given by

$$w_{ij} = \frac{P(C=j|t_i)}{P(C=j|X=x_i,t_i)}, \tag{6.3}$$

where the denominator of the weight is the probability that an individual is a member of her observed class conditional on personal characteristics and time. The numerator of the weight is the probability of membership in that same class location conditional only on time. This ratio of probabilities "up-weights" individuals who are less likely to be members of their observed class given their demographic characteristics, and it "down-weights" individuals who are more likely to be a member of their observed class. The true IP weights are unknown and must be estimated from data. A multinomial logit model of class attainment conditional on individual covariates is used to estimate the denominator of the weight, and a restricted version of this model provides estimates of the numerator. The IP Weights are censored at the 1st and 99th percentiles to improve efficiency and avoid disproportionate influence from a small number of outlying observations. Appendix D provides additional details about IP weighting and local linear regression.

The foregoing analyses are designed to estimate trends in mean income—a somewhat limited single number summary of central tendency, especially with skewed data. To investigate temporal changes across the entire income distribution, this study also uses semi-parametric quantile regression (Hao and Naiman 2007; Koenker and Hallock 2001). These models express income deciles as a function of class, time, and covariates, permitting a more detailed examination of temporal shifts in income distribution between classes than is afforded by analyses of trends in mean income alone.

This decile regression model has form

$$Q_d(Y|C = j, X = x, t) = \beta_{0j}^d + \beta_{1j}^d t + \beta_{2j}^d t^2 + \left(\gamma_{0j}^d + \gamma_{1j}^d t + \gamma_{2j}^d t^2\right)x\,, \tag{6.4}$$

where $Q_d(Y|C = j, X = x, t)$ is the d^{th} decile of the income distribution at time t for the subgroup of respondents in class $C = j$ with covariates $X = x$. In Equation 6.4, the β parameters define a quadratic function of time, and the γ parameters allow this function to differ by levels of measured covariates. Experimentation with different functions of time indicates that a quadratic function performs just as well as higher-order polynomials. This model is estimated with an exterior-point algorithm (Hao and Naiman 2007), and adjusted estimates of trends in income deciles for each class are plotted graphically with covariates set to their pooled sample means.

In analyses of the GSS, confidence intervals for all trend estimates are computed using bootstrap methods (Efron and Tibshirani 1993). Inferential statistics are not reported for analyses of the CPS because its extremely large sample size renders the magnitude of sampling error trivial. The GSS and CPS also provide weights designed to adjust for survey nonresponse and a complex multistage sampling design, respectively. Because analyses conducted with the weighted and unweighted samples are not notably different, results from the unweighted analysis are reported here.

Results

Demographic Composition of Classes

Table 6.1 and Table 6.2 contain statistics describing the demographic composition of classes, revealing stark differences between them. In particular, these estimates reveal a strong and enduring correspondence between ascriptive status and class position, where lower status groups, such as blacks and women, are disproportionately represented among workers, and

higher status groups, such as whites and men, are disproportionately represented among managers and proprietors. For example, during the 1980s, proprietors consisted almost exclusively of white men. In the CPS, only 2 percent of proprietors were black and only 16 percent were female. Among workers, by contrast, about 10 percent were black and 44 percent were female. The GSS reveals a similar pattern of racial and gender differences across classes.

The lower rows of Table 6.1 and Table 6.2 describe educational differences across classes. Both the GSS and CPS show persistent educational disparities, where proprietors and managers have more advanced educations than workers and independent producers. Consistent with these findings, data from the GSS additionally suggest that proprietors and managers, compared to workers and independent producers, have higher cognitive ability and come from families with more highly educated parents. Separate estimates from the 1980s, 1990s, and 2000s document a substantial increase in educational attainment across all classes.

Table 6.1. GSS Sample Characteristics by Class and Decade

Variable	Workers			Ind. producers			Managers			Proprietors		
	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s
Class size												
N	2,776	3,773	5,010	234	395	516	1,823	2,251	2,487	374	481	457
Age	37.77	39.17	40.16	40.68	43.17	44.87	38.09	38.89	40.98	40.94	43.80	45.22
Race												
Nonblack	0.83	0.85	0.83	0.93	0.94	0.95	0.89	0.89	0.88	0.95	0.94	0.94
Black	0.17	0.15	0.17	0.07	0.06	0.05	0.11	0.11	0.12	0.05	0.06	0.06
Gender												
Male	0.49	0.47	0.47	0.61	0.57	0.63	0.61	0.59	0.59	0.76	0.73	0.78
Female	0.51	0.53	0.53	0.39	0.43	0.37	0.39	0.41	0.41	0.24	0.27	0.22
Region												
East	0.20	0.20	0.18	0.18	0.21	0.16	0.20	0.18	0.17	0.17	0.16	0.14
Midwest	0.27	0.25	0.24	0.28	0.22	0.23	0.25	0.24	0.23	0.24	0.25	0.19
South	0.36	0.36	0.38	0.31	0.33	0.39	0.33	0.37	0.38	0.35	0.36	0.42
West	0.16	0.19	0.20	0.23	0.23	0.21	0.22	0.21	0.22	0.24	0.23	0.24
Education												
Less than high school	0.18	0.11	0.12	0.18	0.11	0.10	0.11	0.09	0.09	0.15	0.10	0.08
High school	0.36	0.32	0.28	0.33	0.30	0.28	0.31	0.28	0.24	0.29	0.22	0.23
Some college	0.23	0.28	0.29	0.29	0.30	0.28	0.26	0.29	0.31	0.23	0.23	0.26
College graduate	0.23	0.29	0.31	0.20	0.29	0.34	0.31	0.34	0.36	0.34	0.45	0.43
Verbal ability	5.92	6.11	6.05	6.15	6.37	6.34	6.30	6.24	6.26	6.37	6.77	6.56
Father's education												
Less than high school	0.51	0.40	0.34	0.50	0.41	0.32	0.45	0.33	0.28	0.45	0.32	0.31
High school	0.28	0.32	0.35	0.28	0.31	0.31	0.30	0.34	0.36	0.29	0.31	0.29
Some college	0.09	0.11	0.12	0.06	0.12	0.14	0.10	0.13	0.13	0.10	0.09	0.12
College graduate	0.12	0.17	0.19	0.16	0.17	0.23	0.15	0.19	0.23	0.16	0.29	0.28

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the GSS. Results are combined estimates from 5 multiple imputation datasets. Cells for the covariate by class and year cross-classification contain sample means.

Table 6.2. CPS Sample Characteristics by Class and Decade

Variable	Workers			Ind. producers			Managers			Proprietors		
	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s
Class size												
N	216.4K	309.0K	498.7K	18.5K	24.1K	35.6K	69.3K	106.2K	181.3K	18.3K	24.8K	37.3K
Age	37.76	38.58	40.27	42.37	43.10	44.23	39.65	40.39	42.14	44.25	44.97	46.16
Race												
Nonblack	0.90	0.90	0.88	0.98	0.97	0.94	0.95	0.94	0.92	0.98	0.98	0.96
Black	0.10	0.10	0.12	0.02	0.03	0.06	0.05	0.06	0.08	0.02	0.02	0.04
Gender												
Male	0.56	0.56	0.55	0.78	0.73	0.70	0.67	0.61	0.58	0.84	0.79	0.77
Female	0.44	0.44	0.45	0.22	0.27	0.30	0.33	0.39	0.42	0.16	0.21	0.23
Region												
East	0.23	0.22	0.20	0.18	0.19	0.20	0.24	0.24	0.21	0.22	0.23	0.21
Midwest	0.24	0.24	0.24	0.32	0.29	0.27	0.23	0.23	0.24	0.23	0.21	0.22
South	0.31	0.31	0.31	0.26	0.27	0.27	0.31	0.30	0.31	0.30	0.29	0.28
West	0.22	0.23	0.25	0.24	0.25	0.26	0.23	0.23	0.25	0.26	0.27	0.29
Education												
Less than high school	0.16	0.13	0.11	0.17	0.13	0.11	0.06	0.04	0.03	0.08	0.06	0.05
High school	0.44	0.39	0.34	0.46	0.41	0.37	0.32	0.26	0.22	0.28	0.26	0.23
Some college	0.19	0.27	0.29	0.19	0.26	0.29	0.22	0.27	0.27	0.20	0.24	0.26
College graduate	0.20	0.22	0.26	0.18	0.20	0.23	0.40	0.43	0.47	0.44	0.45	0.47

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the CPS. Results are combined estimates from 5 multiple imputation datasets. Cells for the covariate by class and year cross-classification contain sample means.

Income Differences between Class Positions

Figure 6.1 displays unadjusted local linear regression estimates of mean income from 1983 to 2010, separately for each class. The upper panel of the figure contains estimates from the GSS, and the lower panel contains estimates from the CPS. Consistent with hypotheses about growing income differences between classes, estimates from both samples show a clear divergence in mean income between proprietors and managers, on the one hand, and workers, on the other.

Specifically, results indicate that mean income for proprietors increased substantially since the early 1980s. Point estimates from the GSS show that, on average, proprietors earned about $71,000 (expressed in 2011 real dollars) in 1983 and about $113,000 in the late 2000s, which represents a relative increase of about 60 percent. Mean income for managers also increased substantially, rising more than 25 percent between 1983 and the mid-2000s, from about $55,000 to nearly $70,000. By contrast, mean income for workers grew much more slowly, with estimates from the GSS showing an increase of only 12 percent over three decades, from about $41,000 in the early 1980s to about $46,000 in the late 2000s. Incomes for independent producers grew less rapidly than for proprietors and managers but more rapidly than for workers. Trend estimates from the GSS and CPS are largely consistent, although point estimates of mean income are slightly different between surveys and the magnitude of growth in class income differences is less pronounced in the CPS. In general, both data sources document considerable income gains for managers and proprietors, and minimal growth for workers.

Figure 6.2 displays IP-weighted local linear regression estimates of mean income trends from the GSS and CPS. These adjusted estimates capture divergent trends in mean income between classes that are not simply due to potentially confounding social changes like increasing

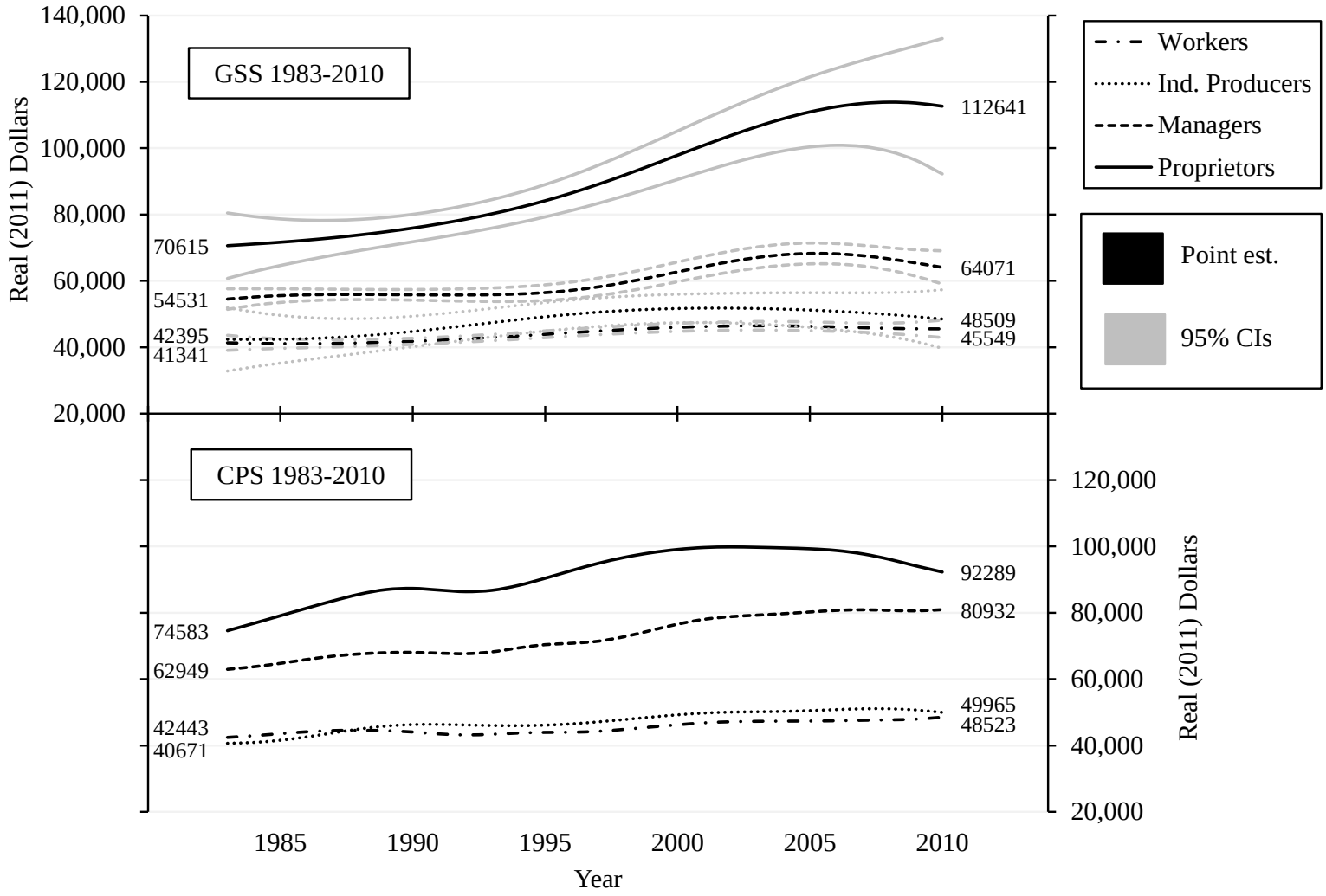
income returns to education or the declining gender wage gap. Overall, adjusted differences in mean income between classes are smaller than unadjusted differences, as expected. But even after controlling for compositional differences across classes, Figure 6.2 indicates that between-class differences in mean income grew much larger over time. Net of demographic characteristics and measured skills, incomes for managers and proprietors increased substantially, while incomes for workers largely stagnated. For example, between the early 1980s and the late 2000s, adjusted estimates from the CPS indicate that mean income increased by 30 percent, from about $65,000 to $85,000, for proprietors; by about 25 percent, from roughly $56,000 to $71,000, for managers; and by about 13 percent, from approximately $46,000 to $52,000, for workers. Adjusted estimates from the GSS, which additionally control for verbal ability and parental education, suggest an even greater divergence in income between proprietors and workers over time.

Figure 6.3 plots the sum of pairwise Euclidean distances between class means at each time point to provide a single number summary of total growth in between-class income differences. This metric is scaled to equal one in 1983, and all values thereafter represent proportionate changes. Estimates from the CPS suggest that unadjusted differences in mean income between classes increased by about 53 percent from 1983 to the mid-2000s, when class inequality reached peak levels, and then declined slightly during the economic recession of 2007 to 2009. After controlling for the potentially confounding influence of education and other demographic characteristics, estimates from the CPS suggest a comparable increase in total class inequality: adjusted differences in mean income increased by about 48 percent from 1983 to the mid-2000s and then declined during the recent recession. In the GSS, estimates suggest an even larger overall divergence in income distribution between classes. Unadjusted and adjusted

differences in mean income are estimated to have approximately doubled and tripled, respectively, since the early 1980s. These estimates, however, are imprecise, as indicated by the wide confidence intervals plotted in gray. Given this high level of variability, caution dictates an emphasis on the more conservative results from the CPS.

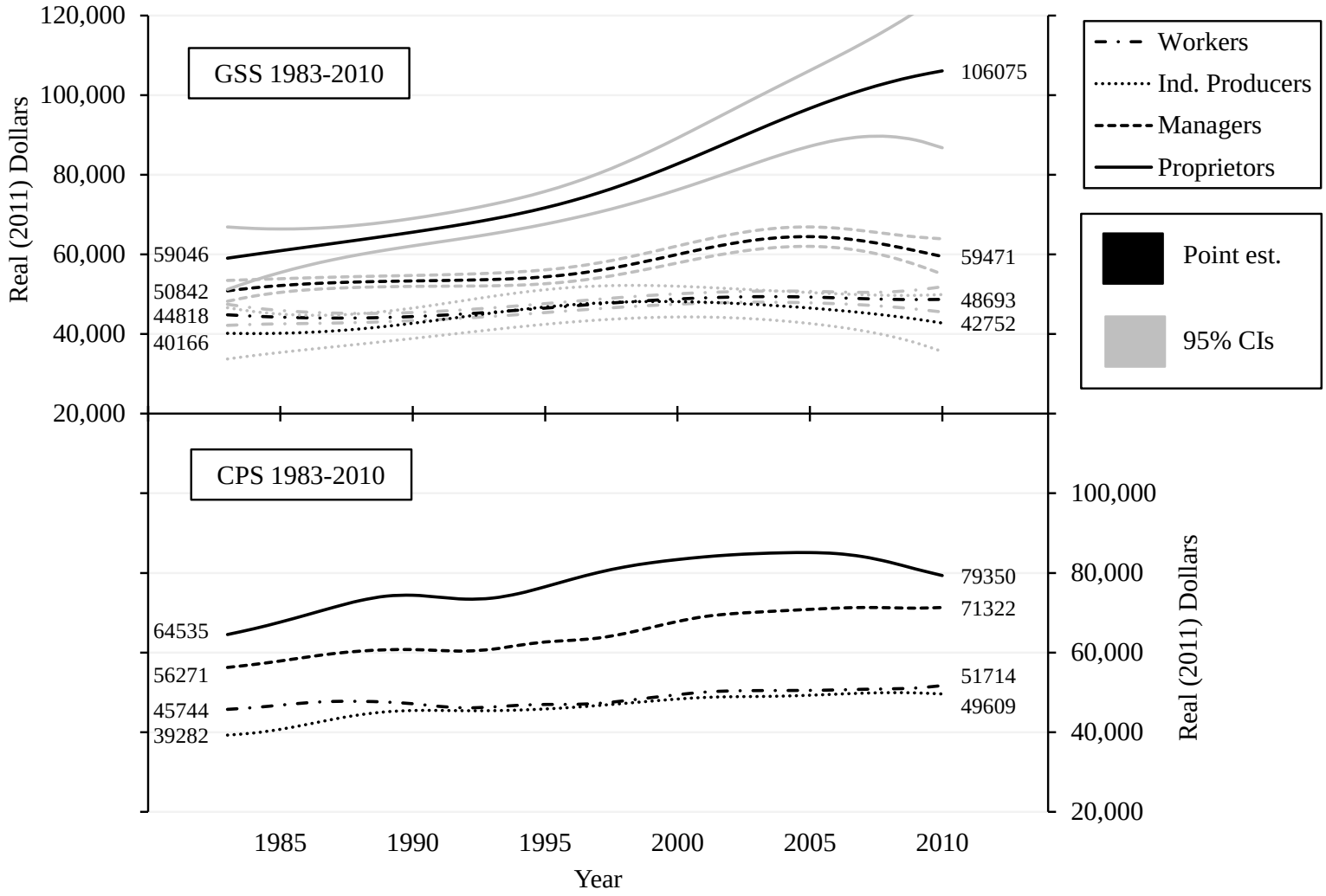
Figure 6.4 contains estimates from decile regression models, which describe temporal changes in both the location and shape of the class-specific income distributions. These estimates are computed only from CPS data because the interval measure of income in the GSS lacks the precision needed to accurately estimate quantiles. Consistent with hypotheses that divergent income trends between classes have been driven predominantly by income growth at the top of the property and authority structure, decile regression estimates indicate that incomes for managers and proprietors in the upper half of the distribution increased substantially since the early 1980s, while incomes in the lower half of the distribution stagnated or increased more slowly. For example, net of education and demographic characteristics, the 90th percentile of the income distribution for proprietors increased by 30 percent, from about $119,000 to $155,000, between 1983 and the mid-2000s. Median income, by contrast, increased by just 7 percent, from about $55,000 to $59,000. For workers, almost the entire income distribution stagnated or declined after controlling for education and demographics. Only the top decile of the income distribution for workers increased by a nontrivial amount, but even this increase—about $7,000, or approximately 9 percent, over three decades—is comparatively modest.

Figure 6.1. Unadjusted Trends in Mean Income by Class Position



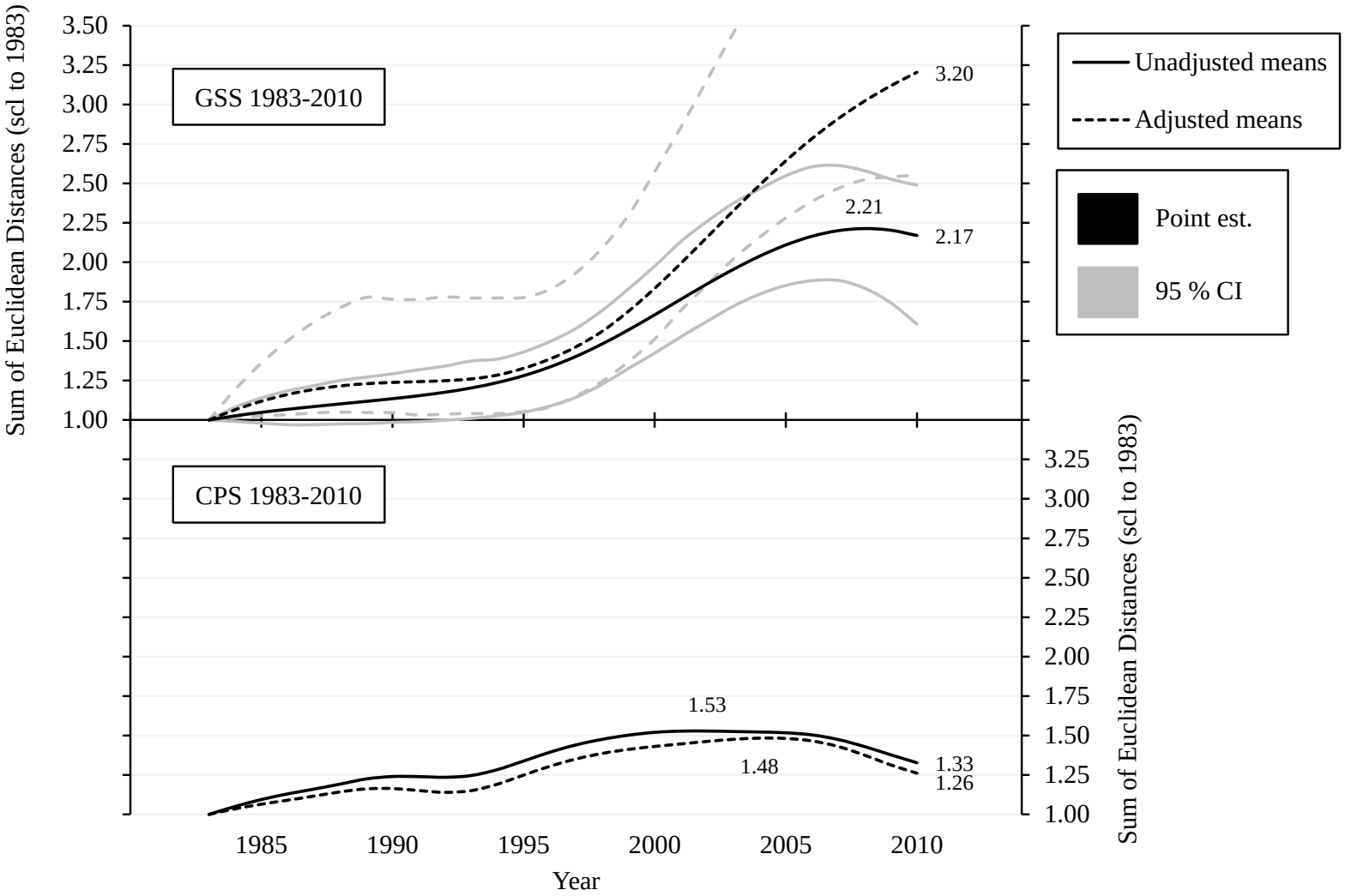
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals (CIs) are based on 200 bootstrap samples.

Figure 6.2. Covariate-adjusted Trends in Mean Income by Class Position



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals (CIs) are based on 200 bootstrap samples.

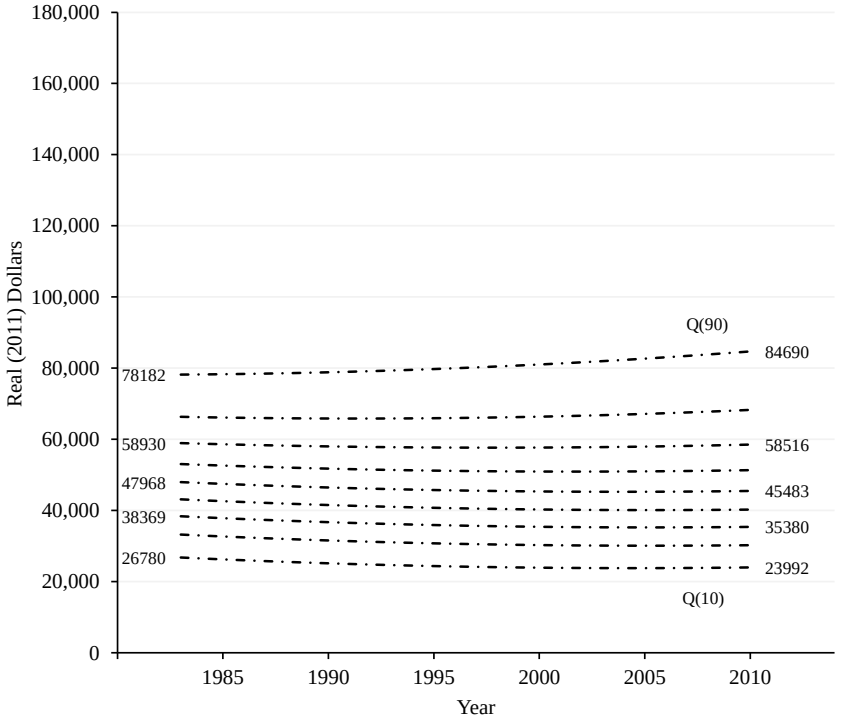
Figure 6.3. Total Change in Mean Income Differences between Class Positions



Notes: Samples include respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals are based on quantiles of 500 bootstrap samples.

Figure 6.4. Covariate-adjusted Trends in Income Deciles by Class Position, CPS 1983-2010

A. Workers



B. Independent Producers

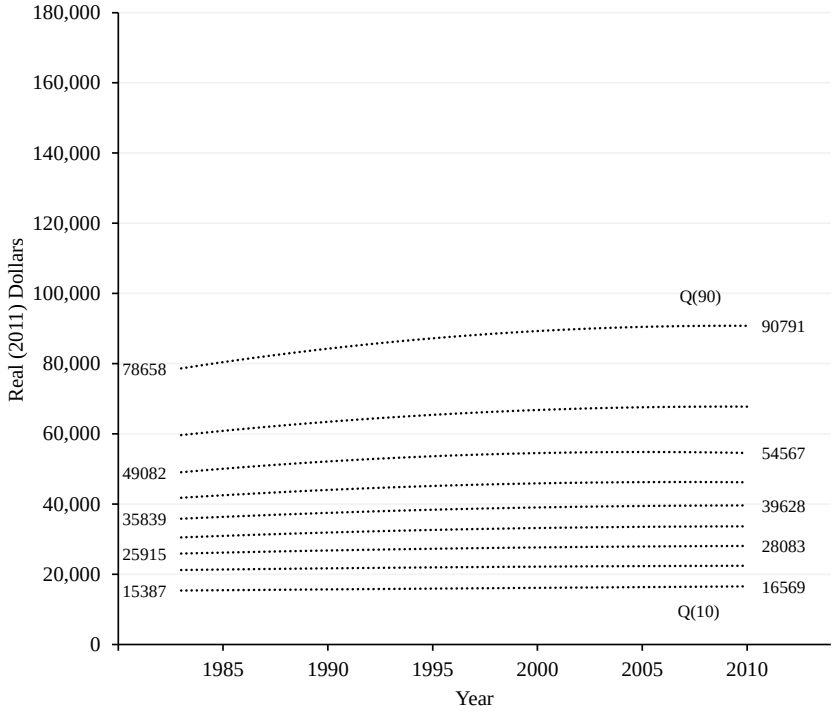
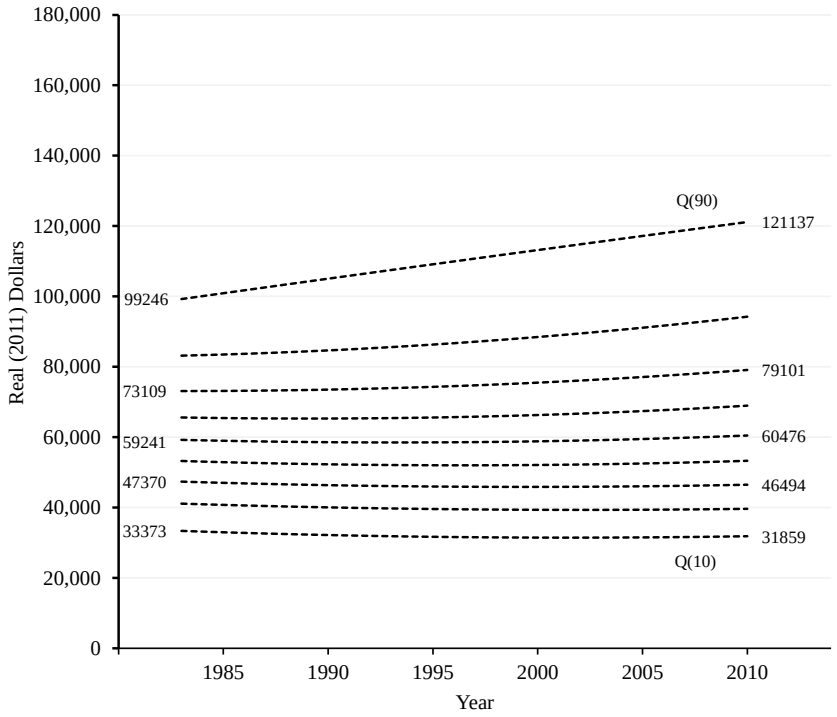
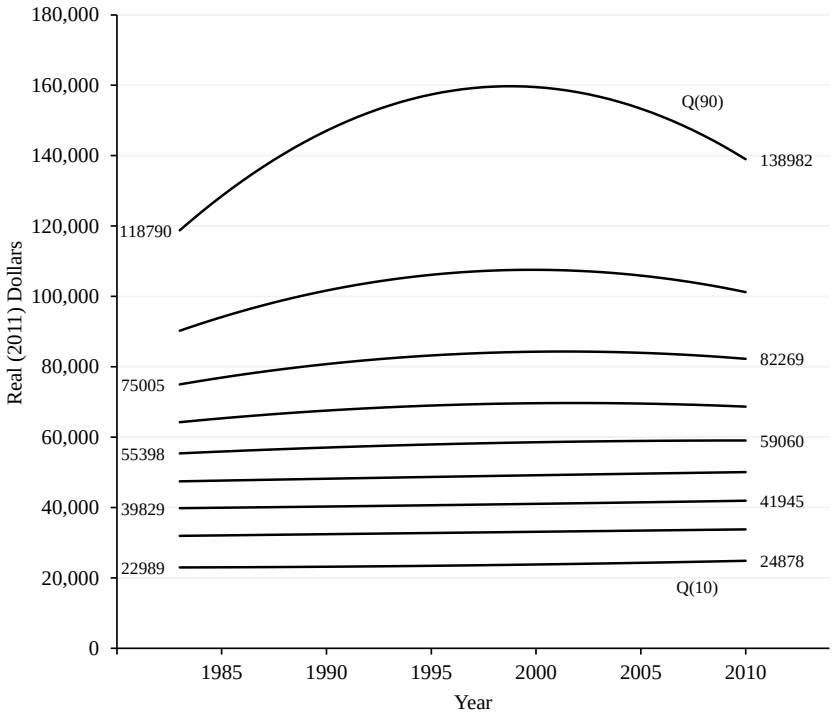


Figure 6.4 continued

C. Managers



D. Proprietors



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets and are based on quantile regression models with quadratic functions of time.

Income Differences between Class Strata

Figure 6.5 displays unadjusted local linear regression estimates of mean income separately by class strata. In the GSS, results indicate that income growth was considerably greater for high-level managers than for low-level managers. From the early 1990s to the late 2000s, mean income for high-level managers increased by more than 50 percent, from about $59,000 to $90,000. For low-level managers, mean income increased by about 17 percent, from approximately $48,000 to $56,000. The CPS suggests a similar pattern of income growth for high- and low-level managers, but because distinctions between managerial strata are imprecisely measured by occupational categories, these results are much less reliable.

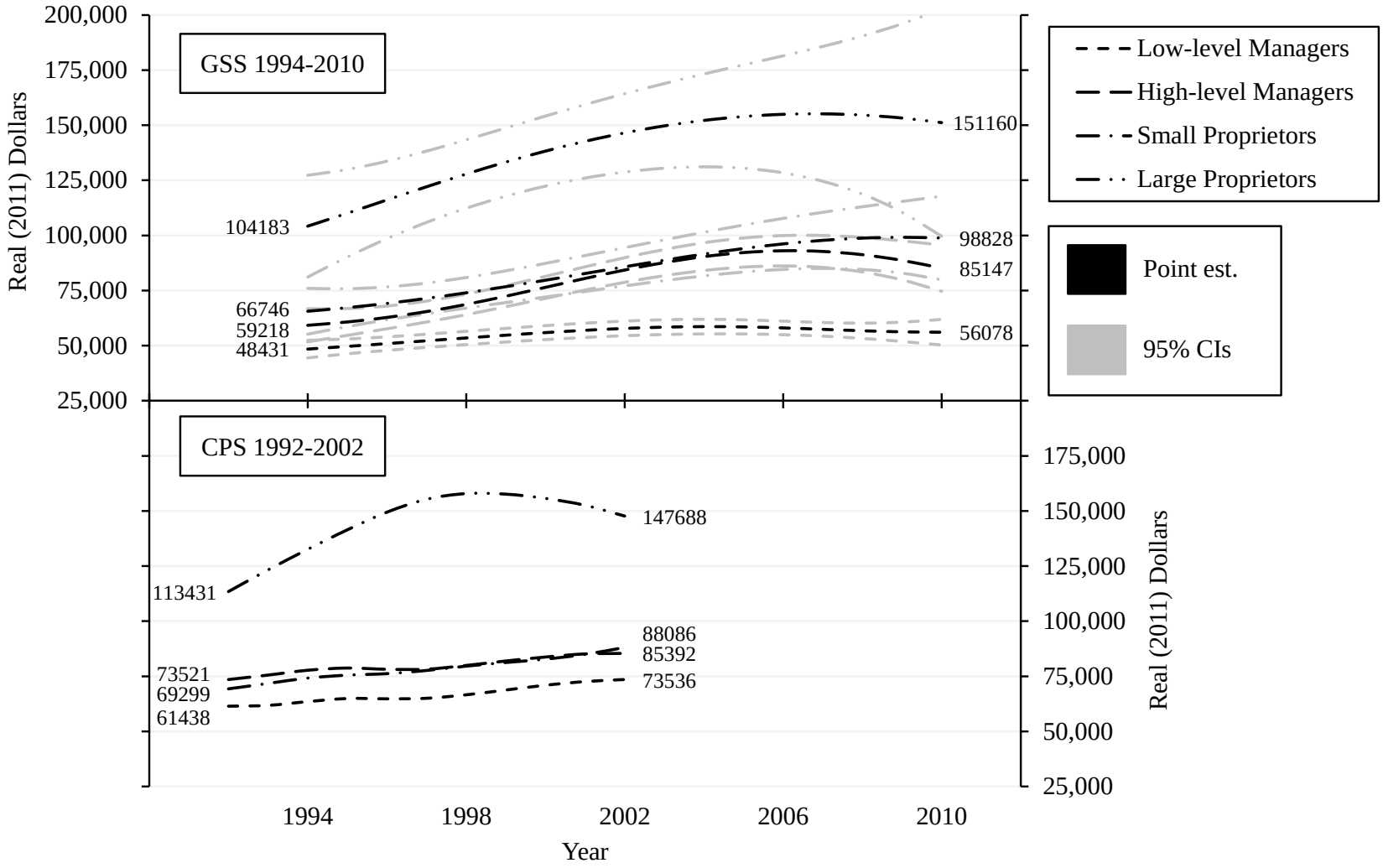
The weight of the evidence also indicates that incomes for large proprietors increased by a greater amount, on average, than incomes for small proprietors. In the GSS, between 1994 and the mid-2000s, mean income increased by about $50,000 for large proprietors and by about $30,000 for small proprietors. These estimates, however, are subject to considerable sampling error. The CPS provides more definitive evidence of income divergence between strata within the proprietor class, indicating that mean income for large proprietors, compared to small proprietors, increased by a substantially greater amount during the 1990s.

Figure 6.6 presents IP-weighted local linear regression estimates of trends in mean income, separately by class strata. These estimates suggest that greater income growth among upper versus lower class strata is not simply due to confounding by demographic characteristics or education. For large proprietors, adjusted estimates from the CPS indicate that mean income increased by 30 percent during the 1990s, from about $99,000 to $130,000, while for small proprietors, mean income increased by approximately 16 percent, from about $60,000 to

$70,000. Adjusted estimates from the GSS are consistent with those from the CPS, although they are highly imprecise owing to the small number of respondents in several class strata.

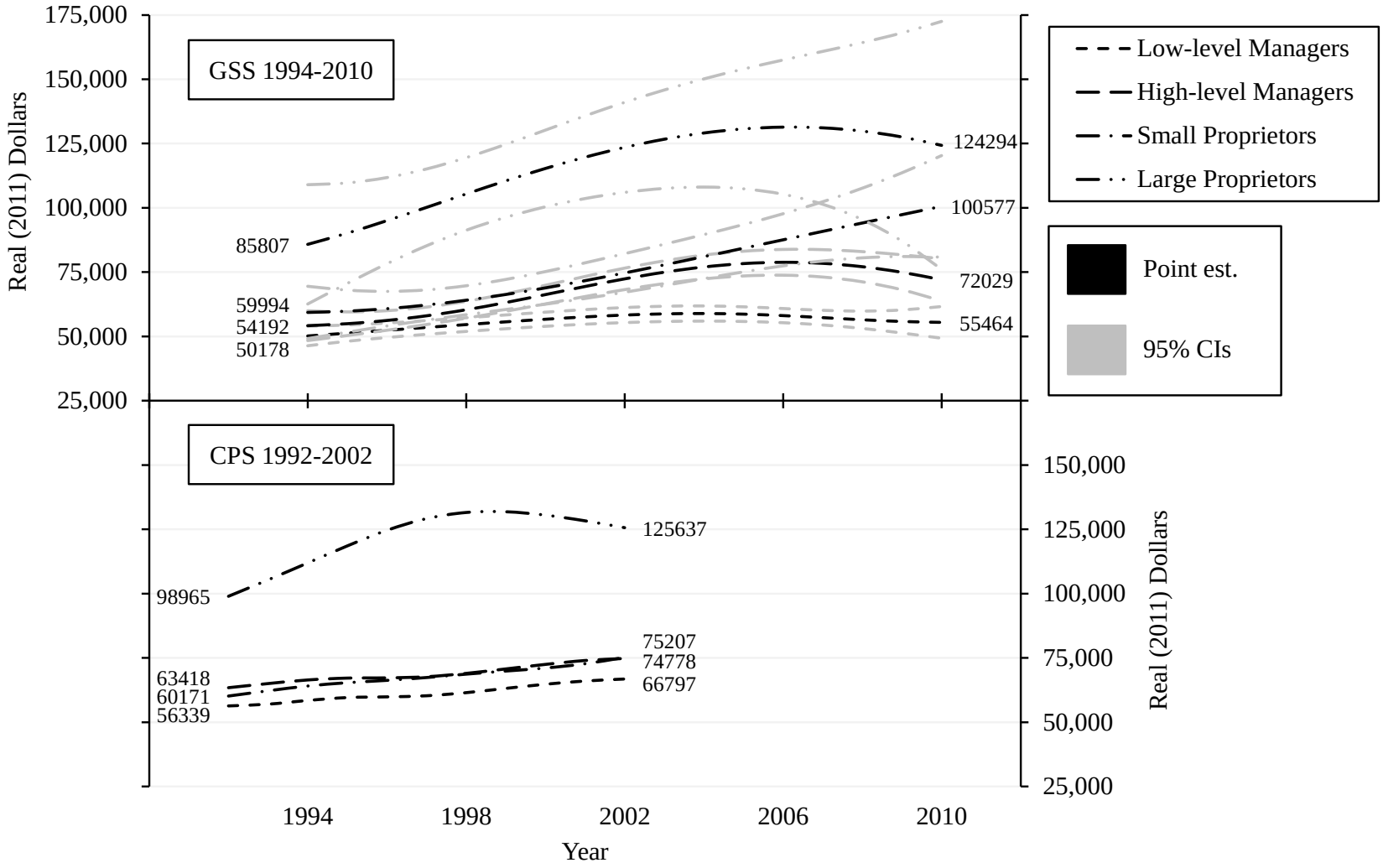
Figure 6.7 displays decile regression estimates describing changes in both location and shape of the strata-specific income distributions. These estimates assess whether changes in class income differences are disproportionately driven by income growth among the highest-earning upper strata of the property and authority structure. Figure 6.7 suggests that incomes for both high- and low-level managers in the upper half of the distribution increased during the 1990s, while incomes in lower half of the distribution generally stagnated. Similarly, decile regression estimates also indicate that income growth was especially pronounced in the top half of the distribution for large proprietors. For example, among large proprietors, the 90th percentile of the income distribution increased from about $200,000 to $250,000 in just ten years, while median income increased from about $70,000 to $80,000. These data indicate that the highest-earning upper strata of proprietors and managers have become substantially better off in terms of personal material welfare in contrast to the vast majority of workers.

Figure 6.5. Unadjusted Trends in Mean Income by Class Strata



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves and in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals (CIs) are based on 200 bootstrap samples.

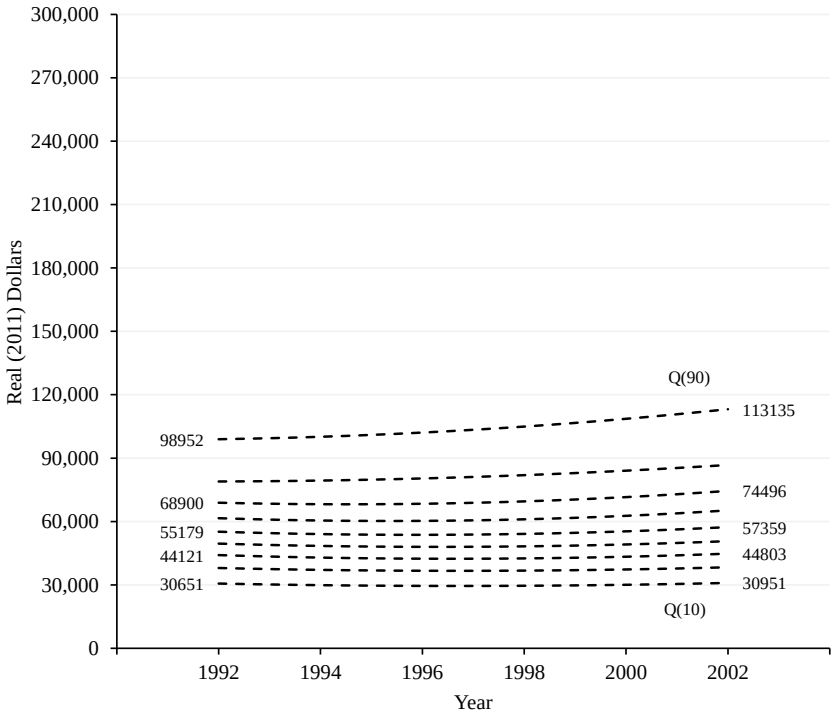
Figure 6.6. Covariate-adjusted Trends in Mean Income by Class Strata



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves and in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals (CIs) are based on 200 bootstrap samples.

Figure 6.7. Covariate-adjusted Trends in Income Deciles by Class Strata, CPS 1992-2002

A. Low-level Managers



B. High-level Managers

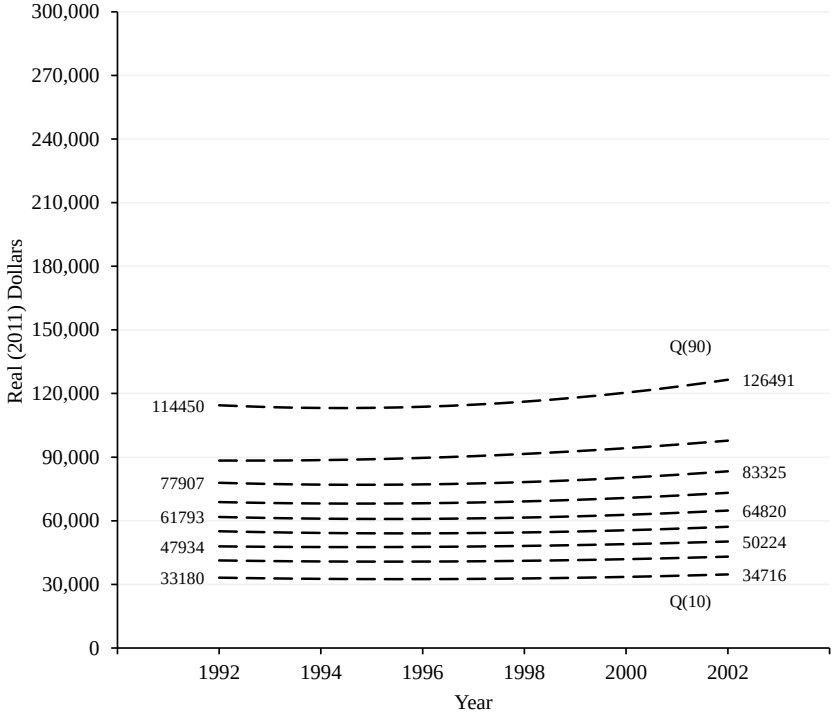
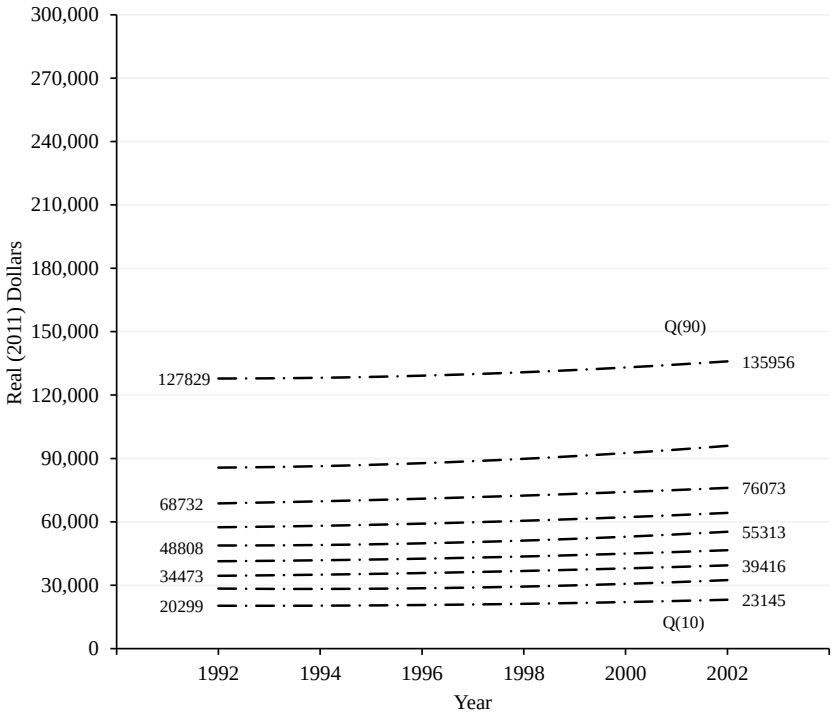
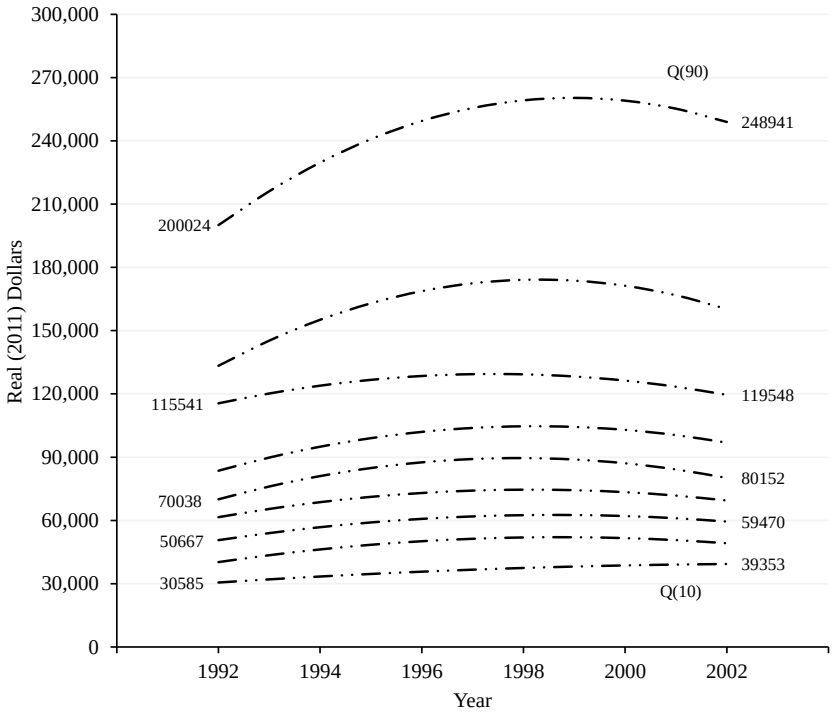


Figure 6.7 continued

C. Small Proprietors



D. Large Proprietors



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1992 to 2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets and are based on quantile regression models with quadratic functions of time.

Social versus Technical Divisions

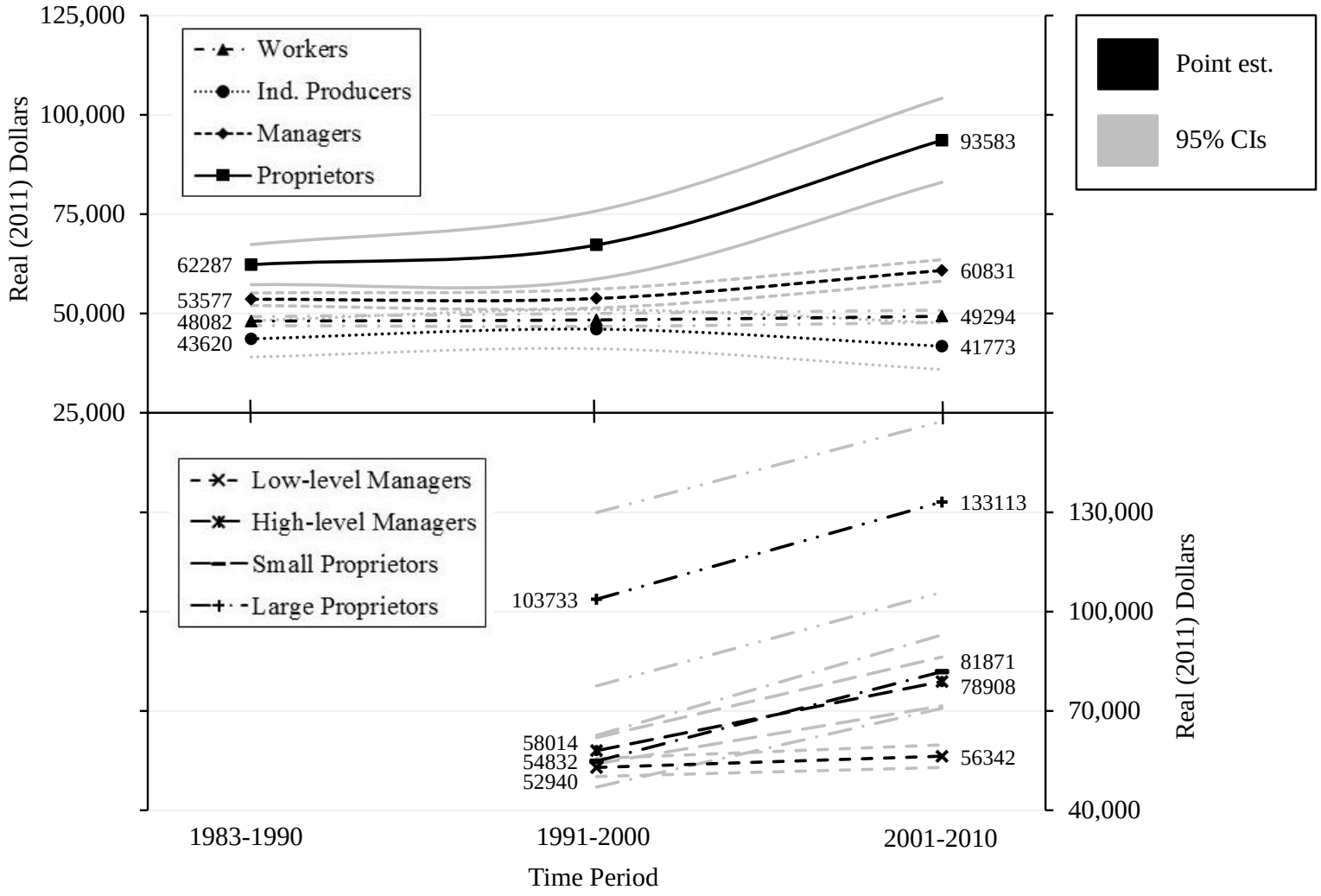
Several researchers argue that occupations defining the technical division of labor have become considerably more important determinants of inequality than classes based on the social relations of production (Grusky and Sorensen 1998; Weeden and Grusky 2005). Although this study controls for a variety of individual-level confounders, it remains possible that observed income trends between classes simply reflect occupational differences in skill, prestige, or the extent of social closure. Property and authority relations are in part expressed through the technical division of labor, but for the approach to class analysis outlined in this study, these social relations are posited to have effects on income independent of occupational distinctions. Have income differences linked to property and authority relations also increased within occupations?

To address this question, I use GSS data to estimate income regressions for the effects of class that include both individual controls and fixed-effects for unit occupations. For this analysis, detailed codes from the Census Occupational Classification System are collapsed into 126 occupational groups following the methods used by Weeden and Grusky (2005). These disaggregated occupational groups are constructed to reflect "institutionalized boundaries as revealed by the distribution of occupational associations, unions, and licensing arrangements, as well as the technical features of the work itself" (Weeden and Grusky 2005:156). With these data, I estimate a series of income regressions that include class, individual covariates, and occupational dummy variables as regressors. These models are estimated separately by decade, which allows for a crude tracking of class income differences over time while ensuring a sufficient number of observations per occupational group and improving the precision of

estimates. These models reflect class income differences within occupations for each decade under consideration.

Results from this analysis are presented graphically in Figure 6.8. This figure displays trends in mean income by class position (upper panel) and class strata (lower panel), net of individual covariates and occupation fixed effects. After controlling for both individual covariates and occupation, results continue to show significant income differences between positions in property and authority relations. Furthermore, results indicate that these differences have increased significantly over time. For example, net of individual covariates and occupation fixed effects, estimates show that proprietors' average income increased from about $62,000 during the 1980s to about $94,000 during the 2000s, while workers' average income increased from about $48,000 to only $49,000 over the same time period. Overall, class income inequality within occupations is estimated to have nearly tripled from the 1980s to the 2000s. These results indicate that growing inequality between positions in the property and authority structure cannot be reduced to occupational differences in skills, prestige, or social closure. Even within highly disaggregated occupations, incomes for those with property and authority in production have grown substantially, while incomes for workers without property and authority have stagnated.

Figure 6.8. Trends in Mean Income by Class Net of Occupation Fixed-effects, GSS 1983-2010



Notes: Sample includes respondents who are 18 to 65 years old, work full-time, and have nonmissing occupation data in the 1983 to 2010 GSS waves. Results are combined estimates from 5 multiple imputation datasets. Confidence intervals (CIs) are based on heteoscedasticity-robust standard errors.

Summary

Consistent with class-analytic hypotheses, data from the GSS and CPS indicate that income differences between classes have increased substantially over time. Between 1983 and the late 2000s, conservative estimates from the CPS suggest that unadjusted income differences increased by about 50 percent. More extreme estimates from the GSS suggest an increase in class income differences of more than 100 percent. Prior to the economic recession of 2007 to 2009, the average proprietor earned about $70,000 more and the average manager about $25,000 more than the average worker. By comparison, mean income differences between those with a college education and those with only a high school education or less increased by about 70 percent since the early 1980s, and by the late 2000s, college educated respondents earned about $45,000 more on average than their less-educated counterparts. Thus, recent growth in income differences between classes has been as severe as the well-documented growth in income differences by levels of education, and the gaps in material welfare that separate those with and without property and authority in production remain some of the deepest in American society.

Growth in between-class income differences was driven by strong income gains for managers and especially proprietors combined with stagnating incomes for workers. In addition, the distributional gains among proprietors and managers have been most pronounced for the highest-earning upper strata of these classes—those with ownership stakes in large production operations and with extensive control over the production process. Adjustment for compositional differences between classes further indicates that none of these trends simply reflect confounding by educational or demographic changes. Rather, the weight of the evidence suggests that these trends reflect a broad shift in the balance of power between those with and without property and authority in production.

CHAPTER VII

Trends in Class Structure and Class Attainment

This chapter investigates changes in the American class structure and trends in racial and gender disparities in class attainment from 1972 to 2010. Despite a variety of competing hypotheses about changes in class structure and class attainment, few prior studies employ a time-series research design capable of rigorously adjudicating between them. The vast majority of research on class structure and class attainment is based on cross-sections of the population at a single point in time (e.g., Carr 1996; Fairlie and Meyer 1996; Jaffee 1989; McGuire and Reskin 1993; Wolf and Fligstein 1979a; Wolf and Fligstein 1979b; Wright 1985), and prior studies that do examine temporal changes rely on imprecise measures of ownership and authority in production (Aronson 1991; Blau 1987; Fairlie 2004; Fairlie and Meyer 2000; Wright 1997; Wright and Martin 1987) and data series that only extend through the 1990s (Aronson 1991; Fairlie 2004; Fairlie and Meyer 2000; Smith 1999; Wright 1997; Wright and Martin 1987). The analyses in this chapter extend previous research by using time-series data that permit direct repeated measurements of class position and that cover more recent decades. In the sections that follow, I first discuss different theories of class attainment, focusing on racial and gender disparities in ownership and authority within production. Then, I estimate recent trends in class structure and class attainment with time-series data from the 1972 to 2010 waves of the GSS.

Race, Gender, and Class Attainment

Previous research based on cross-sectional analyses indicate that women and racial minorities, compared with men and whites, are less likely to occupy positions of ownership and authority within production (Fairlie 2007; Smith 2002; Wright 1997). Theories of the social processes that generate racial and gender disparities in class attainment can be roughly categorized into micro-level explanations that emphasize individual differences in human capital and personal preferences for certain types of work, macro-level explanations that focus on how minorities and women are disproportionately located in marginalized sectors of the economy, and meso-level explanations that highlight the role of discrimination and homosocial reproduction (Smith 2002). In fact, these various explanations are not neatly separable and intersect in many ways—for example, career preferences and sector marginalization are likely shaped by discrimination—but this heuristic categorization nevertheless provides a useful guide for analyses of racial and gender disparities in class attainment.

Micro-level theories point to differences in the preferences and human capital characteristics of individuals as explanations for differential class attainment by race and gender. According to this perspective, women and racial minorities, compared with men and whites, are underrepresented in positions of ownership and authority largely because they have less training, education, and experience (Becker 1964; Blau and Duncan 1967; Sewell, Haller, and Portes 1969). Individual investment in human capital increases the likelihood of attaining authority at work (Kluegel 1978; Ross and Reskin 1992) and is positively associated with self-employment and small business ownership (Fairlie and Meyer 1996; Hout and Rosen 2000; Loscocco, Robinson, Hall, and Allen 1991). Racial and gender disparities in education and training, then, are thought to explain, at least in part, disparities in ownership and authority within production.

Indeed, previous cross-sectional research indicates that human capital differences explain part, but not all, of the racial and gender gaps in workplace authority and self-employment (Carr 1996; Hout and Rosen 2000; Smith 2002).

With regard to gender disparities in particular, micro-level theories also contend that aspirations, preferences, and strategic decisions based on early socialization processes and rational evaluations of economic opportunities explain female underrepresentation in ownership and managerial roles (Boden 1999; Carr 1996). According to this argument, women place less value on workplace authority and business ownership, are less competitive and more risk-averse, and are also more likely than men to assume family responsibilities that conflict with the time demands associated with owning or managing a firm. For these reasons, women are thought to choose career paths that do not lead to business ownership and select themselves out of contention for managerial responsibilities at work. Although family responsibilities and personal preferences are important predictors of class attainment, the weight of the evidence indicates that these factors can explain only a small part of the gender gap in ownership and authority within production (Fairlie 2007; Hull and Nelson 2000; Smith 2002).

Macro-level explanations for racial and gender disparities in class attainment posit that women and racial minorities are underrepresented in positions of ownership and authority because they are disproportionately located in marginalized sectors of the economy that offer limited opportunities for business development and promotion into managerial hierarchies (Jaffee 1989; Loscocco and Robinson 1991; Loscocco, Robinson, Hall, and Allen 1991; Smith 2002). Macro-level indicators commonly used to explain racial and gender differences in class attainment include geographic region, population density, and industrial sector (Loscocco and Robinson 1991; Loscocco, Robinson, Hall, and Allen 1991; Smith 1999; Wilson 1997a). Prior

research indicates that women and racial minorities are more likely than their demographic counterparts to work in certain sectoral economies, such as the personal services industry, which provide fewer promotional opportunities and are less conducive to successful business development, but pronounced racial and gender disparities in class attainment persist even after accounting for a variety of structural economic factors (Loscocco, Robinson, Hall, and Allen 1991; Reskin and Padavic 1994; Smith 1999; Smith 2002; Wilson 1997b).

Meso-level theories are based on the premise that dominant status groups, like whites and men, have an objective interest in maintaining their disproportionate control over privileged class positions (Smith 2002; Wright 1997). To this end, dominant group members with substantial influence over business development and managerial hierarchies, such as financiers and promotion managers, may exclude women and minorities from access to capital and workplace authority structures in an effort to preserve economic power for themselves and similar others. In addition to overt acts of discrimination, members of dominant status groups in key class positions may also engage in statistical discrimination by using race and gender identities as a proxy for productivity when making promotion and investment decisions, or they might engage in more subtle forms of "homosocial reproduction" (Kanter 1977). Homosocial reproduction refers to the situation where dominant group members who occupy privileged class positions develop and maintain "management enclaves" and business networks composed of individuals who share a set of social, demographic, and ideational characteristics. This is thought to occur because of uncertainty associated with promotion and investment decisions together with the need for proprietors and managers to maintain a sense of shared value commitments and solidarity in the face of potential challenges to their economic power (Elliott and Smith 2001; Elliott and Smith 2004; Smith 2002). Previous empirical research using a variety of different

study designs to identify the extent of discrimination suggest that it is widespread and significantly harms the class attainment prospects of women and racial minorities (Blanchflower, Levine, and Zimmerman 2003; Cavalluzzo, Cavalluzzo, and Wolken 2002; Elliott and Smith 2001; Elliott and Smith 2004; Reskin and Padavic 1994).

Based on the foregoing theories of status group differences in class attainment, two competing perspectives on recent trends in racial and gender disparities can be derived. The declining disparities perspective posits that women and racial minorities have made substantial inroads to business ownership and management since the early 1970s, leading to a steady reduction of the race and gender gaps in class attainment. The enduring disparities perspective, by contrast, anticipates persistent racial and gender differences in class attainment as a result of continuing discrimination and homosocial reproduction.

The declining disparities perspective emphasizes several broad social changes since the early 1970s that may have attenuated the historically severe underrepresentation of women and minorities in positions of economic power. First, the U.S. federal government enacted and expanded a variety of nondiscrimination and affirmative action policies designed to facilitate access to managerial hierarchies and promote business ownership among women and minorities. Second, human capital differences between men and women and between whites and racial minorities have declined—in some cases substantially—since the early 1970s (Kao and Thompson 2003; Kerbo 2009). To the extent that racial and gender disparities in class attainment are driven by human capital differences, this trend suggests a pattern of growing parity in access to positions of ownership and authority in production. Finally, over the past several decades, research on intergroup attitudes documents a substantial decline in overt racism and sexism, a smaller but nontrivial decline in negative stereotypical views about women and racial minorities,

growing endorsement of less restrictive gender roles, and an increase in support for principles of intergroup equality (Brewster and Padavic 2000; Brooks and Bolzendahl 2004; Schuman, Steeh, Bobo, and Krysan 1997). These attitudinal changes may signal real declines in the extent of discrimination and in-group preference not only among the population at large but also on the part of dominant group gatekeepers within extant networks of business owners, creditors, and promotion managers.

The enduring disparities perspective recognizes these egalitarian social changes but insists that members of dominant status groups continue to have an objective interest in maintaining their privileged access to positions of economic power. To maintain these privileges during a period when they are being actively challenged by subordinate status groups, dominant group members may continue to discriminate and engage in homosocial reproduction while superficially retreating from negative intergroup attitudes and tolerating relatively weak opportunity-enhancing policies in an effort to placate subordinate group members and subvert more radical challenges to the status quo (Jackman 1994; Jackman and Muha 1984; Wodtke 2013a). According to this perspective, the well-documented liberalization of intergroup attitudes since the early 1970s simply indicates that dominant status groups have developed a more sophisticated ideational defense of their privileges. Similarly, nondiscrimination and affirmative action policies are thought to be largely symbolic concessions, and the limited scope and lax enforcement of these policies ensure that they do not fundamentally transform the distribution of economic power.

In sum, for the enduring disparities perspective, attitudinal and policy changes over the past several decades are not held to reflect a sincere commitment to racial and gender equality. Rather, they are thought to reflect dominant group efforts to pacify subordinate groups striving to

overcome their disadvantages, among which exclusion from positions of ownership and authority in production is paramount. This perspective implies that women and racial minorities, despite their considerable human capital gains, have remained significantly disadvantaged in terms of their class attainment prospects owing to persistent, albeit more subtle, forms of discrimination and homosocial reproduction on the part of predominantly white male proprietors and managers.

Methods

Data and Measures

To investigate trends in class structure and class attainment, this analysis uses data from the 1972 to 2010 waves of the GSS. The analytic sample for this analysis includes respondents who were 18 to 65 years old and worked full-time. Supplemental analyses of data that include both full- and part-time respondents yield similar results (see Appendix A).[11]

For this analysis, class position is measured using the same procedures as in Chapter VI. This analysis also examines gradational differences in property and authority among proprietors and managers. As mentioned previously, the GSS asks respondents who report supervising others whether any of their subordinates are themselves supervisors. This question indicates whether employed managers occupy a position closer to the top of the workplace authority structure, and it provides an approximate measure of the size of the business owned by self-employed proprietors (larger companies are more likely to have a multilevel managerial structure than smaller companies). Based on this survey item, large versus small proprietors, and high- versus low-level managers, are differentiated according to whether their subordinates also have supervisory responsibilities at work.

[11] Analyses that include unemployed respondents as a residual category in the class typology also yield results nearly identical to those presented in the main text, and there is no evidence that changes in class structure are simply responses to cyclical changes in unemployment.

To evaluate whether the hypothesized persistence of racial and gender disparities in class attainment are due to discrimination and homosocial reproduction, this study adopts the "residual" approach to isolating these mechanisms. This approach involves estimating the residual racial and gender gaps in class attainment that remain after controlling for an extensive set of other covariates thought to explain these disparities, including human capital, family, and structural economic factors. Nonzero estimates of residual racial and gender differences are then interpreted as evidence of discrimination and homosocial reproduction. Although this approach suffers from several well-known limitations, it is widely used in studies of racial and gender inequality and can provide highly suggestive, if not definitive, evidence of discrimination (Rodgers III 2006; Smith 2002; Wolf and Fligstein 1979a).

The demographic and human capital factors included in this analysis are respondent race, gender, nativity, education, cognitive ability, age, and parental education. The measurement and coding of these variables was previously described in Chapter VI. In addition, I measure and control for several other dimensions of a respondent's family background, including father's occupational prestige and self-employment status. Father's occupational prestige scores come from the Hodge-Siegel-Rossi rating system, which assigns scores based on respondent estimates of the relative social standing of different occupations (Hauser and Featherman 1977; Siegel 1971). Father's self-employment status is coded 1 for self-employed and 0 otherwise.

In addition to human capital and family background, this analysis also controls for marital status and the presence of young children in the household. Marital status is coded 1 for married and 0 for unmarried, and the presence of young children is expressed as a dummy variable coded 1 if there are children younger than 12 years old present in the household and 0 otherwise. Multivariate analyses include interactions between these measures and gender to

account for the differential impact of family responsibilities on men's and women's career choices. Controlling for measures of marital status and household composition is intended to adjust for the possibility that women are more likely than men to assume family responsibilities that may interfere with class attainment.

The structural economic controls included in this analysis are geographic region, rural residence, and industrial sector. Geographic region is expressed as a series of dummy variables for residence in the "East," "South," "Midwest," and "West." Rural residence is coded 1 if a respondent lives in a county without any towns of 10,000 residents or more, and 0 otherwise. Industrial sector is measured with a series of dummy variables for "agriculture," "manufacturing," "wholesale or retail trade," "business or personal services," and "professional or other services." For all variables, missing values are simulated using multiple imputation with 20 replications, and all results are combined estimates across these multiply imputed datasets (Rubin 1987).

Analyses

To investigate trends in class structure, semiparametric multinomial logit models are used to compute smoothed estimates of the proportion of the population in different class positions at each survey wave, denoted by $P(C = j|t)$. In this notation, C is a polytomous variable with $j = 1, \dots, 4$ categories representing each the class positions defined previously, and $t = 1973, \dots, 2010$ denotes the survey wave. The multinomial logit model has the general form

$$P(C = j|t) = \exp\left(g\left(t, \beta_{C=j}\right)\right) / \sum_{k=1}^{4} \exp\left(g(t, \beta_{C=k})\right) , \quad k = 1, \dots, 4 , \tag{7.1}$$

where $g(t, \beta_{C=1})$ is constrained to equal zero and $g\left(t, \beta_{C=j}\right)$ for $j = 2, \dots, 4$ are functions of time and the unconstrained parameters, β_j. Exploratory analyses that evaluated a variety of

specifications for the unconstrained $g(t, \beta_{C=j})$, including several different polynomial and spline functions of time, indicated that a quadratic *B*-spline with knots at the years 1972, 1992, and 2010 provided the best fit to the data.

B-splines are a semiparametric smoothing technique that models temporal changes in class structure using a flexible nonlinear function of time. In a quadratic *B*-spline, *k* knots are introduced on the time axis located at $t_1, t_2, \ldots, t_k$, and the model consists of piecewise quadratic polynomials between adjacent knots that are constrained to be continuous and smooth at each knot (Kvam and Vidakovic 2007). Because parameter estimates from *B*-splines are difficult to interpret, results are presented graphically as interval estimates of $P(C = j|t)$ plotted across time. These figures, which give smoothed estimates of trends in the relative size of different class positions, have a straightforward interpretation. A similar multinomial logit smoothing approach is used to estimate trends in the relative size of different class strata.

To investigate racial and gender disparities in class attainment over time, the multinomial logit model in Equation 1 is elaborated to permit separate *B*-spline functions for blacks and nonblacks and for men and women. Based on this model, unadjusted smooth trends in class attainment are estimated, plotted graphically, and compared for each status group. Then, to evaluate whether unadjusted racial and gender differences in class attainment are due to persistent discrimination, another model is estimated that includes controls for human capital characteristics, socioeconomic background, family responsibilities, and structural economic factors. Results from these more complex models are also presented graphically to simplify interpretation—specifically, interval estimates for the probabilities of class attainment are plotted across time, separately for blacks and nonblacks and for men and women, with control variables set to their pooled sample means.

Because of problems associated with data sparseness, analyses of racial and gender differences in gradational measures of ownership and authority are based on more parsimonious models of temporal change. Instead of a complex spline function with many parameters, these models use a simple stepwise function of time that permits separate estimates for the period from 1970 to 1990 and for the period from 1991 to 2010. Comparing racial and gender differences in the attainment of higher versus lower class strata across these two periods allows for a crude tracking of temporal changes while improving the precision of estimates. Probabilities of attaining higher versus lower class strata are estimated from these models and plotted graphically in bar charts. Confidence intervals for all estimates are computed using the delta method (Long and Freese 2006).

Results

Trends in Class Structure

Figure 7.1 presents interval estimates of the proportion of the working population in different class positions from 1972 to 2010. These estimates are computed from a multinomial logit model of class structure with a quadratic B-spline function of time. The upper panel of the figure displays the relative size of all four classes on the same scale. The lower panel plots trends for the two smallest classes—proprietors and independent producers—using a magnified scale on the right vertical axis. The stacked plot makes it easier to visibly discern changes in the relative size of both large and small classes.

Figure 7.1 reveals that the American class structure followed two different trajectories from early 1970s to the mid-1980s, on the one hand, and from the mid-1980s to the present, on the other. From 1972 to 1985, the proportion of workers decreased, while the proportion of managers, proprietors, and independent producers increased. Specifically, the proportion of

workers declined from about 60 percent to 53 percent between 1972 and 1985. Over the same time period, the proportion of managers increased from about 31 percent to 34 percent, as did the proportions of proprietors and independent producers, which grew from about 5 percent to 7 percent and from about 3 percent to 5 percent, respectively.

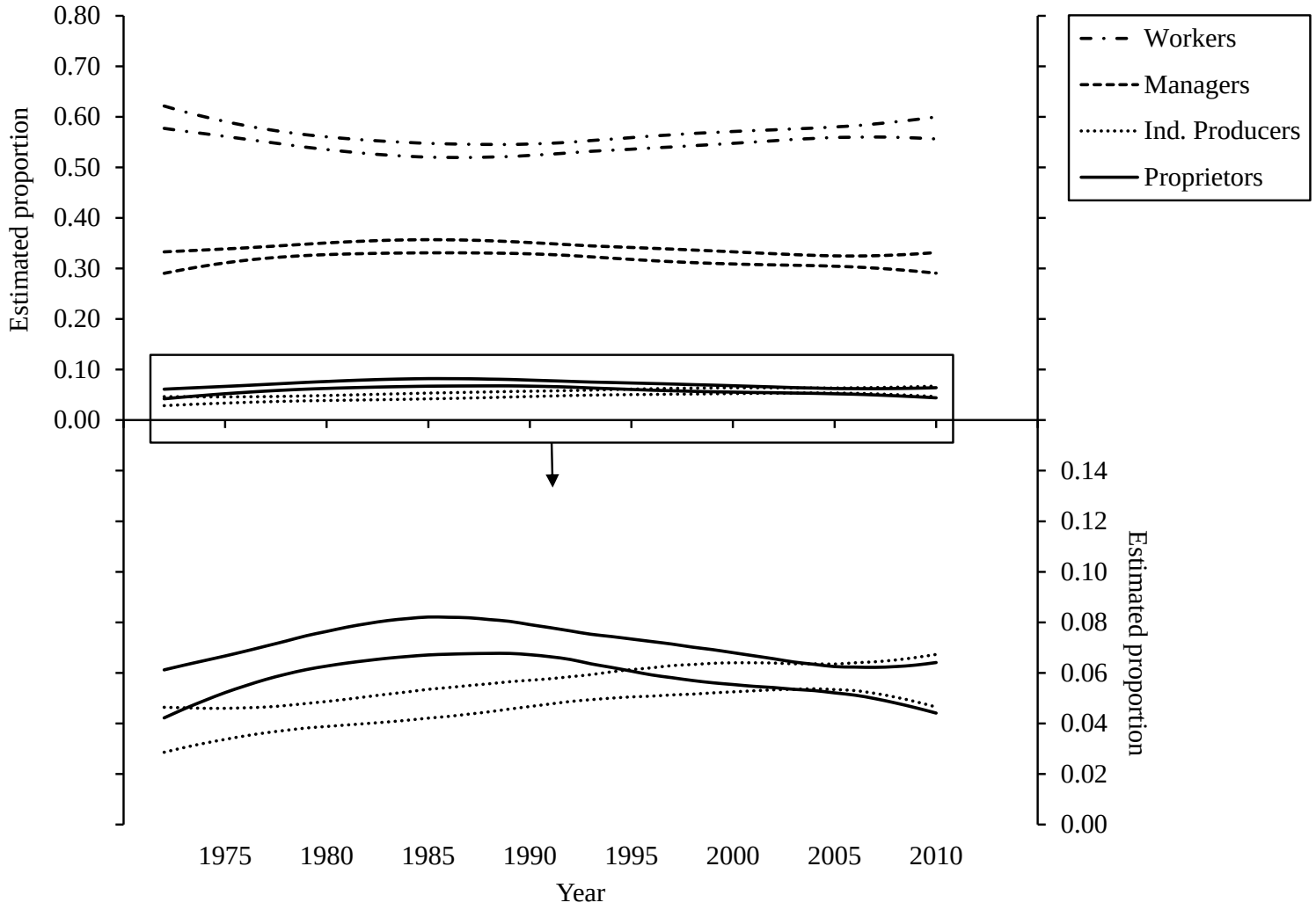
From the mid-1980s onward, however, these trends reversed. Between 1985 and 2010, the proportion of workers increased, while the proportions of managers and proprietors decreased. Only the proportion of independent producers continued to grow modestly throughout this period. Specifically, the proportion of workers increased from about 53 percent to 58 percent between 1985 and 2010. By contrast, the proportion of managers declined from about 34 percent to 31 percent, and the proportion of proprietors declined from about 7 percent to 5 percent during this period. The proportion of independent producers grew slowly from about 5 to 6 percent between the mid-1980s and 2010. As a result of the different trends from 1972 to 1985 and from 1985 to 2010, the class structure of the late 2000s closely resembles that of the early 1970s.

Figure 7.2 presents interval estimates of the relative size of different class strata from 1972 to 2010. The upper panel of the figure displays estimates for all class strata, and the lower panel plots trends for the smallest strata on a magnified scale. Although these estimates are less precise than those for class position, they reveal a similar trend. From 1972 to 1985, the proportions of low-level managers and small proprietors increased, and from the mid-1980s onward, these lower strata generally decreased, despite some evidence of a recent uptick in the proportion of low-level managers. Similarly, between 1972 and the late 1980s, the estimated proportions of high-level managers and large proprietors increased, albeit slightly and not to a statistically significant degree, and then decreased thereafter. Overall, the relative sizes of the upper strata of proprietors and managers exhibit more stability than do the lower strata.

In sum, trends in the class structure of the American economy follow two distinct trajectories during the period under consideration. From the early 1970s to the mid-1980s, results are consistent with the declining significance of class perspective, which predicts a decline in the proportion of workers and an increase in the proportion of managers, proprietors, and independent producers. From the mid-1980s onward, the observed trends are less consistent with this perspective; rather, they are consistent, at least in part, with the class-analytic perspective.

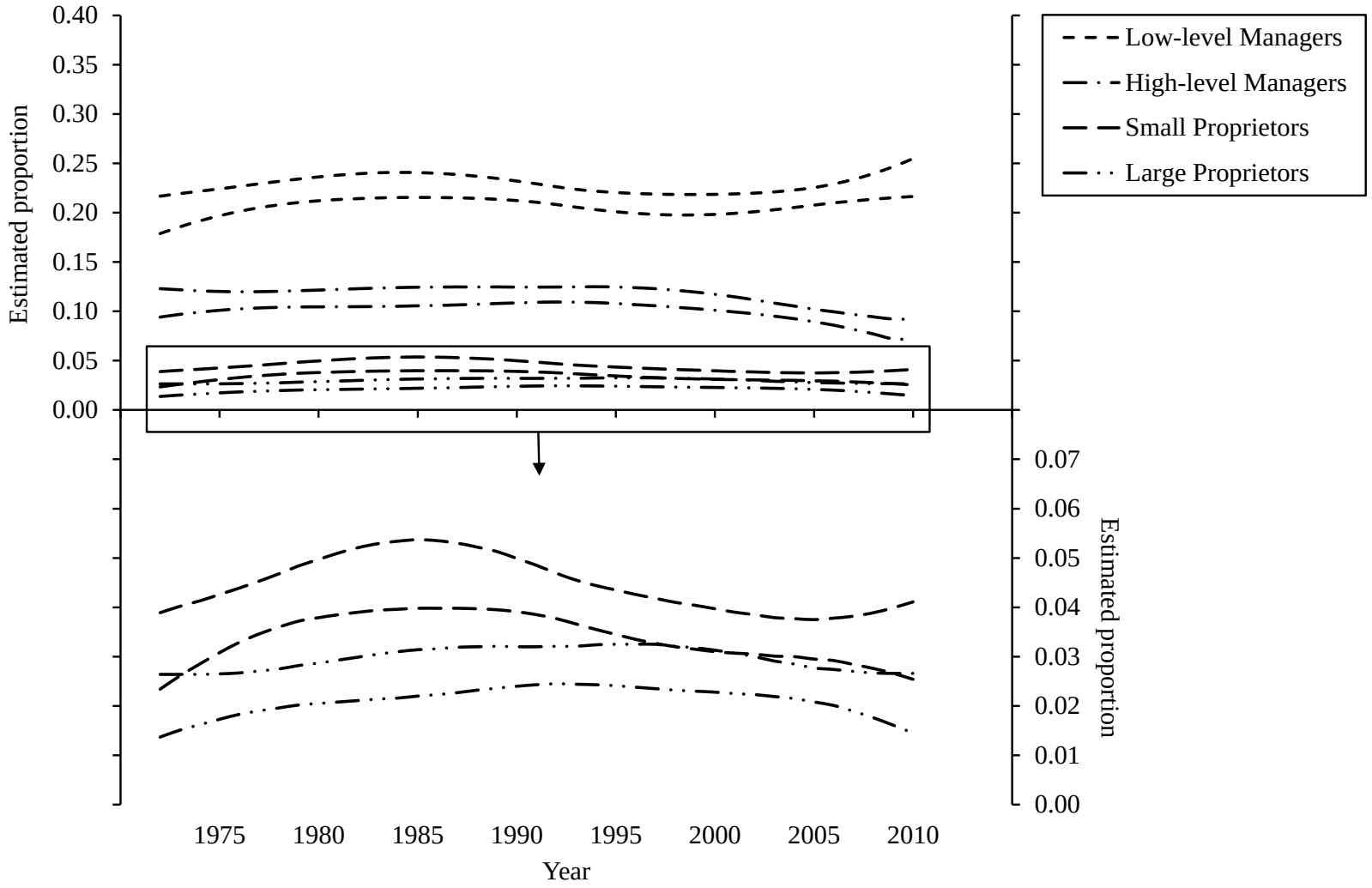
The modest but persistent growth in the proportion of independent producers is somewhat difficult to reconcile with this perspective, however. Because of measurement limitations in the GSS, it is difficult to distinguish nominally self-employed contingent workers, who sell only their own labor power, lack capital, and have no control over the production process, from self-employed independent business owners that do possess some capital and control their own small production operation. If observed growth in the proportion of independent producers simply reflects growth in the number of nominally self-employed contingent workers, such as freelancers, homeworkers, and temporary contractors (Dale 1986; Kalleberg, Reskin, and Hudson 2000; Kalleberg 2011), then this trend would be more consistent with class-analytic theory. Descriptive results from Chapter VI indicate that workers and independent producers are not substantially different in terms of earned income and human capital. Furthermore, despite considerable gains in human capital over time, there is some evidence that mean income for independent producers declined slightly since the early 1980s—a trend that contrasts sharply with the tremendous income growth observed among proprietors. These patterns suggest that increases in the proportion of independent producers may simply reflect growth in the nominally self-employed contingent labor force.

Figure 7.1. Trends in Class Structure, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure 7.2. Trends in Class Strata, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Racial Differences in Class Attainment

Figure 7.3 summarizes unadjusted racial differences in class attainment from 1972 to 2010. Specifically, it presents interval estimates of the proportions of blacks and whites in different class positions over time. Although these estimates are somewhat imprecise for blacks—a consequence of their comparatively small sample size in the GSS—results indicate that they are less likely than nonblacks to be proprietors, managers, and independent producers, and more likely to be workers. Throughout the entire period from 1972 to 2010, between 65 to 75 percent of blacks are workers, between 25 to 30 percent are managers, between 2 to 3 percent are independent producers, and between 2 to 3 percent are proprietors. Among nonblacks, by contrast, between 52 to 58 percent are workers, between 30 to 35 percent are managers, between 4 to 6 percent are independent producers, and between 6 to 8 percent are proprietors during the same time period.

Estimates also indicate that from 1972 to 2010, despite some transitory fluctuation, racial disparities in class attainment have been fairly stable, consistent with the enduring disadvantage hypothesis. Between 1972 and the mid-1980s, when the proprietor and manager classes were expanding at the population level, nonblacks were about 6 to 8 percentage points, or about 1.3 times, more likely than blacks to be managers and about 4 to 6 percentage points, or about 4 times, more likely to be proprietors. Then, in the 1990s, the proportions of nonblacks in management and ownership declined rapidly, while the proportions of blacks in these class positions remained comparatively stable. These trends lead to a modest and temporary decline in class attainment disparities by race. For example, in the late 1990s, nonblacks were not significantly more likely than blacks to be managers, and nonblacks were only about 3 percentage points, or about 2 times, more likely to be proprietors. During the 2000s, however,

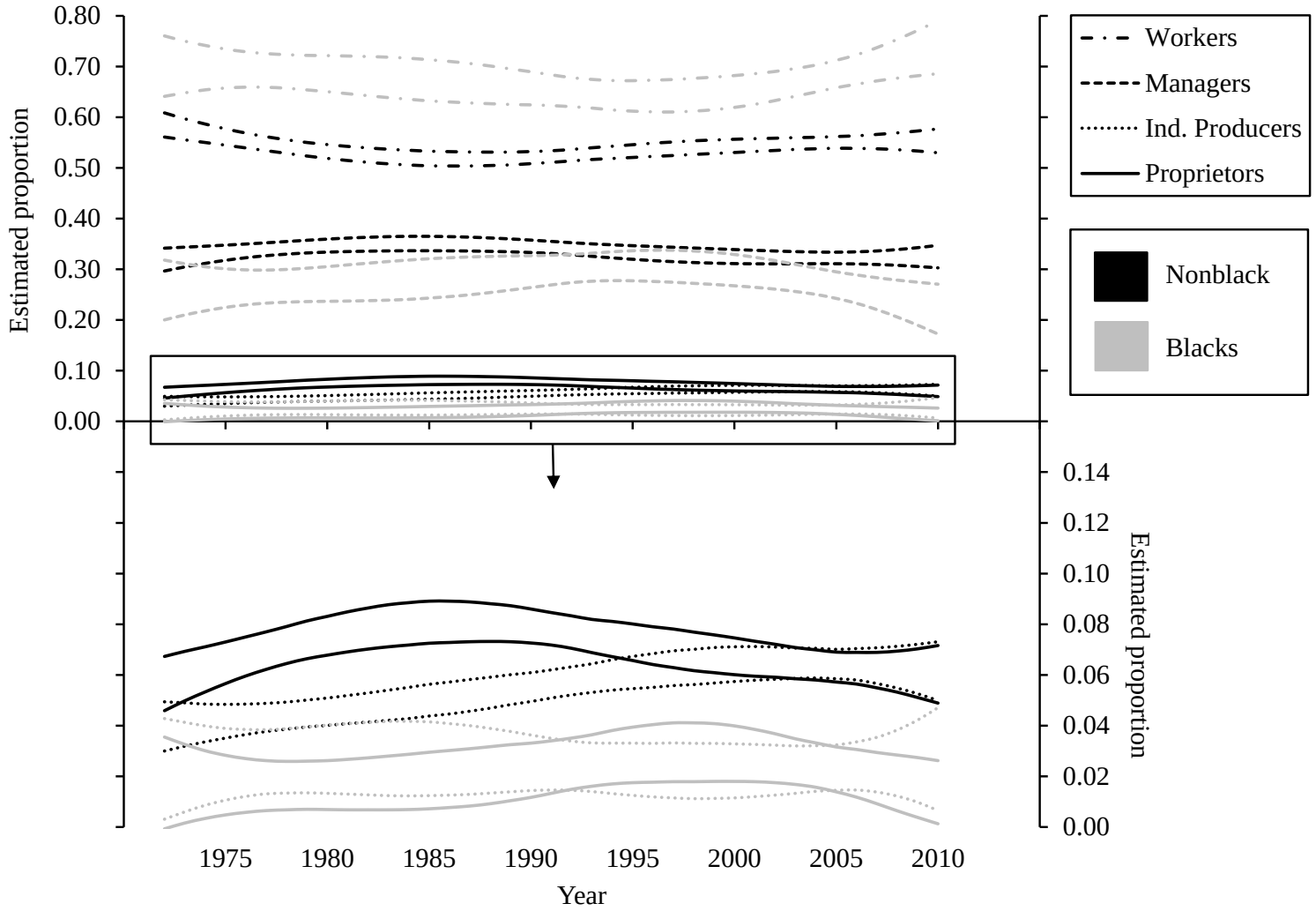
the proportions of blacks in management and ownership sharply declined, and racial disparities in class attainment abruptly widened. At the end of this decade, racial disparities reached their highest point since the early 1970s: in 2010, nonblacks were about 10 percentage points, or about 1.5 times more likely, than blacks to be managers and about 5 percentage points, or nearly 4.5 times, more likely to be proprietors.

Figure 7.4 summarizes covariate-adjusted racial disparities in class attainment. It plots interval estimates of the proportion of blacks and nonblacks in different class positions computed from a multinomial logit model that controls for human capital characteristics, family background, and structural economic factors. Estimates are computed with control variables set to their pooled sample means. These estimates indicate that racial differences in human capital, family background, and sectoral concentration account for a large part of overall racial disparities in class attainment. In general, covariate-adjusted racial differences in the probability of class attainment are considerably smaller than unadjusted differences. At several points between 1972 and 2010, these differences are not statistically significant at conventional thresholds. Similar to trends in unadjusted racial differences, covariate-adjusted racial differences in class attainment widen during the 1980s, decline during the 1990s, and then widen again during the 2000s.

Although covariate-adjusted racial differences in class attainment are smaller overall, these results provide little evidence of a consistent decline in these disparities over time. After accounting for differences in human capital, family background, and sectoral concentration, blacks were underrepresented in positions of economic power during the 1980s and approached parity with nonblacks during the late 1990s. The period of declining racial disparities from the mid-1980s to the late 1990s, however, was due to sharp declines in the proportion of nonblacks

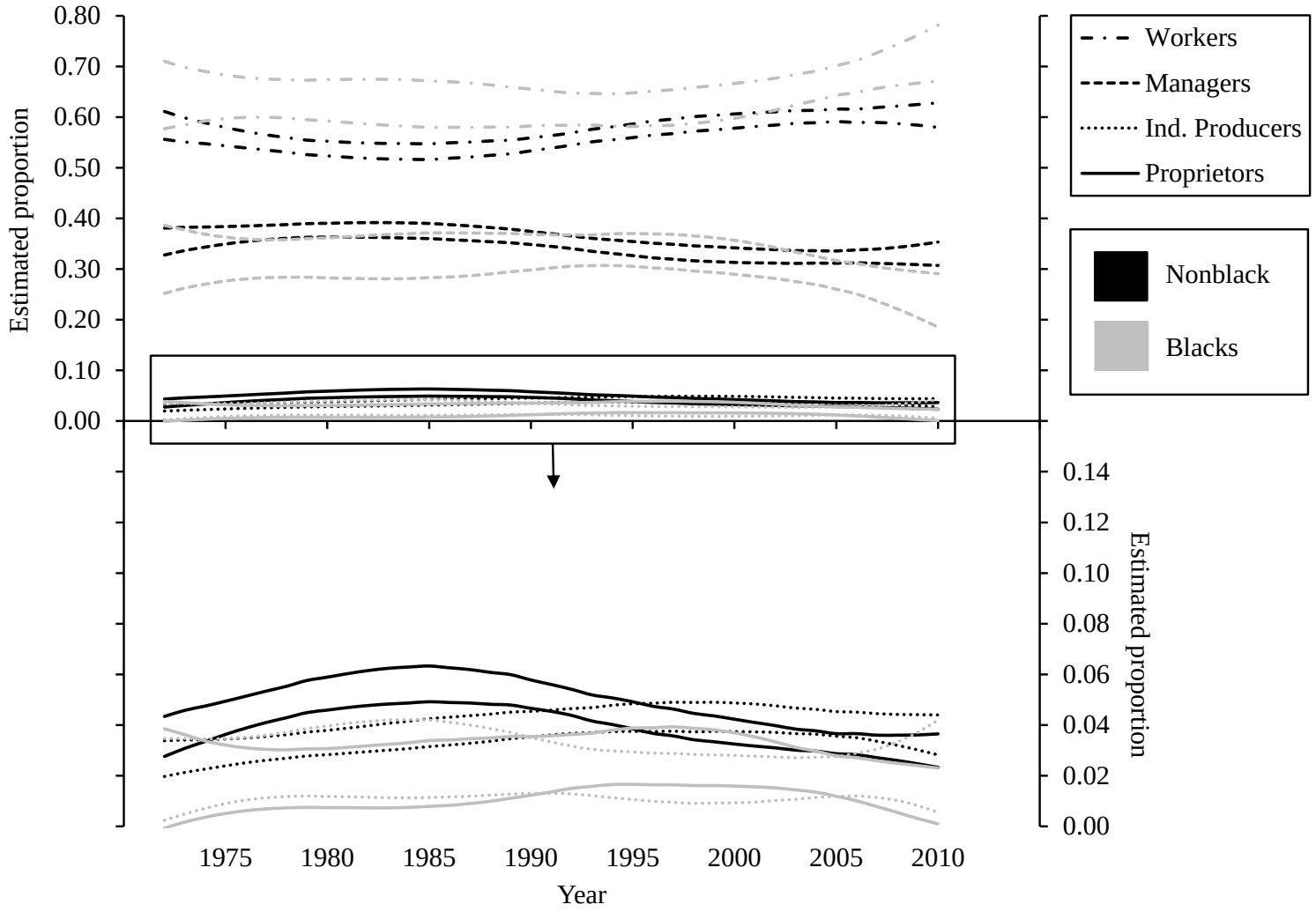
in management and ownership rather than growth in the proportion of blacks in these class positions. Moreover, the trend toward declining racial disparities during the 1990s eroded over the subsequent decade as the proportion of blacks in management and ownership declined in turn, and toward the end of the 2000s, significant racial disparities in class attainment remerged. In sum, these results are difficult to reconcile with the declining disparities perspective, and despite some fluctuations over time, they are generally consistent with the enduring disparities perspective.

Figure 7.3. Unadjusted Racial Disparities in Class Attainment, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure 7.4. Covariate-adjusted Racial Disparities in Class Attainment, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their pooled sample means.

Gender Differences in Class Attainment

Figure 7.5 summarizes unadjusted gender disparities in class attainment from 1972 to 2010. It displays interval estimates of the proportion of men and women in different class positions over time. These estimates reveal large and persistent gender disparities in class attainment, with men substantially more likely than women to take part in ownership and management within production. Throughout the four decades under consideration, between 45 to 55 percent of men are workers, between 35 to 40 percent are managers, and between 7 to 10 percent are proprietors. In comparison, between 60 to 70 percent of women are workers throughout this period, and no more than 30 percent and 4 percent are managers and proprietors, respectively, at any point from 1972 to 2010.

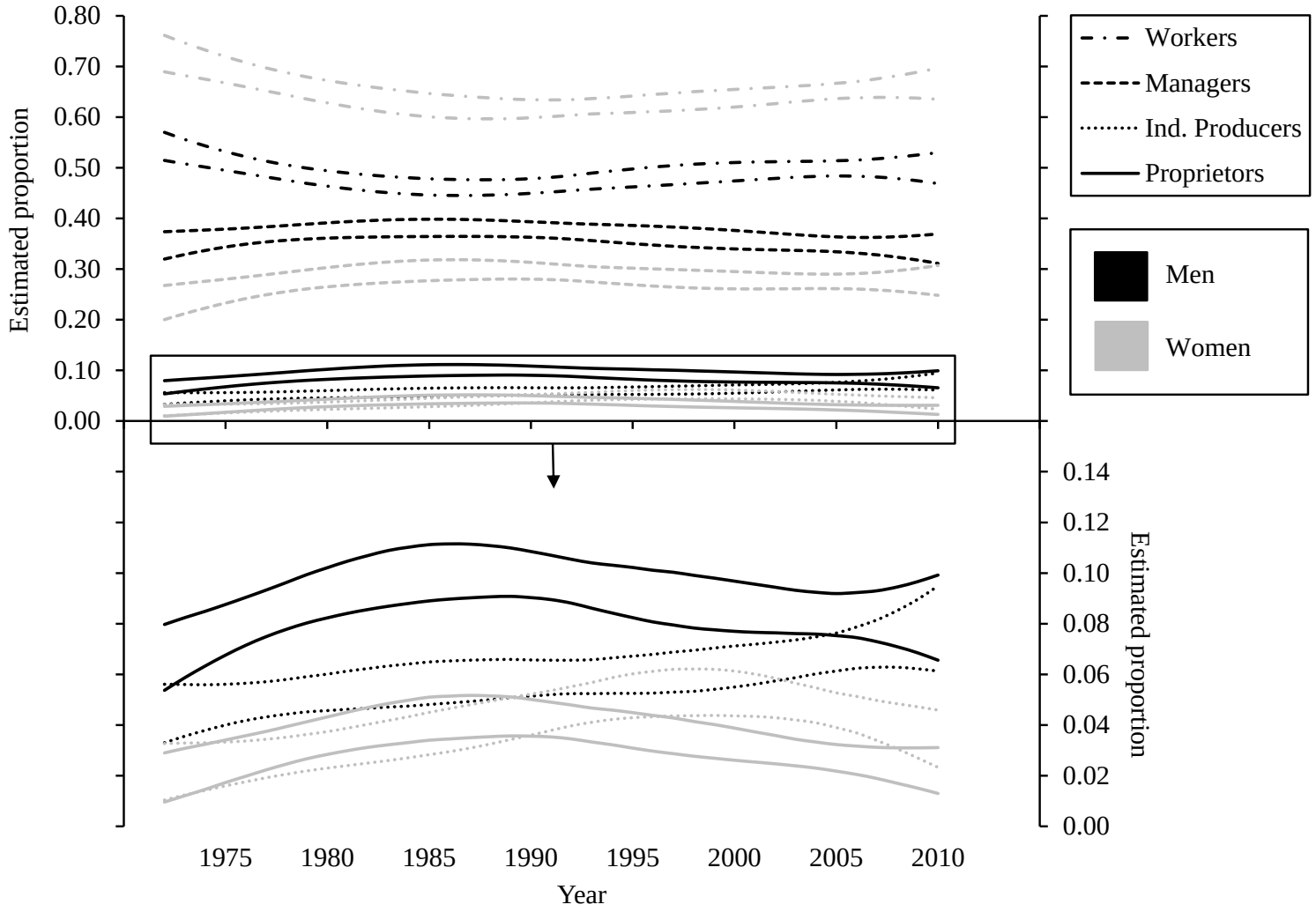
The unadjusted trend estimates in Figure 7.5 do not suggest any appreciable changes in class attainment by gender from 1972 to 2010, apart from a transitory period in late 1990s when men and women came to have similar chances of becoming independent producers. In the 1970s and 1980s, men were about 8 to 10 percentage points, or about 1.3 to 1.5 times, more likely than women to be managers and about 5 to 6 percentage points, or about 2.5 to 3 times, more likely to be proprietors. Several decades later, in the 1990s and 2000s, men remained 7 to 9 percentage points, or about 1.3 to 1.4 times, more likely than women to be managers and about 5 to 6 percentage points, or about 2.5 to 3 times, more likely to be proprietors. Throughout the period under consideration, women were consistently about 15 to 18 percentage points, or about 1.3 times, more likely than men to be workers.

Figure 7.6 describes covariate-adjusted gender differences in class attainment. It plots interval estimates of the proportion of men and women in different class positions computed from a multinomial logit model that controls for human capital characteristics, family

background, household structure, and sectoral concentration. These estimates indicate that covariate-adjusted gender differences in class attainment are smaller than unadjusted differences. This suggests that male and female differences in human capital, household responsibilities, and sectoral concentration account for part of the overall gender disparity in class attainment. But even after controlling for an extensive set of covariates, gender disparities in class attainment remain substantial and persist largely intact from 1972 to 2010.

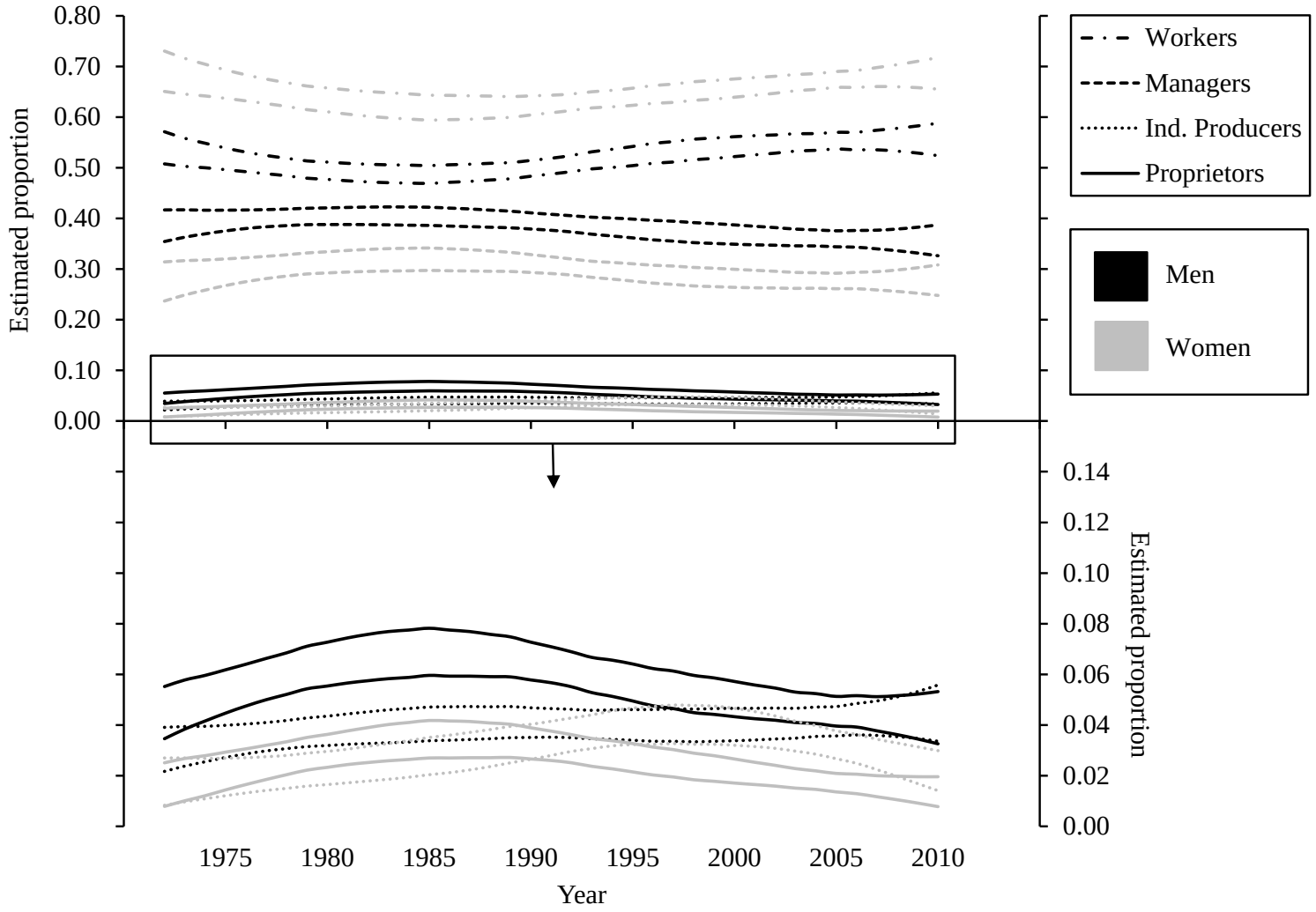
Throughout this period, men are consistently about 8 to 10 percentage points, or about 1.3 to 1.4 times, more likely than comparable women to be managers, and about 3 to 4 percentage points, or about 2 to 3 times, more likely to be proprietors. By extension, women are also consistently about 12 to 15 percentage points, or about 1.25 times, more likely than comparable men to be workers. The covariate-adjusted estimates in Figure 7.6 also indicate that the proportion of women classified as independent producers slowly increased from the early 1970s through the late 1990s, when men and women had comparable chances of attaining this class position, but then declined sharply in the 2000s. These results, which reveal large and persistent gender differences in class attainment over the past four decades net of human capital characteristics, household constraints, and structural economic factors, are consistent with the enduring disparities hypothesis.

Figure 7.5. Unadjusted Gender Disparities in Class Attainment, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure 7.6. Covariate-adjusted Gender Disparities in Class Attainment, 1972-2010



Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their sample means.

Race, Gender, and Class Strata

Figure 7.7 describes unadjusted racial and gender differences in attainment of different class strata—that is, in the relative chances of becoming an owner of a large versus small enterprise or a manager at a higher versus lower level of the workplace authority hierarchy. These estimates are computed separately for the period from 1972 to 1990 and for the period from 1991 to 2010 in order to simultaneously improve the precision of estimates and allow for a crude tracking of changes over time. The upper panel of Figure 7.7 displays estimates for all four class strata on the same scale, and the lower panel uses a magnified scale on the right axis to better display estimates for large and small proprietors.

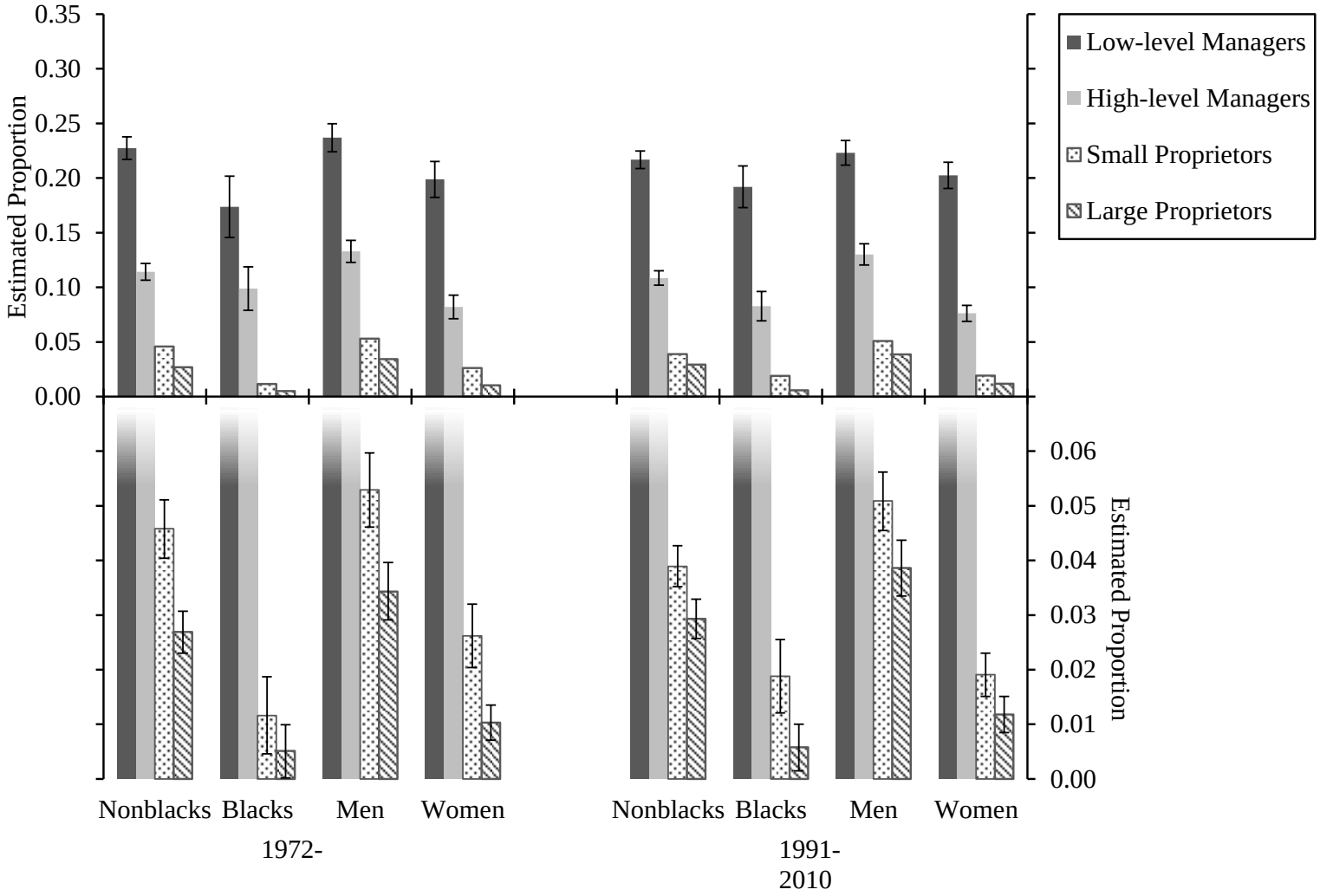
The unadjusted estimates in Figure 7.7 show a fairly stable pattern of racial and gender differences in attainment of higher versus lower strata over time. With respect to racial differences, nonblacks are more likely than blacks to be high-level managers, and they are substantially more likely to be large proprietors. Specifically, from 1972 to 1990 and from 1991 to 2010, nonblacks are about 2 percentage points, or about 5 times, more likely than blacks to be large proprietors. With respect to gender differences, men are much more likely than women to become high-level managers and large proprietors during both periods, and there is little evidence of temporal change in these disparities. From 1972 to 1990 and from 1991 to 2010, men are about 5 percentage points, or around 1.6 times, more likely than women to be high-level managers, and about 2 percentage points, or upward of 3 times, more likely to be large proprietors.

Figure 7.8 describes covariate-adjusted racial and gender disparities in the chances of attaining higher versus lower class strata, separately for the period from 1972 to 1990 and for the period from 1991 to 2010. These estimates indicate that after accounting for differences in

human capital, family background, and sectoral concentration, racial disparities in access to higher levels of the managerial hierarchy are smaller and not statistically significant in either time period. Racial disparities in ownership of large enterprises, however, remain significant during 1972 to 1990 and during 1991 to 2010, even after controlling for an extensive set of covariates. Covariate-adjusted estimates also indicate that gender disparities in the chances of becoming a high-level manager or a large proprietor are pronounced during both periods and have remained stable over time. In the periods from 1972 to 1990 and 1991 to 2010, men are about 2.5 times more likely than women to be large proprietors, and about 1.5 times more likely to be high-level managers.

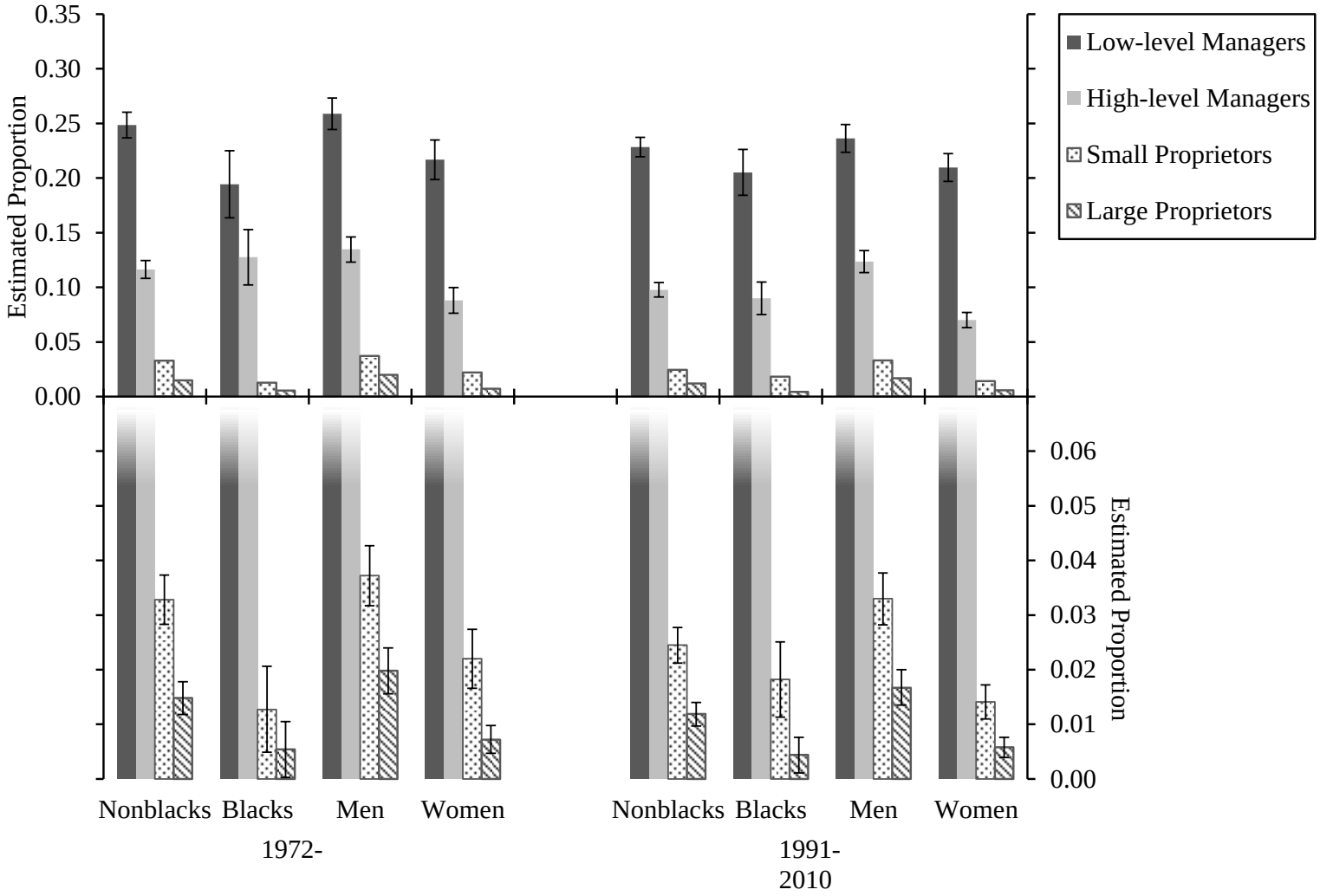
In sum, these results indicate that blacks and especially women have constrained chances of ascending to the higher levels of managerial hierarchies and of owning a large business enterprise. These disparities in class attainment are explained in part by differences in human capital, family background, household constraints, and sectoral concentration, but racial and gender gaps persist in most cases even after controlling for these factors and are relatively invariant across time. Thus, these data indicate that, regardless of qualifications and personal constraints, the organizational positions that confer an extensive amount of power and influence in modern capitalist societies have remained firmly dominated by men, and to a lesser degree nonblacks, from 1972 to 2010.

Figure 7.7. Unadjusted Racial and Gender Differences in Attainment of Class Strata



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure 7.8. Covariate-adjusted Racial and Gender Differences in Attainment of Class Strata



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their sample means.

Summary

Continuity and change in modern class structures are central to the study of economic power and social stratification. Although competing theories suggest starkly different trends in aggregate class structure and in the class attainment prospects for disadvantaged status groups, past studies do not provide a rigorous assessment of these theories because they rely on imprecise measurement of ownership and authority relations, and time-series data that do not extend beyond the 1990s. Using data that permit direct measurements of ownership and authority relations in the workplace from 1972 to 2010, this chapter investigated hypothesized transformations of the American class structure and of racial and gender disparities in class attainment.

Results indicate that the relative size of different classes remained fairly stable from the early 1970s to the late 2000s. During the 1970s, the proportion of workers declined and the proportion of managers and proprietors increased, but from the mid-1980s onward, these trends reversed as the proportion of workers increased and the relative number of managers and proprietors steadily declined. As a result, the class structure of the American economy at the end of the 2000s closely resembled that of the early 1970s. In addition, results indicate that racial and gender disparities in class attainment also remained fairly stable throughout this period, despite a substantial narrowing of human capital differences, the introduction of policies designed explicitly to promote access to positions of economic power for subordinate status groups, and broad attitudinal changes indicating a decline in overt racism and sexism. Although results suggest some modest fluctuations over time, there is no discernable trend toward either greater equality or inequality in the class attainment prospects of different status groups. At present,

blacks and especially women remain significantly less likely to occupy positions of ownership and authority in production.

These results extend previous findings in several important ways. First, Wright's (1997; 1987) seminal studies on changes in aggregate class structure documented steady declines in the proportions of workers and a pronounced increase in the proportion of managers between 1960 and 1990. Using a more direct measure of class and a longer time-series, this study corroborates these findings through the early 1980s, but it also reveals that trends in aggregate class structure completely reversed course in the mid- to late-1980s. These results demand a reconsideration of Wright's (1997; 1987) conclusion that the empirical record provides overwhelming support for the declining significance of class perspective on changes in modern class structures.

Second, the results presented in this chapter also demand a reconsideration of conventional methods used to measure the relative number of managers. While studies of the managerial class based on occupational classification data tend to show strong growth in the proportion of managers since the 1970s (e.g., Goldstein 2012), results based on self-reported supervisory data indicate that growth in the proportion of managers peaked in the mid-1980s and then declined. In addition, although prior research based on occupational classification data provides some evidence of gender integration across class positions since the early 1970s (Cohen, Huffman, and Knauer 2009; Hughes 2003; Loscocco and Robinson 1991), the results presented in this study indicate that gender disparities in class attainment have remained highly stable from 1972 to 2010, with women consistently underrepresented in ownership and management.

These findings call occupation-based measures of managerial and ownership roles into question and cast doubt upon prior evidence of declining gender disparities in economic power.

They are also consistent with other evidence indicating that many firms have expanded managerial job titles, but not real organizational control and tangible workplace authority, to include a greater number of female and minority employees in an effort to appear compliant with nondiscrimination policies (Jacobs 1992; Reskin and Ross 1992). Altogether, this suggests that occupational classification data may have become increasingly unreliable as an indicator of workplace authority and managerial power over the past several decades.

The results documented in this analysis are consistent with elements of the class-analytic perspective on long-term changes in relative size of different classes, especially since the mid-1980s. Furthermore, the stable pattern of racial and gender differences in class attainment support the enduring disparities perspective. These persistent differences in class attainment suggest that discrimination and homosocial reproduction on the part of predominantly white male proprietors and managers remain widespread in capital markets, business networks, and promotion ladders. Although prior research indicates that racial and gender differences with respect to other dimensions of social stratification, such as education and income, have declined over the past four decades, this study reveals that deep inequalities in access to positions of ownership and authority within production continue to divide status groups in the United States.

Although this analysis makes several important contributions to research on class structure and class attainment, it is not without limitations. In particular, it does not observe discrimination or homosocial reproduction directly but rather relies on the "residual" approach to identifying these underlying mechanisms, which requires the strong assumption that there are no unobserved individual-level characteristics that affect class attainment and differ across status groups. If, for example, there are unobserved differences in human capital or career preferences between men and women, then it would be inappropriate to attribute residual disparities in class

attainment to discrimination. It is impossible to completely rule out unobserved heterogeneity as an explanation for observed status group disparities in class attainment, but this analysis controlled for an extensive set of human capital and family background characteristics and prior research suggests that racial and gender differences in career preferences are typically not large enough to explain the pronounced disparities in class attainment (Fairlie 2007).

To further address this limitation, an additional analysis of the 1989, 1998, and 2006 waves of the GSS, which asked a small random subsample of respondents if they would prefer to be self-employed or to work for someone else, indicate that racial and gender differences in preferences for self-employment cannot explain status group disparities in class attainment (results not shown, available upon request). A strong majority of GSS respondents report a preference for self-employment; there are few racial differences in these preferences; men are only about 15 percentage points, or about 1.3 times, more likely than women to prefer self-employment; and large statistically significant racial and gender disparities remain in multivariate models of class attainment that additionally control for self-employment preferences. These ancillary analyses bolster the conclusion that persistent differences in class attainment by race and gender are in large part due to discrimination and homosocial reproduction. Nevertheless, they are based on a comparatively small number of respondents from only a few waves of the GSS and a single measure of career preferences. Without more detailed data, it is difficult to completely rule out the possibility that long-term racial and gender disparities in class attainment are due to differential preferences.[12]

[12] These ancillary analyses are based on 1,550 non-missing responses to the EMPSELF question in the GSS. It is important to note that multivariate models of class attainment that control for concurrently measured preferences are problematic because such a measure of preferences is endogenous to class attainment and to unobserved discrimination. That is, individuals who become successfully self-employed and do not suffer discrimination or other forms of exclusion may then be more likely to have a favorable attitude toward self-employment.

This analysis also does not account for the life-course dimension of class attainment, which suggests that status group integration across class boundaries may involve a process of cohort replacement that would only be reflected in time-series data many decades after egalitarian changes in human capital acquisition and prejudicial attitudes. For example, if promotion into positions of workplace authority typically occurs later in one's career, at which point downward mobility out of authority hierarchies is rare, then gender disparities in promotional practices from decades past may continue to exert a strong influence on cross-sectional gender differences in class attainment observed during more recent periods. In other words, the life-course perspective suggests that significant gender integration across classes will only be observed after the current stock of predominantly white male proprietors and managers retire and are replaced by greater numbers of blacks and women from younger cohorts who have the requisite human capital and no longer face significant discrimination. Although such a pattern of cohort replacement would attenuate the magnitude of changes in cross-sectional status group disparities, this study tracks these disparities over nearly four decades—a period long enough to reflect the posited cohort replacement process—and finds no evidence of integration. In addition, ancillary analyses of status group disparities using synthetic cohort methods indicate that more recent birth cohorts of blacks and women face barriers to becoming proprietors and managers that are just as steep as those encountered by older cohorts of blacks and women when they were are at a similar stage in their careers.

These limitations notwithstanding, this analysis provides considerable evidence that status group disparities in class attainment remained remarkably stable from 1972 to 2010. This stability suggests that ascriptive inequalities in access to positions of economic power are highly resilient to policy interventions and expansions of higher education.

CHAPTER VIII

Trends in Aggregate Income Inequality: A Decomposition Analysis

This chapter provides a formal decomposition of trends in aggregate income inequality from 1983 to 2010 that evaluates the impact of (1) changes in between-class income differences, (2) compositional changes in the relative size of different classes, and (3) changes in within-class income dispersion. The weight of the evidence from prior chapters suggests a strong relationship between social class and growth in income inequality at the population level that is consistent with the class-analytic perspective. The exact contribution of compositional, between-class, and within-class changes to growth in aggregate income inequality, however, is still uncertain. Does growth in income differences between classes explain an appreciable part of observed growth in aggregate income inequality? Have compositional changes in the size of different classes inflated or dampened trends in population-level inequality? And, what is the relative importance of between-class and compositional effects compared to the residual, or within-class, effect?

Methods

Data and Measures

This chapter once again uses time-series data from the 1983 to 2010 waves of both the GSS and CPS (King et al 2010; Smith et al 2011). The analytic sample consists of 20,577 respondents in the GSS and 1,539,568 respondents in the CPS who were 18 to 65 years old at the time of the interview and worked full-time during the previous calendar year. Supplemental

analyses of data that include both full- and part-time respondents yield similar results (see Appendix A). Additional sample restrictions are necessary in some analyses because the requisite data are only available in certain survey waves.

In both the GSS and CPS, class position, class strata, and personal market income are measured exactly as they were in Chapter VI. The covariates included in multivariate decomposition analyses are age, race, gender, and education. Age is expressed as a series of dummy variables for the following age groups: 18 to 25 years, 26 to 35 years, 36 to 45 years, 46 to 55 years, and 56 to 65 years. Race is coded 1 for black and 0 for nonblack, and gender is coded 1 for female and 0 for male. Respondent's education is expressed as a series of dummy variables for "less than high school," "high school graduate," "some college," and "college graduate." Multiple imputation with five replications is used to fill in missing values for all variables (Rubin 1987).

Analyses

I measure aggregate income inequality with the variance of log income, $V = Var(\log(Y))$. The variance of log income is a scale-invariant measure of inequality that has a convenient functional relationship with several other inequality metrics, such as the Gini index (Allison 1978).[13] For notational simplicity, the log operator on income is henceforth omitted from all equations.

This measure can be decomposed into between-class and within-class components as follows

[13] Parallel analyses using the variance of untransformed income values as the measure of aggregate inequality yield results similar to those based on the natural log transformation. The variance of income is a translation-invariant, but not scale-invariant, measure of inequality that is equally sensitive to transfers in the upper and lower tails of the income distribution. The variance of log income, by contrast, is scale-invariant, but not translation-invariant, and it is disproportionately sensitive to transfers in the lower tail of the income distribution.

$$V = Var\big(E(Y|C)\big) + E\big(Var(Y|C)\big) = B + W \ . \tag{8.1}$$

The between-class and within-class components of aggregate inequality, respectively denoted by B and W, can be expressed as a weighted sum of class-specific means and variances:

$$V = B + W = \sum_{j=1}^{4} \pi_j \, r_j^2 + \sum_{j=1}^{4} \pi_j \, \sigma_j^2 \ , \tag{8.2}$$

where π_j represents the proportion of respondents in class $C = j$, $r_j = \hat{Y}_j - \bar{Y}$ is the deviation of mean log income for class $C = j$ from the population mean, and σ_j^2 denotes the variance of log income within class $C = j$.

With time-series data, the change in aggregate income inequality from time $T = 0$ (the baseline survey wave) to $T = t'$ (a post-baseline survey wave) can be decomposed into a compositional effect, δ_P, reflecting shifts in the relative size of different classes; a between-class effect, δ_B, reflecting changes in mean income for different class positions; and a within-class effect, δ_W, capturing changes in income dispersion within class positions. Specifically, the change in aggregate income inequality is given by the sum of these three components:

$$V_{t'} - V_0 = \delta_P + \delta_B + \delta_W \ , \tag{8.3}$$

where the compositional effect of size shifts in class structure is

$$\delta_P = \sum_j \big(\pi_{jt'} - \pi_{j0}\big)\Big(r_{jt'}^2 + \sigma_{jt'}^2\Big) \ , \tag{8.4}$$

the between-class effect of changes in mean income for different class positions is

$$\delta_B = \sum_j \pi_{j0}\Big(r_{jt'}^2 - r_{j0}^2\Big) \ , \tag{8.5}$$

and the within-class effect of changing inequality within class positions is

$$\delta_W = \sum_j \pi_{j0}\Big(\sigma_{jt'}^2 - \sigma_{j0}^2\Big) \ . \tag{8.6}$$

To investigate the link between class structure and growth in aggregate income inequality, I estimate the quantities in Equations 8.4 through 8.6 and scale them by the total change in

inequality. These estimates assess the proportionate impact of compositional shifts in class structure, changes in between-class income differences, and changes in within-class income dispersion on growth in aggregate income inequality. In the GSS, bootstrap methods are used to compute 95 percent confidence intervals for these effects (Efron and Tibshirani 1993). Inferential statistics are not computed in analyses of CPS data because the extremely large number of observations renders the magnitude of sampling error trivial.

The decomposition analysis described here does not control for individual-level characteristics that affect both income and class attainment. The class effects estimated in the foregoing analysis may simply reflect the potentially confounding effects of increasing income returns to education or changes in the demographic makeup of classes. To estimate class effects on growth in aggregate income inequality net of individual characteristics, this study combines multivariate decomposition methods with variance function regression (Western and Bloome 2009).

In analyses of aggregate income inequality that involve d covariates with levels $l_1, l_2 \ldots, l_d$, the data are organized in a decomposition table, where each observation is assigned to one of the $L = l_1 \times l_2 \times \ldots \times l_d$ cells in the cross-classification of all covariates. Similar to the decomposition outlined previously, aggregate income inequality is expressed as a weighted sum of cell means and variances, with $V = B + W = \sum_l \pi_l r_l^2 + \sum_l \pi_l \sigma_l^2$, and temporal trends can be decomposed into the effects of changes in cell proportions, changes in between-cell mean income differences, and changes in within-cell income dispersion.

For this approach to multivariate decomposition, variance function regression is used to simultaneously model the cell means and variances at each time point, and the net effects of class

on trends in aggregate income inequality are quantified with counterfactual variances that fix model coefficients at their baseline values. The variance function regression model has form

$$E(Y|C,X,t) = \hat{Y}_t = \alpha_t + \gamma_t C + \theta_t X \text{ and} \tag{8.7}$$

$$\log\big(Var(Y|C,X,t)\big) = \log(\sigma_t^2) = \lambda_t + \mu_t C + \nu_t X\,, \tag{8.8}$$

where C is a vector of dummy variables for class position and X represents a set of individual-level covariates. Its parameters, which describe how class position and individual covariates relate to both mean income and income dispersion, are estimated in two steps. First, estimates of the mean effects, α_t, γ_t, and θ_t, are obtained from a conventional least squares regression of log income on class dummy variables and individual covariates, stratified by time. Second, squared residuals from the model for mean income are computed as $\varepsilon_{it}^2 = (y_{it} - \alpha_t + \gamma_t c_i + \theta_t X)^2$, and then the variance effects, λ_t, μ_t, and ν_t, are estimated by maximum likelihood from a gamma regression of the squared residuals on class dummy variables and individual covariates.[14]

The net effects of class on trends in aggregate inequality are then quantified by plotting counterfactual variance estimates that fix the specific regression coefficients associated with class position at their baseline values. Specifically, to measure the effect of covariate-adjusted changes in mean income between class positions, I compute and plot the following counterfactual variance

$$V_t^B = \textstyle\sum_{l=1}^{L} \pi_{lt}(\tilde{r}_{lt}^2 + \sigma_{lt}^2)\,, \tag{8.9}$$

where the adjusted between-cell mean difference, $\tilde{r}_{lt} = \tilde{Y}_{lt} - \bar{Y}_t$, is calculated from $\tilde{Y}_{lt} = \alpha_t + \gamma_0 C_l + \theta_t X_l$. In this notation, X_l and C_l denote the values of these variables associated with cell l in the cross-classification of all covariates in the analysis. This counterfactual variance is

[14] In empirical analyses, rather than fully stratifying these regressions by time, I model the cell means and variances as a smooth cubic function of time. Experimentation with different smooth functions indicated that a cubic specification provides the best fit to the observed data.

interpreted as the aggregate level of income inequality that would have been observed had net differences in mean income between class positions remained constant since the baseline survey wave.

The counterfactual variance that measures the effect of compositional changes in the relative size of different classes is given by

$$V_t^P = \sum_l \tilde{\pi}_{lt}(r_{lt}^2 + \sigma_{lt}^2) \,, \tag{8.10}$$

where $\tilde{\pi}_{lt}$ is a cell proportion reweighted so that the marginal size of different class positions remains invariant over time. Let $P(C = j|t) = p_{jt}$ be the marginal proportion of individuals in class $C = j$ at time t. The adjusted cell proportions are given by $\tilde{\pi}_{lt} = \left(p_{j0}/p_{jt}\right)\pi_{lt}$ for all cells l in which $C = j$. This counterfactual variance is interpreted as the level of aggregate income inequality that would have been observed had the relative size of different class locations remained invariant over time. In the GSS, to determine whether the net effects of class on trends in aggregate inequality are statistically significant, bootstrap methods are used to test the null hypotheses that $H_0: V_t^B = V_t$ and $H_0: V_t^P = V_t$ for $t > 0$.[15]

Where sufficient data permit, analyses parallel to those discussed throughout this section are conducted to investigate the effects of class strata on trends in aggregate income inequality. Like decompositions based on class position, these analyses involve decomposing changes in aggregate income inequality into components due to changes in the relative size of class strata, changes in between-strata income differences, and changes in within-strata income dispersion. These analyses additionally allow for an assessment of how divergent income trends between

[15] Specifically, I compute 98 percent confidence intervals for $V_t^B - V_t$ and $V_t^P - V_t$ based on the 1st and 99th percentiles of a sampling distribution estimated from 500 bootstrap replications. If these confidence intervals do not contain the value zero, then the corresponding null hypotheses are rejected at the $\alpha = 0.02$ level.

higher versus lower levels of the ownership and authority structure are linked to changes in income inequality at the population level.

Because of sparseness in multivariate decompositions based on the GSS, observations from this data source are pooled within decades, and estimates are computed separately for the 1980s, 1990s, and 2000s. This ensures that there are a sufficient number of observations in each cell of the decomposition table, improves the precision of estimates, and still allows for an informative, albeit less fine-grained, tracking of changes over time.

Results

Trends in Aggregate Income Inequality from 1983 to 2010

Figure 8.1 displays trends in the variance of log income. The solid black line represents estimates from the GSS, the solid grey line represents estimates from the CPS, and the dotted grey line plots smooth model-based estimates from the CPS. Several patterns are evident in these data. First, estimates from the GSS suggest a higher overall level of income inequality than estimates from the CPS. For example, in the 1980s, the variance of log income in the GSS is about 0.45, while in the CPS it ranges between 0.36 and 0.40 during this period. A more detailed comparison of estimated income distributions from the GSS and CPS indicate that the higher overall level of inequality in the GSS is due to a greater frequency of low incomes. For example, during the 1980s, the first, fifth, and tenth percentiles of the income distribution in the GSS were about $7,500, $12,000, and $16,000, respectively, while in the CPS, the same percentiles were $9,500, $15,000, and $19,000. Above the tenth percentile, estimated income quantiles in the GSS and CPS are very similar. This suggests that midpoint imputation with the GSS interval measure of personal income may be less accurate in the lower tail of the distribution.

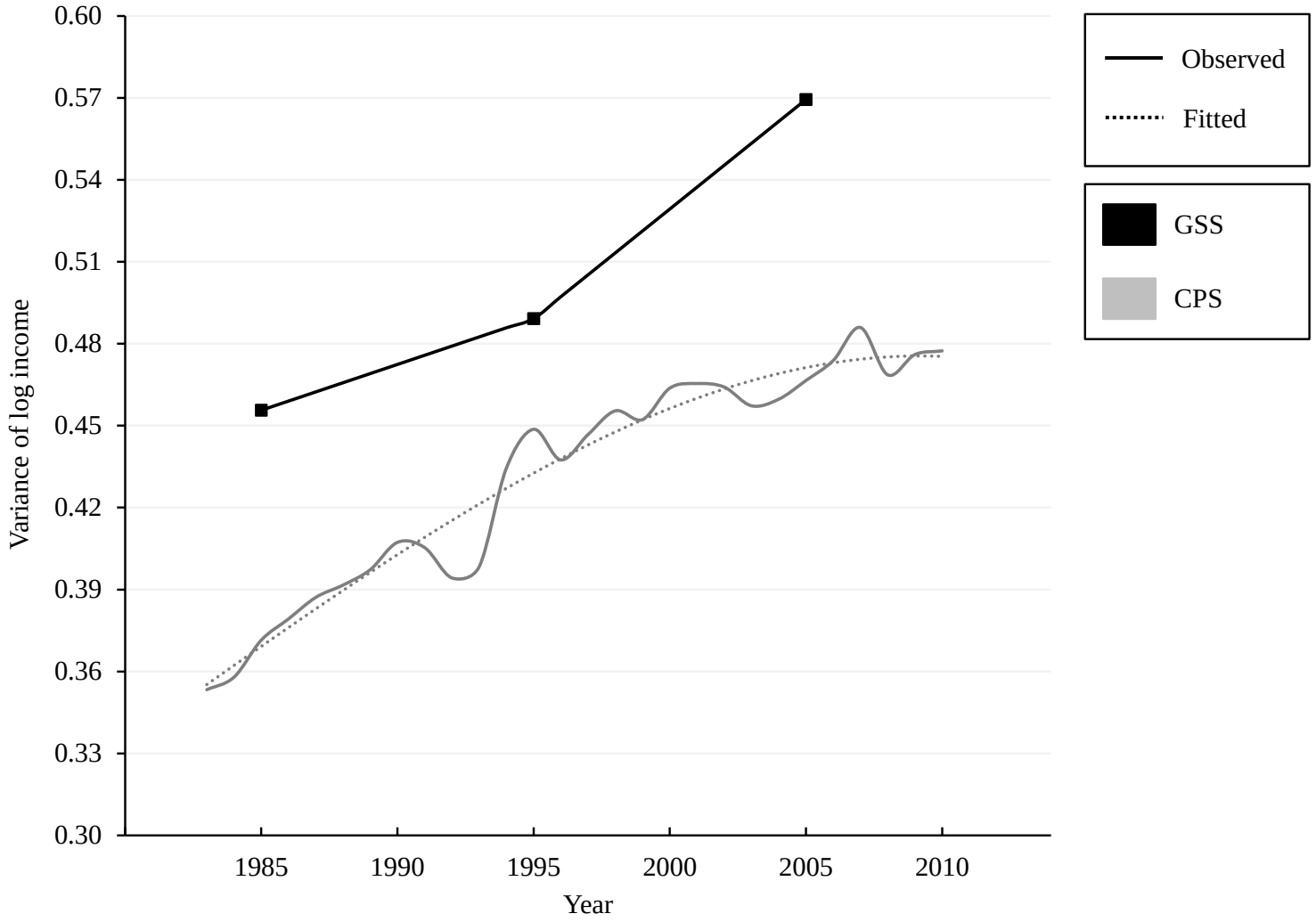
Second, both the GSS and CPS reveal an upward trend in aggregate income inequality since the early 1980s. The GSS, however, suggests that growth in income inequality was more pronounced from the 1990s to the 2000s, while the CPS suggests steeper growth in income inequality during the 1980s. In the GSS, the variance of log income increased by about 6 percent, from 0.46 to 0.49, between the 1980s and 1990s. Between the 1990s and 2000s, the variance of log income increased by about 16 percent, from 0.49 to 0.57. In the CPS, by contrast, the variance of log income increased by about 14 percent, from 0.36 to 0.41, between 1983 and 1990. Then, between the mid-1990s and the late 2000s, the variance of log income increased by about 9 percent, from 0.44 to 0.48. The marked fluctuation in CPS estimates of aggregate income inequality during the early 1990s is likely due, at least in part, to a major questionnaire redesign, a change in survey mode, and a large increase in the topcoding thresholds for certain categories of income, all of which occurred between the 1993 and 1995 survey waves.[16]

Trend estimates of the variance of log income provide a concise summary of overall changes in aggregate income inequality, but they do not reveal the more specific distributional changes underlying these trends. To investigate changes in the lower tail, middle, and upper tail of the income distribution that may be driving overall growth in the variance of log income, Figure 8.2 displays trends in the fifth percentile, the median, and the ninety-fifth percentile of the income distribution. These estimates are scaled to equal zero at the baseline time period, and all values thereafter represent proportionate changes.

[16] For a detailed review of these design changes to the CPS, see Burkhauser et al (2004) and Ryscavage (1999). Although abrupt changes in CPS topcoding thresholds lead to some pronounced short-term fluctuations in estimates of aggregate income inequality, previous research indicates that estimates of the long-term trend in aggregate inequality computed from these data (e.g., as depicted by the slope of the smooth model-based estimates in Figure 1) are highly consistent with similar trend estimates computed from alternative data that constrain the extent of topcoding to be the same across all waves of the CPS (Burkhauser et al 2004; Larrimore et al 2008).

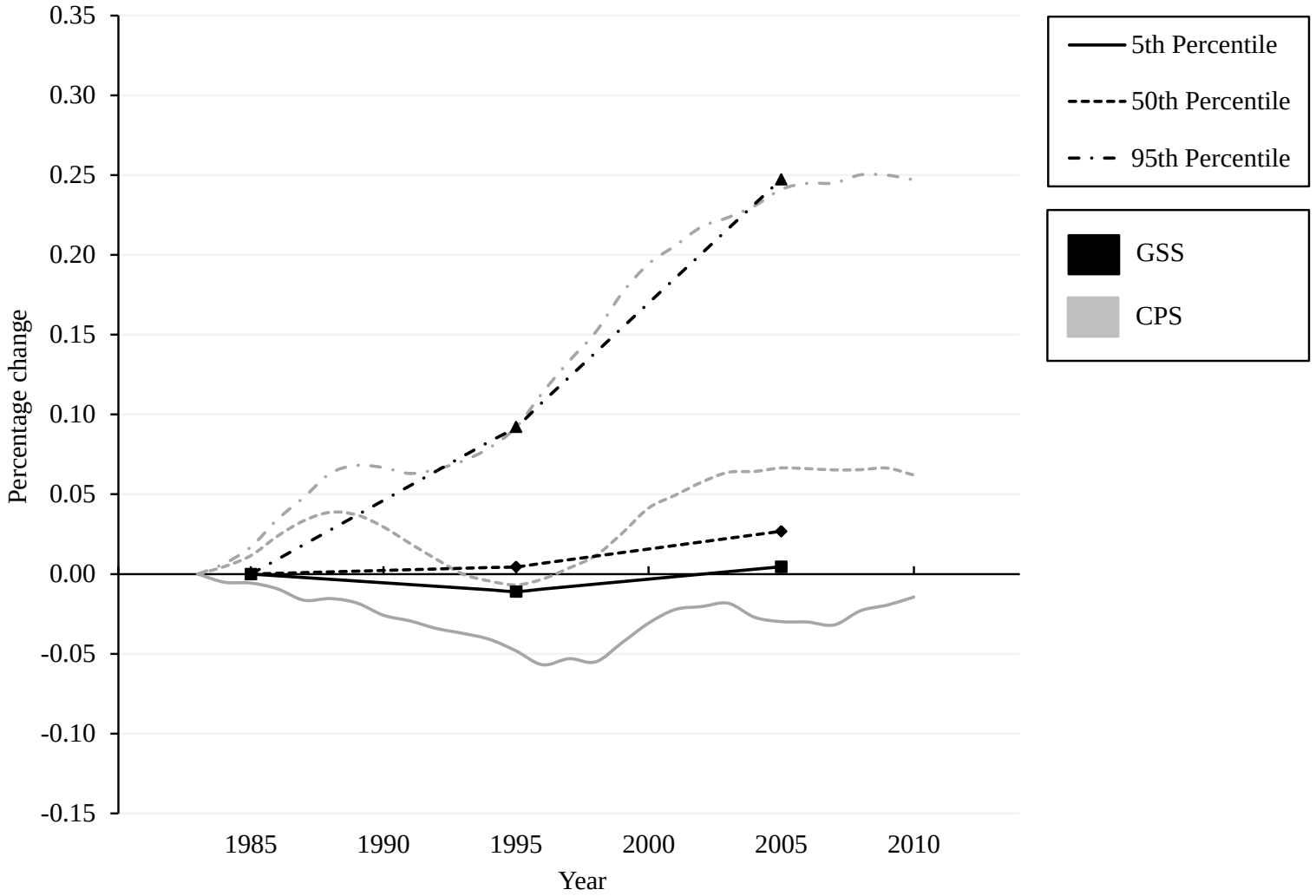
In the GSS, estimates suggest that growth in aggregate income inequality is driven almost entirely by increasing incomes in the upper tail of the distribution together with stagnating incomes in the middle and lower tail of the distribution. Because top incomes grew more rapidly between the 1990s and the 2000s, GSS estimates of growth in aggregate income inequality were more pronounced during this period than during the 1980s. In the CPS, by contrast, growth in aggregate income inequality between the early 1980s and mid-1990s was driven by both increasing incomes at the top of the distribution and declining incomes at the bottom. The divergent estimates for the fifth percentile of the income distribution from the GSS and CPS again suggest that the interval measure of income used by the GSS is less accurate in the lower tail of the distribution. After the mid-1990s, Figure 8.2 indicates that both the median and fifth percentile increased moderately in the CPS, but aggregate income inequality continued to increase, albeit at a slower pace, because of pronounced income growth in the upper tail of the distribution.

Figure 8.1. Trends in Aggregate Income Inequality



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure 8.2. Trends in Income Quantiles



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets. Estimates are scaled to equal the percentage change since the baseline time period. CPS estimates are based on 5-year smoothed averges.

Decomposition of Trends in Inequality by Class Position

Table 8.1 presents results from a formal decomposition of changes in aggregate income inequality by class position, with estimates computed separately for the GSS and CPS. Results from the GSS indicate that compositional changes in the relative size of different classes had a negligible effect and that changes in between-class income differences had a modest dampening effect on growth in aggregate income inequality between the 1980s and 1990s. Between the 1990s and 2000s, however, estimates from the GSS suggest that compositional changes in the relative size of different classes had a modest dampening effect and that growth in between-class income differences had a strong inflationary effect on trends in aggregate income inequality. For example, point estimates indicate that growth in between-class income differences explains about 30 percent of the increase in aggregate income inequality between the 1990s and 2000s. For the entire period under consideration, results from the GSS indicate that compositional changes in the relative size of different classes had a modest dampening effect, that growth in between-class income differences had a modest inflationary effect, and that growth in within-class income dispersion had a very large inflationary effect on trends in aggregate income inequality.

Results from the CPS are generally consistent with those from the GSS, although point estimates for compositional and between-class effects are somewhat less pronounced. The weight of the evidence from the CPS suggests that compositional changes in the relative size of different classes had a very small dampening effect on trends in aggregate income inequality throughout the period from 1983 to 2010. In addition, estimates from the CPS suggest that growth in between-class income differences had a negligible impact on growth in aggregate income inequality during the 1980s and a modest inflationary effect during the 1990s and 2000s. For example, between 1990 and 2000, the between-class effect explains 16 percent of the growth

in income inequality at the population level. Further echoing results from the GSS, increases in within-class income dispersion had the largest inflationary effects on trends in aggregate income inequality in the CPS.

Figure 8.3 displays counterfactual variance estimates that quantify covariate-adjusted compositional and between-class effects on growth in aggregate income inequality since the early 1980s. These estimates are based on a multivariate decomposition of changes in the variance of log income combined with a variance function regression that controls for age, race, gender, and education. By controlling for the potentially confounding influence of individual-level determinants of income and class attainment, these counterfactual estimates describe the net impact of compositional changes in the relative size of different classes and changes in between-class income differences.

Results from the GSS indicate that observed aggregate income inequality (i.e., the variance of log income) increased by 24 percent, from about 0.46 to 0.57, between the 1980s and 2000s. In comparison, estimates of the counterfactual variance quantifying the between-class effect indicate that aggregate income inequality would have increased by only 20 percent, from about 0.46 to 0.55, if covariate-adjusted income differences between class positions had remained unchanged at their 1980s level. Similarly, in the CPS, observed aggregate income inequality increased by 33 percent, from about 0.36 to 0.48, while estimates of the counterfactual variance quantifying between-class effects indicate that aggregate income inequality would have increased by only 28 percent, from about 0.36 to 0.46, if the net effects of class position on income had remained unchanged at their 1983 level. In other words, growth in between-class income differences had a significant inflationary impact on trends in aggregate income inequality, even after accounting for the confounding influence of education and demographic

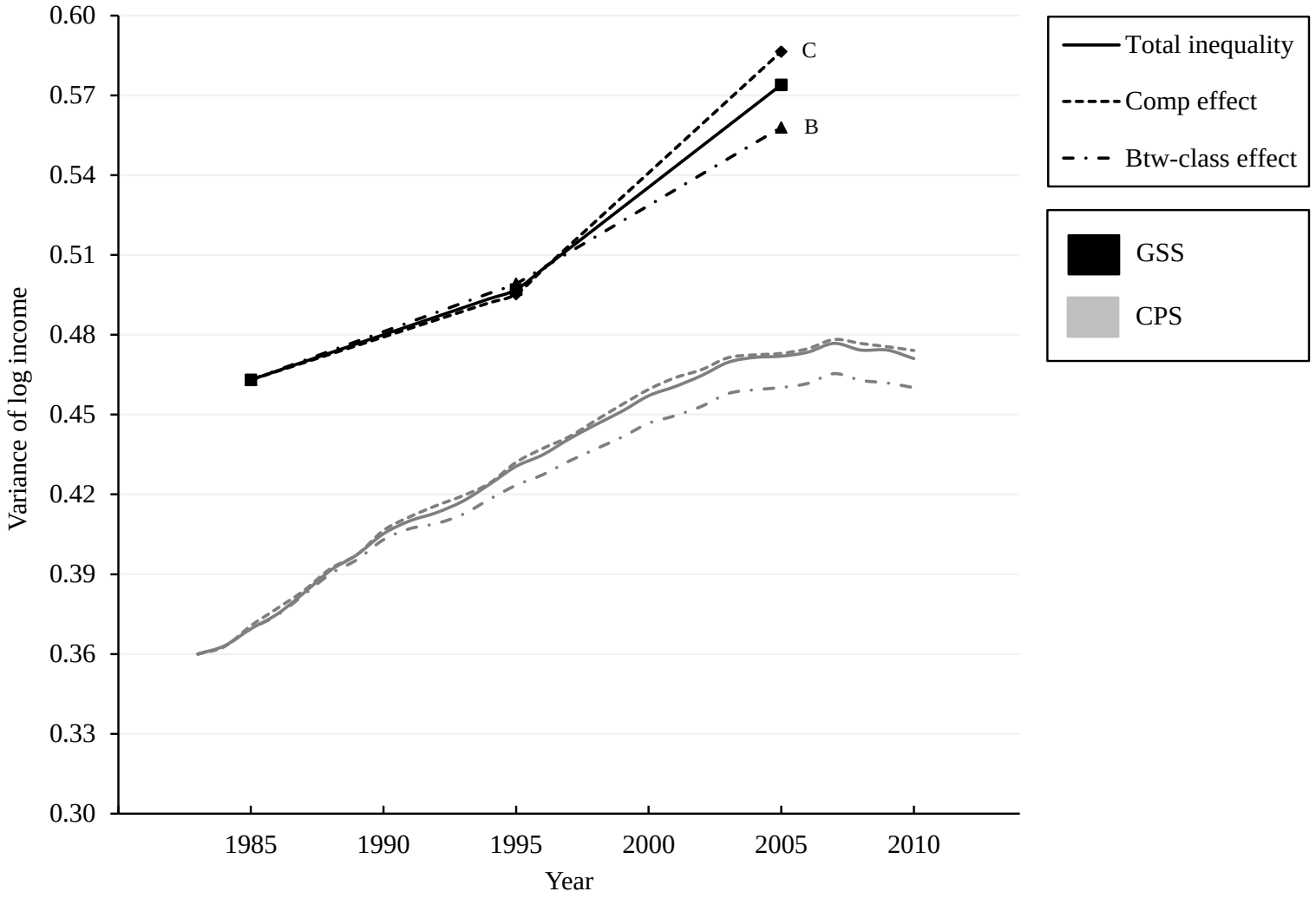
characteristics. Counterfactual variance estimates quantifying compositional effects indicate that aggregate income inequality would have increased by a slightly larger amount if the relative size of different classes had not changed since the early 1980s.

Table 8.1. Decomposition of Trends in Aggregate Income Inequality by Class Position

Study/period	Pr of change in variance of log income due to:					
	Compositional effect		Between-group effect		Within-group effect	
	Est.	95% CI	Est.	95% CI	Est.	95% CI
GSS						
1980s to 1990s	.02	(–.05, .07)	–.17	(–.42, –.04)	1.16	(1.02, 1.43)
1980s to 2000s	–.13	(–.17, –.10)	.16	(.11, .21)	.97	(.92, 1.02)
1990s to 2000s	–.16	(–.23, –.12)	.30	(.23, .38)	.87	(.81, .93)
CPS						
1983 to 1990	–.02	-	–.01	-	1.02	-
1983 to 2000	–.02	-	.08	-	.93	-
1983 to 2010	–.02	-	.07	-	.95	-
1990 to 2000	–.03	-	.16	-	.87	-
1990 to 2010	–.03	-	.12	-	.91	-

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are based on 5 multiple imputation datasets. Confidence intervals in parentheses are based on quantiles of 500 bootstrap sample estimates.

Figure 8.3. Counterfactual Estimates of Income Inequality for Compositional and Between-class Effects



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS and CPS waves. Results are combined estimates from 5 multiple imputation datasets. The "C" and "B" labels respectively indicate that the compositional and between-class effects are statistically significant at the $p<0.02$ level in the GSS.

Decomposition of Trends in Inequality by Class Strata

Table 8.2 presents results from a formal decomposition analysis of changes in aggregate income inequality by class strata—an analysis that incorporates gradational distinctions in the scope of authority and the extent of property ownership within production. This decomposition is based on data from 1994 to 2010 in the GSS and from 1992 to 2002 in the CPS because these are the periods for which the information needed to accurately measure gradational distinctions in property and authority are available in both surveys.

In the GSS, compositional changes in the relative size of different class strata had a modest dampening effect on growth in aggregate income inequality between the 1990s and 2000s, while changes in between-strata income differences had a large inflationary effect. For example, point estimates indicate that growth in between-strata income differences can explain nearly 50 percent of the increase in aggregate income inequality between the 1990s and 2000s. Results from the GSS also indicate that growth in within-strata income dispersion had a large inflationary effect on trends in aggregate income inequality.

Results from the CPS are consistent, at least in part, with those from the GSS. Decomposition estimates from the CPS indicate that compositional changes in the relative size of different class strata had no impact on trends in aggregate income inequality. In addition, these estimates suggest that growth in between-strata income differences had a significant inflationary impact, although this effect is less pronounced than is indicated by estimates from the GSS. Specifically, in the CPS, the between-strata effect explains 15 percent of the growth in aggregate income inequality between 1992 and 2002. Results from the CPS also suggest that growth in within-strata income dispersion had a large inflationary effect, accounting for 85 percent of the increase in aggregate income inequality during the 1990s.

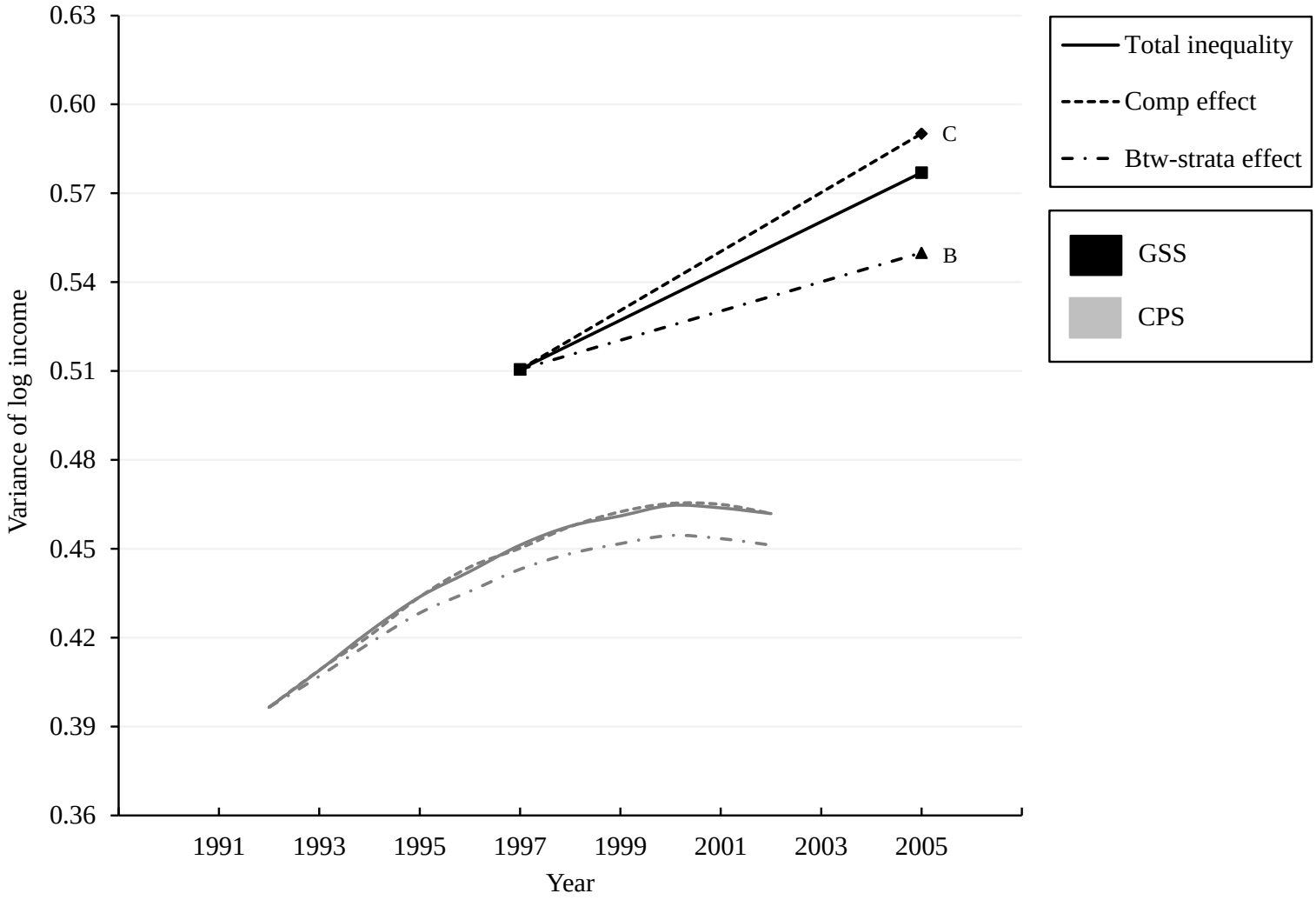
Figure 8.4 displays counterfactual variance estimates that quantify covariate-adjusted compositional and between-strata effects on growth in aggregate income inequality since the 1990s. Results from the GSS indicate that observed aggregate inequality increased by 12 percent, from about 0.51 to 0.57, between the 1990s and 2000s. By contrast, counterfactual variance estimates for the between-strata effect indicate that aggregate income inequality would have increased by only 6 percent, from about 0.51 to 0.54, if covariate-adjusted income differences between class strata had remained unchanged at their 1990s level. In the CPS, observed aggregate inequality increased by 18 percent, from about 0.39 to 0.46, while counterfactual variance estimates indicate that aggregate income inequality would have increased by 15 percent, from about 0.39 to 0.45, if covariate-adjusted income differences between class strata had remained at same level since 1992. In both data sources, counterfactual variance estimates for the compositional effect indicate changes in the relative size of different class strata had a comparatively minimal impact on trends in aggregate income inequality since the early 1990s.

Table 8.2. Decomposition of Trends in Aggregate Income Inequality by Class Strata

Study/period	Pr of change in variance of log income due to:					
	Compositional effect		Between-group effect		Within-group effect	
	Est.	95% CI	Est.	95% CI	Est.	95% CI
GSS						
1990s to 2000s	–.18	(–.26, –.12)	.48	(.38, .61)	.70	(.61, .77)
CPS						
1992 to 2002	.00	-	.15	-	.85	-

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves and the 1992 to 2002 CPS waves. Results are based on 5 multiple imputation datasets. Confidence intervals in parentheses are based on quantiles of 500 bootstrap sample estimates.

Figure 8.4. Counterfactual Estimates of Income Inequality for Compositional and Between-strata Effects



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves and the 1992 to 2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets. The "C" and "B" labels respectively indicate that compositional and between-strata effects are statistically significant at the $p<0.02$ level in the GSS.

Summary

Results indicate that compositional changes in the relative size of different classes had a small dampening effect and that growth in between-class income differences had a moderate inflationary effect on trends in aggregate income inequality from the 1980s to 2000s. Between-class effects were weaker during the 1980s, when growing inequality was due in part to declining incomes at the bottom of the distribution, and stronger during the 1990s and 2000s, when growing inequality was largely due to increasing incomes at the top of the distribution. Additional analyses that incorporate gradational differences in property ownership and workplace authority suggest that growing income differences between class strata may explain as much as 50 percent of the growth in aggregate income inequality during the 1990s and 2000s. Despite evidence of significant between-class effects, increasing within-class income dispersion consistently had the largest impact on growth in income inequality at the population level.

Although the weight of the evidence indicates that changes in between-class income differences had a notable impact on trends in aggregate income inequality, it remains unclear whether these effects have been more or less consequential than the effects of individual characteristics, such as educational attainment, that are commonly hypothesized to have been the primary determinants of recent growth in inequality (Autor, Levy, and Murnane 2003; Juhn 1999; Lemieux 2006). To assess the practical significance of between-class effects, I compare them to the effects of increasing income returns to education on growth in aggregate income inequality. Results from this comparative decomposition analysis (not shown, available upon request) indicate that increasing income returns to education have generally had a larger impact on trends in aggregate income inequality than growth in between-class income differences. For example, results suggest that increasing income returns to education explain between 35 to 50

percent of growth in aggregate income inequality from the early 1980s to 2000s, while between-class effects explain only about 10 to 20 percent of this growth. However, during certain periods, like the 1990s, estimates indicate that between-class effects are comparable to the effects of increasing income returns to education.

The results presented in this chapter are difficult to reconcile with the declining significance of class perspective. Income differences between classes have increased substantially, the relative number of proprietors and managers has declined, and the relative number of workers has increased since the 1980s. These changes, and especially growth in between-class income differences, had a significant impact on recent trends in aggregate income inequality, consistent with the patterns predicted by class-analytic theory. Although these findings tend to support class-analytic theory, some important ambiguities remain. In particular, results indicate not only that classes have become more dissimilar from one another but also that they have become more internally differentiated in terms of income. Furthermore, this growth in within-class income dispersion consistently had the largest impact on changes in aggregate income inequality.

The results presented in Chapter VI indicate that growth in within-class income dispersion among workers was driven by declining incomes throughout the lower half of the distribution, stagnating incomes in the middle, and modestly growing incomes at the very top. Among proprietors and managers, by contrast, growth in within-class income dispersion was due to enormous income gains for the highest-earning proprietors and managers together with smaller, although still nontrivial, income gains for other members of these classes. At a simple level, growing within-class income dispersion lends support to the declining significance of class perspective in that large social classes, and workers in particular, have become more atomized

and no longer represent largely homogenous social groups with highly constrained life chances. But rather than foretelling the "death of class" as a social position with meaningful impacts and constraints on individual material welfare, growth in within-class inequality may simply reflect the differential impacts of monopolization, institutional change, and technological development on certain subgroups of proprietors, managers, and workers.

For example, growing monopolization and economic concentration are expected to widen the overall gap in material welfare between different class positions, but the effects of competitive insulation are likely much more pronounced for proprietors and high-level managers in control of large enterprises than for small business owners and low-level supervisors. Similarly, institutional changes that improve the bargaining position of ownership and management, such as deunionization, are also likely to have their most pronounced effects on the incomes of unskilled workers and large employers. This type of internal heterogeneity within class positions—whether in terms of income, occupation, or skill—is not incompatible with class-analytic theory, except for perhaps its most ambitious variants that posit an extensive and growing degree of uniformity among members of the same class.

This chapter provides evidence of a robust relationship between class structure and changes in aggregate income inequality over the past three decades. These findings demand a reconsideration of recent theoretical claims that social classes—defined in terms of property and authority relations within production—are no longer linked to detectable patterns inequality in modern societies. Contrary to these arguments, this analysis indicates that class-analytic theory remains important for understanding recent trends in aggregate income inequality.

CHAPTER IX

Conclusion

Since the early 1980s, aggregate income inequality has increased substantially in the United States, and different sociological theories provide competing predictions about the link this trend and social classes. On one side of the debate, class-analytic theory suggests that the dynamics of market competition, technological development, and class conflict have widened income disparities between classes and disproportionately expanded the number of workers relative to the number of proprietors and managers. These between-class and compositional changes are anticipated to have a large inflationary effect and a small dampening effect, respectively, on growth in aggregate income inequality. The declining significance of class perspective, by contrast, contends that technological, political, and cultural changes have attenuated income differences between classes and disproportionately expanded the number of proprietors and managers relative to the number of workers, leading to a large dampening between-class effect and a small inflationary compositional effect on trends in aggregate income inequality.

Despite ongoing theoretical debates about the continuing relevance of class for contemporary patterns of inequality, previous empirical research has not investigated the link between class structure and recent changes in the aggregate distribution of personal income. With time-series data from two omnibus national surveys, this study examines whether changes in class structure and between-class income differences are related to trends in income inequality

at the population level. Specifically, it assigns respondents to classes in a simple typology based on their position within the ownership and authority structure of the workplace and then decomposes growth in aggregate income inequality to evaluate the impact of compositional changes in the relative size of different classes, changes in between-class income differences, and changes in within-class income dispersion.

Results indicate that between-class income differences increased by at least 50 percent since the 1980s. This increase was driven by growing incomes for managers and especially proprietors together with stagnating incomes for workers. Results also indicate that, since the mid-1980s, the proportion of workers and independent producers increased, while the proportion of proprietors and managers declined. Finally, formal decomposition analyses suggest that changes in the relative size of different classes had a small dampening effect and that growth in between-class income differences had a large inflationary effect on trends in aggregate income inequality, particularly during the 1990s.

This study makes a number of contributions to theory and empirical research on class structure and income inequality. First, it outlines a simple approach to class analysis of income distribution based on several interrelated perspectives within the conflict theoretical framework, including anarchist theory and neo-Marxist theory. This framework has several advantages over other approaches to class analysis. In particular, it implies a parsimonious class typology that is easily measured and deployed in empirical research, avoids the ad hoc quality of alternative approaches that expand or contract their class typologies based on analytic convenience (e.g., Breen 2005; Erikson and Goldthorpe 1992), provides a precise account of the mechanisms—exploitation and domination—underlying class conflict, and contains a more comprehensive theory of the social changes governing trends in class structure and class inequality over time.

Second, by testing several key implications of this framework using time-series data from two large national surveys, this study addresses calls for historical investigations of class inequality (Wright 1997) as well as recent arguments that class has dissolved as a salient explanatory category in modern society (Pakulski 2005). This type of population-based evidence about property, authority, and personal income distribution over time is largely absent from the literature on social stratification in America. The results of this analysis resonate with research on the functional distribution of income, which documents a declining share of labor income since the early 1980s (Baker and Mishel 1995; Dumenil and Levy 2004b; Kristal 2013), and with studies of executive compensation, which reveal enormous income gains for those at the apex of the managerial hierarchy in America's largest companies (Frydman and Jenter 2010). With nationally representative data on personal market income, this study extends these findings by showing that widening income differences between positions in the property and authority structure of the American economy is a general and pervasive social trend with a pronounced effect on growth in income inequality among the population at large.

Third, this study also contributes methodologically by applying a new approach to covariate adjustment in nonparametric regression models: IP-weighted local linear estimation. In the foregoing analyses, this method provided an efficient way to adjust income trends for demographic and educational differences across classes without imposing a rigid functional form on the relationship between class, covariates, and income over time. This method can be applied to any problem that involves estimating temporal trends in the group means of a metric outcome. It is especially useful when the shapes of the group-specific time trends are unknown and the groups of interest differ on covariates that also affect the outcome.

Public debate about the most effective means for attenuating income inequality is largely dominated by just two perspectives. The conservative perspective, insofar as it admits that growing inequality is in fact a problem, contends that declining incomes at the bottom of the distribution are due to a persistent subversion of morale, motivation, and effort caused by high taxes, generous welfare programs, and government regulation. The solution, therefore, is to reduce the scope of government interventions in the economy and allow the forces of market competition to naturally multiply the ambition and effort of workers. The liberal perspective, by contrast, argues that the market should be relied upon as much as possible, but where inefficiencies, excesses, and imperfections remain, the welfare state should be strengthened and government should be used as a redistributive mechanism without fundamentally restructuring the social relations of production.

The theory and results presented in this study suggest a third perspective could be productively added to the public debate. Specifically, they suggest that inequality may also be attenuated by transforming exclusionary ownership and authority relations within the workplace. To achieve this transformation, some theorists in the class-analytic tradition have advocated for a state-controlled nonmarket system of production and distribution (e.g., Marx 1978), while others have promoted a loosely regulated market economy inhabited by a vibrant mix of independent producers, worker-owned and managed cooperative enterprises, and democratically controlled banking institutions (e.g., Proudhon 2011). Given the mixed progress and limited success of the liberal and conservative proposals in recent decades, a serious public discussion of alternative modes of organizing and governing productive enterprises that do not involve rigidly hierarchical property and authority relations seems warranted.

Although this study provides a number of important contributions to theory and research on class structure and income inequality, it is not without limitations. First, it relies on a somewhat limited measure of class position that imperfectly captures differences in ownership and authority within production. For example, it remains unclear whether self-employment and supervisory data from full-time respondents accurately classifies rentiers, venture capitalists, and corporate directors with substantial shareholdings as proprietors because much of their income is generated through passive engagement in economic activity.

Second, despite efforts to control for several types of skills using measures of educational attainment, cognitive test scores, and disaggregated occupational categories, it remains possible that observed income trends between class positions are simply due to unobserved skill heterogeneity. Without more detailed data, it is difficult to completely rule out the possibility that observed trends in between-class income differences are not merely the result of changing income returns to unobserved skills.

Third, this study focuses on but one of a variety of different income measures—personal market income excluding the value of capital gains and in-kind benefits. Changes to the tax code that incentivize proprietors to shift capital income payments to salaries and bonuses as well as growth in the value of employer-provided benefits to workers may distort estimates of class inequality over time. In addition, although this income measure captures trends in market-mediated distributional outcomes, it may be less reliable as an indicator of changes in personal material welfare because it ignores the impact of government taxes and transfers.

Finally, this study does not evaluate the more specific claims of class-analytic theory about the underlying mechanisms responsible for long-term changes in class structure and class inequality, such as technological development, institutional change, and monopolization. This

study suggests a close correspondence between these underlying mechanisms and class effects on aggregate income inequality, but it does not rigorously evaluate causal link between them.

These limitations highlight important directions for future research on class structure and income inequality. In particular, future research should focus on whether the trends documented in this study are directly related to patterns of capital mobility, technological substitution, monopoly power, and different types of class-based political activism. This might be accomplished by linking individual data from the CPS or GSS to information on plant relocations and sector monopolization from the Economic Census or to information on corporate investment in political candidates from the Federal Election Commission. These data might be used to test whether regional or inter-industry differences in class inequality are associated with local rates of capital mobility, differential monopolization across industrial sectors, or corporate political investment at the state level. Future research should also investigate alternative measures of property, authority, and income—for example, by using data from the Panel Study of Income Dynamics on individuals' non-household wealth holdings, decision latitude in production, and lifetime incomes that account for the value of capital gains, in-kind benefits, and government taxes and transfers.

Despite these limitations, this study provides evidence of a robust relationship between class structure and changes in aggregate income inequality over the past three decades. These findings demand a reconsideration of recent theoretical claims that social classes—defined in terms of property and authority relations within production—are no longer linked to detectable patterns inequality in modern societies. Contrary to these arguments, this study indicates that class-analytic theory remains important for understanding recent trends in population-level income inequality. As social scientists increasingly grapple with these trends, rigorous

integration of class-analytic theory with quantitative empirical research will be crucial for advancing knowledge of social stratification.

APPENDICES

APPENDIX A

Parallel Analyses of Full- and Part-time Respondents

To assess whether results are sensitive to sample restrictions based on levels of economic engagement, this appendix presents results from a parallel analysis that includes both full- and part-time respondents. If trends in the relative size of different classes or in between-class income differences are substantially different among respondents who work part-time, the results presented in the main text may provide a misleading assessment of the link between class structure and aggregate inequality over time. In this analysis, respondent reports of their annual income are converted to an estimated hourly wage rate using additional information on the typical length of a work week in hours and the number of weeks worked in the previous year. Data on work hours and work weeks are collected from all respondents at every survey wave of CPS, but the GSS records these measures in only a handful of survey waves for a small subset of respondents. Analyses of hourly wages are therefore based on data only from the CPS.

Results from this analysis are presented in Figures A.1 to A.18 and Tables A.1 to A.2. They are very similar to those reported in the main text. Findings from the pooled sample of full- and part-time respondents reveal a substantial increase in wage inequality between class positions driven by rapidly growing wages for proprietors and managers, and stagnating wages for workers. Results further indicate that divergent wages between class positions are not simply due to demographic or educational differences, and that wage growth is especially pronounced among the highest-earning upper strata of proprietors and managers. Consistent with results

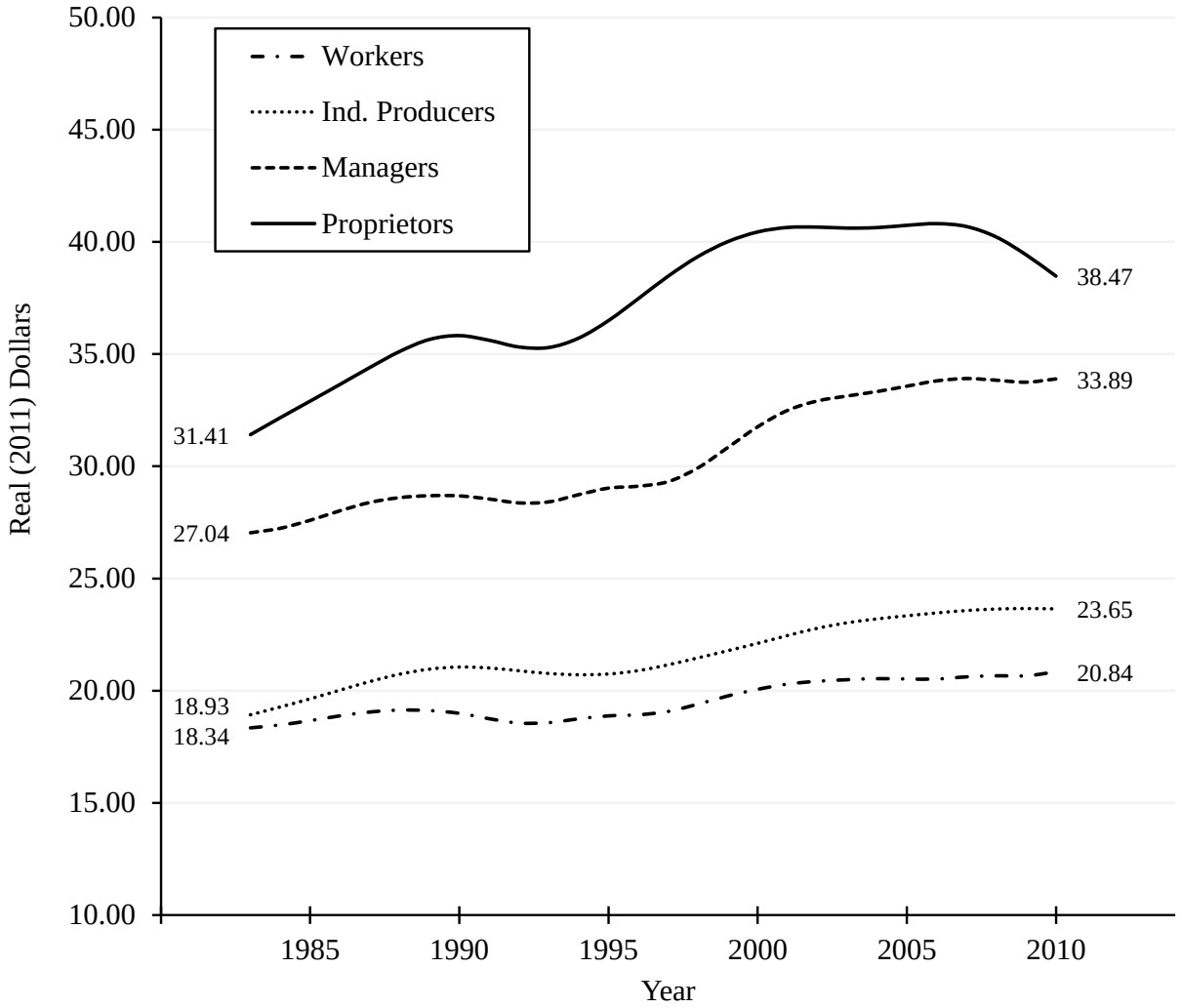
presented in the main text, Figure A.3 suggests that between-class wage differences increased by about 50 percent from 1983 through the mid-2000s, and then declined slightly during the economic recession of 2007 to 2009.

Estimates from the pooled sample of full- and part-time respondents also indicate that during the 1970s, the proportion of workers declined and the proportion of managers and proprietors increased. But from the mid-1980s onward, these trends reversed, and the proportion of workers increased while the proportions of managers and proprietors steadily declined. In addition, results from this parallel analysis indicate that racial and gender disparities remained fairly stable throughout this period. Although estimates suggest modest fluctuations in racial and gender disparities over time, there is no discernable trend toward either larger or smaller racial and gender differences in class attainment from 1972 to 2010.

Results from a parallel decomposition analysis based on respondents in the CPS who worked either full- or part-time are quite similar to those reported in the main text, although there are some minor differences. Findings from the pooled sample indicate that growth in between-class wage differences had a notable inflationary effect on growth in aggregate wage inequality. Furthermore, this effect was more pronounced in the 1990s and 2000s than in the 1980s. For example, estimates in Table A.1 indicate that growth in between-class wage differences explains about 9 percent of the growth in aggregate wage inequality throughout the entire period from 1983 to 2010, but during the period from 1990 to 2010, growth in between-class wage inequality explains about 17 percent of the growth in aggregate wage inequality. Unlike the results presented in the main text, parallel analyses of wage inequality among both full- and part-time respondents suggests a small inflationary effect (rather than a small dampening effect) of compositional changes in the relative size of different classes on growth in aggregate wage

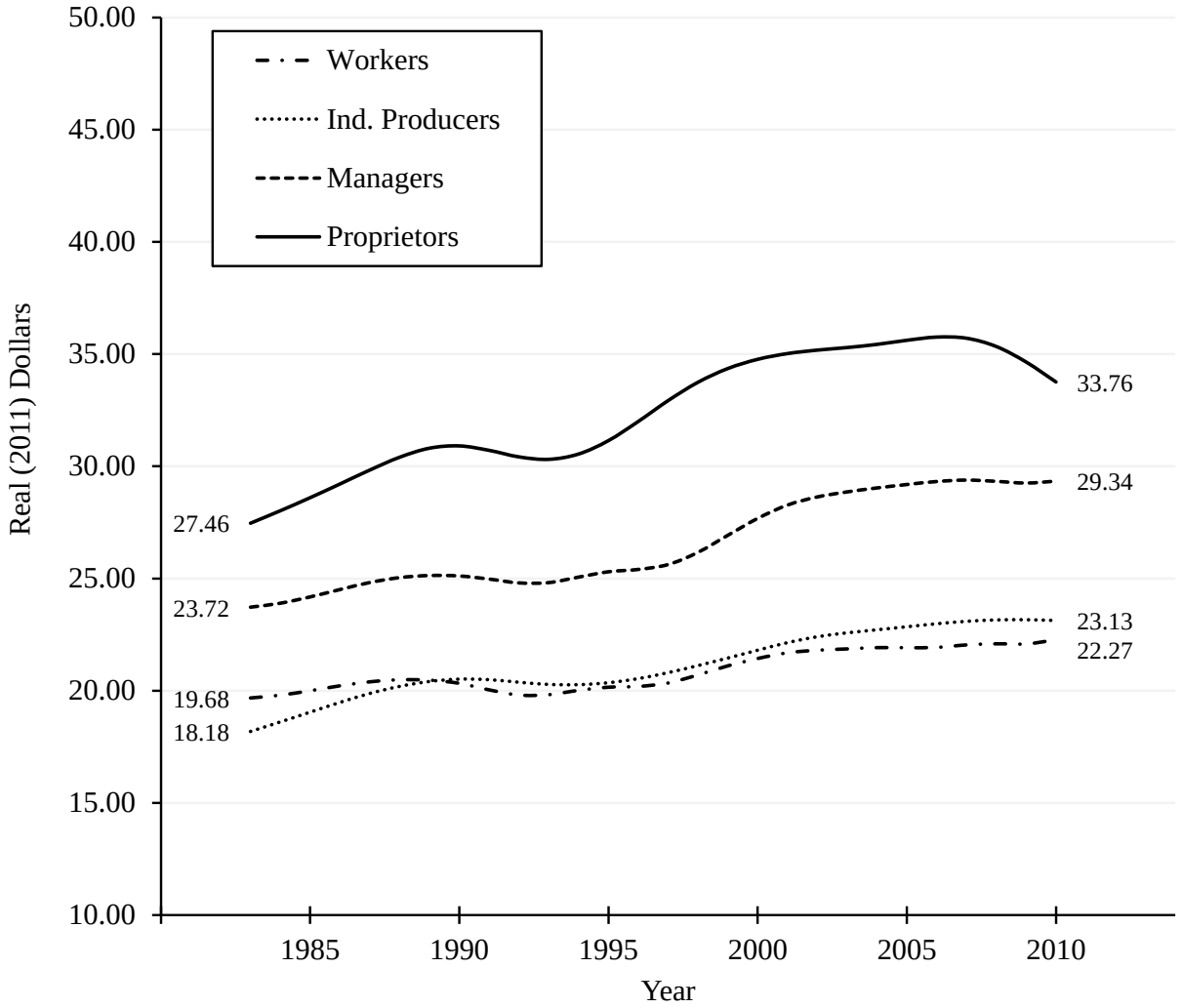
inequality. These differences are fairly minor, however, and both analyses suggest relatively small compositional effects. The main substantive finding that growth in between-class inequality had a significant inflationary impact on trends in aggregate inequality, particularly during the 1990s and 2000s, is not sensitive to sample restrictions based on a respondent's level of economic engagement.

Figure A.1. Unadjusted Trends in Mean Hourly Wage by Class, Full- and Part-time CPS Samples



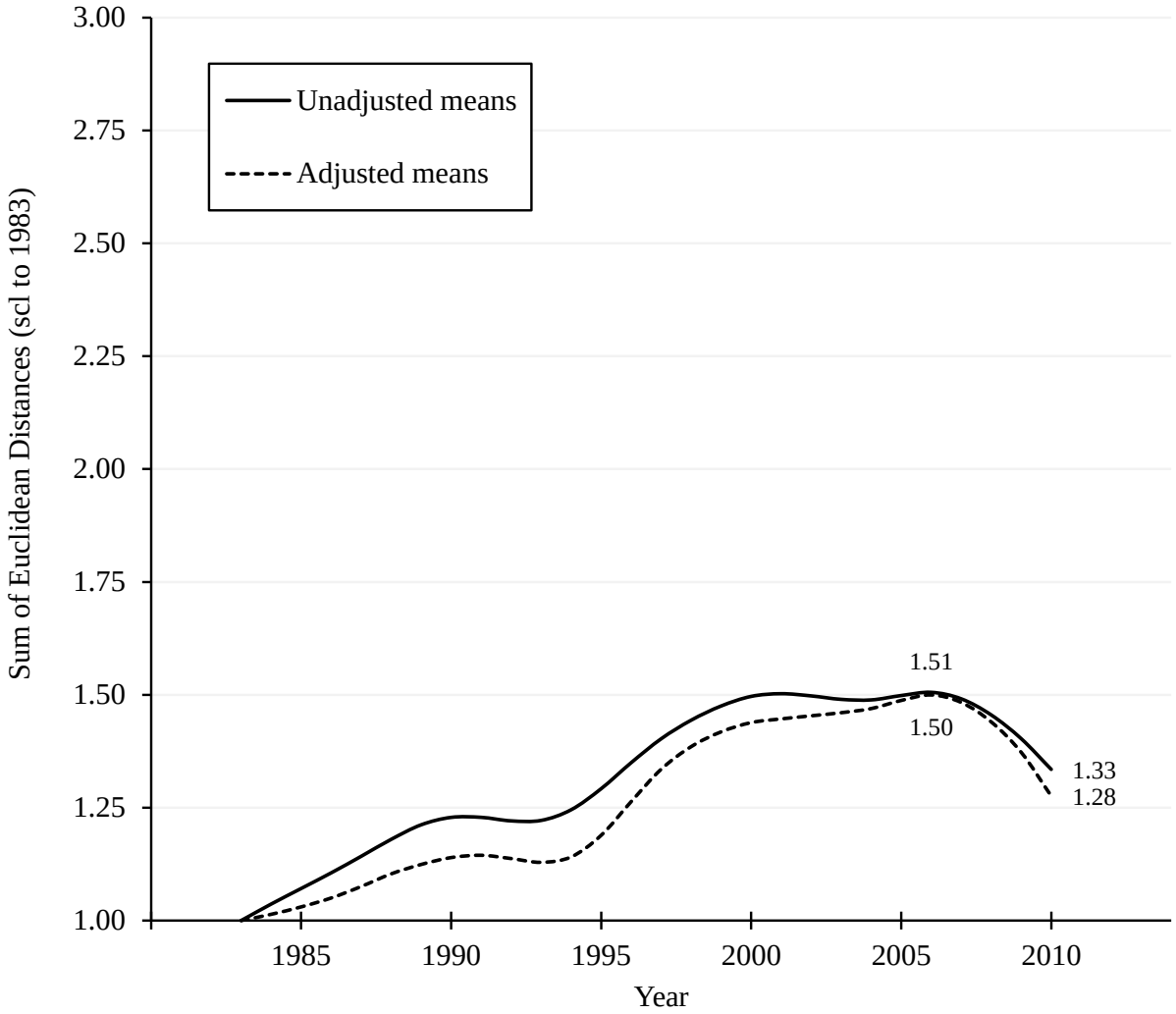
Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure A.2. Covariate-adjusted Trends in Mean Hourly Wage by Class, Full- and Part-time CPS Samples



Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

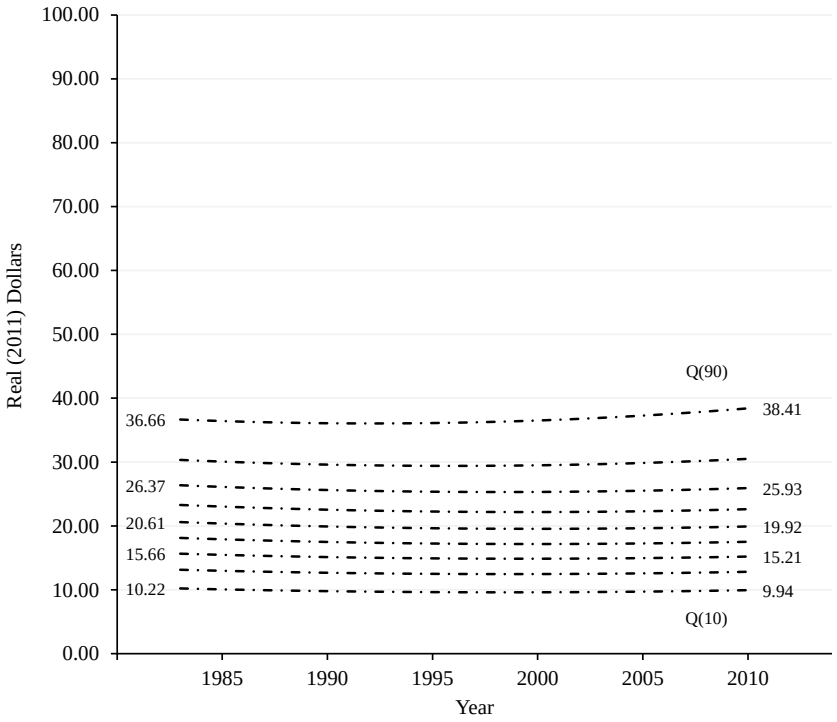
Figure A.3. Total Change in Mean Wage Differences between Class Positions, Full- and Part-time CPS Samples



Notes: Samples include respondents who are 18 to 65 years old and work either full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure A.4. Covariate-adjusted Trends in Wage Deciles by Class, Full- and Part-time CPS Samples

A. Workers



B. Independent Producers

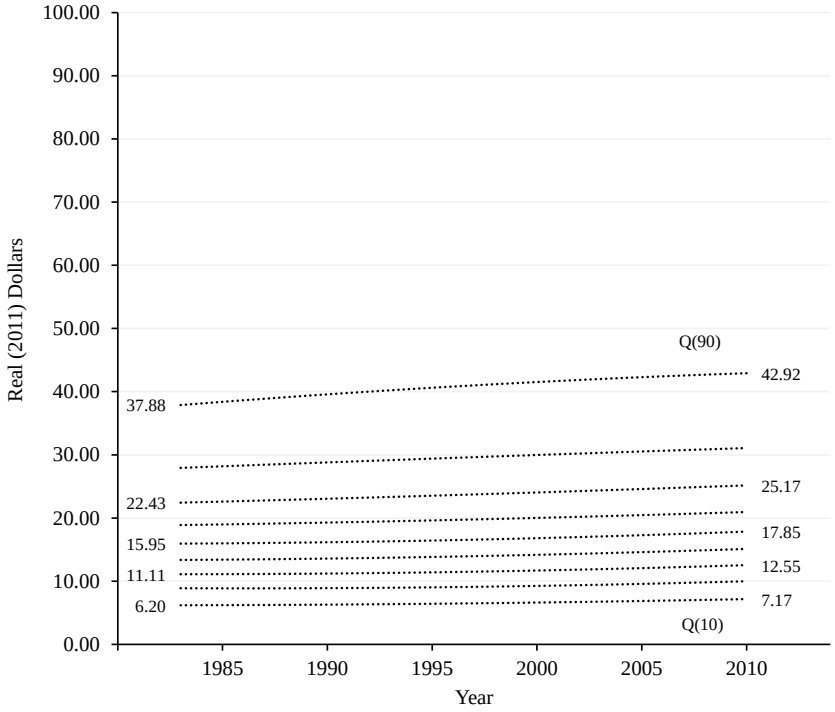
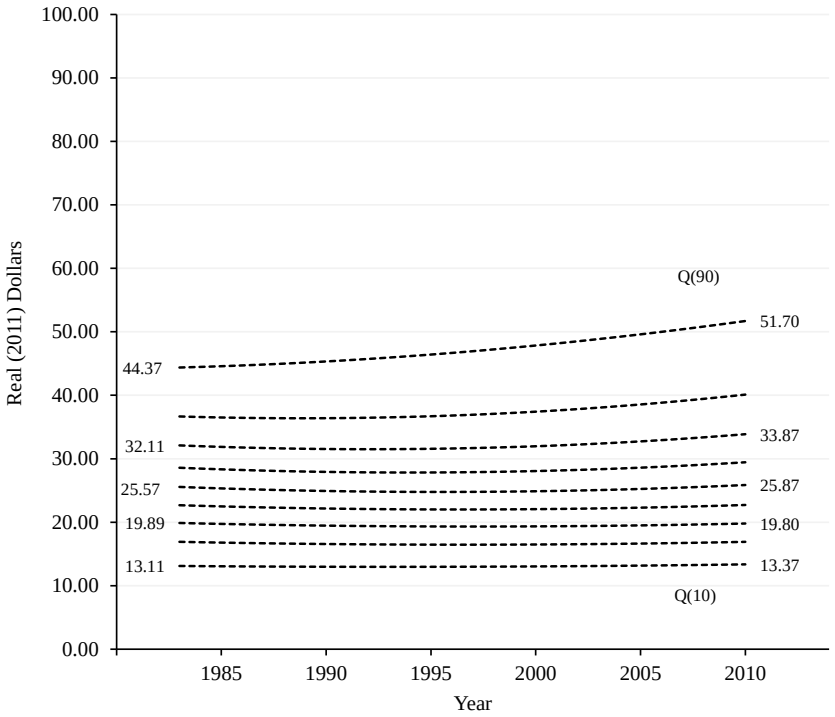
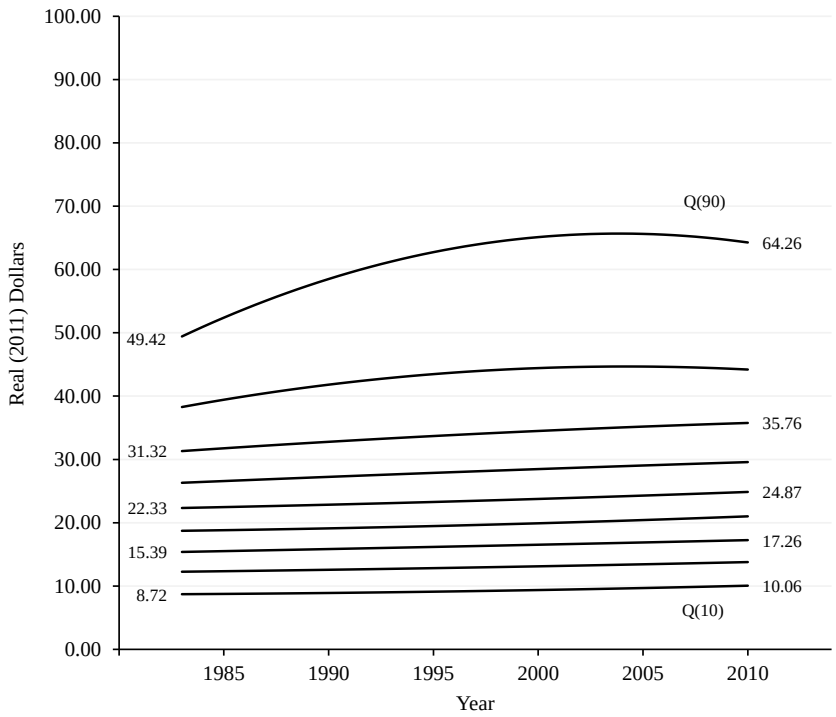


Figure A.4 continued

C. Managers

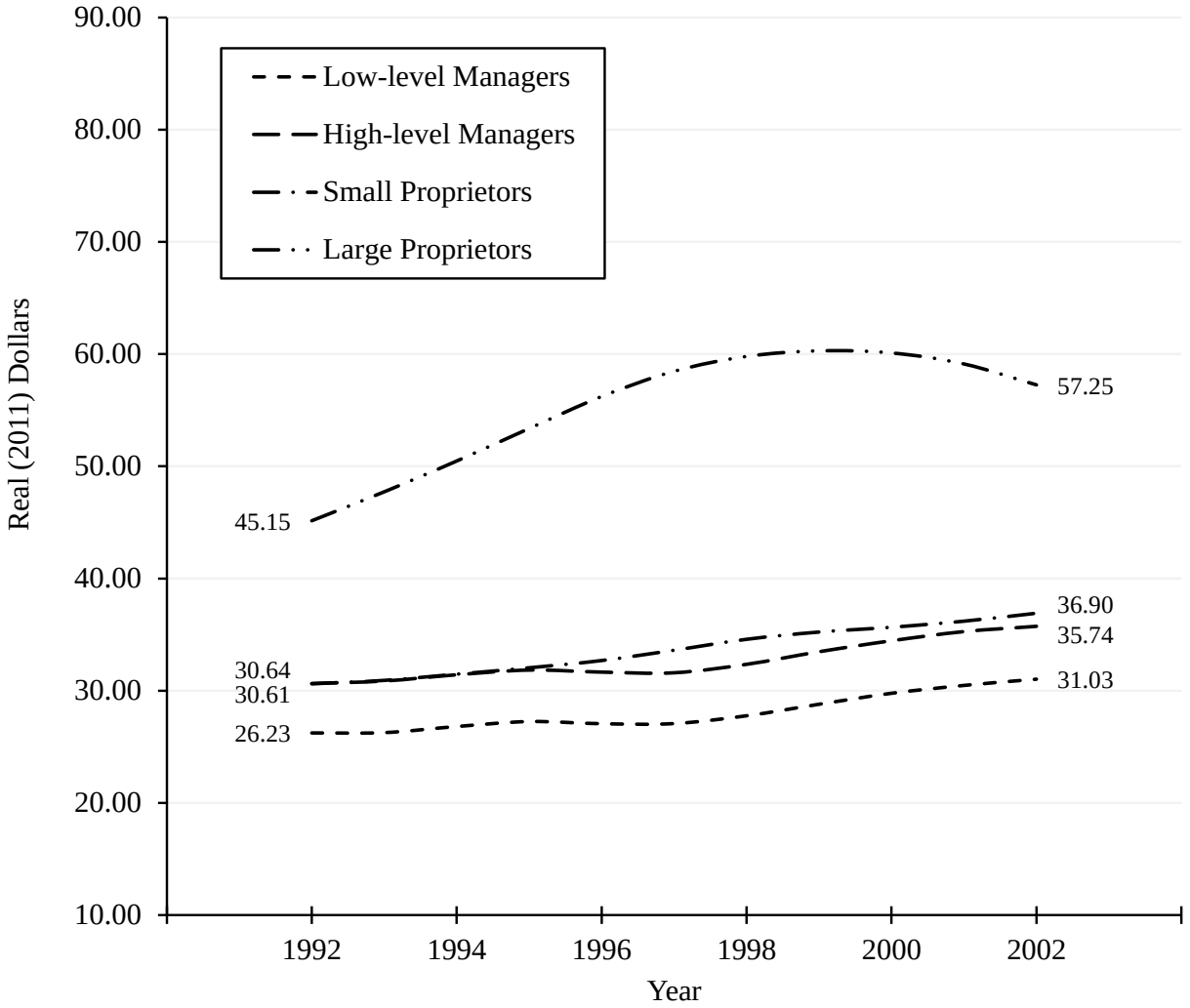


D. Proprietors



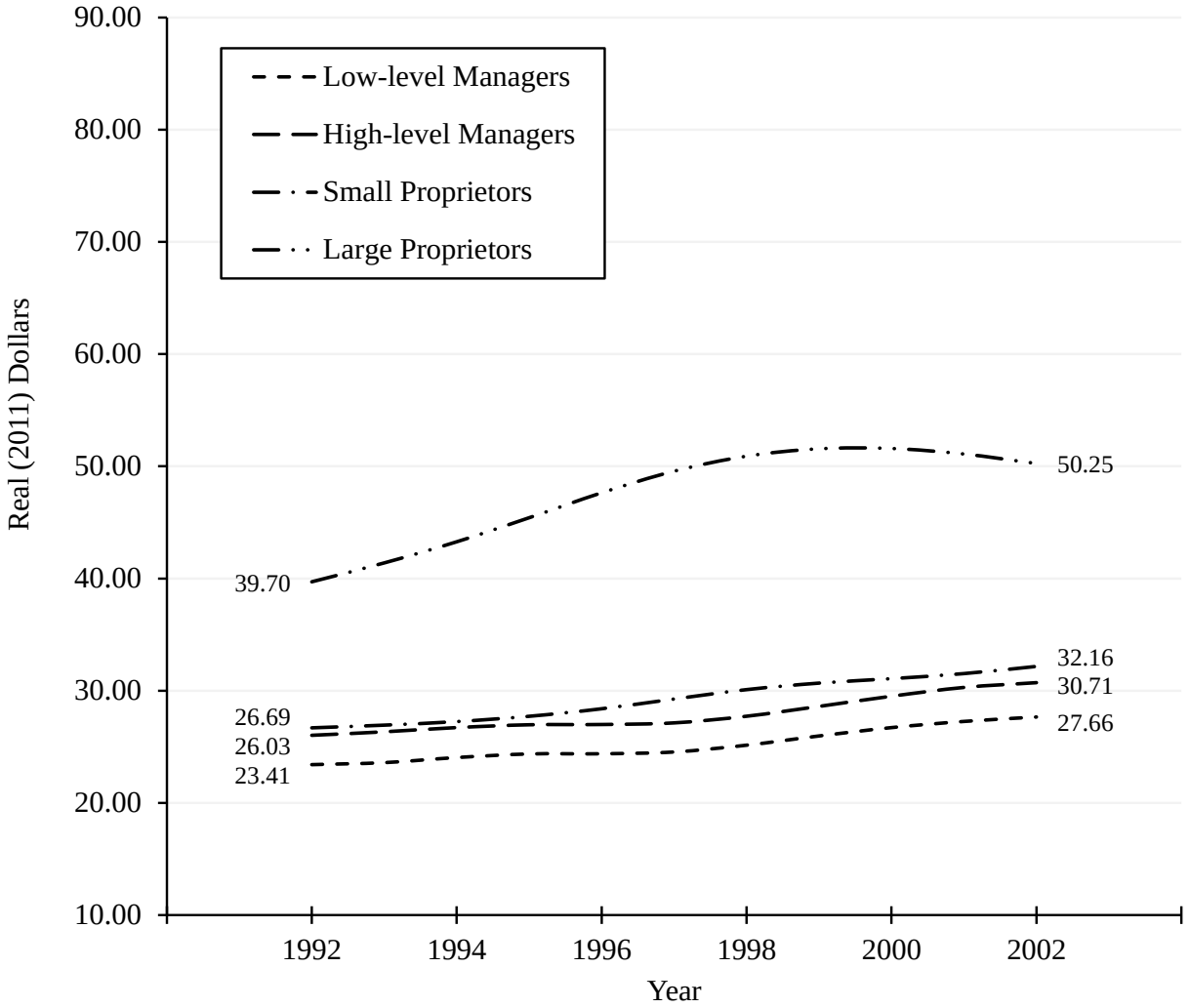
Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets and are based on quantile regression models with quadratic functions of time.

Figure A.5. Unadjusted Trends in Mean Hourly Wage by Class Strata. Full- and Part-time CPS Samples



Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

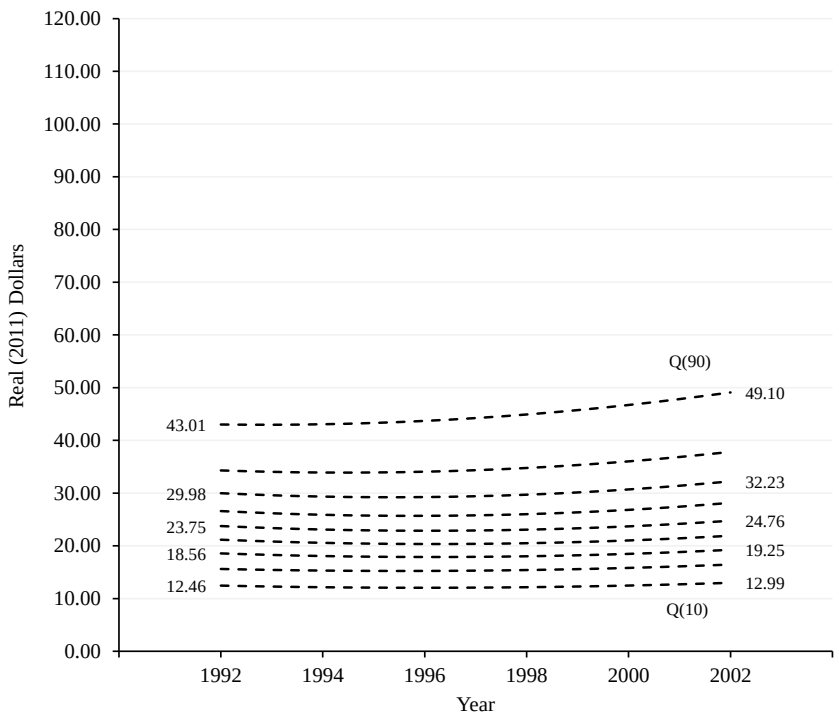
Figure A.6. Covariate-adjusted Trends in Mean Hourly Wage by Class Strata, Full- and Part-time CPS Samples



Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure A.7. Covariate-adjusted Trends in Wage Deciles by Class Strata, Full- and Part-time CPS Samples

A. Low-level Managers



B. High-level Managers

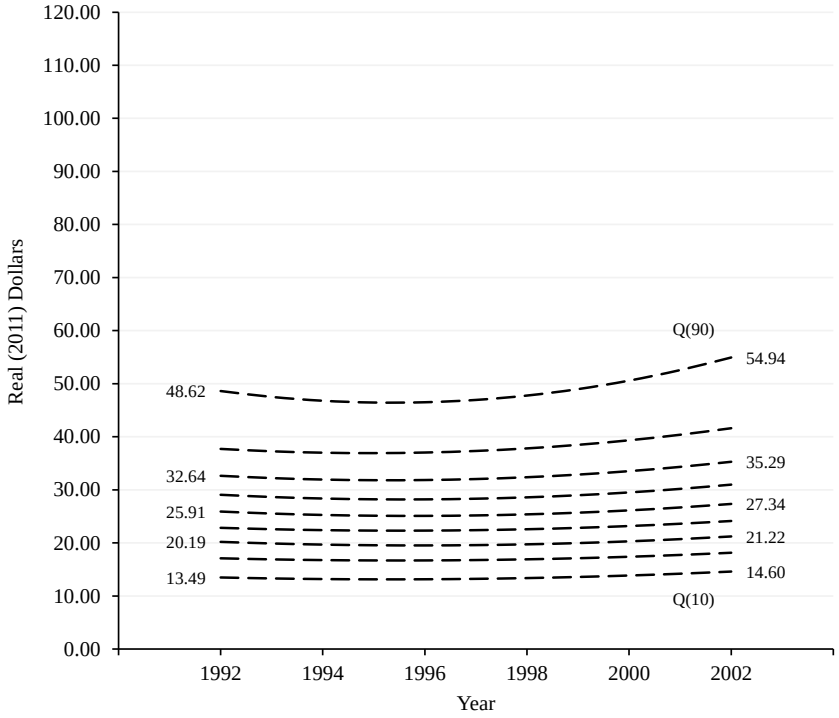
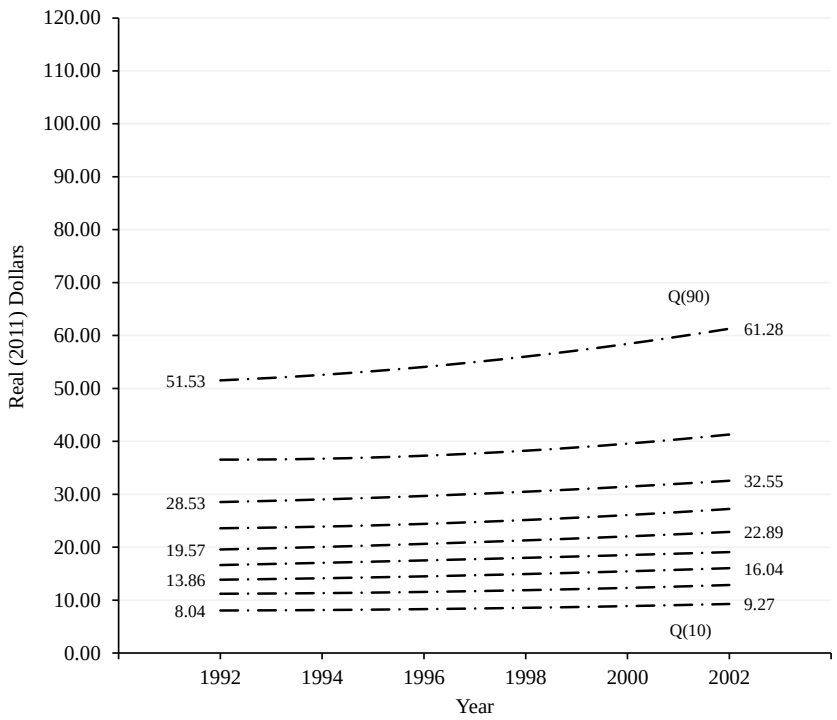
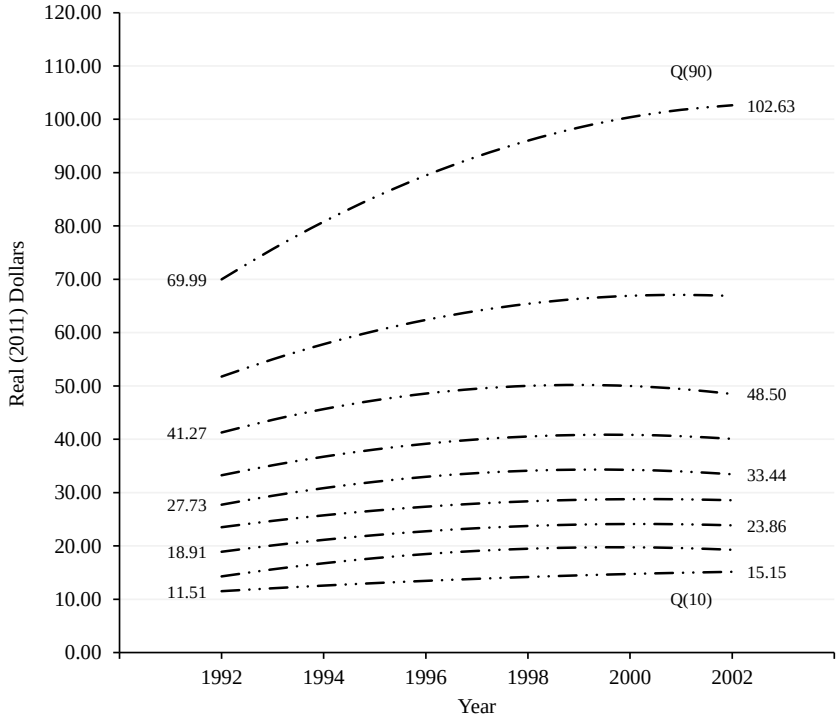


Figure A.7 continued

C. Small Proprietors

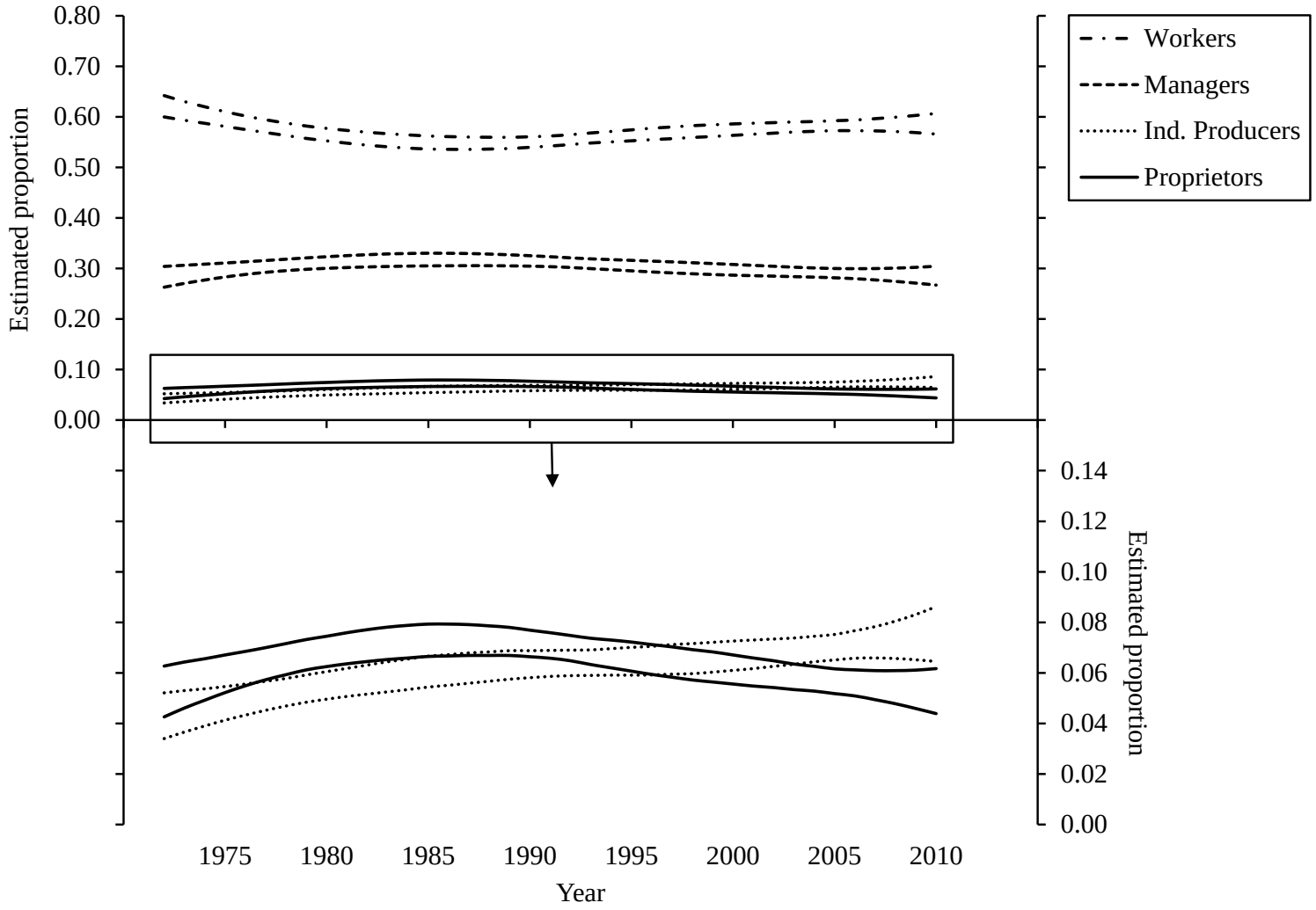


D. Large Proprietors



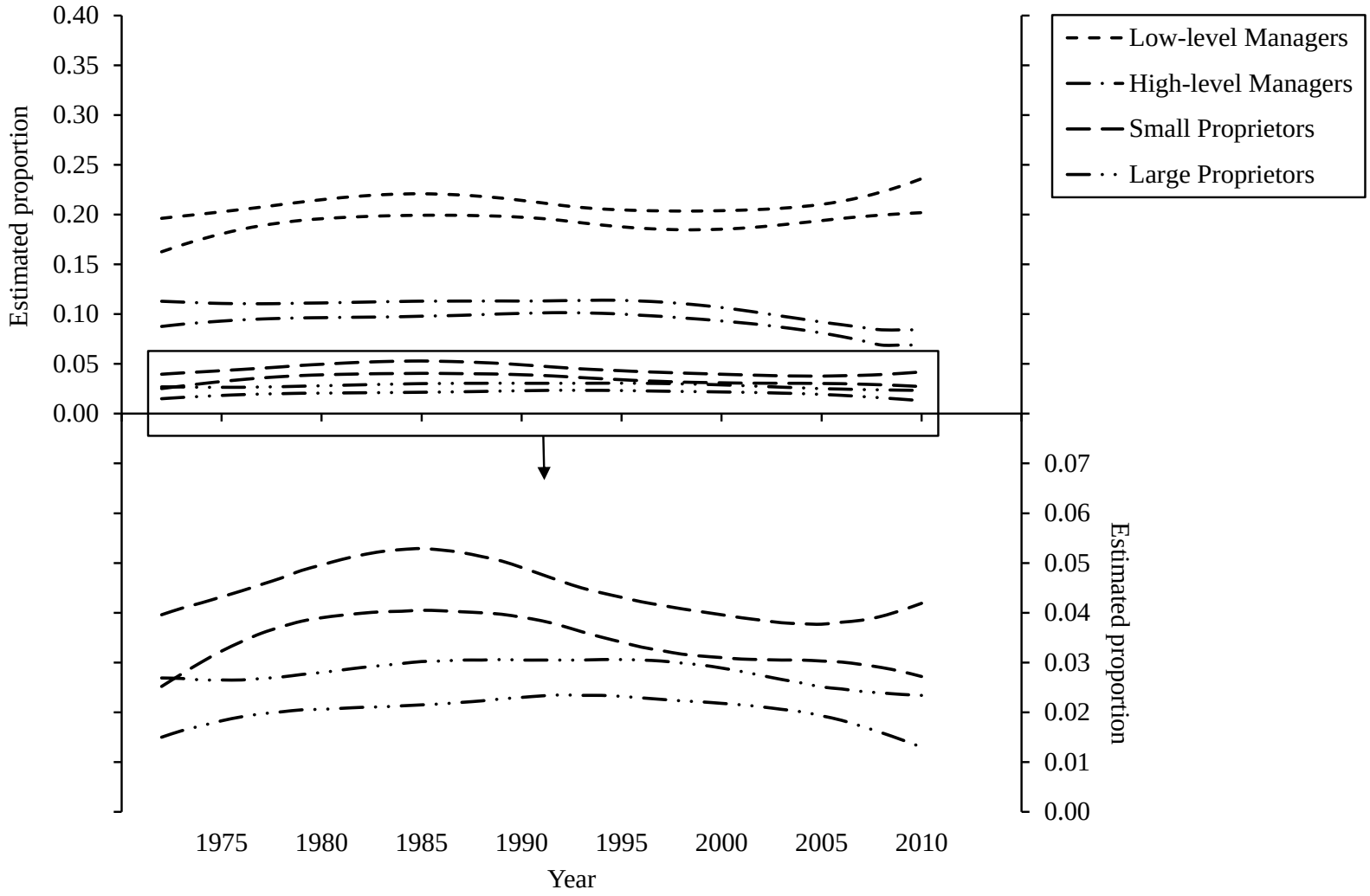
Notes: Sample includes respondents who are 18 to 65 years old and work either full- or part-time in the 1992 to 2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets and are based on quantile regression models with quadratic functions of time.

Figure A.8. Trends in Class Structure, Full- and Part-time GSS Samples



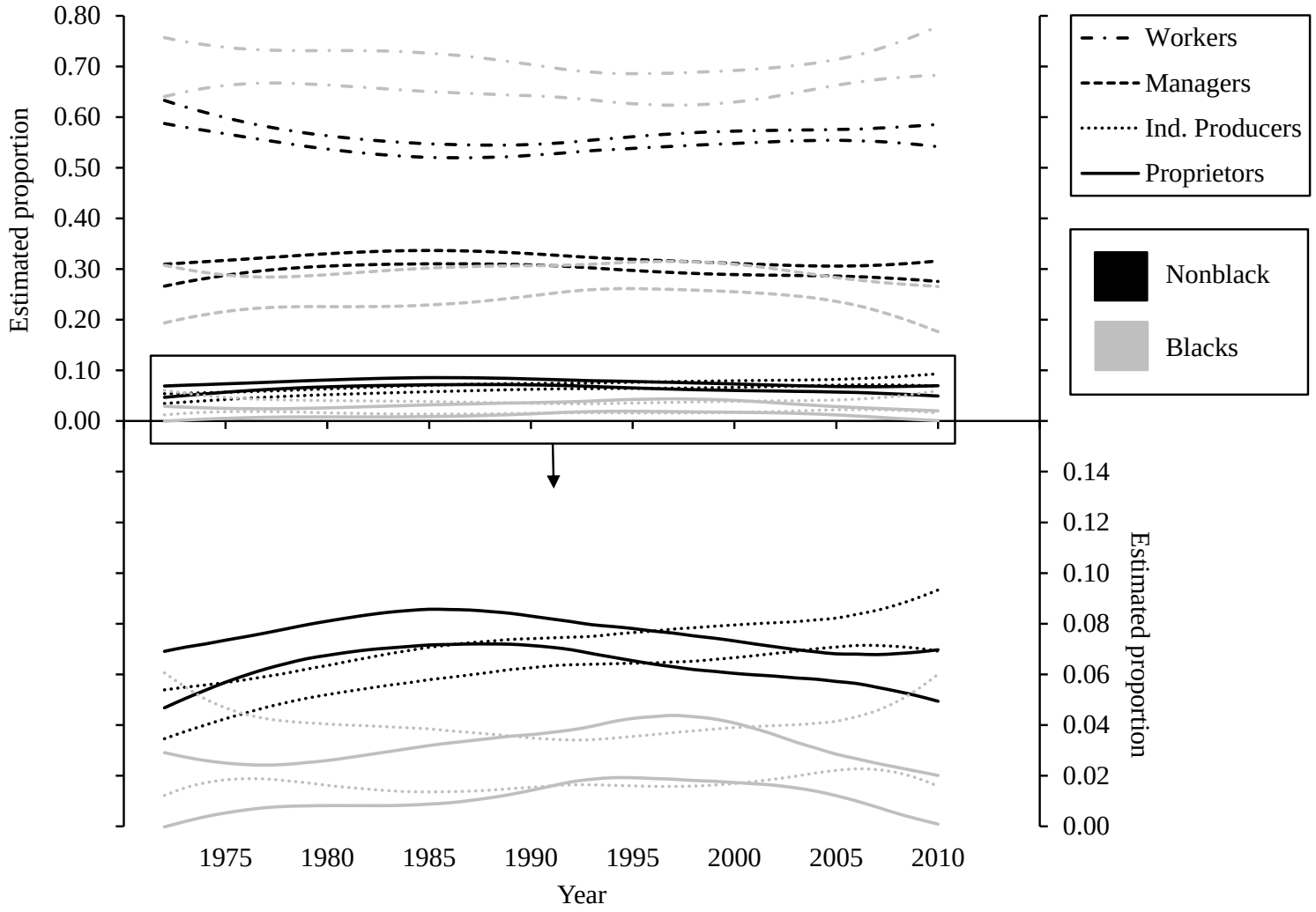
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure A.9. Trends in Class Strata, Full- and Part-time GSS Samples



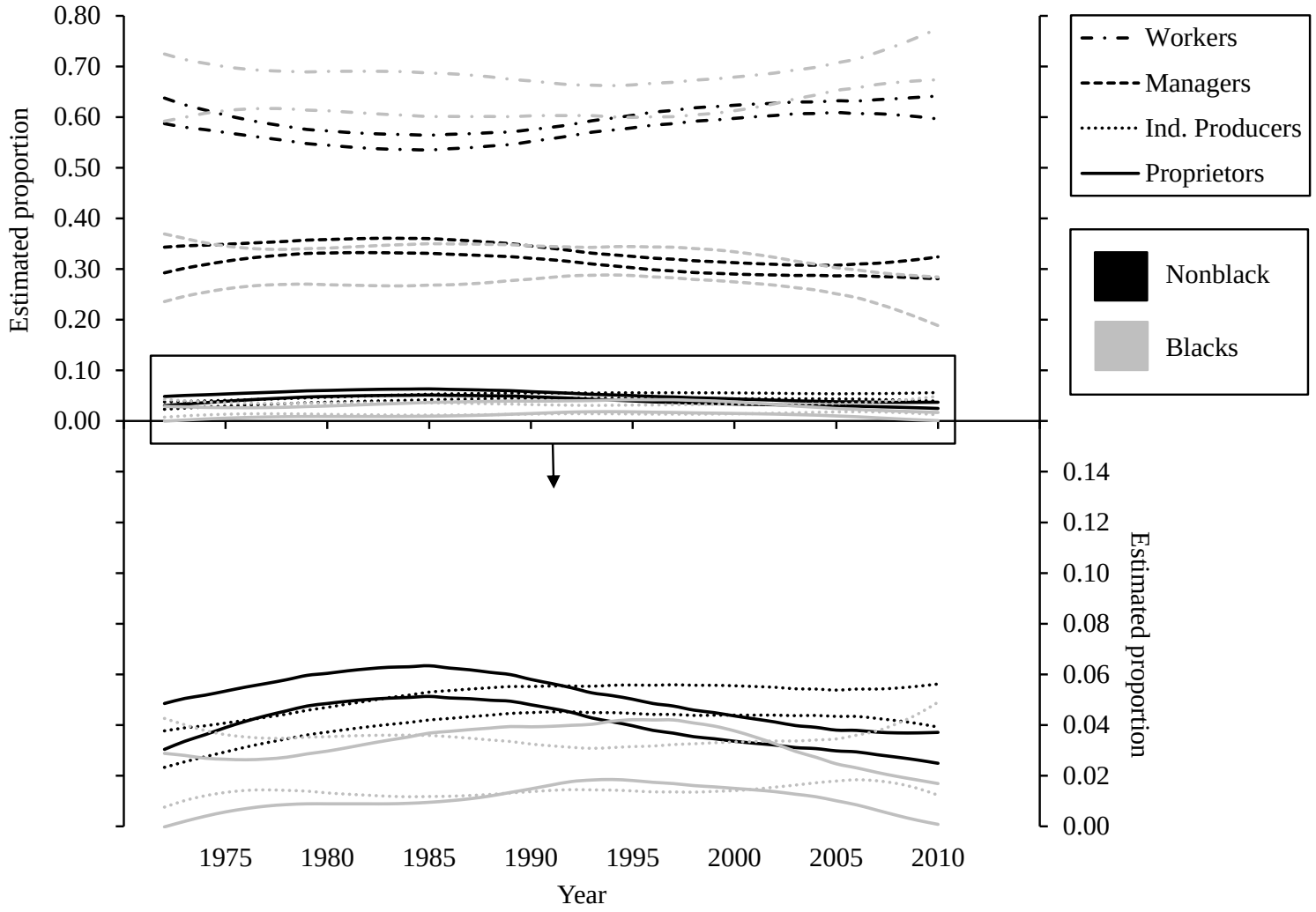
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- and part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure A.10. Unadjusted Racial Disparities in Class Attainment, Full- and Part-time GSS Samples



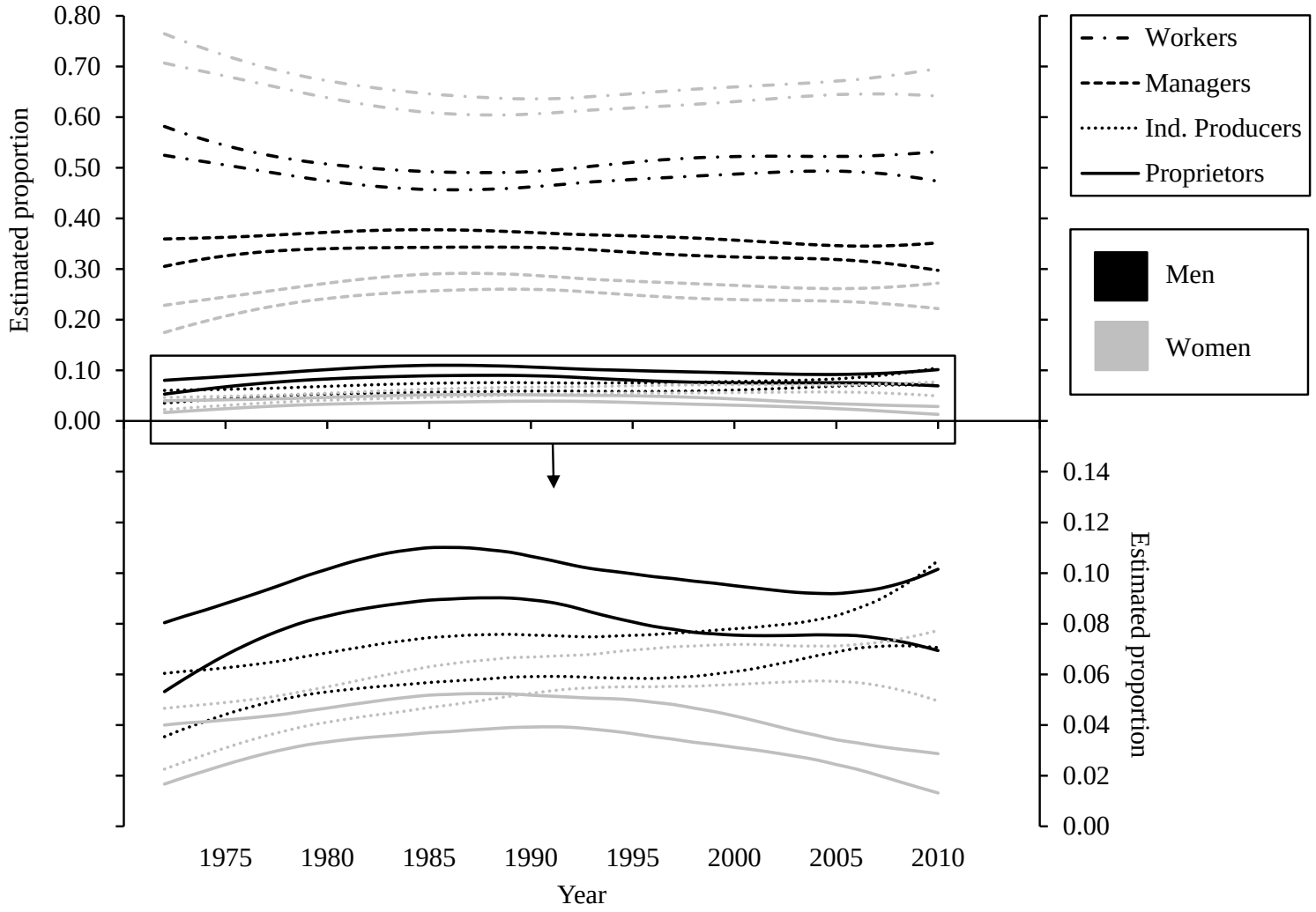
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure A.11. Covariate-adjusted Racial Disparities in Class Attainment, Full- and Part-time GSS Samples



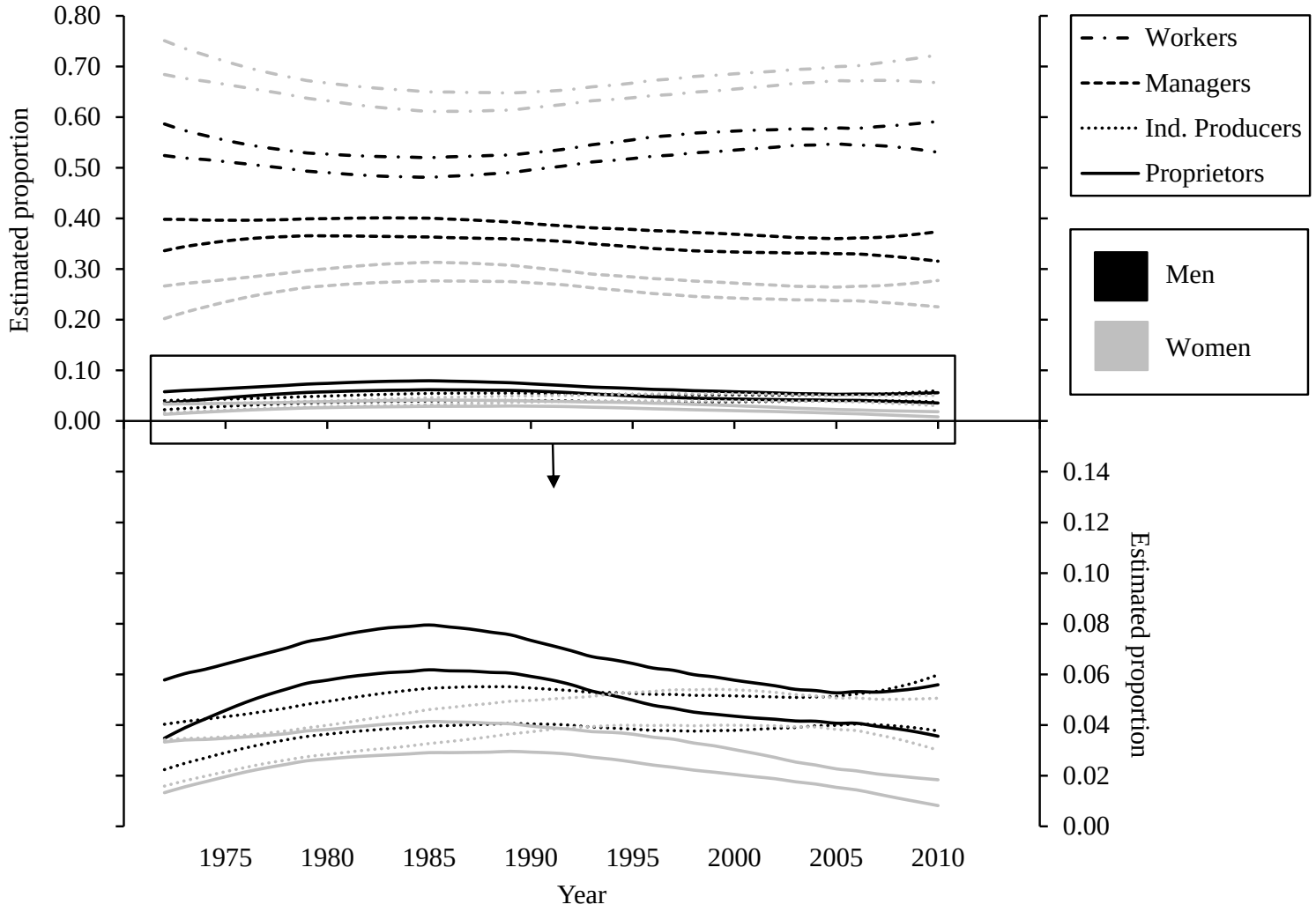
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their pooled sample means.

Figure A.12. Unadjusted Gender Disparities in Class Attainment, Full- and Part-time GSS Samples



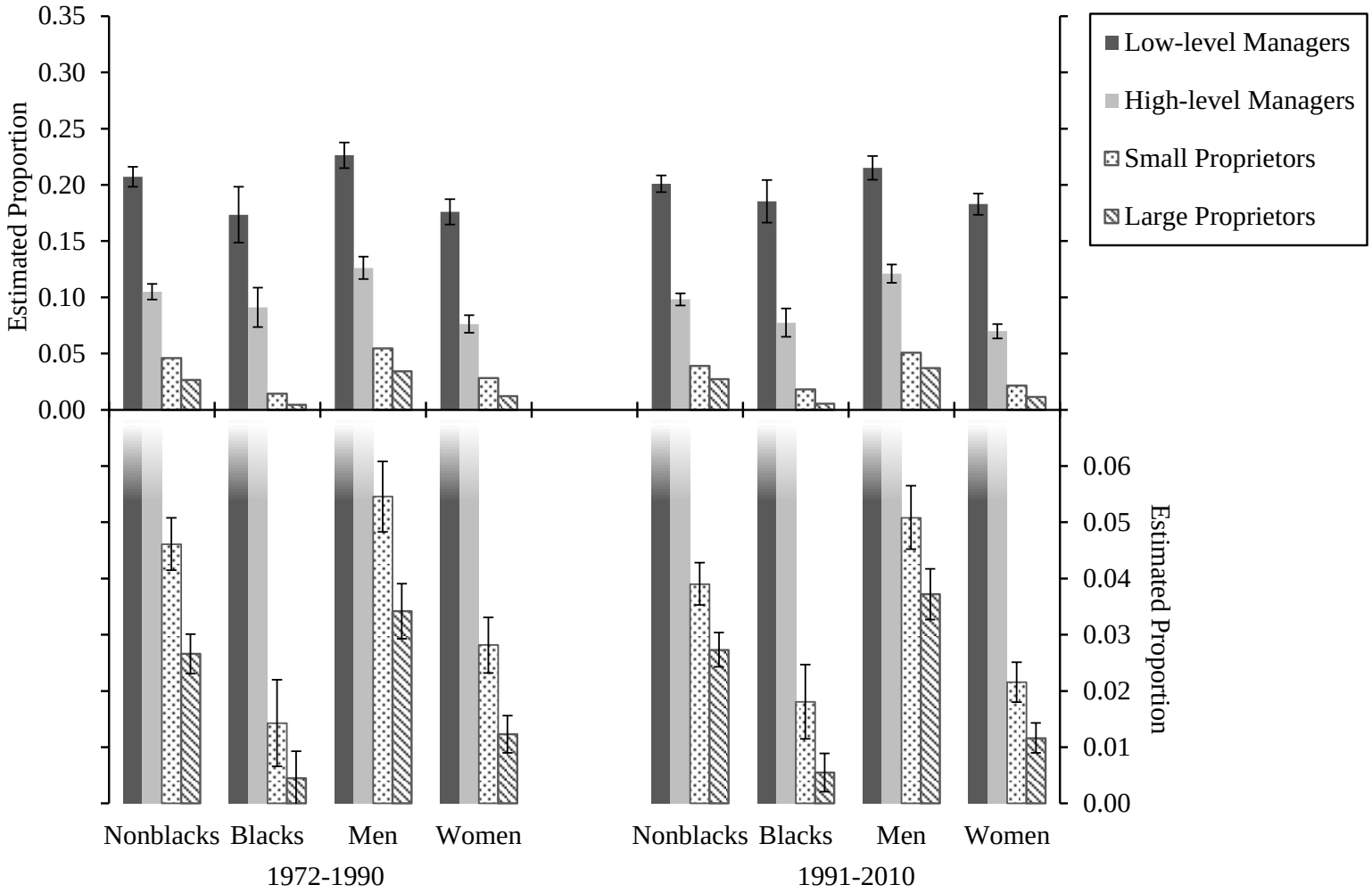
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure A.13. Covariate-adjusted Gender Disparities in Class Attainment, Full- and Part-time GSS Samples



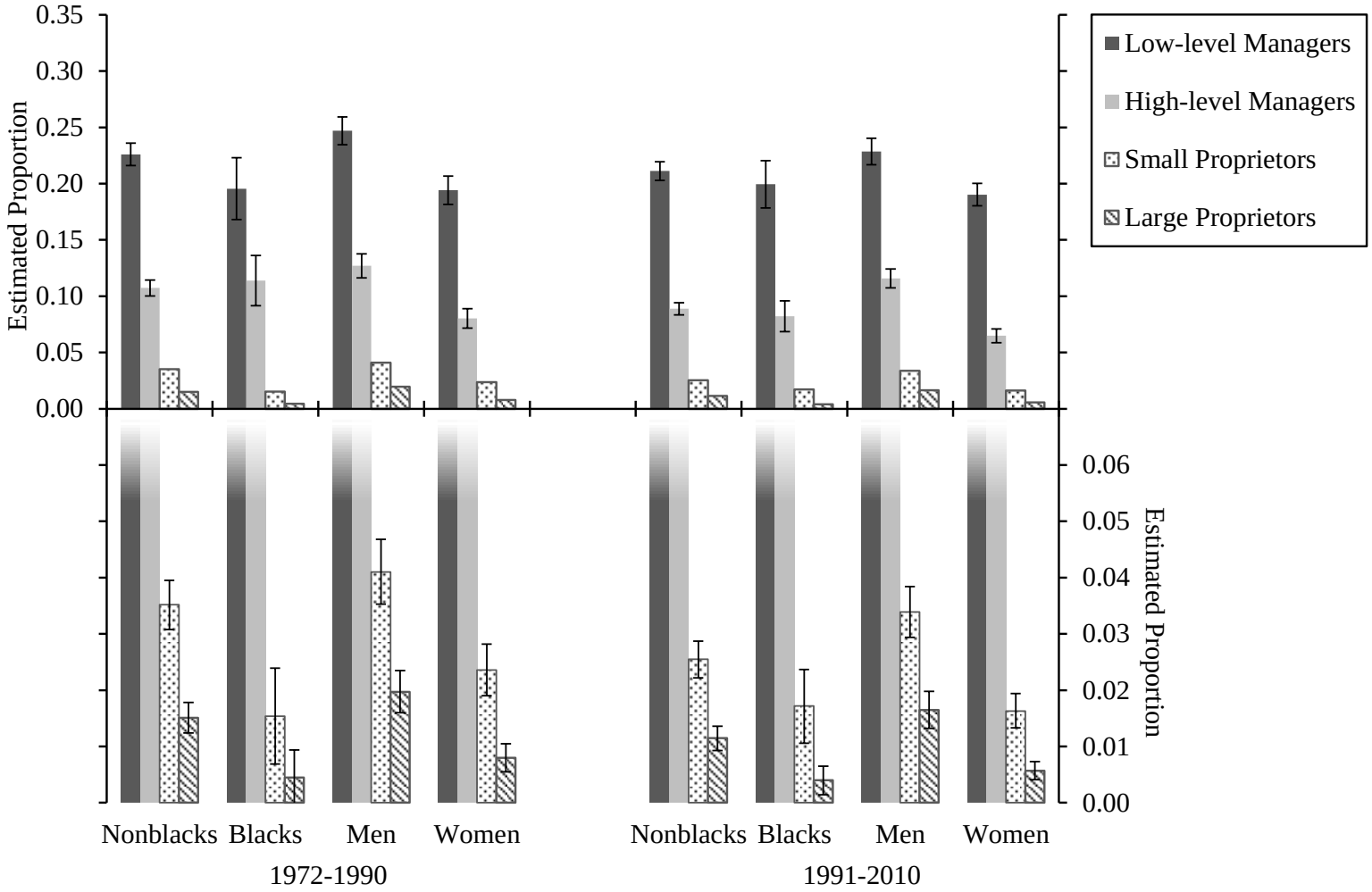
Notes: Plot displays 95 percent confidence intervals. Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their sample means.

Figure A.14. Unadjusted Racial and Gender Differences in Attainment of Class Strata, Full- and Part-time GSS Samples



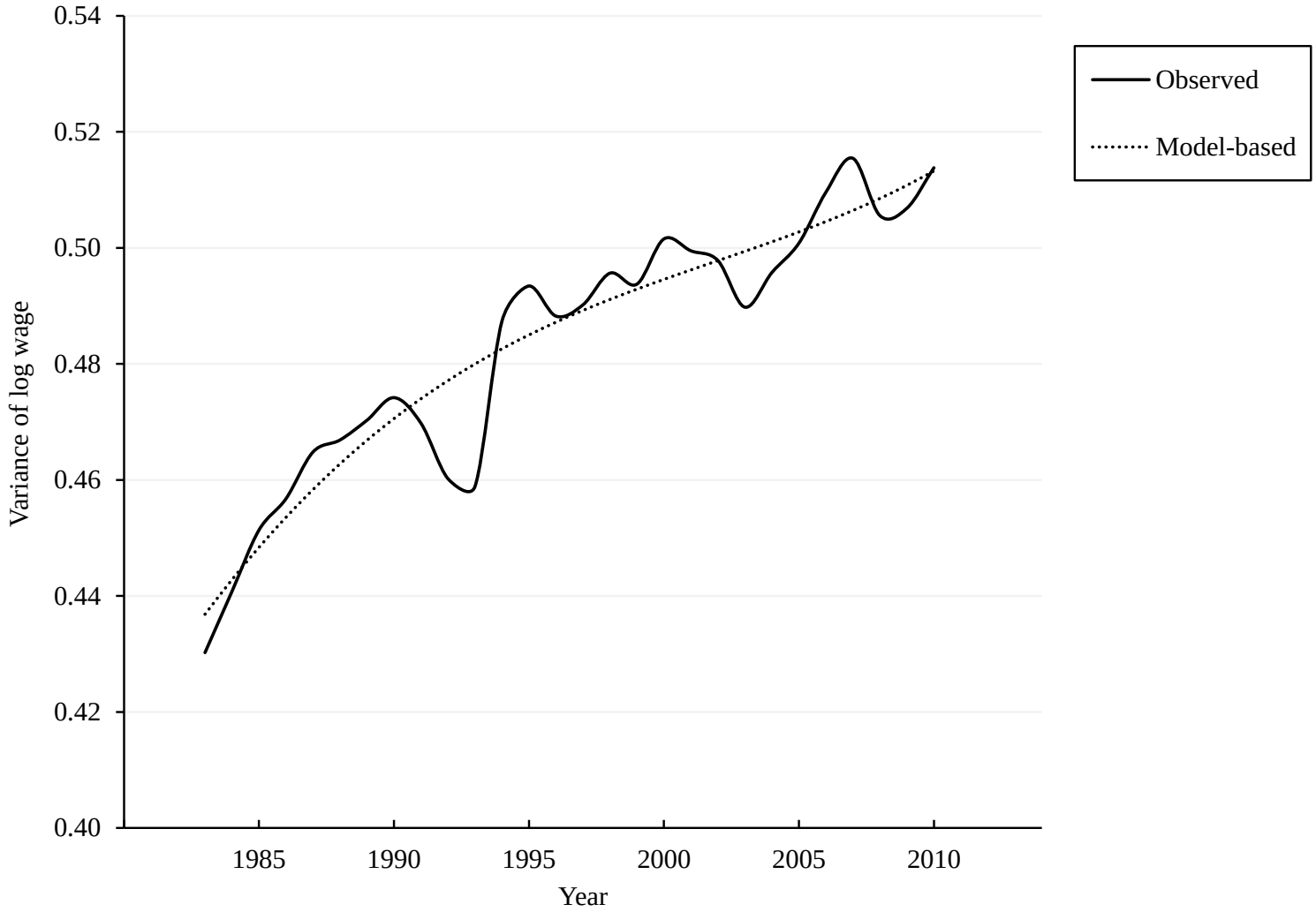
Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets.

Figure A.15. Covariate-adjusted Racial and Gender Differences in Attainment of Class Strata, Full and Part-time GSS Samples



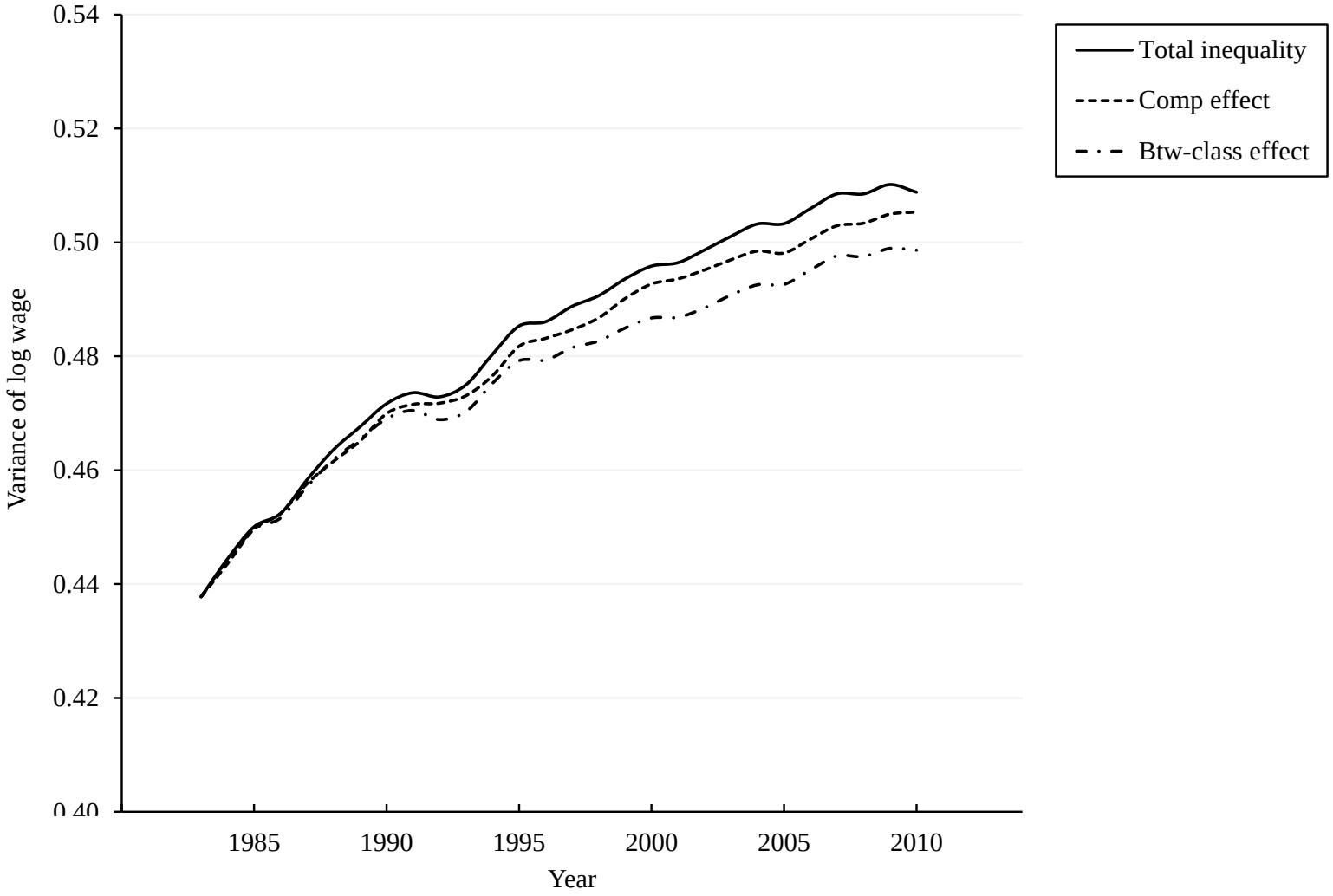
Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1972 to 2010 GSS waves. Results are combined estimates from 20 multiple imputation datasets. Proportions are estimated with control variables set to their sample means.

Figure A.16. Trends in Aggregate Wage Inequality, Full- and Part-time CPS Samples



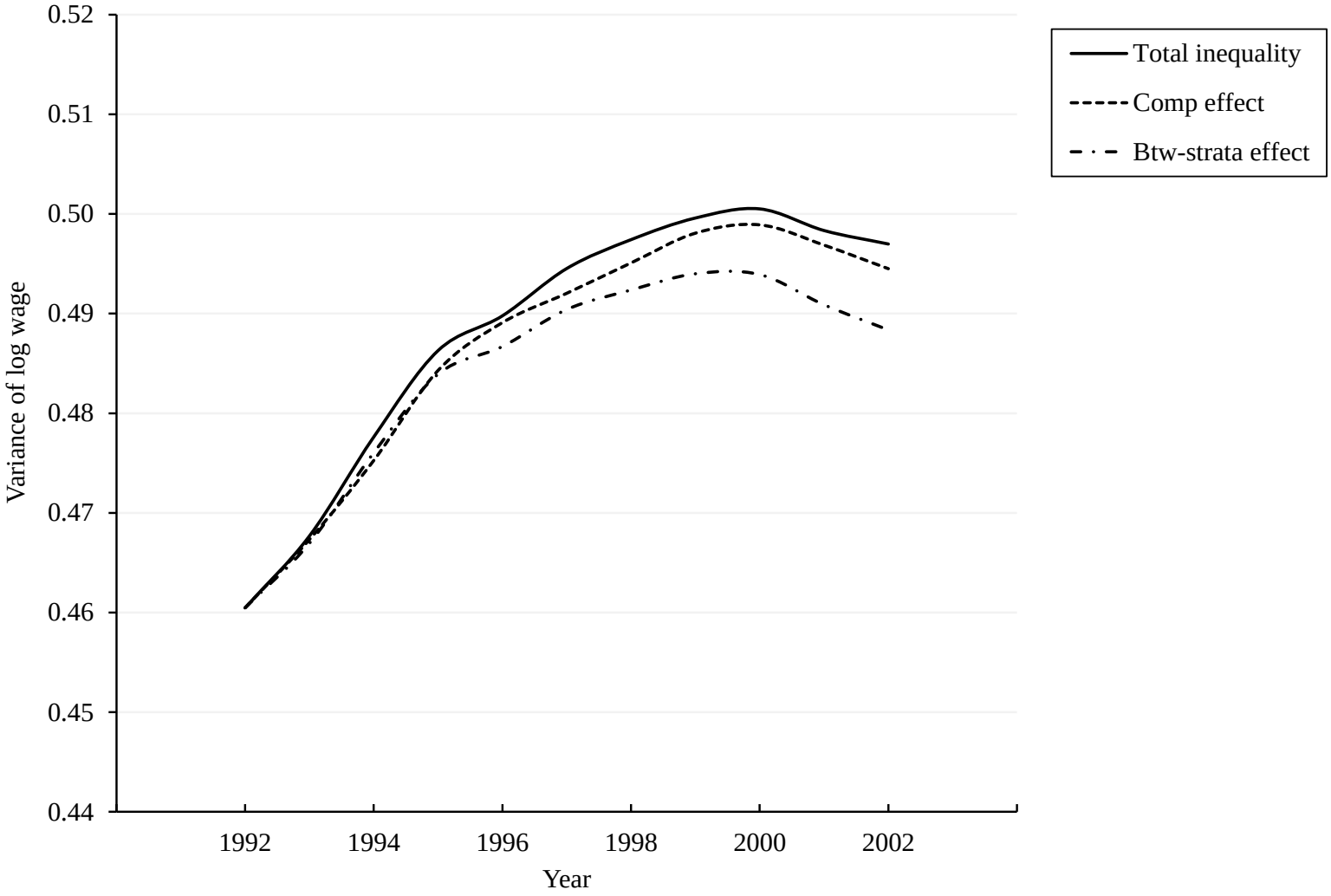
Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure A.17. Counterfactual Estimates of Wage Inequality for Compositional and Between-class Effects, Full- and Part-time CPS Samples



Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure A.18. Counterfactual Estimates of Wage Inequality for Compositional and Between-strata Effects, Full- and Part-time CPS samples



Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1992 to 2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Table A.1. Decomposition of Trends in Aggregate Wage Inequality by Class Position, Full- and Part-time CPS Samples

Study/period	Pr of change in variance of log income due to:		
	Compositional effect	Between-group effect	Within-group effect
CPS			
1983 to 1990	.06	–.01	.95
1983 to 2000	.07	.08	.85
1983 to 2010	.06	.09	.85
1990 to 2000	.04	.22	.74
1990 to 2010	.03	.17	.80

Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1983 to 2010 CPS waves. Results are based on 5 multiple imputation datasets.

Table A.2. Decomposition of Trends in Aggregate Wage Inequality by Class Strata, Full- and Part-time CPS Samples

Study/period	Pr of change in variance of log income due to:		
	Compositional effect	Between-group effect	Within-group effect
CPS			
1992 to 2002	.07	.16	.77

Notes: Sample includes respondents who are 18 to 65 years old and work full- or part-time in the 1992 to 2002 CPS waves. Results are based on 5 multiple imputation datasets.

APPENDIX B

Measuring Class with Occupational Data from the CPS

This appendix describes and evaluates the procedures used to assign individuals to classes using occupational categories and self-employment data from the CPS. With this approach, census occupational categories are used as a proxy measure for supervisory and managerial responsibilities at work. Respondents in occupations that typically involve supervisory or managerial responsibilities are classified as proprietors if they are self-employed and as managers if they are employed by someone else. Conversely, respondents in occupations that do not typically involve supervisory or managerial responsibilities are classified as independent producers if they are self-employed and workers if they are employed by someone else.

To determine whether occupations typically involve supervisory or managerial responsibilities, highly specific occupational categories are first aggregated into larger groups to yield sufficiently large sample sizes. Then, these occupational groups are cross-tabulated with respondent reports of supervisory responsibilities from the GSS, which collects data on occupation and directly asks about various types of job responsibilities. This cross-tabulation is presented in the left-hand columns of Table B.1, with occupational groups sorted in descending order based on the percentage of respondents who report that they supervise others at work.

Occupational groups in which more than 50 percent of respondents reported that they supervise others at work are defined as typically involving supervisory or managerial

responsibilities. Respondents in these occupations are classified as either proprietors or managers, depending on their self-employment status. Occupational groups in which less than 50 percent of respondents reported supervising others at work are defined as not typically involving supervisory or managerial responsibilities. Respondents in these occupations are classified as either independent producers or workers, depending on their self-employment status. The exact coding of the occupational proxy measure used in the main text is documented in the middle and right-hand columns of Table B.1, which provide a breakdown of detailed occupational codes next to their class assignments.

This measurement strategy is subject to known error. It misclassifies respondents who have control over the work activities of others but are in occupations that do not typically involve supervisory or managerial responsibilities (e.g., a self-employed "carpenter" that owns a large construction company is classified as an independent producer rather than a proprietor). It also misclassifies respondents who do not have any control over the work activities of others but are in an occupation that does typically involve supervisory or managerial responsibilities (e.g., an employed "real estate agent" without a subordinate staff or any decision latitude within his or her company is classified as a manager rather than a worker). Despite these known limitations, occupational categories still capture some information about supervisory and managerial responsibilities and thus can be used together with self-employment data to roughly assign individuals to classes.

For a certain subset of occupations, this measurement strategy is particularly prone to error because these occupational categories do not closely reflect the social relations of production. Specifically, for engineering, skilled trade, and farming occupations, Table B.1 shows that between 40 and 50 percent of respondents have supervisory or managerial

responsibilities at work. This indicates that many individuals in these occupations have an inaccurate class assignment from the proxy measurement procedure.

Self-employed carpenters, for example, likely include both owners of large home building companies as well as small independent contractors. Similarly, carpenters that report working for someone else are likely composed of many regular workers with no control over the activities of others as well as a large number of project managers directing construction at particular worksites. Engineers, skilled tradespersons, and farmers enter the social relations of production in a variety of different ways, making it particularly difficult to assign them to a relational class location with a high level of accuracy. Because of the inaccuracy associated with measuring the relational class position of engineers, skilled tradespersons, and farmers, this appendix evaluates the primary occupational proxy measure on which results presented in the main text are based as well as an alternate proxy measure that additionally classifies respondents in these occupations as proprietors or managers (rather than independent producers or workers), depending on their self-employment status.

Table B.2 contains static estimates of class size, separately by the different measures of described here. These estimates come from the 1994 to 2010 waves of GSS, which is the period for which all three class measures can be obtained in this survey. Results indicate that both the primary and alternate occupational proxy measures tend to overstate the number of workers and understate the number of managers. Furthermore, estimates of the relative size of different strata within classes indicate that this pattern of underestimation is primarily due to the occupational proxy measures misclassifying a nontrivial number of low-level managers as workers. These misclassified low-level managers are likely respondents in non-managerial occupations that nevertheless have supervisory responsibilities at the point of production. Table B.2 also provides

misclassification rates, which give the percentage of respondents classified differently under the direct versus occupational proxy measure. These rates indicate that the primary occupational proxy measure assigns about 34 percent of respondents to an incorrect class position and about 40 percent of respondents to an incorrect class stratum. The alternate occupational proxy measure has slightly higher misclassification rates, as expected.

Table B.3 presents results from static models of income fit to GSS data from 1994 to 2010, separately by the different class measures. These results help to assess whether between-class income differences based on the occupational proxy measures are consistent with those based on the direct measure. Table B.3 indicates that estimates of class income differences based on the primary occupational proxy measure are reasonably consistent with those based on the direct measure. The only notable difference is that, compared to the direct measure, the primary occupational proxy measure overstates mean income for low-level managers. Taken together with the disparate estimates of class size documented in Table B.2, this suggests that the main limitation of the primary occupational proxy measure is that it misclassifies a number of individuals with low-level supervisory responsibilities in nonmanagerial occupations. Table B.3 additionally indicates that the alternate occupational proxy measure not only provides somewhat inaccurate estimates for managers but also underestimates mean income for proprietors. Based on these results, the primary occupational proxy measure that classifies engineers, skilled tradespersons, and farmers as independent producers or workers is preferred over the alternate measure that classifies respondents in these occupations as proprietors or managers, depending on their self-employment status.

The highest level of confidence in results from the CPS can be achieved if it is also possible to demonstrate that the primary substantive conclusions of this study are insensitive to

the choice of proxy measure. Figures B.1 to B.7 and Tables B.4 to B.5 present results from a parallel analysis of the CPS based on the alternate occupational proxy measure of class. The alternate proxy measure provides similar estimates of temporal changes in between-class income differences and justifies similar substantive conclusions about the link between class structure and aggregate income inequality since the early 1980s.

In sum, the supplementary analyses presented here indicate that occupational data provide a reasonable proxy measure for the relational definition class outlined in this study; that the primary occupational proxy measure that classifies engineers, skilled tradespersons, and farmers as independent producers or workers performs better than an alternate proxy measure that classifies these occupations as proprietors or managers; and that notwithstanding differences in performance between the primary and alternate proxy measure, both measures lead to similar substantive conclusions about the relationship between class structure and aggregate income inequality.

Table B.1. Occupational Proxy Measure of Class

Occupational group	Pct w/ Auth in GSS	Proxy Coding		1980/1990 COCs	2000 COCs
		Self-employed	Employed		
Production/trade supervisors	**85.71**	Proprietor	Manager	503, 553-8, 613, 633, 803, 823, 843	600, 620,700,770,900,924
Office/clerical supervisors	**82.78**	Proprietor	Manager	303-7, 413-5, 433, 448, 456	370-3,400-1,420-1,430-2,470-1,500
Jurists	**73.08**	Proprietor	Manager	178-9	210-1
Farm/agricultural managers	**70.37**	Proprietor	Manager	475-7, 485	20
Health professionals	**69.72**	Proprietor	Manager	84-9, 96	300-1,304-6,312,325-6
Clergy	**69.70**	Proprietor	Manager	176	204-5
Execs, managers, administrators	**66.51**	Proprietor	Manager	3-22**,23-37	1-16,22-43,50-3,56,62-95
FIRE/sales professionals	**60.33**	Proprietor	Manager	243-55	481-2,492
Construction/extraction trades	47.66	Ind. Producer	Worker	563-99, 615-7	622-53,680-92
Architects, engineers	44.24	Ind. Producer	Worker	43-59	130-53
Farmers, agricultural workers	42.22	Ind. Producer	Worker	473-4, 479-84, 486-98	21,601-13
Writers, artists, entertainers	38.72	Ind. Producer	Worker	183-99	260-96
Social/recreational workers	38.71	Ind. Producer	Worker	174-5, 177	201-2,206
Scientists	34.77	Ind. Producer	Worker	63-83, 166-73	120-4,160-86
Mechanics	31.03	Ind. Producer	Worker	505-49	670,701-62
Sales workers	30.31	Ind. Producer	Worker	256-85	472-80,483-90,493-6
Technicians and programmers	30.06	Ind. Producer	Worker	213-35	100-11,154-6,190-6,214-5,903-4
Precision production workers	28.63	Ind. Producer	Worker	634-99	621,780-4,806-10,813,821,823,833-5,844-52,875-6,891-2
Other laborers	25.59	Ind. Producer	Worker	863-89	660,671-6,693-4,894-6,942-75
Service workers	24.44	Ind. Producer	Worker	403-7, 416-31, 434-47, 449-55, 457-69	374-95,402-16,422-25,434-65,905
Fabricators, inspectors	24.35	Ind. Producer	Worker	783-99	666,771-75,814,874,941
Clerical workers	24.05	Ind. Producer	Worker	308-89	54,60,501-94
Vehicle/machine operators	23.30	Ind. Producer	Worker	703-79, 804-13, 824-9, 844-59	785-804,812,815-20,822,824-32,836-43,853-73,880-90,893,911-23,926-36
Nurses, health techs	17.82	Ind. Producer	Worker	95, 97-106, 203-8	303,311,313-24,330-65
Teachers	15.18	Ind. Producer	Worker	113-65	200,220-55

Notes: The percentages of respondents in each occupational group that report having supervisory responsibilities come from a GSS sample that includes respondents who are 18 to 65 years old, work full-time, and have nonmissing occupation and supervisory data in the 1988 to 2010 waves. Bold font is used to highlight those occupations in which >60 percent of respondents report having supervisory responsibilities.

**These occupational categories define the upper stratum of the managerial class (i.e., high-level managers)

Table B.2. Class distributions by Occupational Proxy Measure, GSS 1994-2010

Variable	Marginal Pct		
	Direct Measure	Occ. Proxy Measure	Alt. Occ. Proxy Measure
Class			
Workers	57.90	67.56	63.23
Ind. producers	5.76	6.67	5.24
Managers	30.60	20.90	25.28
Proprietors	5.73	4.88	6.24
Missclassification rate	-	34.08	34.53
Class strata			
Managers			
Low-level managers	20.63	11.39	15.72
High-level managers	9.97	9.50	9.56
Proprietors			
Small proprietors	4.11	3.47	4.71
Large proprietors	1.62	1.41	1.53
Missclassification rate	-	39.74	40.71

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves. Results are combined estimates from 5 multiple imputation datasets. Missclassification rate gives the percentage of respondents classified differently under the direct versus occupational proxy measure. The alternate occupational proxy measure additionally classifies architects, engineers, production trades, extraction trades, and farmers as proprietors or managers (depending on their self-employment status), rather than independent producers or workers.

Table B.3. Estimates and Fit Statistics from Static Models of Income by Occupational Proxy Measure, GSS 1994-2010

Specification	Unadjusted Income Model						Adjusted Income Model					
	Direct Measure		Occ. Proxy Measure		Alt. Occ. Proxy Measure		Direct Measure		Occ. Proxy Measure		Alt. Occ. Proxy Measure	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Class												
Workers	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Ind. producers	6107	2102	9736	2031	11383	2546	-2647	2014	2066	1883	3604	2374
Managers	16658	1139	24799	1338	23858	1248	11269	987	15807	1207	14186	1165
Proprietors	53920	4128	59791	3797	49832	3246	38415	3431	39960	3567	32000	3059
Rsq	0.069		0.089		0.081		0.261		0.263		0.256	
Class strata												
Workers	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Ind. producers	6107	2102	9736	2031	11383	2546	-2473	2029	2140	1884	3692	2371
Managers												
Low-level managers	9521	1094	19500	1704	18801	1479	6923	1013	13079	1550	11208	1399
High-level managers	31433	2590	31153	2037	32175	2001	20733	2083	19332	1852	19523	1821
Proprietors												
Small proprietors	37704	3689	40762	3893	32718	3055	23837	3369	22697	3606	16564	2843
Large proprietors	95219	10962	106738	8403	102692	8140	77062	9168	83380	8098	80573	7830
Rsq	0.096		0.109		0.107		0.278		0.278		0.275	

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1994 to 2010 GSS waves. Results are combined estimates from 5 multiple imputation datasets. Heteroskedasticity-robust standard errors are reported. Adjusted models control for time, age, race, sex, education, region, cognitive ability, and parental education.

Table B.4. Decomposition of Trends in Aggregate Income Inequality by an Alternate Occupational Proxy Measure of Class Position

Study/period	Pr of change in variance of log income due to:		
	Compositional effect	Between-group effect	Within-group effect
CPS			
1983 to 1990	–.04	.08	.96
1983 to 2000	–.04	.09	.95
1983 to 2010	–.04	.04	.99
1990 to 2000	–.05	.09	.96
1990 to 2010	–.05	.02	1.03

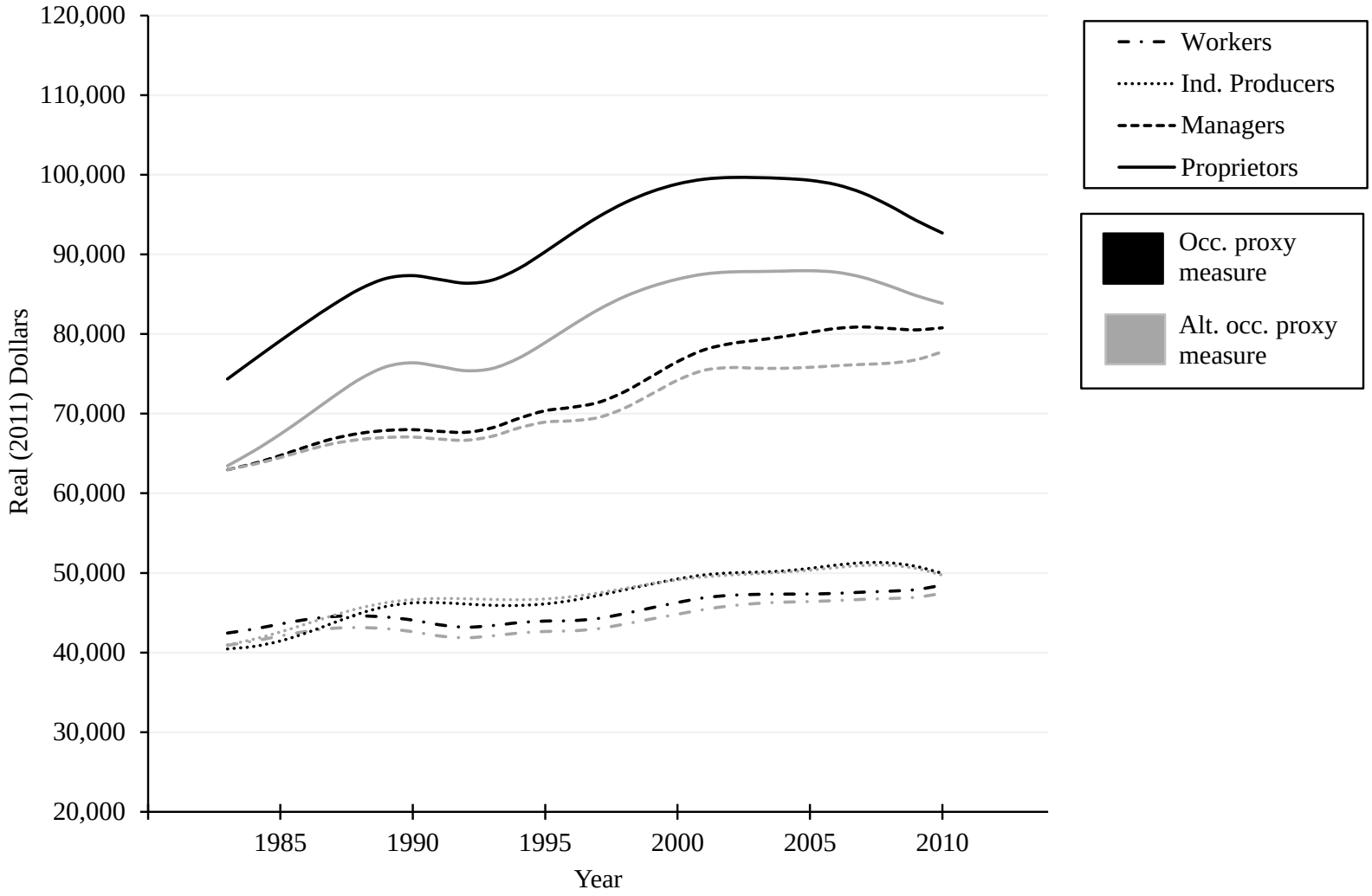
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are based on 5 multiple imputation datasets.

Table B.5. Decomposition of Trends in Aggregate Income Inequality by an Alternate Occupational Proxy Measure of Class Strata

Study/period	Pr of change in variance of log income due to:		
	Compositional effect	Between-group effect	Within-group effect
CPS			
1992 to 2002	.02	.13	.86

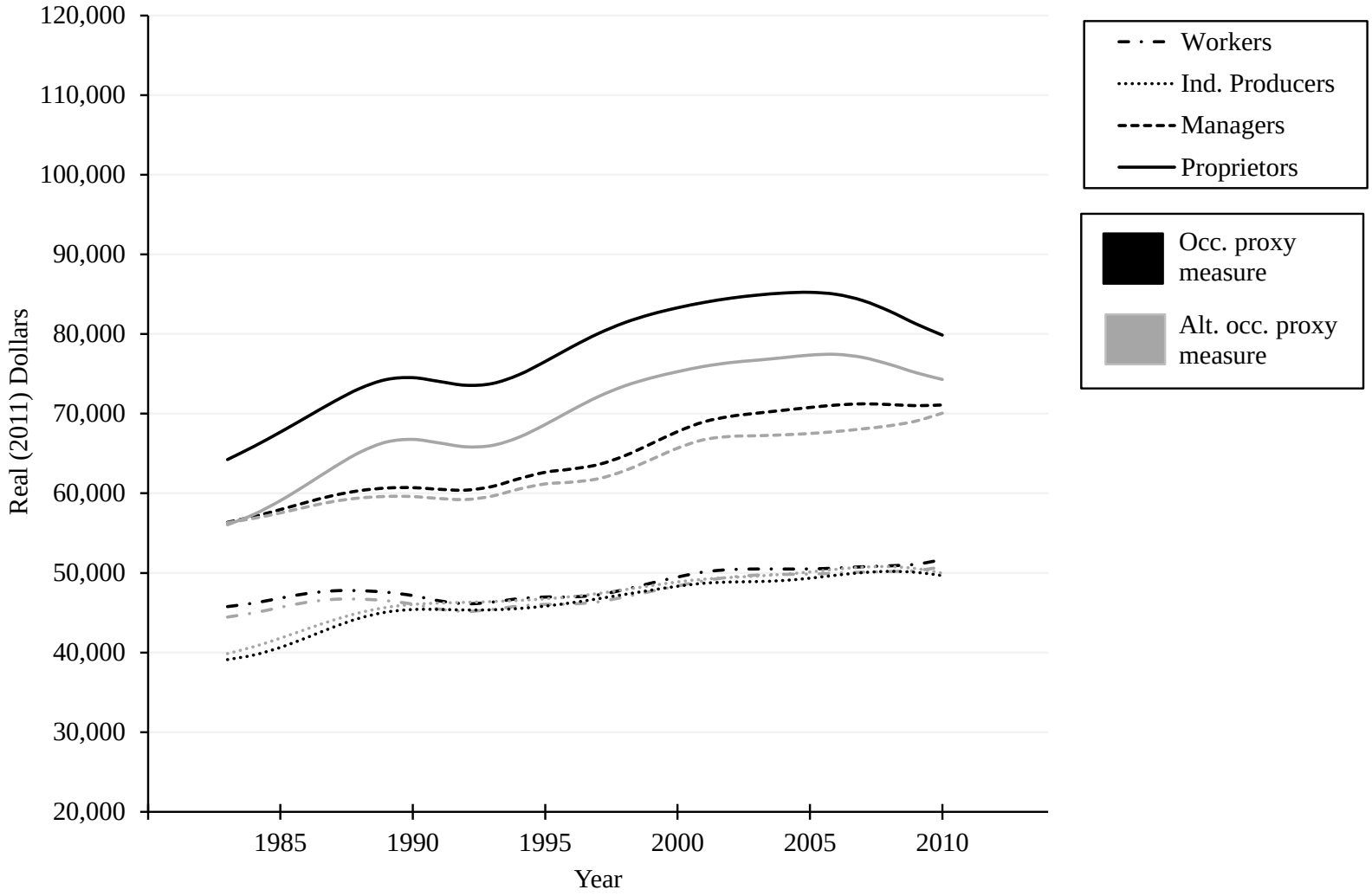
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1992 to 2002 CPS waves. Results are based on 5 multiple imputation datasets.

Figure B.1. Unadjusted Trends in Mean Income by Class and Occupational Proxy Measure, CPS



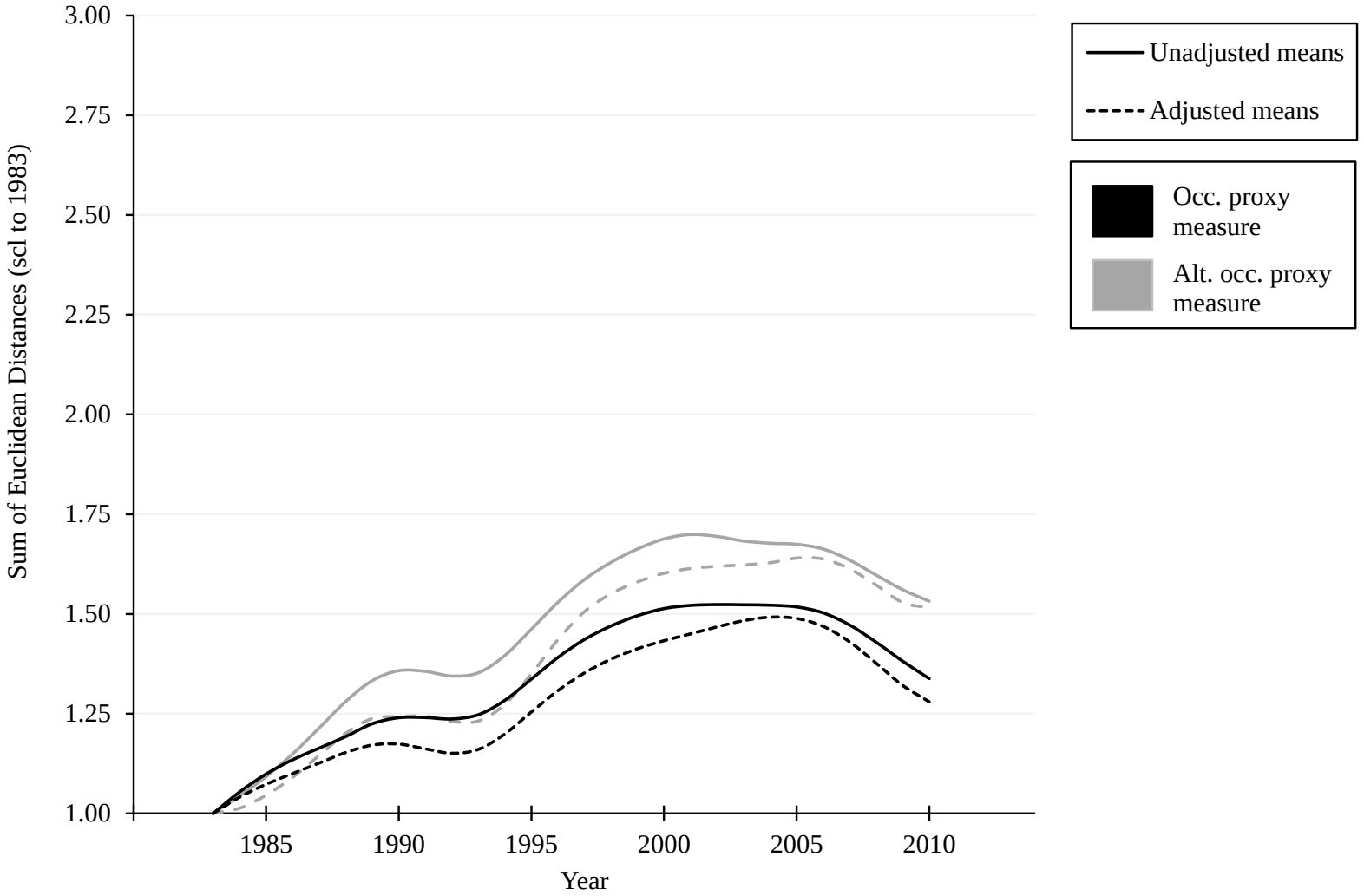
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.2. Covariate-adjusted Trends in Mean Income by Class and Occupational Proxy Measure, CPS



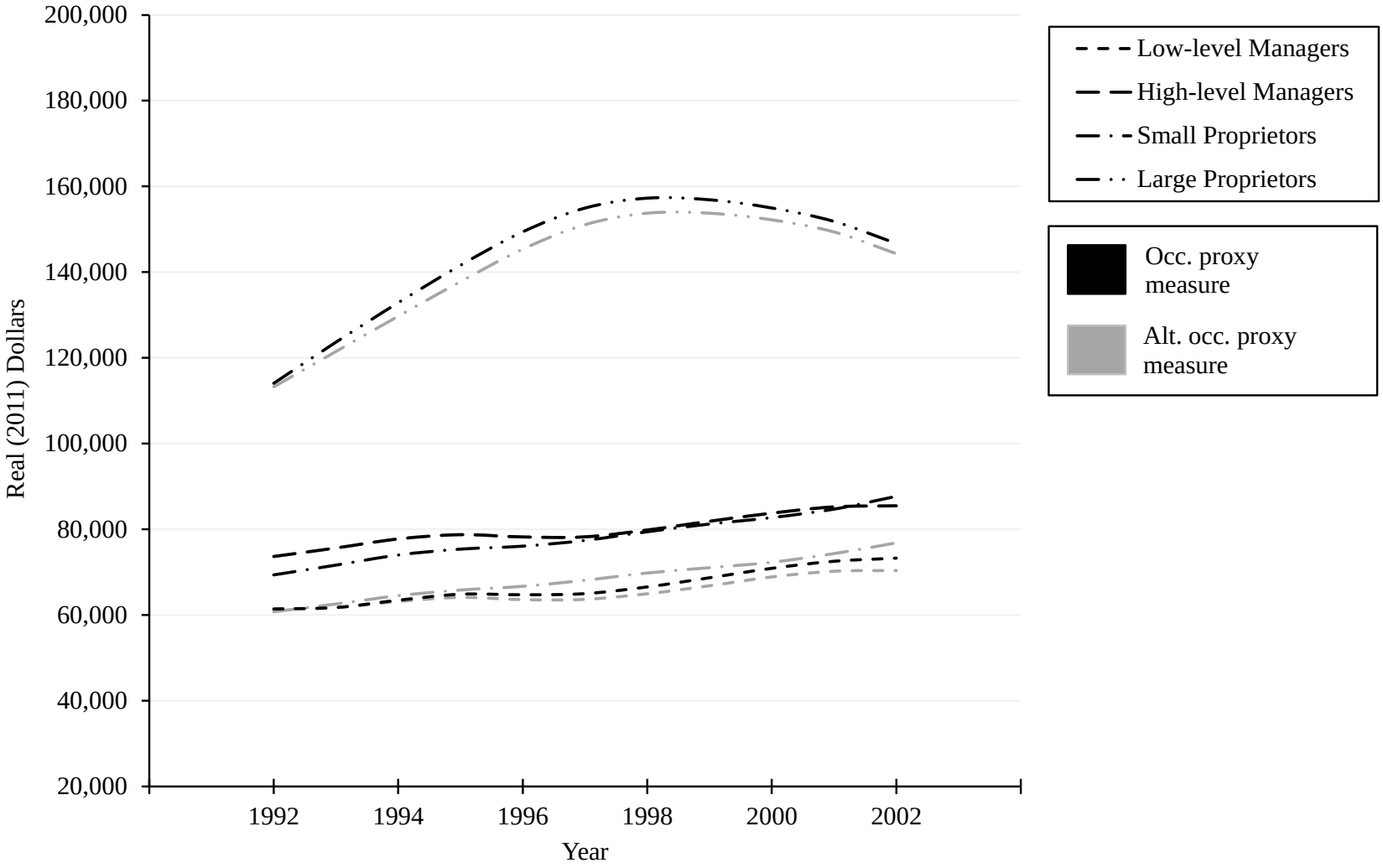
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.3. Total Change in Mean Income Differences between Classes by Occupational Proxy Measure, CPS



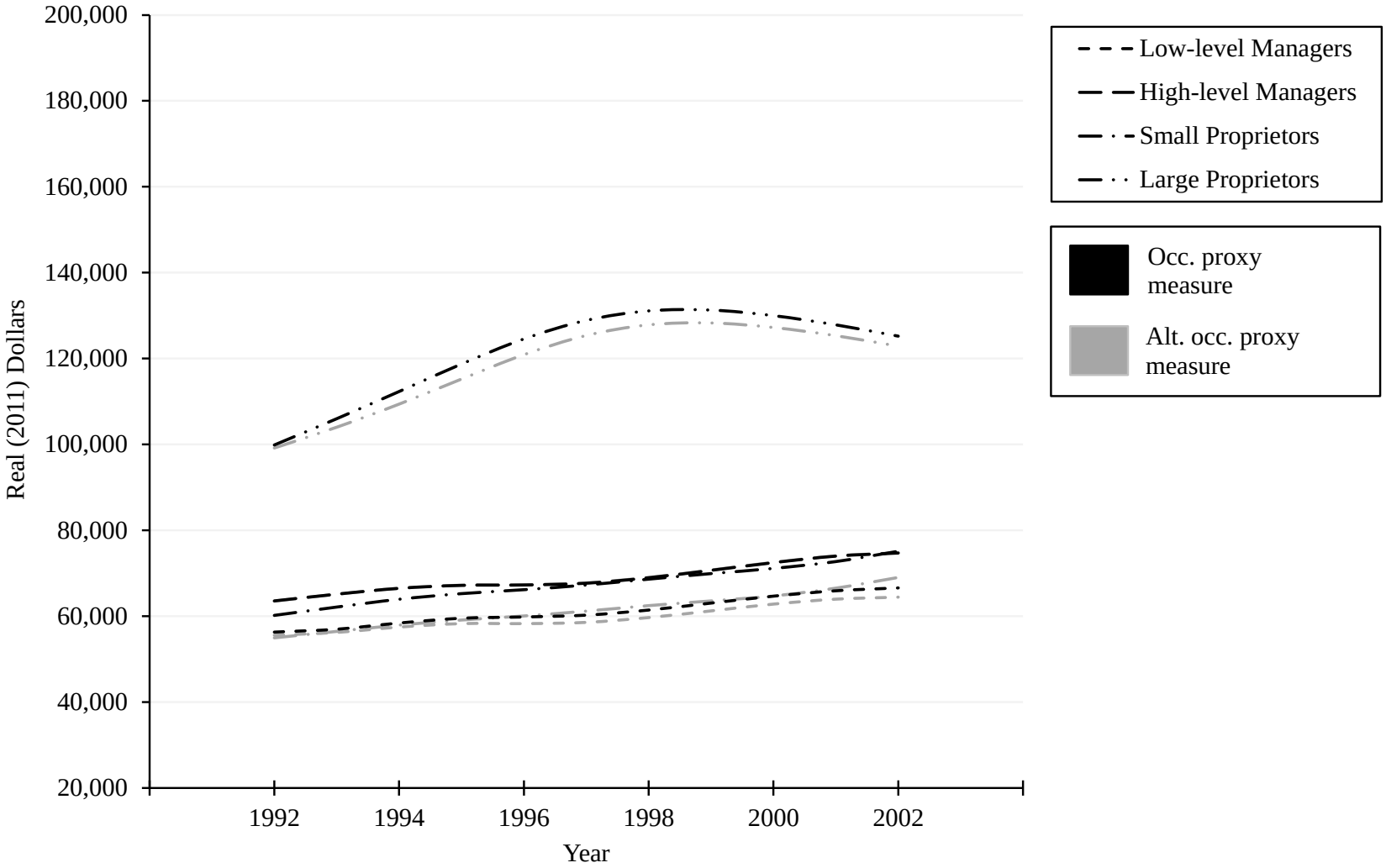
Notes: Samples include respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.4. Unadjusted Trends in Mean Income by Class Strata and Occupational Proxy Measure, CPS



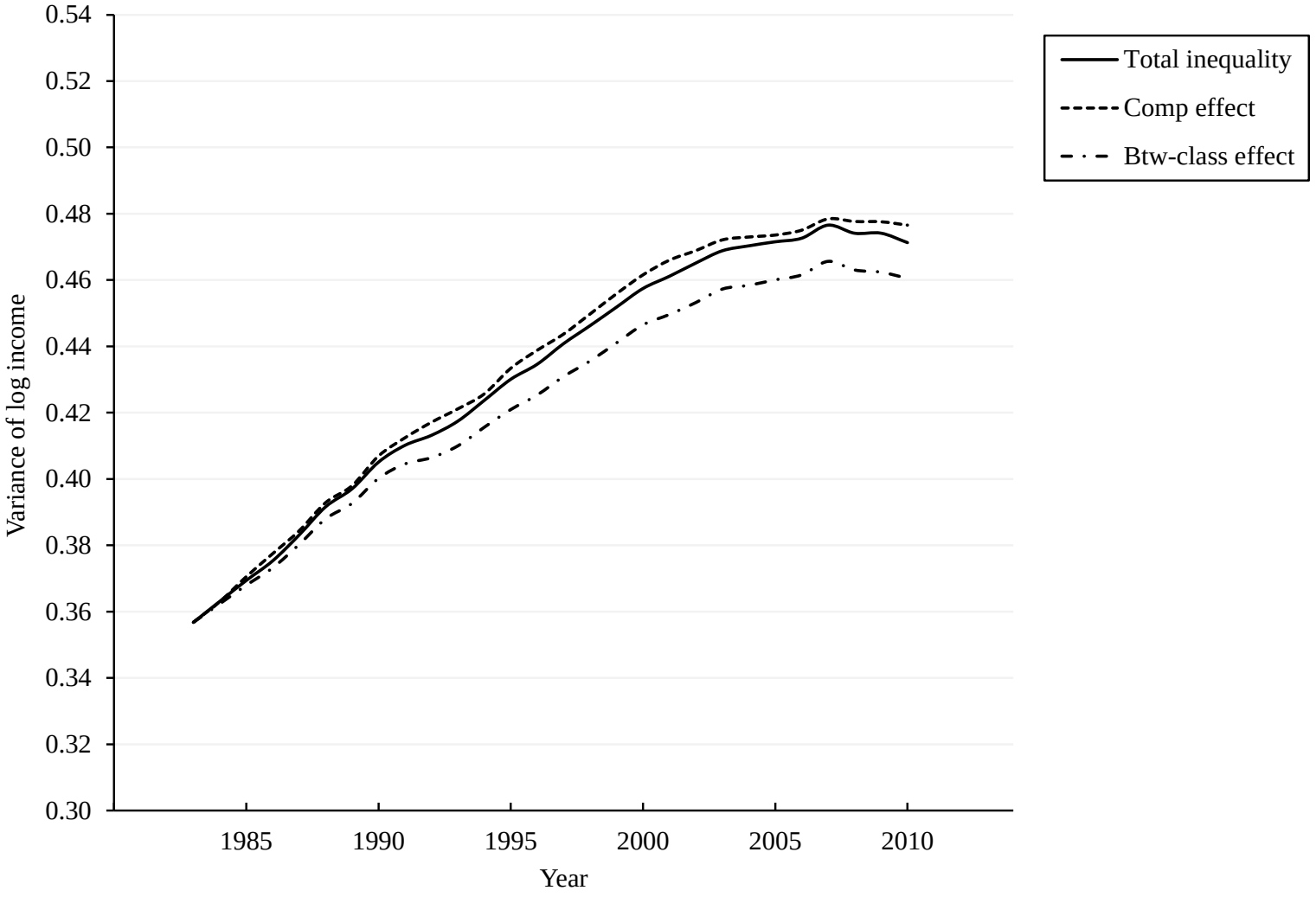
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.5. Covariate-adjusted Trends in Mean Income by Class Strata and Occupational Proxy Measure, CPS



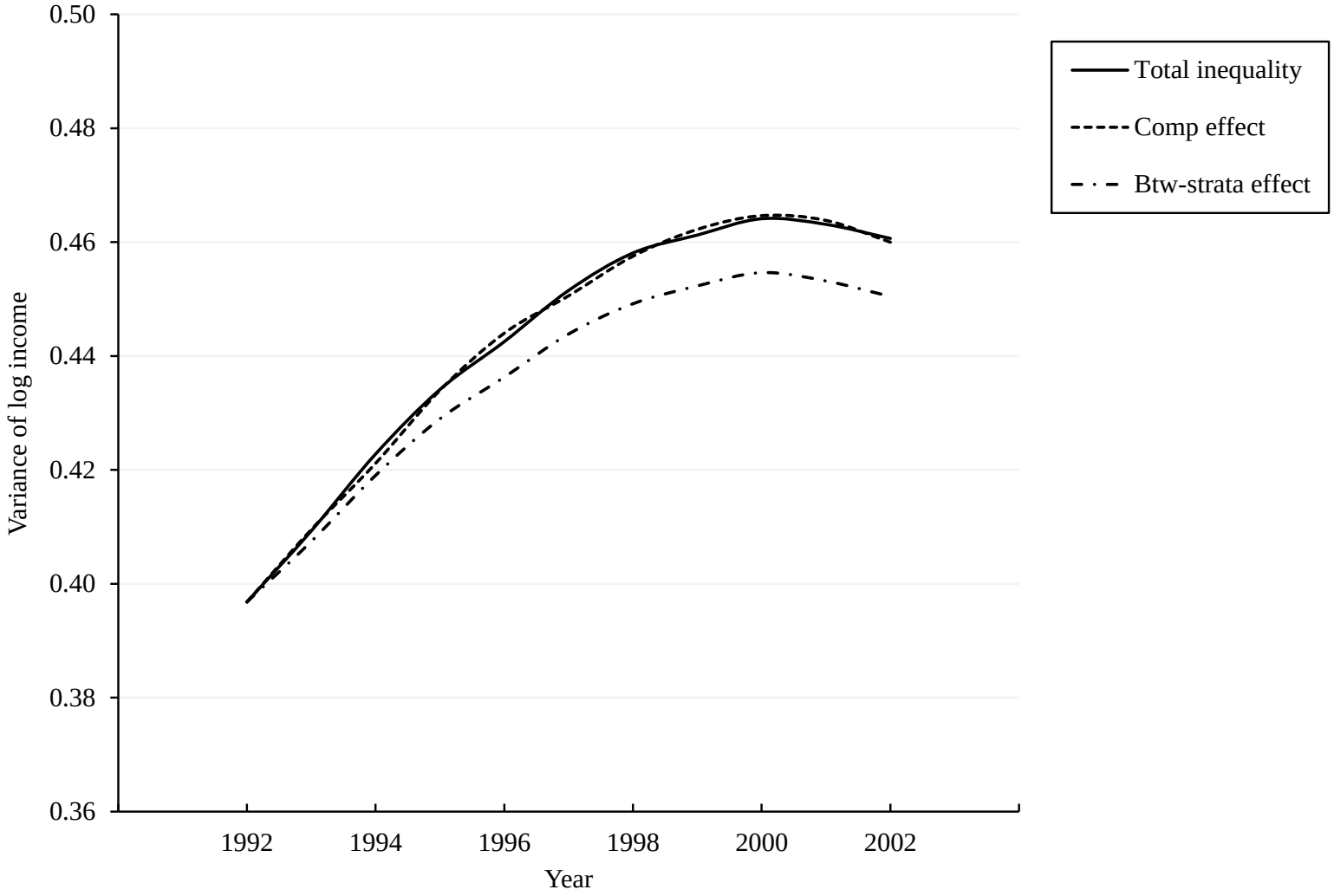
Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1992-2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.6. Counterfactual Estimates of Income Inequality for Compositional and Between-class Effects, Alternate Occupational Proxy Measure of Class Position



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

Figure B.7. Counterfactual Estimates of Income Inequality for Compositional and Between-strata Effects, Alternate Occupational Proxy Measure of Class Strata



Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1992 to 2002 CPS waves. Results are combined estimates from 5 multiple imputation datasets.

APPENDIX C

Income Measurement in the GSS and CPS

This appendix describes the procedures used to measure personal market income in the GSS and CPS, and it explains the adjustments applied to topcoded incomes in both surveys. In the GSS, total personal income earned over the previous year is measured in intervals, and dollar values are imputed based on interval midpoints. The highest incomes fall in a final open-ended interval, the lower bound of which increases systematically across survey ways as nominal incomes increase over time. Table C.1 provides the exact lower-bound values used as topcode thresholds in the GSS as well as the percentage of respondents at each wave with incomes above these thresholds. Incomes are topcoded at $50,000 from 1983 to 1985, at $60,000 from 1986 to 1990, at $75,000 from 1991 to 1997, at $110,000 from 1998 to 2005, and at $150,000 from 2006 onward.

For these topcoded incomes, nominal values are estimated using a Pareto approximation for the upper tail of the income distribution (Hout 2004). This approach involves extrapolating from the next-to-last income interval's midpoint using the frequencies from both the next-to-last and the last open-ended intervals. Specifically, the formula for estimating topcoded incomes is

$$Y_{top} = LL_{top}\left(\frac{V}{V-1}\right), \tag{C.1}$$

where LL_{top} is the lower bound of the last open-ended income interval and

$$V = \frac{\log(F_{top-1}+F_{top})-\log(F_{top})}{\log(LL_{top})-\log(LL_{top-1})}. \tag{C.2}$$

In Equation C.2, F_{top-1} and F_{top} are the frequencies from the next-to-last and the last open-ended intervals, respectively. These estimates are computed from data pooled across waves that use the same income measurement intervals because estimates computed separately for each survey wave are somewhat unstable with several extremely large imputed values. Table C.1 reports the exact values substituted for topcoded incomes based on this imputation procedure.

In the CPS, income from different sources is measured in nominal dollars using separate survey items, and then these amounts are summed to achieve a measure of total market income. This study focuses on income from labor, businesses, farm operations, and several different types of investments, including income from interest, dividends, and rents. The survey items used to measure income from these different sources were revised between 1987 and 1988, so information on income measurement and topcoding is presented separately for the periods before and after this change. Between 1983 and 1987, the CPS used separate survey items to measure income from labor, businesses, farm operations, interest, and dividends and rents combined. From 1988 onward, the CPS first asked about income from a respondent's main job, regardless of whether that income came from labor, a business, or a farm. The survey then inquired about other income from secondary labor, business, or farm activities not reported as income from a respondent's main job. Additionally, after 1988, the CPS included separate items for income from dividends and rents.

In public CPS data, large incomes from each of these sources are top-coded to protect respondent anonymity. The exact topcoding thresholds for each income source and each survey wave, together with the percentage of topcoded respondents, are presented in Tables C.2 to C.4. To adjust for topcoding in the public CPS, incomes above the topcoding threshold are imputed with group-specific means of above-threshold incomes. These means are computed from internal

CPS data (not available to the public) in which income topcoding is much less extensive. Internal CPS income data are not completely uncensored, but the internal topcoding thresholds are generally much higher than topcoding thresholds in the public data (e.g., from 2003 to 2010, the internal topcoding threshold for main job income was $1,099,999, while the public threshold was $200,000). Overall, internal CPS data contain uncensored incomes from all sources for about 99.5 to 99.8 percent of the sample (Larrimore et al 2008). Thus, internal CPS data can be used to estimate topcoded incomes for the public CPS while maintaining respondent anonymity, but because of internal topcoding, even these estimates will slightly understate average incomes for respondents above the public topcoding threshold. Nevertheless, this procedure provides more accurate estimates of topcoded incomes than other common adjustments, such as imputing based on a constant multiple of the public topcoding threshold (Card and DiNardo 2002; Larrimore et al 2008). The group means used to impute topcoded incomes in the public CPS are provided in Tables C.5 to C.9. From 1996 to 2010, the Census Bureau directly provided these group means along with the public CPS data. For survey waves prior to 1996, group means are obtained from Larrimore et al (2008), who calculated and reported this information with special permission from the Census Bureau in order to provide researchers with a consistent imputation procedure over time.

There are typically between 1 to 5 percent of respondents with incomes that exceed topcode thresholds at any given wave in both the GSS and CPS. For certain groups of respondents, however, a significantly higher proportion have topcoded incomes. In particular, about 8 percent of proprietors and 18 percent of large proprietors have incomes that exceed the topcode threshold for main job earnings in the CPS, and in the GSS, about 18 percent of proprietors and 25 percent of large proprietors have topcoded incomes. This indicates that

income trends for proprietors and large proprietors, and especially trends in the upper quantiles of the income distribution for these groups, are sensitive to topcoding and should therefore be interpreted with caution. Furthermore, because the topcoding adjustments in this study do not reflect the enormous gains among the upper fractiles (i.e., the top 0.05 to 0.01 percent) of the income distribution (Piketty and Saez 2006) and because proprietors and managers are disproportionately represented in these fractiles, the estimates provided in this study likely understate the true increase in between-class income differences since the early 1980s.

Table C.1. Topcoded income data in the 1983-2010 GSS waves

Year	Income		
	Pct topcoded	Topcode threshold	Imputed value
1983	3.16	50,000	80,732
1984	4.28	50,000	80,732
1985	6.73	50,000	80,732
1986	3.26	60,000	93,729
1987	2.79	60,000	93,729
1988	3.14	60,000	93,729
1989	3.29	60,000	93,729
1990	3.81	60,000	93,729
1991	2.37	75,000	127,858
1993	5.74	75,000	127,858
1994	4.11	75,000	127,858
1996	5.30	75,000	127,858
1998	1.28	110,000	235,730
2000	1.71	110,000	235,730
2002	1.60	110,000	235,730
2004	2.88	110,000	235,730
2006	2.60	150,000	277,607
2008	3.29	150,000	277,607
2010	2.40	150,000	277,607

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 2010 GSS waves. Imputed values come from a Pareto approximation of the upper tail of the income distribution.

Table C.2. Topcoded income data in the 1983-1987 CPS waves

Year	Labor income		Business income		Farm income		Interest		Dividends/rents	
	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold
1983	0.92	75,000	0.21	75,000	0.02	75,000	0.00	75,000	0.02	75,000
1984	0.94	75,000	0.27	75,000	0.03	75,000	0.00	75,000	0.01	75,000
1985	0.51	99,999	0.16	99,999	0.00	99,999	0.02	99,999	0.03	99,999
1986	0.62	99,999	0.13	99,999	0.00	99,999	0.00	99,999	0.02	99,999
1987	0.83	99,999	0.17	99,999	0.01	99,999	0.01	99,999	0.01	99,999

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1983 to 1987 CPS waves.

Table C.3. Topcoded income data in the 1988-2010 CPS waves

Year	Main job income		Oth. labor income		Oth. business income		Oth. farm income	
	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold
1988	0.95	99,999	0.00	99,999	0.01	99,999	0.00	99,999
1989	1.19	99,999	0.00	99,999	0.01	99,999	0.00	99,999
1990	1.61	99,999	0.01	99,999	0.01	99,999	0.00	99,999
1991	1.56	99,999	0.00	99,999	0.03	99,999	0.00	99,999
1992	1.60	99,999	0.01	99,999	0.01	99,999	0.00	99,999
1993	1.83	99,999	0.00	99,999	0.01	99,999	0.00	99,999
1994	2.25	99,999	0.03	99,999	0.02	99,999	0.00	99,999
1995	2.61	99,999	0.04	99,999	0.02	99,999	0.01	99,999
1996	0.86	150,000	0.57	25,000	0.12	40,000	0.04	25,000
1997	1.04	150,000	0.42	25,000	0.10	40,000	0.01	25,000
1998	1.10	150,000	0.80	25,000	0.13	40,000	0.05	25,000
1999	1.12	150,000	0.73	25,000	0.15	40,000	0.03	25,000
2000	1.37	150,000	0.87	25,000	0.14	40,000	0.03	25,000
2001	1.57	150,000	1.03	25,000	0.12	40,000	0.08	25,000
2002	1.73	150,000	0.88	25,000	0.17	40,000	0.10	25,000
2003	1.04	200,000	0.42	35,000	0.10	50,000	0.07	25,000
2004	0.96	200,000	0.48	35,000	0.16	50,000	0.11	25,000
2005	0.96	200,000	0.44	35,000	0.14	50,000	0.08	25,000
2006	1.09	200,000	0.53	35,000	0.13	50,000	0.13	25,000
2007	1.20	200,000	0.61	35,000	0.13	50,000	0.06	25,000
2008	1.19	200,000	0.55	35,000	0.09	50,000	0.05	25,000
2009	1.44	200,000	0.61	35,000	0.11	50,000	0.05	25,000
2010	1.46	200,000	0.46	35,000	0.11	50,000	0.07	25,000

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1988 to 2010 CPS waves.

Table C.4. Topcoded income data in the 1988-2010 CPS waves continued

Year	Interest		Dividends		Rents	
	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold	Pct topcoded	Topcode threshold
1988	0.00	99,999	0.00	99,999	0.00	99,999
1989	0.02	99,999	0.00	99,999	0.01	99,999
1990	0.04	99,999	0.01	99,999	0.00	99,999
1991	0.02	99,999	0.01	99,999	0.00	99,999
1992	0.01	99,999	0.00	99,999	0.01	99,999
1993	0.02	99,999	0.00	99,999	0.01	99,999
1994	0.02	99,999	0.00	99,999	0.02	99,999
1995	0.01	99,999	0.01	99,999	0.02	99,999
1996	0.03	99,999	0.01	99,999	0.03	99,999
1997	0.03	99,999	0.02	99,999	0.02	99,999
1998	0.05	99,999	0.07	99,999	0.07	99,999
1999	0.21	35,000	0.59	15,000	0.23	25,000
2000	0.32	35,000	0.70	15,000	0.19	25,000
2001	0.24	35,000	0.59	15,000	0.19	25,000
2002	0.25	35,000	0.38	15,000	0.25	25,000
2003	0.23	25,000	0.23	15,000	0.15	40,000
2004	0.23	25,000	0.39	15,000	0.13	40,000
2005	0.36	25,000	0.43	15,000	0.16	40,000
2006	0.44	25,000	0.53	15,000	0.14	40,000
2007	0.60	25,000	0.51	15,000	0.17	40,000
2008	0.60	25,000	0.63	15,000	0.13	40,000
2009	0.40	25,000	0.40	15,000	0.17	40,000
2010	0.38	25,000	0.54	15,000	0.17	40,000

Notes: Sample includes respondents who are 18 to 65 years old and work full-time in the 1988 to 2010 CPS waves.

Table C.5. Group mean imputation values for topcoded incomes in the 1983-1987 CPS waves

Year	Labor income						Business income					
	Male			Female			Male			Female		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
1983	89,485	87,647	96,915	92,340	87,647	NA	88,987	90,964	90,964	90,608	NA	90,964
1984	90,220	NA	92,530	88,528	NA	NA	92,506	86,400	86,400	89,529	NA	NA
1985	99,999[a]	99,999[a]	99,999[a]	99,999[a]	NA	NA	99,999[a]	NA	99,999[a]	99,999[a]	NA	NA
1986	136,613	170,804	124,324	133,348	NA	NA	136,144	108,836	NA	108,836	NA	108,836
1987	140,359	119,934	150,042	125,434	169,047	NA	130,751	-99,999	170,968	170,968	NA	NA

Notes: NA indicates that there were not any topcoded respondents in a particular group.

[a]Public topcode threshold is equivalent to internal threshold and thus no additional information about large incomes is available.

Table C.6. Group mean imputation values for topcoded incomes in the 1983-1987 CPS waves continued

Year	Farm income						Interest	Dividends/rents
	Male			Female				
	White	Black	Hispanic	White	Black	Hispanic		
1983	82,381	NA	NA	NA	NA	NA	97,565	92,724
1984	83,154	NA	NA	NA	NA	NA	94,024	87,201
1985	99,999[a]	NA	NA	NA	NA	NA	99,999[a]	99,999[a]
1986	NA	NA	NA	NA	NA	NA	99,999[a]	99,999[a]
1987	122,398	NA	NA	NA	NA	NA	99,999[a]	99,999[a]

Notes: NA indicates that there were not any topcoded respondents in a particular group.

[a]Public topcode threshold is equivalent to internal threshold and thus no additional information about large incomes is available.

Table C.7. Group mean imputation values for topcoded incomes in the 1988-2010 CPS waves

Year	Main job income						Other labor income					
	Male			Female			Male			Female		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
1988	148,852	136,582	159,300	151,838	153,098	153,098	NA	NA	NA	NA	NA	NA
1989	143,204	138,971	154,412	152,647	137,250	137,250	NA	NA	NA	NA	NA	NA
1990	153,067	159,309	153,072	143,812	124,782	124,782	99,999[a]	NA	NA	NA	NA	NA
1991	151,763	144,161	135,010	153,090	132,453	132,230	NA	NA	NA	NA	NA	NA
1992	142,991	133,707	136,560	131,061	121,099	NA	99,999[a]	NA	NA	NA	NA	NA
1993	148,241	144,800	143,657	149,557	114,123	114,123	99,999[a]	NA	NA	NA	NA	NA
1994	188,027	232,995	205,449	215,571	273,701	159,042	158,174	125,569	NA	125,569	NA	NA
1995	187,347	180,854	179,894	191,029	160,143	212,792	207,148	109,775	109,775	109,775	NA	NA
1996	302,539	464,782	257,390	283,525	NA	404,570	64,542	29,778	183,748	56,977	35,662	35,662
1997	318,982	391,163	384,160	357,884	454,816	454,816	45,749	62,044	62,044	48,635	257,102	62,044
1998	330,659	204,325	309,950	306,468	267,659	394,555	61,345	51,707	39,943	48,755	47,530	35,080
1999	306,731	266,303	419,044	402,204	492,657	367,181	59,925	51,139	52,678	35,583	34,826	36,826
2000	300,974	257,525	362,315	256,384	244,810	333,565	50,037	35,625	39,676	51,469	67,776	50,770
2001	329,998	277,959	345,181	318,370	247,864	469,588	55,436	63,610	41,197	44,451	35,358	36,064
2002	320,718	326,969	331,926	361,315	477,562	330,981	60,670	49,155	50,534	43,389	40,556	65,493
2003	390,823	443,501	562,913	480,607	336,975	595,494	91,360	60,724	49,866	55,255	48,548	57,290
2004	404,469	360,083	427,646	390,847	556,932	387,963	89,988	156,017	64,536	67,710	57,293	49,202
2005	422,850	471,917	421,411	474,404	713,263	366,935	77,282	60,016	57,768	63,911	53,189	60,586
2006	423,545	543,488	404,840	410,175	303,536	257,855	79,378	52,371	54,590	55,344	59,002	68,283
2007	437,528	579,599	619,221	423,652	615,203	438,937	74,091	53,197	56,306	61,472	45,266	240,674
2008	419,969	272,589	425,629	366,022	688,117	351,023	73,029	51,636	56,732	57,459	57,069	57,991
2009	389,599	553,087	436,465	407,720	383,596	397,063	72,946	62,071	57,838	59,069	70,577	64,367
2010	409,068	418,365	415,929	433,605	566,972	493,804	67,527	59,900	54,534	62,705	40,348	87,422

Notes: NA indicates that there were not any topcoded respondents in a particular group.

[a]Public topcode threshold is equivalent to internal threshold and thus no additional information about large incomes is available.

Table C.8. Group mean imputation values for topcoded incomes in the 1988-2010 CPS waves continued

Year	Other business income						Other farm income					
	Male			Female			Male			Female		
	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
1988	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1989	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1990	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1991	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1992	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1993	99,999[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1994	157,513	NA	NA	157,513	NA	NA	NA	NA	NA	NA	NA	NA
1995	305,001	NA	357,471	357,471	NA	NA	NA	NA	NA	NA	NA	NA
1996	154,528	82,233	NA	64,058	NA	NA	53,067	45,717	NA	45,717	NA	NA
1997	128,477	152,709	152,709	152,709	NA	152,709	38,781	NA	NA	38,781	NA	NA
1998	101,769	NA	104,335	53,484	NA	NA	90,170	NA	NA	61,127	NA	NA
1999	123,543	NA	103,545	52,835	NA	NA	65,337	NA	NA	44,558	NA	NA
2000	119,583	NA	64,058	63,258	NA	NA	87,162	NA	51,354	54,785	NA	NA
2001	117,099	NA	55,231	55,231	NA	NA	NA	NA	NA	NA	NA	NA
2002	127,597	108,083	79,683	56,934	49,520	49,520	NA	NA	NA	NA	NA	NA
2003	141,605	149,560	149,560	75,880	NA	NA	65,682	199,326	199,326	46,839	NA	199,326
2004	111,645	104,785	91,233	99,464	104,785	NA	67,545	37,503	50,171	40,178	37,503	NA
2005	160,832	164,370	164,370	90,574	NA	164,370	50,413	45,639	45,639	71,842	45,639	45,639
2006	186,628	76,650	76,650	80,515	76,650	76,650	208,516	43,931	141,398	51,655	43,931	43,931
2007	125,974	195,957	146,920	454,133	195,957	NA	145,701	48,679	48,679	43,376	NA	48,679
2008	93,400	93,014	93,014	93,014	93,014	93,014	43,286	NA	49,095	63,438	NA	49,095
2009	133,732	183,401	183,401	171,377	183,401	NA	62,368	NA	35,615	NA	NA	NA
2010	120,846	135,215	135,215	122,432	NA	135,215	61,670	59,646	NA	34,352	NA	NA

Notes: NA indicates that there were not any topcoded respondents in a particular group.

[a]Public topcode threshold is equivalent to internal threshold and thus no additional information about large incomes is available.

Table C9. Group mean imputation values for topcoded incomes in the 1988-2010 CPS waves continued

Year	Interest`	Dividends	Rents
1988	99,999[a]	99,999[a]	99,999[a]
1989	99,999[a]	99,999[a]	99,999[a]
1990	99,999[a]	99,999[a]	99,999[a]
1991	99,999[a]	99,999[a]	99,999[a]
1992	99,999[a]	99,999[a]	99,999[a]
1993	99,999[a]	99,999[a]	99,999[a]
1994	99,999[a]	99,999[a]	99,999[a]
1995	99,999[a]	99,999[a]	99,999[a]
1996	99,999[a]	99,999[a]	99,999[a]
1997	99,999[a]	99,999[a]	99,999[a]
1998	99,999[a]	99,999[a]	99,999[a]
1999	60,819	36,877	57,453
2000	63,005	36,962	55,220
2001	61,337	36,364	58,676
2002	64,854	38,962	57,417
2003	50,186	33,581	72,409
2004	51,372	39,987	74,636
2005	55,524	35,416	76,259
2006	54,984	37,508	76,212
2007	53,946	38,224	75,061
2008	52,619	33,651	70,556
2009	51,580	38,815	73,177
2010	55,289	40,100	71,580

[a]Public topcode threshold is equivalent to internal threshold and thus no additional information about large incomes is available.

APPENDIX D

IP-weighted Local Linear Regression

This appendix describes IP weighting and local linear regression with a series of simulation experiments. Consider first a simple example in which the goal is to estimate temporal trends in the mean of a metric outcome separately for two distinct groups without any compositional differences between them. The nonparametric regression function in this example can be written as

$$E(Y|C = j, t) = m_j(t), \quad j = 1,2 \tag{D.1}$$

where $E(Y|C = j, t)$ is the expectation of the outcome for group $C = j$ at time t, and $m_j(t)$ is a group-specific function of time. The conventional local linear estimator for $m_j(t)$ is given by

$$\widehat{m}_j(t) = \sum_{i=1}^{n_j} a_{ij} y_{ij} = \sum_{i=1}^{n_j} \left(\frac{1}{n_j}\right) \frac{\left(S_2(t) - S_1(t)(t_{ij} - t)\right) K_b(t_{ij} - t)}{S_2(t) S_0(t) - S_1(t)^2} y_{ij}. \tag{D.2}$$

In this equation, y_{ij} is the metric outcome for individual i in group j, and $a_{ij} = \left(\frac{1}{n_j}\right) \frac{\left(S_2(t) - S_1(t)(t_{ij} - t)\right) K_b(t_{ij} - t)}{S_2(t) S_0(t) - S_1(t)^2}$ is a local weight assigned to each respondent, where $S_v(t) = \sum_{i=1}^{n_j} \left(\frac{1}{n_j}\right) (t_{ij} - t)^v K_b(t_{ij} - t)$ and $K_b(t_{ij} - t) = \frac{1}{b} K\left(\frac{t_{ij} - t}{b}\right)$ represents a kernel function with bandwidth b.

The asymptotic bias of $\widehat{m}_j(t)$ is equal to

$$Bias\left(\widehat{m}_j(t), m_j(t)\right) = \frac{b^2}{2} m_j''(t) \int u^2 K_b(u) du. \tag{D.3}$$

This expression indicates that the bias of the conventional local linear regression estimator depends on the size of the bandwidth, the curvature of the conditional expectation function, and the type of kernel. Specifically, smaller bandwidths and less curvature in the expectation function are associated with lower bias because as $b \to 0$ or $m_j''(t) \to 0$, $Bias\left(\widehat{m}_j(t), m_j(t)\right) \to 0$. When the conditional expectation function is linear, and thus $m_j''(t) = 0$, the local linear estimator is unbiased.

The asymptotic variance of $\widehat{m}_j(t)$ is given by

$$Var\left(\widehat{m}_j(t)\right) = \frac{\sigma^2(t)}{nbf(t)} \int uK_b(u)^2 du, \tag{D.4}$$

indicating that the precision of the estimator depends on the sample size, bandwidth, type of kernel, and the distribution of observations across time. Specifically, the variance decreases as the sample size, bandwidth, and density of observations at time t increase. Based on these expressions for the asymptotic bias and variance, the asymptotic mean squared error of $\widehat{m}_j(t)$ is equal to

$$AMSE\left(\widehat{m}_j(t)\right) = \frac{\sigma^2(t)}{nhf(t)} \int uK_b(u)^2 du + \left(\frac{b^2}{2} m_j''(t) \int u^2 K_b(u) du\right)^2. \tag{D.5}$$

This reveals a clear bias-variance tradeoff associated with the size of the bandwidth: narrow bandwidths reduce bias but increase variance, and wide bandwidths reduce variance but increase bias. In general, narrow bandwidths are expected to perform best when the group-specific time trends are highly nonlinear, while wider bandwidths are better suited for conditional expectation functions that are characterized by more moderate deviations from linearity.

Now suppose that, rather than being comparable in terms of other covariates, the two groups of interest in this example differ on one or more factors that also affect the outcome. In this situation, the group-specific trends estimated from Equation D.2 are confounded by

compositional differences between groups. There are several approaches to adjusting trend estimates for this type of confounding. First, one could condition on the covariates, x, in a parametric model for $E(Y|C = j, X = x, t)$, but correctly specifying this model may be difficult if its functional form is unknown or highly nonlinear. The conditional expectation $E(Y|C = j, X = x, t)$ could also be estimated nonparametrically using multivariate local linear regression and a higher-order kernel, but with many covariates, this approach suffers from the so-called "curse of dimensionality," meaning that the variance of this estimator rapidly increases with the dimension of x. Even with a large sample and just a few covariates, multivariate local linear regression can perform quite poorly.

IP-weighting provides an alternative semi-parametric approach to adjusting group-specific time trends for confounding that attenuates some of the problems associated with parametric multivariate regression and fully nonparametric multivariate methods. With this approach, information about compositional differences between the groups of interest on a potentially high-dimensional set of covariates is reduced to a single dimension—the conditional probability of group membership given the covariates—and a simple transformation of this probability yields a set of weights that balance the distribution of covariates across groups. Conventional local linear regression is then applied to the weighted observations to estimate unconfounded group-specific time trends. Specifically, this approach estimates the following double expectation function: $E_x\big(E(Y|C = j, X = x, t)\big) = g_j(t)$, which is the expectation of the outcome conditional on group membership, covariates, and time, averaged across the covariates.

The IP-weighted local linear regression estimator for this function can be expressed as

$$\hat{g}_j(t) = \sum_{i=1}^{n_j} a_{ij}^w y_{ij} = \sum_{i=1}^{n_j} \left(\frac{w_{ij}}{\sum_{i=1}^{n_j} w_{ij}} \right) \frac{\big(S_2^w(t) - S_1^w(t)(t_{ij} - t)\big) K_b(t_{ij} - t)}{S_2^w(t) S_0^w(t) - S_1^w(t)^2} y_{ij}, \quad \text{(D.6)}$$

where w_{ij} is the IP weight equal to $\frac{P(C=j|t_i)}{P(C=j|X=x_i,t_i)}$, $S_v^w(t)$ is equal to $\sum_{i=1}^{n_j}\left(\frac{w_{ij}}{\sum_{i=1}^{n_j} w_{ij}}\right)(t_{ij} - t)^v K_b(t_{ij} - t)$, and $K_b(t_{ij} - t)$ is defined as previously. The weight w_{ij} varies around 1 based on the degree to which covariates impact the probability of group membership. It gives greater weight to individuals who are less likely to be members of their observed group given their covariate values, and it gives less weight to individuals who are more likely to be a member of their observed group. This estimator is considered semi-parametric in the sense that the weights are in practice typically estimated from a parametric model, but this need not be the case, as fully nonparametric methods could also be used to estimate the weights. In the next section, I demonstrate how the IP-weighted local linear estimator works in several different simulated data examples, and then I investigate the small and large sample properties of this estimator with a series of simulation experiments.

Table D.1 summarizes the distribution of a binary covariate by group membership and time from fifty thousand simulated observations. The exact data generating model is documented in the footnotes to the table (as is the case for all subsequent simulations). In this example, selection into different groups based on the binary covariate is invariant over time, and at each time point, this covariate is highly imbalanced across the groups of interest. The second set of columns in Table D.1 illustrates the impact of weighting by the inverse probability of group membership, revealing covariate balance across groups at each time point in the weighted sample.

Figure D.1 presents unadjusted and IP-weighted local linear regression estimates for a simulated outcome based on the group and covariate data from Table D.1. The outcome variable is generated from a model with a highly nonlinear time trend. There are no differences in this trend between groups conditional on the binary covariate, which has time-invariant effects on

both the probability of group membership and the outcome. Because the binary covariate is imbalanced across groups and has a time-invariant effect on the outcome, unadjusted estimates show a similar temporal trend for each group, but the trend lines are shifted upward and downward by a constant amount. The IP-weighted estimates, by contrast, closely approximate the true expectation function that both groups share conditional on the confounding covariate.

Figure D.2 presents local linear regression estimates from simulated data where, as in the previous example, the outcome follows a highly nonlinear trend among both groups conditional on the binary covariate, and the binary covariate has a time-invariant effect on the probability group membership. Unlike the previous example, however, the binary covariate has time-dependent effects on the outcome, with its impact increasing in magnitude over time. For this example, unadjusted local linear estimates show highly divergent temporal trends between groups. The IP-weighted estimates, on the other hand, show both groups following the same nonlinear trend over time and closely approximate the true conditional expectation function averaged across levels of the binary covariate.

Table D.2 and Figure D.3 present results from a final simulated example in which the outcome follows a highly nonlinear trend, and the two groups of interest follow the same trend conditional on a confounding binary covariate. The binary covariate in this example has a time-invariant effect on the outcome and time-dependent effects on the probability of group membership such that compositional differences between groups on this covariate become more pronounced over time. The descriptive statistics in Table D.2 summarize this pattern of growing covariate imbalance over time and show that IP weighting balances the covariate distribution across groups at each time point. Figure D.3 plots unadjusted local linear estimates, which show

divergent trends in the outcome between groups, and IP-weighted local linear estimates, which recover the time trend shared by both groups conditional on the binary covariate.

The simulated examples discussed here demonstrate the various confounding processes that can lead to divergent group-specific trend estimates with conventional local linear regression. In empirical research on class differences in income over time, all of these confounding processes are likely operating simultaneously with multiple covariates. For example, the effects of both education and gender on income are changing over time as are their effects on class attainment. The simulated examples discussed previously show that IP-weighted local linear regression is capable of adjusting for all of these confounding processes.

Table D.3 and Table D.4 describe the small and large sample properties of the IP-weighted local linear regression estimator based on the results of several simulation experiments with one thousand replications. The first simulation, summarized in the upper panels of Table D.3 and Table D.4, involves a highly nonlinear trend with a conditionally normal and homoscedastic outcome. The second simulation, summarized in the middle panels of Table D.3 and Table D.4, involves only a moderate degree of trend nonlinearity with a conditionally normal and homoscedastic outcome. The last simulation, presented in the lower panels of Table D.3 and Table D.4, is designed to approximate the income models considered in the empirical analysis. It involves a moderately nonlinear temporal trend with a highly skewed and heteroscedastic outcome.

In each of these simulations, the IP-weighted local linear regression estimator performs as expected. The bootstrap standard error provides a good approximation for the true standard deviation of IP-weighted estimates. Bias is more severe at a point on the expectation function with a high degree of curvature, compared with a point where the expectation function is roughly

linear, and it increases with the size of the bandwidth. Shapiro-Wilk tests applied to the simulated sampling distributions suggest that estimates based on conditionally normal data are themselves normally distributed. For small sample estimates based on highly skewed lognormal data, these tests frequently reject the null of a normal sampling distribution. Graphical inspection of these distributions, however, indicates that they are nevertheless very close to normal. In simulations where temporal change in the outcome is only moderately nonlinear, bias with both the narrow and standard bandwidths is close to zero, and 95 percent bootstrap confidence intervals that assume a normal sampling distribution cover the true conditional expectation with equivalent probability. Overall, for moderately nonlinear functions, the IP-weighted local linear regression estimator performs quite well regardless of bandwidth size, and for highly nonlinear functions, the IP-weighted estimator performs better with a narrow bandwidth.

Table D.1. Weighted and unweighted covariate distribution by group in simulated data example with time-invariant selection process[a]

Time	Unweighted		IP-weighted	
	Group 1	Group 2	Group 1	Group 2
1.00-1.49	0.29	0.73	0.50	0.51
1.50-2.49	0.31	0.72	0.53	0.51
2.50-3.49	0.31	0.70	0.52	0.49
3.50-4.49	0.27	0.70	0.47	0.50
4.50-5.49	0.28	0.70	0.48	0.49
5.50-6.49	0.29	0.69	0.49	0.49
6.50-7.49	0.30	0.69	0.51	0.49
7.50-8.49	0.29	0.69	0.49	0.49
8.50-9.49	0.29	0.71	0.49	0.50
9.50-10.49	0.31	0.71	0.52	0.51
10.50-11.49	0.29	0.70	0.48	0.49
11.50-12.49	0.29	0.70	0.49	0.50
12.50-13.49	0.31	0.69	0.51	0.49
13.50-14.49	0.28	0.69	0.47	0.49
14.50-15.49	0.30	0.71	0.49	0.50
15.50-16.49	0.30	0.68	0.50	0.48
16.50-17.49	0.29	0.71	0.48	0.51
17.50-18.49	0.31	0.72	0.52	0.51
18.50-19.49	0.31	0.70	0.51	0.50
19.50-20.00	0.27	0.74	0.45	0.53

[a]50,000 observations simulated from the following data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.4*covariate)

Table D.2. Weighted and unweighted covariate distribution by group in simulated data example with time-dependent selection process[a]

Time	Unweighted		IP-weighted	
	Group 1	Group 2	Group 1	Group 2
1.00-1.49	0.48	0.49	0.49	0.46
1.50-2.49	0.48	0.54	0.50	0.50
2.50-3.49	0.49	0.56	0.51	0.51
3.50-4.49	0.49	0.56	0.52	0.50
4.50-5.49	0.45	0.57	0.48	0.50
5.50-6.49	0.44	0.61	0.49	0.52
6.50-7.49	0.44	0.61	0.49	0.51
7.50-8.49	0.43	0.58	0.50	0.48
8.50-9.49	0.45	0.63	0.53	0.51
9.50-10.49	0.42	0.62	0.50	0.50
10.50-11.49	0.43	0.65	0.53	0.51
11.50-12.49	0.41	0.64	0.51	0.50
12.50-13.49	0.38	0.65	0.49	0.50
13.50-14.49	0.36	0.68	0.48	0.52
14.50-15.49	0.34	0.64	0.47	0.48
15.50-16.49	0.36	0.66	0.50	0.49
16.50-17.49	0.35	0.67	0.51	0.49
17.50-18.49	0.35	0.71	0.53	0.52
18.50-19.49	0.30	0.71	0.48	0.51
19.50-20.00	0.31	0.68	0.52	0.49

[a]50,000 observations simulated from the following data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time)

Table D.3. Small sample (n=500) properties of IP-weighted local linear estimator in three simulation experiments

Simulation description	Mean SD	Mean BSE	Linear bias	Curvature bias	RMISE	95% CI coverage	Distn shape
Normal outcome w/ highly nonlinear temporal change[a]							
Narrow bandwidth	3316	3267	-951	-2292	4172	0.89	normal
Standard bandwidth	2455	2452	-2026	-5459	4701	0.59	normal
Wide bandwidth	1905	1909	-2462	-7007	5123	0.40	normal
Normal outcome w/ moderately nonlinear temporal change[b]							
Narrow bandwidth	3381	3339	-77	-168	3689	0.94	normal
Standard bandwidth	2423	2429	-330	-406	2690	0.95	normal
Wide bandwidth	1840	1851	-672	-1460	2308	0.88	normal
Lognormal outcome w/ moderately nonlinear temporal change[c]							
Narrow bandwidth	5755	5570	-443	-535	5993	0.93	aprx norm
Standard bandwidth	4197	4130	-582	-543	4413	0.94	aprx norm
Wide bandwidth	3255	3246	-809	-1476	3581	0.92	aprx norm

Notes: Narrow, standard, and wide bandwiths respectively equal 0.5, 1, and 2 times h=1.06*sd(x)*(n^(-1/5)). Linear bias refers to bias at a point where the regression function is roughly linear, and curvature bias refers to bias at a point where the regression function is highly nonlinear. RMISE denotes root mean integrated squared error of the estimator.

[a]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ normal(40000 + 7000*cos(time) + group*(0 + 0*g(time)) covariate*(0 + 3000*time),10000)

[b]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ normal(40000 + 1000*time - 100*time^2 + group*(0 + 0*time + 0*time^2) + covariate*(10000 + 3000*time - 50*time^2),10000)

[c]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ covar*(10000+5000*time-125*time^2) + lognormal(10.6 + 0.015*time - 0.0015*time^2 + group*(0 + 0*time + 0*time^2),0.5)

Table D.4. Large sample (n=5000) properties of IP-weighted local linear estimator in three simulation experiments

Simulation description	Mean SD	Mean BSE	Linear bias	Curvature bias	RMISE	95% CI coverage	Distn shape
Normal outcome w/ highly nonlinear temporal change[a]							
Narrow bandwidth	1265	1258	-441	-1058	1633	0.88	normal
Standard bandwidth	917	917	-1260	-3322	2588	0.39	normal
Wide bandwidth	695	698	-2347	-6312	4338	0.19	normal
Normal outcome w/ moderately nonlinear temporal change[b]							
Narrow bandwidth	1349	1337	-73	-115	1435	0.95	normal
Standard bandwidth	960	956	-211	-223	1047	0.95	normal
Wide bandwidth	699	699	-544	-755	961	0.83	normal
Lognormal outcome w/ moderately nonlinear temporal change[c]							
Narrow bandwidth	2220	2194	-81	-139	2288	0.95	normal
Standard bandwidth	1598	1590	-248	-226	1668	0.95	normal
Wide bandwidth	1188	1187	-604	-725	1371	0.91	normal

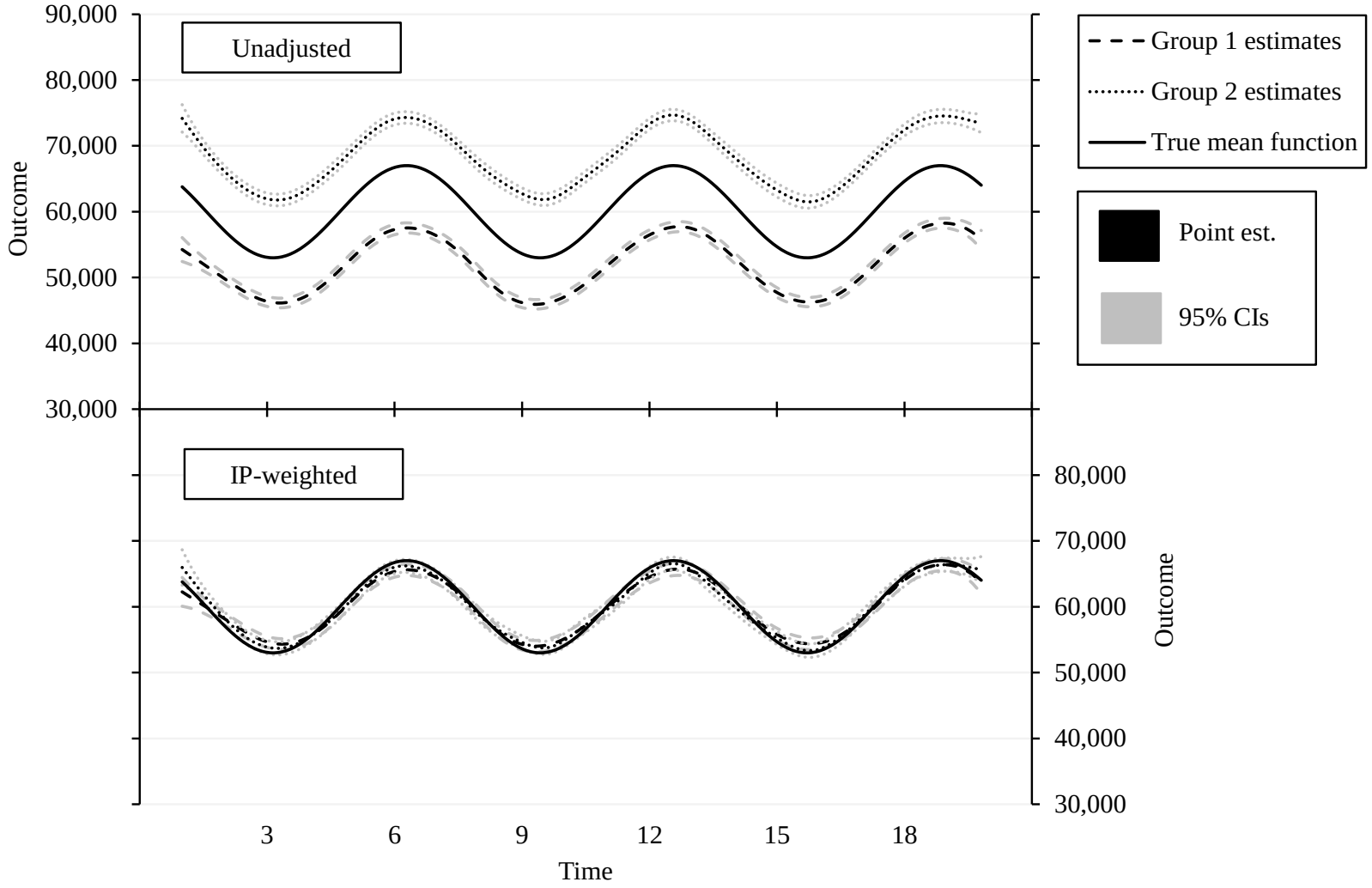
Notes: Narrow, standard, and wide bandwiths respectively equal 0.5, 1, and 2 times h=1.06*sd(x)*(n^(-1/5)). Linear bias refers to bias at a point where the regression function is roughly linear, and curvature bias refers to bias at a point where the regression function is highly nonlinear. RMISE denotes root mean integrated squared error of the estimator.

[a]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ normal(40000 + 7000*cos(time) + group*(0 + 0*g(time)) covariate*(0 + 3000*time),10000)

[b]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ normal(40000 + 1000*time - 100*time^2 + group*(0 + 0*time + 0*time^2) + covariate*(10000 + 3000*time - 50*time^2),10000)

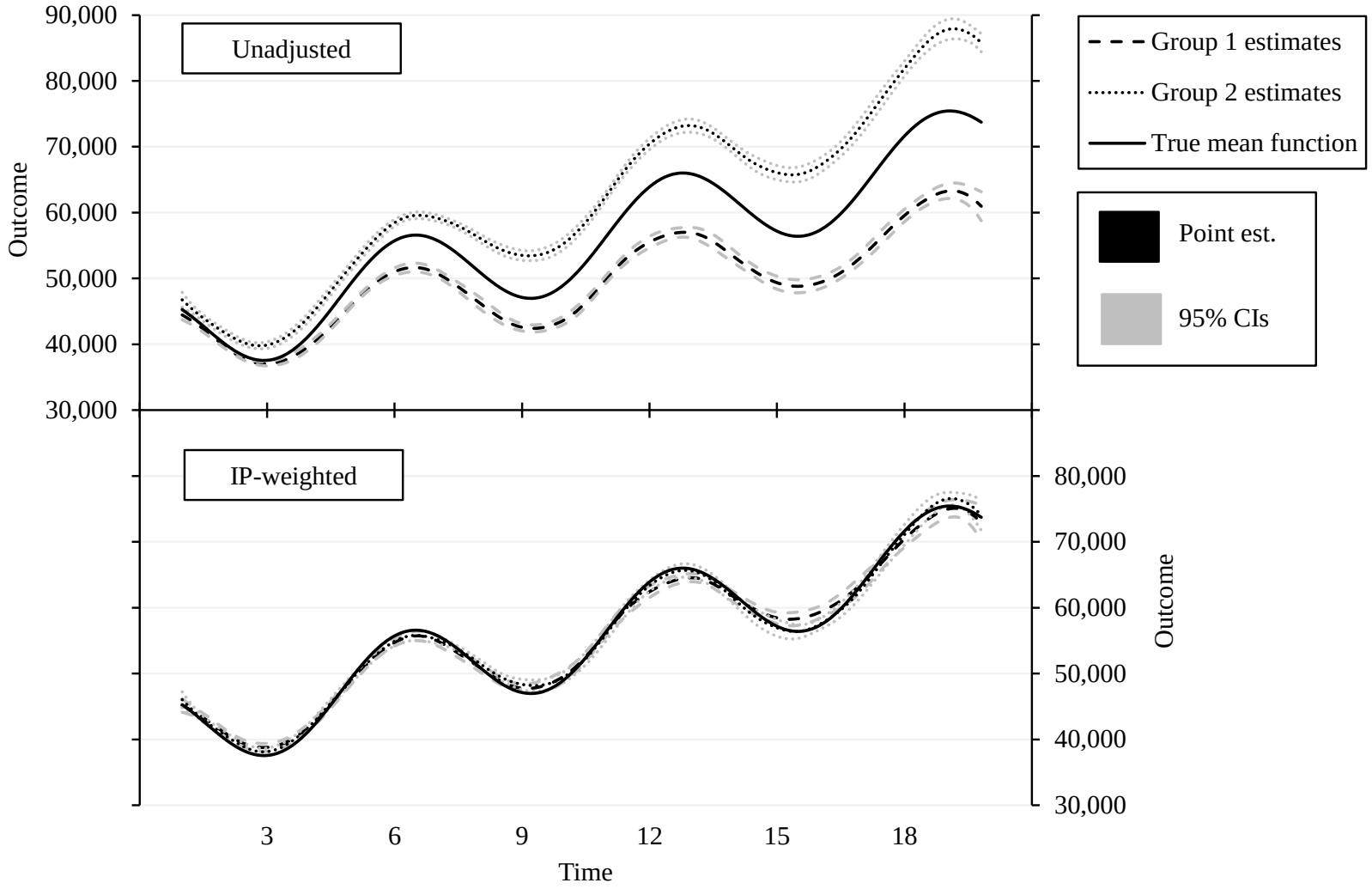
[c]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ covar*(10000+5000*time-125*time^2) + lognormal(10.6 + 0.015*time - 0.0015*time^2 + group*(0 + 0*time + 0*time^2),0.5)

Figure D.1. Unadjusted and IP-weighted local linear estimates based on simulated data with time-invariant group selection and time-invariant covariate effects on outcome[a]



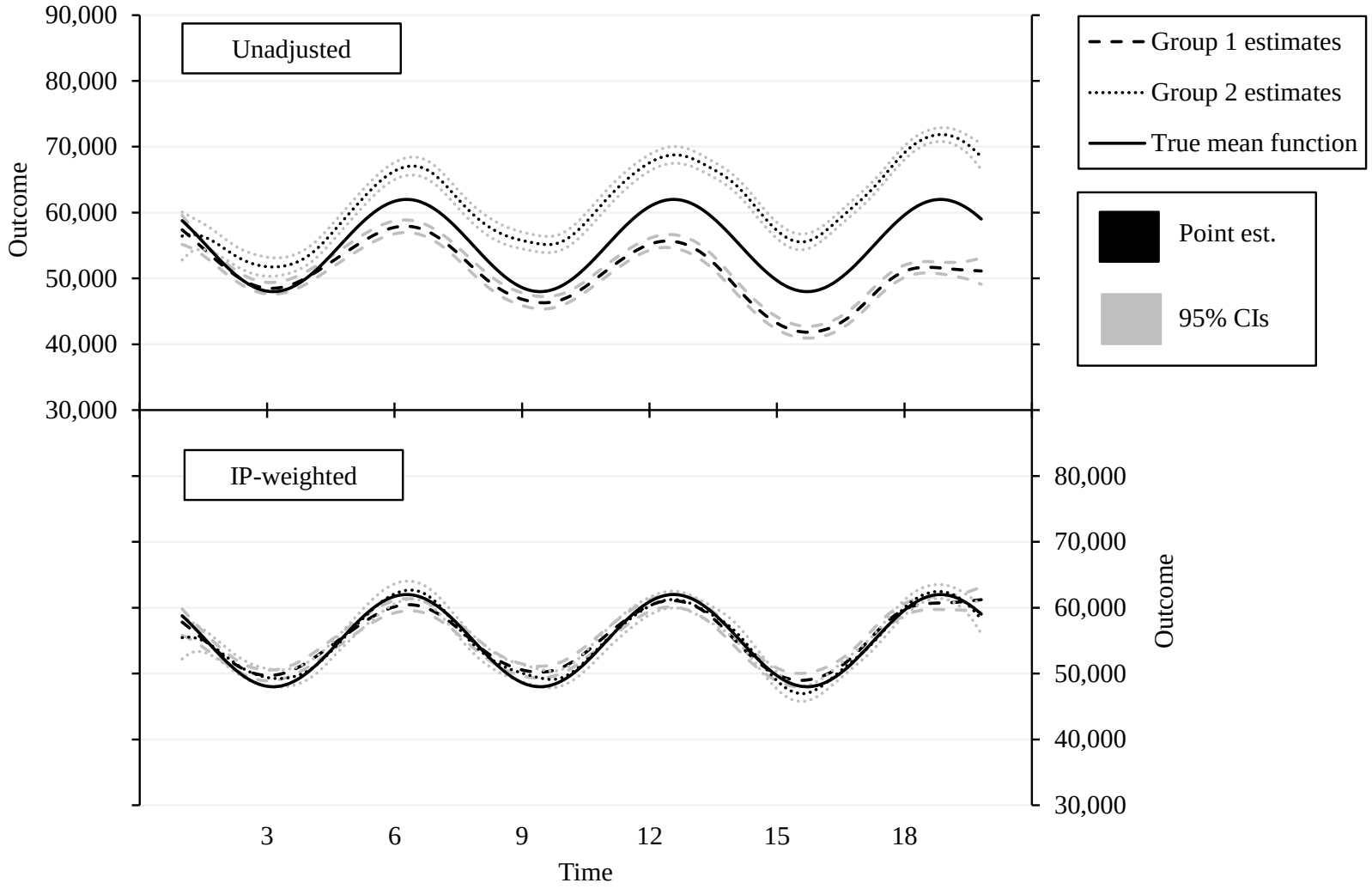
[a]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.4*covariate), outcome ~ normal(40000 + 7000*cos(time) + group*(0 + 0*g(time)) covariate*(40000 + 0*g(time)),10000)

Figure D.2. Unadjusted and IP-weighted local linear estimates based on simulated data with time-invariant group selection and time-dependent covariate effects on outcome[a]



[a]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.4*covariate), outcome ~ normal(40000 + 7000*cos(time) + group*(0 + 0*g(time)) covariate*(0 + 3000*time),10000)

Figure D.3. Unadjusted and IP-weighted local linear estimates based on simulated data with time-dependent group selection and time-invariant covariate effects on outcome[a]



[a]Data generating model: time ~ uniform(1,20), covariate ~ binomial(1,0.5), group ~ binomial(1,0.3 + 0.02*covariate*time), outcome ~ normal(40000 + 7000*cos(time) + group*(0 + 0*g(time)) covariate*(40000 + 0*g(time)),10000)

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