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Assessing the Consequences of Declining Unionization and Public-Sector Employment: A Density- Function Decomposition of Rising Inequality From 1983 to 2005

Work and Occupations
XX(X) 1–43
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DOI: 10.1177/0730888410364938
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Abstract

This study defines four sectors of labor markets based on union membership and public-sector employment. Using the current population surveys from 1983 to 2005, the authors decompose the growth of wage inequality into compositional changes, group-specific mean changes, and group-specific variance changes. This approach allows one to more precisely identify and assess the immediate intervening processes associated with rising wage inequality. The findings suggest that, although the increase of the demand for the skilled workers does play a significant role, the recent increase in wage dispersion cannot be fully explained by skill-biased technological change. This study's analysis instead indicates that the two main sources of increasing inequality include the "nonunion private sectorization" of all sectors and the reduction in the sizes of the institutionally protected market sectors. Rising inequality seems to be because of the dismantling of the institutions that formerly insulated a large proportion of workers from direct engagement with market forces as the immediate wage-setting mechanism.

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Keywords

wage inequality, labor unions, public-sector employment, density-function decomposition

There is widespread consensus among social scientists that wage and earnings inequalities have been increasing in the United States since the 1980s (Autor, Katz, & Kearney, 2006; Card & DiNardo, 2002; Kalleberg & Mouw, 2006; Kim & Sakamoto, 2008a; Morris & Western, 1999). Many commentators further argue that rising inequality has deleterious consequences for American society (Burtless & Jencks, 2003; Krugman, 2007). Debates about appropriate public policy measures to address these problems require an accurate appraisal of the characteristics and causes of the growing disparities in incomes. Improving our understanding of the precise empirical contours and the underlying sources of rising inequality thus remains an important task for social scientists.

This article seeks to provide further evidence about these issues. Our analysis assesses the relative significance of the skill-biased technological change view versus what we refer to as the bargaining power view. A key theoretical concern in this debate is the extent to which rising inequality derives from the efficient operation of market forces that reward workers who invest in scarce work skills. The latter process is emphasized by the skill-biased technological change view whereas the bargaining power perspective focuses on the role of labor market institutions that are said to reduce the level of inequality by moderating sources of market imperfections.

With regard to the empirical characterization of inequality, we investigate which specific portions of the distribution of wages are growing more unequal and for which groups. Our study decomposes the growth of wage inequality into compositional changes, group-specific mean changes, and group-specific variance changes using a grouping of four labor market sectors that differ in terms of workers' bargaining power and the extent to which the employing organization is directly subject to market pressures. Our findings address major theoretical concerns in this literature by more carefully delineating the empirical aspects of rising inequality.

Theoretical Background*The Bargaining Power Perspective*

Explaining the substantive sources of rising inequality continues to be debated. Economists have largely remained faithful to their traditional

framework emphasizing the competitive market forces of supply and demand. Although not entirely ignoring market competition, sociological explanations typically refer to various labor market institutions as important explanatory variables as well. Although significantly influenced by supply and demand factors and macroeconomic conditions, labor market institutions are viewed by sociologists as independent factors that evolve in response to the organizational, legal, political, cultural, and historical environment within which an economy is embedded (Brady, 2007; Carbonaro, 2006; DiPrete, 2005; Granovetter, 1985; Gustafsson & Johansson, 1999; Hedström & Swedberg, 1985).

With regard to the study of labor force outcomes for the contemporary United States, we describe a general sociological approach that we refer to as the bargaining power view. Although not clearly codified into a single, coherent theory, sociological research may be organized by referring to two encompassing intermediary processes that tend to be consistently considered in this literature. These generic processes simultaneously affect one another as well as mediate macrolevel influences and microlevel labor force outcomes. Together they represent a typical sociological approach that we identify as the bargaining power view.

The first intermediary process is what Kalleberg, Wallace, and Althausser (1981) describe as “economic segmentation.” More generically, this refers to the capacity of the employing organization (typically a firm) to prosper in the immediate economic environment and to extract rewards from it by exploiting any sort of advantages that may be generated from that environment (Baron & Bielby, 1984). The successful adaptation of the firm may involve efficacious adjustment to market pressures and external constraints as well as extramarket activities to control, circumvent, or manipulate social networks, physical resources, information, legal regulations, and market competition (Nohria & Gulati, 1994; Ram, Edwards, & Jones, 2007).

A simple model of this capacity of the firm to extract resources from its environment was provided by the dual-economy literature and related analyses of market segmentation (Beck, Horan, & Tolbert, 1978; Hodson, 1983). Because those classifications implicitly assumed an isolated national economy in which the primary sector tended to enjoy monopolistic advantages because of limited domestic competition, the more recent rise of globalized markets (Berg & Kalleberg, 2001) raises doubts about the traditional dual-economy approach. Nonetheless, the capacity of the firm to successfully extract resources from its environment remains a generically important concern for sociologists who have studied interfirm linkages and related business groupings (Burt, 1992; Uzzi, 1997), the social construction of market niches (Hannan, Pólos, & Carroll, 2007; White, 1981), historical factors

affecting the governmental promotion of particular industries (Dobbin, 1994), cultural processes involved in the reduction of market uncertainty (Fligstein, 2002), and cross-national variation in political pressures (Brady, 2007; DiPrete, 2005).

Apart from “economic segmentation,” a second encompassing process in the modern U.S. labor market is the struggle of the employees of a given employing organization to obtain the economic surplus generated by their firm. This conflict reflects the power relations inside firms (Hirsch & Soucey, 2006; Kalleberg et al., 1981) and associated organizational linkages among workers such as unions, licensing requirements, professional credentialing practices, and any legal regulations regarding the employment of labor (e.g., the minimum wage). Frenkel (2003, p. 135) analyzes this conflict as involving the “embedded character of workplace relations” in order to underscore that they are not simply derivative of technology and input costs as assumed in microeconomics which views the firm as an uninteresting “black-box” that mechanically processes market forces in a deterministic fashion (Williamson, 1981). In the terminology of Kalleberg et al. (1981), the capacity of employees to obtain socioeconomic rewards from their firms represents “worker power.”

As emphasized by Berg and Kalleberg (2001), price competition between firms has notably increased in recent years in part due to the advent of global competitive pressures. However, increased market competition between firms to maintain lower costs does not directly translate into heightened neo-classical economic “wage competition” between workers within in the same firm (Thurow, 1975). As noted by Sørensen (1994),

Nothing prevents a firm from satisfying the dictates of marginal productivity theory and still not paying individual workers according to their current productivity. All that the theory requires is that variation in total labor costs satisfies the marginal productivity theory. (p. 510)

In other words, a firm may underpay some of its workers while overpaying others and still be able to meet the pressures for price competition as long as their total labor costs are minimized vis-à-vis other firms.

Given that employers and their agents simply do not have perfect information about the productivities of all of their workers (Sørensen, 1994; Sørensen & Kalleberg, 1981) and that managers may have various sorts of motivations, including the promotion of their self-interest by way of alliance formation (Finkelstein, 1992), the traditional economic assumption that the only source of bargaining power that a worker possesses is his or her own productivity

(Thurow, 1975) is overly simplistic (Sørensen & Kalleberg, 1981). As is often discussed in regard to the “principal–agent relationship” (Williamson, 1981), some of the managerial agents of employers are undoubtedly more directly concerned with enhancing their own incomes and rewarding their personal allies than with maximizing the long-term efficiency of the firm per se. Employers cannot exactly pay workers according to their productivities when the latter are only incompletely measured, are costly to more fully ascertain, and are subject to various sorts of employee malfeasance (Williamson, 1981). For these reasons, “worker power” (i.e., the capacity of the employees to extract the economic surplus generated by their firm) continues to represent an important encompassing process in the modern U.S. labor market despite the advent of globalized competition which does not increase efficient “wage competition” between workers within any given firm.

Institutional Changes With the Rise of the New Economy

Consisting of “economic segmentation” and “worker power” as we have defined them above, the bargaining power view differs from the traditional microeconomics approach by being less presumptuous that unbridled market forces uniformly result in increased efficiency (Hirsch & Soucey, 2006). Rather than being understood solely in terms of changes in the supply and demand of various labor skills, the bargaining power view would interpret labor market outcomes as deriving from conflict over control of the production process and over the distribution of the economic surplus (Budros, 1997; Davis, Diekmann, & Tinsley, 1994; Granovetter & Tilly, 1988; Zuckerman, 2000). Sociologists espousing this view typically argue that the institutional changes associated with the rise of the New Economy at least partially reflect power differentials between social groups rather than deriving from a Pareto-optimal, competitive equilibrium as envisioned in economists’ conceptualization of economic efficiency (Pindyck & Rubinfeld, 2001).

An example of role of power differentials is declining unionization rates in the United States (Clawson & Clawson, 1999; Cornfield & Fletcher, 2001). The antilabor political tactics of management undoubtedly play a significant role in this decline (Freeman, 1988). Organizational changes associated with the introduction of new information technologies are probably additional sources of the reduction in the percentage of American workers that belongs to a union in recent decades (Nelson, 2001).

Another phenomenon associated with increasing inequality in the New Economy includes the increase in part-time employment and nonstandard work arrangements (Kalleberg, 2001, 2003; Kim & Sakamoto, 2008a;

McGrath & Keister, 2008). Workers who are placed into this situation are often not choosing it voluntarily but are rather more vulnerable and lack bargaining power within the firm (Cappelli, 2001; Hirsch & Soucey, 2006; Kalleberg, 2003; Mishel, Bernstein, & Schmitt, 2001). This source of inequality increases profitability for companies but it probably does not reflect a fully competitive market process over who obtains full-time employment and who does not.

There is also evidence of a decline in internal labor markets. As stated by Cappelli (2001, p. 207), “internalized employment arrangements that buffer jobs from market pressures are giving way to arrangements that rely much more heavily on outside market forces to manage employees.” The decline in internal labor markets represents an organizational change that has increased wage inequalities, but this restructuring “raises questions for sociologists of work about fundamental shifts in the distribution of power and authority in the organization . . .” (Hirsch & Soucey, 2006, p. 181). Consistent with the latter view, Kim and Sakamoto’s (2008b) study of the U.S. manufacturing sector finds that increases in wage inequality do not raise productivity thus calling into question the widespread assumption that heightened inequality necessarily improves economic efficiency.

Privatization is another source of rising inequality. Using county-level data, Lobao and Hooks (2003) show that federal or state government employment are negatively correlated with income inequality in the United States. Similar conclusions regarding the growth of wage inequality across occupations are reached by Kim and Sakamoto (2008a). Comparative international studies confirm that among the advanced, industrialized economies, stability in the size of the public sector (or high levels of public spending) reduces the growth of inequality (Gustafsson & Johansson, 1999; Jäntti, 1997; Lee, 2005; Milanovic, 1994).

Privatization is one of the most common forms of the increasing use of markets (Megginson & Netter, 2001; Sikora, 2005). Propelled by the conservative political climate of the 1980s, the rationale for privatization is to increase economic efficiency by exposing publicly owned enterprises to market competition (Megginson & Netter, 2001, p. 324). Once privatized, the companies become less politically constrained and change their organizational goals toward a profit orientation that generally results in greater inequality. Studies also show that, in addition to increasing the proportion of the labor force that is in the private sector, privatization changes organizational power relations by increasing the vulnerability of workers in terms of both wages and employment (Megginson & Netter, 2001).

In sum, organizational restructuring in the New Economy has been interpreted by economists to be associated with increased productivity due to greater market competition. Although not dismissing the relevance of those factors, sociologists have pointed out that institutional changes do not solely derive from market competition but also reflect power differentials between various social groups. The bargaining power view recognizes that market competition operates within a complex social context (Granovetter, 1985; Sørensen & Kalleberg, 1981) such that economic outcomes do not reflect the equilibrium of competitive market exchanges but are instead influenced by the uneven distribution of power between the persons implicated in these exchanges. In particular, bargaining power significantly affects the extent to which workers are exposed to market competition. The implication of this approach is that increases in inequality, rather than being derivative of changes in labor supply and demand, involves changing power relations associated with the restructuring of workplace institutions.

Debating the Sources of Widening Labor Market Inequality

Although the phenomenon of rising inequality is widely acknowledged, researchers disagree on the precise characterization of this trend in terms of which specific portions of the distribution of wages have experienced greater increases in dispersion. The conventional characterization has been that the large increase in wage inequality is “ubiquitous in the sense that all dimensions of inequality were growing” (Lemieux, 2006b, p. 195). Juhn, Murphy, and Pierce (1993) argue, for example, that within-group wage dispersions are increasing for all groups because of the repercussions generated by the increased demand for skilled workers. More recent research contends, however, that most of the growth in inequality is because of the changes at the upper end of the wage distribution (Autor et al., 2006; Kalleberg & Mouw 2006; Lemieux, 2006a, 2006b). Inequality at the lower end may actually be declining (Kalleberg & Mouw, 2006; Lemieux, 2006b). Similarly, increases in wage dispersion are not evident for all educational groups (Kim & Sakamoto, 2008a; Lemieux, 2006b).

Ubiquitous Inequality Increases and Skill-Biased Technological Change

One of the best-known explanations of the trend of increasing inequality is the argument that has come to be known as skill-biased technological change

(SBTC), which remains popular among economists (Card & DiNardo, 2002). The SBTC view is inherently compatible with traditional economic theory according to which the labor market is highly competitive in that it pays workers according to the scarcity of their supply and their contributions to productivity (i.e., their marginal revenue products). Unlike the bargaining power view that emphasizes institutional forces that shape or disrupt market processes, the SBTC approach explains increasing inequality as deriving from technological developments that have increased the demand for high-skilled workers but have decreased the demand for low-skilled workers. Whereas high-skilled workers are now earning more than before, the wages of low-skilled workers are stagnant because of reductions in the demand for workers without advanced or technical work skills (Juhn et al., 1993; Levy, 1998).

A major piece of evidence for this theory is the widening wage gap between skilled and unskilled workers. Although some research suggests that most inequality reflects increases in within-group (not between-group) differentials (Juhn et al., 1993; Karoly, 1993; Murphy & Welch, 1993), the SBTC view explains this phenomenon using the same logic. The highest educational level completed by a worker is just one indicator of various skills. Because of the increased demand for high-skilled workers, the economic returns to diverse skills such as technical know-how, ability, specialized training, and cognitive capacities have increased (Autor & Katz, 1999; Bound & Johnson, 1992; Gottschalk, 1997; Juhn et al., 1993; Levy, 1998; Levy & Murnane, 1992; Murphy & Welch, 1993). As a result of these increased demands for a range of skills, the SBTC view predicts a ubiquitous increase in inequality within all groups that have some degree of heterogeneous skill mix.

Not-So Ubiquitous Increases in Inequality

More recent studies, however, raise questions about the SBTC explanation as described above. Using historical tax data for the United States, Piketty and Saez (2003) contend that most inequality growth in the last half of the 20th century is because of the change at the very top portion of wage distribution. Autor et al. (2006) find that residual inequality at the upper portion of the distribution has grown, but residual inequality at the lower portion has been reduced. Lemieux (2006b) argues that within-group inequalities grew substantially among college-educated workers but changed much less for most other groups. Sociological literature also raises doubts about the adequacy of the SBTC explanation. Kalleberg and Mouw (2006) report that the ratio of the 50-10 percentiles in the wage distribution has actually declined to some degree, whereas the 90-50 ratio has greatly increased for high-wage

occupations. Handel (2007) shows that the within-group residual variance is higher among computer users than among nonusers, and that the increase in computer usage is not significantly associated with the increase in wage inequality. These results suggest that inequality growth has not been as ubiquitous as was previously believed.

Lemieux (2006a) proposes a human capital model with heterogeneous returns to explain increased inequality among college-educated workers. The main innovation of his model is that, rather than a single rate of return to education, a distribution of returns across heterogeneous individuals is evident.¹ His approach implies that “groups experiencing relative increase in average wage should also experience increasing within-group wage dispersion” because these groups are heterogeneous because of higher levels of various unmeasured aspects of human capital (Lemieux, 2006a). This explanation is fundamentally consistent with the SBTC approach because changes in the supply and demand for labor supply are still seen as the most important determinants for rising inequality as mentioned above.

Lemieux (2006a, 2006b) further argues that after controlling for the increase of the return to postsecondary education, the remaining change in wage inequality is because of the increase of the proportion of the labor force that is college educated. In other words, Lemieux contends that compositional changes—not within-group inequality increases—are playing a significant role in the recent growth of inequality. Compositional factors have not received adequate attention in prior research because of the presumption of ubiquitous increases in inequality across all groups.

Analytical Strategy and Methodology

To shed further light on these complexities, we delve deeper into the empirical contours of growing wage inequality including factors relating to rate as well as composition. In doing so, our theoretical concern is to contrast the explanatory capacity of the SBTC view versus the bargaining power view. The specific aspects of labor market structure that we focus on include public sector employment and union membership. In terms of our foregoing discussion, public sector employment is an indicator of “economic segmentation” whereas union membership is a source of “worker power.”

Labor Market Sectors

Both public sector employment and union membership provide some institutional protection from direct market competition. Wages in the public sector

Table 1. Labor Market Sectors

	Private	Public
Nonunion	I: Most competitive	II: Somewhat competitive
Union	III: Somewhat institutionally protective	IV: Most institutionally protective

Note: A. Sensitivity to labor supply and demand: I > II > III > IV. B. Workers' negotiation power: I < II < III < IV. C. Mean log wage: I < II < III < IV. D. Log-wage dispersion: I > II > III > IV.

are less vulnerable to market competition and are more strongly bounded by legal codes (Ehrenberg & Schwarz, 1986; Lee, 2005; Melly, 2005; Volscho, 2007). Historically, wages in the public sector have been more sensitive to civil rights concerns about the equal treatment of demographically diverse workers (Wilson, 1980). As is well known, the union sector traditionally has improved wages and reduced inequality among its members (Cornfield, 1991; Freeman & Medoff, 1984; Volscho, 2007).

We cross-classify these two dichotomous dimensions to define four labor market sectors. The relevance of this cross-classification is further evident in the fact that changes in the rate of unionization differ sharply between the private and public sectors in the United States (Card, 2001; Freeman, 1988). Unionization has declined notably in the private sector but has remained fairly stable in the public sector during the past few decades (Cornfield & Fletcher, 2001).

Table 1 shows our typology of four labor market sectors. Sector I is the private nonunion sector shown in the upper left corner of Table 1. It is the most competitive labor market because it is free from the regulations of both the public sector and unions. In theory, Sector I should be the most responsive to changes in the supply and demand of labor. Conversely, Sector IV is the most institutionally protected sector because it refers to unionized workers in the public sector. Sector IV should be the least sensitive to market forces at least in the short run.²

The intermediate sectors are II and III. Sector II refers to nonunion workers in the public sector whereas Sector III refers to unionized workers in the private sector. Sector II may be more similar to Sector I than to Sector III because union membership has historically been a stronger determinant of wages and the dispersion of wages than has been employment in the public sector (Cornfield & Fletcher, 2001; Dickens & Lang, 1988; Freeman & Medoff, 1984). We therefore characterize Sector II (i.e., nonunion workers in the public sector) as being somewhat competitive whereas Sector III (i.e., unionized workers in the private sector) as being somewhat institutionally

protective. In terms of sensitivity to market forces, the ordering of the sectors (from highest to lowest) is hypothesized to be I, II, III, and IV. Given that institutional protections from the labor market should increase mean wages and reduce inequality (Cappelli 2001; Freeman & Medoff, 1984), we predict that the ordering of mean wages (from highest to lowest) should be IV, III, II, and I whereas the ordering of within-sector wage inequality (from highest to lowest) should be I, II, III, and IV.

We further divide labor markets in each sector by workers' educational groups, including less than high school, high school graduates, some college, and bachelor's degree or more. As is usual in labor market research, we analyze male and female workers separately. Our analysis is thus based on 16 cells (i.e., four sectors by four skill groups) for each gender.³ The motivation for this classification derives from its feasibility and analytical rationale rather than any claim that the four sectors are intrinsically the most realistic portrayal of overall patterns of segmentation in the labor market (as was argued in some older studies in the literature on dual labor markets).

Labor Market Sectors and Changes in the Components of Inequality

Changes of inequality can be decomposed into three factors: compositional changes, sector-specific mean changes, and sector-specific variance changes. Percentage increases in the labor force in those sectors that have higher wage dispersion will raise inequality because of this compositional change even without any changes in mean wages or sector-specific variances. In terms of the link between these statistical components and our theoretical concerns, we interpret the SBTC view as predicting that *holding the sector composition constant, changes in educational composition per se will explain a substantial portion of rising inequality*. Given its emphasis on the increasing labor demand for advanced work skills and human capital, the SBTC approach implies that the distribution of educational attainments in the labor force is increasingly linked to rising inequality. This view does not refer to changes in employment in unions or the public sector as being the main source of increasing inequality.

In contrast, the bargaining power view does not emphasize changes in educational composition as being a critical issue. Instead, this approach suggests that *changes in sector composition will account for a substantial portion of the increase in inequality*. Privatization and declining union membership will increasingly result in workers being forced into Sector I where inequality is higher because of more unrestrained market pressures. This compositional change in the labor force increases inequality regardless of the distribution of educational attainments.

In terms of sector-specific patterns, Sector I is the arena in which competitive market forces are the most unrestrained. Competitive market forces thus have their greatest consequences in Sector I. *If the recent increase in wage inequality is mainly due to efficient market forces involving changes in supply and demand as expected by the SBTC explanation, then the growth of wage dispersion should be the most evident in Sector I because that is the most competitive sector.* In contrast, the most institutionally protected sector is Sector IV (i.e., the unionized public sector), and it should show the smallest increase in inequality according to the SBTC view.

The bargaining power view, however, predicts the opposite result that *Sector IV will show the most obvious increase of inequality whereas Sector I will show the least because employment relations in organizations have generally shifted in favor of employers and against workers.* Workers enjoyed higher negotiation power in sectors that have traditionally been protected by institutional forces, but the shift in employment relations is associated with a decline in the suppression of immediate market pressures. Sectors that have already been competitive are predicted to experience fewer changes than the more institutionally protected sectors.

Density-Function Decomposition

The nature of scalar indices of inequality is that they are summary measures that are dependent on particular features of the wage distribution. They are thus affected differently by different parts of wage distribution (Allison, 1978). Scalar indices are therefore limited in their capacity to provide detailed information about inequality changes. For instance, if inequality in the upper half of the wage distribution grows while it declines in the lower half of the wage distribution, scalar indices might indicate no change.

More precise information on inequality changes are provided by kernel density functions.⁴ They have been widely used in recent economic studies of inequality (DiNardo, Fortin, & Lemieux, 1996; Jenkins & Van Kerm, 2005; Lemieux, 2006a, 2006b). This method has not as yet, however, been applied in sociological analyses.

In the following, we draw on the density function decomposition proposed by Jenkins and Van Kerm (2005). The probability density function (PDF) of a wage distribution that can be partitioned into four sectors (such as Table 1) can be written as

$$f(x) = \sum_{s=1}^4 \sum_{k=1}^4 v^{sk} f^{sk}(x), \quad (1)$$

where v^{sk} is the population share of educational group k in sector s and f^{sk} is the PDF for the wage distribution for educational group k in sector s . Thus, the PDF for the wage distribution of the total population is the weighted sum of the PDFs for the wage distributions of the groups.⁵ The change in $f(x)$ between the initial Time 0 (i.e., 1983-1984) and Time 1 (i.e., 2001-2002) can be written as $\Delta f(x)$ and can be decomposed in several ways. For example,

$$\Delta f(x) = \sum_{s=1}^4 \sum_{k=1}^4 w^{sk} \Delta f^{sk}(x) + \sum_{s=1}^4 \sum_{k=1}^4 z^{sk}(x) \Delta v^{sk} = C_{D^{sk}}^{sk}(x) + C_{P^{sk}}^{sk}(x), \quad (2)$$

where w^{sk} is the weighted sum of v^{sk} at Time 0 and v^{sk} at Time 1 and z^{sk} is the weighted sum of $f^{sk}(x)$ at Time 0 and $f^{sk}(x)$ at Time 1. The weights for both time periods are .5 so that the base time and the end time are equally considered. The first term of the right-hand side of Equation (2), $C_{D^{sk}}^{sk}(x)$, is the contribution of changes in the group-specific wage distributions to the total change in the density (i.e., changes in rates). The second term, $C_{P^{sk}}^{sk}(x)$, is the contribution of changes in the group proportions (i.e., changes in composition). $C_{P^{sk}}^{sk}(x)$ can be further decomposed into a component in which the sector shares are fixed (i.e., the proportions employed in the nonunion private sector, the nonunion public sector, and so on, do not change over this period) whereas the shares of the skill groups within sectors vary, and a component in which the shares of the skill groups are fixed whereas the sector shares vary. Then, $\Delta f(x)$ is decomposed into three parts:

$$\Delta f(x) = C_{D^{sk}}^{sk}(x) + C_{P^s}(x) + C_{P^k}(x), \quad (3)$$

where $C_{P^s}(x)$ is the contribution due to changes in the shares of the sectors and $C_{P^k}(x)$ is the contribution due to changes in the shares of the skill groups within sectors.

Within-group PDF change, $C_{D^{sk}}^{sk}(x)$, also can be further decomposed. This decomposition calculates three parts reflecting changes in the PDF due to change in the means, change in the variances, and change in the density mass on one side of the mode.⁶ This last component is actually a residual that cannot be explained by changes in the means and variances of the subgroups. Given these decompositions, Equation (3) now becomes

$$\Delta f(x) = C_{D_1^{sk}}^{sk}(x) + C_{D_2^{sk}}^{sk}(x) + C_{D_3^{sk}}^{sk}(x) + C_{P^s}(x) + C_{P^k}(x) \quad (4)$$

where $C_{D_1^{sk}}^{sk}(x)$, $C_{D_2^{sk}}^{sk}(x)$, and $C_{D_3^{sk}}^{sk}(x)$ are the components reflecting changes in the means, changes in the variances, and residual changes, respectively.

To estimate $C_{D1}^{sk}(x)$, $C_{D2}^{sk}(x)$, and $C_{D3}^{sk}(x)$, Jenkins and Van Kerm (2005) propose an elementary transformation of densities by using an income transformation function that describes the relationship between Time 0 and Time 1. For each sk subgroup, assume that we can transform workers' wages at Time 0 to their wages at Time 1 by $x_1 = g^{sk}(x_0)$ using some transformation $g(\cdot)$.⁷ The PDF for group sk at Time 1 then becomes

$$f_1^{sk}(x) = \left| \frac{d[(g^{sk}(x))^{-1}]}{dx} \right| f_0^{sk} [(g^{sk}(x))^{-1}]. \quad (5)$$

A counterfactual PDF involves choosing a particular g^{sk} . For example, if the relationship between Time 0 and Time 1 is linear, then

$$x_1 = \alpha^{sk} + \beta^{sk} x_0. \quad (6)$$

The resulting counterfactual PDF for group sk is therefore

$$c f_1^{sk}(x) = \left| \frac{1}{\beta^{sk}} \right| f_0^{sk} \left(\frac{x - \alpha^{sk}}{\beta^{sk}} \right). \quad (7)$$

As mentioned above, $C_{D1}^{sk}(x)$ is the contribution of only the change in the mean wage. If the mean wage for group sk changes by α^{sk} while the other parts of Equation (5) remain constant at their values at Time 0, then the wage at Time 1 will be

$$x_1 = \alpha^{sk} + x_0. \quad (8)$$

Thus, a counterfactual PDF such as a transformation denoted as $c f_1^{sk}(x; \mu_0^{sk}, \sigma_1^{sk})$ (where μ refers to the mean and σ refers to the standard deviation) reflects the fact that the mean wage is set at its value at Time 1 whereas the variance is set at its value at Time 0.

$C_{D2}^{sk}(x)$ is the contribution of only the change in the variances. Assume that we can transform a worker's wage with the function

$$x_1 = (1 - h)E(f_{0^{sk}}) + h x_0 \quad (9)$$

where $E(f_{0^{sk}})$ is the expected wage at Time 0 and h is the square root of the ratio of the variance of wages at Time 1 and the variance of wages at Time 0 (i.e., $\sqrt{\text{var}(f_{1^{sk}})/\text{var}(f_{0^{sk}})}$). $(1 - h)E(f_{0^{sk}})$ in Equation (9) corresponds to α^{sk} in Equation (6) whereas h corresponds to β^{sk} so that the mean wage remains constant but the variance increases by the factor h^2 . We denote the counterfactual PDF obtained after such a transformation as $c f_1^{sk}(x; \mu_0^{sk}, \sigma_1^{sk})$.

The counterfactual PDF that reflects both mean and variance changes can be constructed with the following transformation:

$$x_i = E(f_{0sk}) - hE(f_{1sk}) + hx_{0i} \quad (10)$$

We denote this counterfactual density as $cf_1^{sk}(x; \mu_1^{sk}, \sigma_1^{sk})$. The residual change, $C_{D3sk}(x)$, will thus be $f_1^{sk}(x) - cf_1^{sk}(x; \mu_1^{sk}, \sigma_1^{sk})$. Using Equations (7), (8), (9), and (10), we can construct the counterfactual kernel densities for the subgroups.

The aggregate counterfactual kernel densities are the weighted sums of the subgroup densities. The constructed counterfactual densities are thus

$$cf(x) = \sum_{s=1}^4 \sum_{k=1}^4 v^{s(t)k(t)} cf_d^{sk(1)}(x), \quad (11)$$

where $v^{s(t)k(t)}$ is the population share of educational group k in sector s at Time t and $cf_d^{sk(1)}(x)$ is the counterfactual density for educational group k in sector s at Time 1 (2001-2002) when the PDF of that group changes only for d . For example, if only the proportion for the sectors change between the two time periods while the educational distribution and the group-specific PDFs remain constant, then in this case the counterfactual PDF, $cf_1(x)$, will be

$$cf_1(x) = \sum_{s=1}^4 \sum_{k=1}^4 v^{s(1)k(0)} cf_0^{sk(1)}(x). \quad (12)$$

That is, the sector proportions change to the figures for Time 1, while the educational proportions within sectors remain at the figures for Time 0, and the PDF for each group is fixed at its Time 0 distribution. Thus, $cf_0^{sk(1)}(x)$ is equal to $f^{sk}(x)$ at Time 0. If only the group-specific means for Sector 1 are changed while all the other means, variances, and compositional shares remain at their Time 0 figures, then the counterfactual PDF, $cf_2(x)$, will be

$$cf_2(x) = \sum_{k=1}^4 v^{1(0)k(0)} cf_{D1}^{1k(1)}(x) + \sum_{s=2}^4 \sum_{k=1}^4 v^{s(0)k(0)} cf_0^{sk(1)}(x), \quad (13)$$

where $cf_{D1}^{1k(1)}(x)$ in the first half of the right-hand side of Equation (13) represents the PDFs when the means for Sector 1 are changed to their Time 1 figures.

The counterfactual PDFs therefore capture the marginal effects of compositional changes, mean changes, variance changes, or certain combinations of

these changes. Scalar indices for inequality can be estimated using these aggregate counterfactual densities.⁸ Put simply, the density-function decomposition method allows us to simulate a “what-if” analysis. It estimates how much of the total change in inequality is due to three separate parts, including (a) the pure compositional shift of sectors assuming that the mean wage for each sector and its within-sector variance are unchanged over time, (b) the differential growth rates in mean wages across sectors assuming that other things remain equal, and (c) changes in the within-sector variance assuming that the sectoral compositions and mean wages are unchanged over time. By breaking down the total change in inequality into these additive parts, the decomposition allows us to pinpoint the sources of rising inequality in a way that is revealing in regard to the debate between SBTC and the bargaining power explanations.

Data

We use data from the Outgoing Rotation Groups of the Current Population Survey (CPS-ORG). The CPS-ORG has been a major source for the study of changing wage inequality in part due to its relatively precise measurement of the hourly wage.⁹ We use the CPS-ORG from 1983 to 2005 because the CPS first began ascertaining union membership in 1983. These years cover the period in which wage inequality has grown substantially. The sample is limited to employed persons who are between the ages of 18 and 65 years. The self-employed are excluded because their hourly incomes are affected by sources other than labor income and because measurement issues for this group are more significant.

Wages for each year are adjusted by the CPI-X to the fixed price level for 1993. Following most of the previous studies in this literature, we trim extreme values by deleting cases where the hourly wage is less than 1 dollar (in 1993 fixed dollars), and we adjust top-coded earnings by assuming a log-normal distribution. For the density-decomposition analysis, we pool two years of data for both the base period (1983-1984) and the end period (2001-2002). We use 2001-2002 as the final period for our decompositions because the methodology for the CPS changed significantly in 2003. However, data for 2003 to 2005 are included in our more basic descriptive statistics.

Empirical Results

Table 2 shows the descriptive statistics for the four sectors and the four educational groups at Time 0 (i.e., 1983-1984) and at Time 1 (i.e., 2001-2002). As expected, the mean log wage for Sector I—the most competitive and least

Table 2. Descriptive Statistics

	Male				Female			
	(t_0)		(t_1)	$(t_1) - (t_0)$	(t_0)		(t_1)	$(t_1) - (t_0)$
	1983-1984	2001-2002	1983-1984		2001-2002			
Total ^a					Total ^a			
Workforce share								
Sector								
I. Private–nonunion	.706	.637	.750	.113	.732	.701	.746	.045
II. Public–nonunion	.085	.090	.082	–.008	.117	.120	.118	–.002
III. Private–union	.140	.195	.108	–.087	.065	.090	.054	–.036
IV. Public–union	.069	.078	.062	–.016	.085	.089	.082	–.007
Total	1.000	1.000	1.000		1.000	1.000	1.000	
Education								
Less than high school	.125	.169	.098	–.071	.089	.128	.067	–.061
High school graduates	.344	.354	.330	–.024	.363	.417	.319	–.098
Some college	.260	.234	.278	.044	.298	.259	.324	.065
Bachelor’s degree or more	.272	.243	.295	.052	.250	.200	.290	.090
Total	1.000	1.000	1.000		1.000	1.000	1.000	
Mean log wage								
Total	2.102	2.116	2.143	0.027	1.837	1.764	1.922	0.158
Sector								
I. Private–nonunion	2.046	2.115	2.107	–0.008	1.774	1.688	1.871	0.183
II. Public–nonunion	2.183	2.165	2.228	0.063	1.912	1.840	1.984	0.144
III. Private–union	2.236	2.279	2.226	–0.053	1.959	1.927	2.024	0.097
IV. Public–union	2.319	2.292	2.333	0.041	2.181	2.087	2.232	0.145
Education								
Less than high school	1.755	1.867	1.690	–0.177	1.455	1.497	1.457	–0.040
High school graduates	1.985	2.050	1.982	–0.068	1.692	1.686	1.735	0.049
Some college	2.058	2.081	2.087	0.006	1.809	1.769	1.862	0.093
Bachelor’s degree or more	2.478	2.438	2.549	0.111	2.222	2.096	2.309	0.213
Standard deviation of log wage								
Total	.573	.560	.591	.031	.532	.488	.556	.068
Sector								
I. Private–nonunion	.598	.589	.608	.019	.532	.476	.554	.078
II. Public–nonunion	.577	.573	.580	.007	.510	.463	.530	.067
III. Private–union	.434	.409	.462	.053	.467	.421	.499	.078
IV. Public–union	.424	.389	.450	.061	.444	.405	.465	.060
Education								
Less than high school	.472	.489	.409	–.080	.392	.395	.363	–.032
High school graduates	.483	.492	.470	–.022	.443	.425	.441	.016
Some college	.539	.547	.524	–.023	.492	.467	.492	.025
Bachelor’s degree or more	.565	.552	.590	.038	.524	.483	.541	.058

a. Based on 1983 to 2005.

protected sector which is thus the sector where workers have the least “worker power”—is lower than for the other sectors. In contrast, the mean log wage is highest for Sector IV, which is the least competitive having both unions and public employment. Sector II (which is somewhat competitive consisting of nonunionized workers in the public sector) has a higher mean log wage than Sector III (which is somewhat institutionally protected consisting of unionized workers in the private sector). The mean log wage for both of these intermediate sectors are larger than in the most competitive sector (i.e., Sector I) and smaller than in the least competitive sector (i.e., Sector IV). In sum, the ordering of mean wages across the sectors is consistent with our theoretical expectations as summarized in Table 1 according to which the mean wage declines as the level of market competition increases. This conclusion is clearly evident for both male and female workers in both time periods as shown in Table 2.

Our theoretical expectations are also evident in Table 2 regarding differences in sector-specific levels of wage dispersion. That is, as predicted, wage dispersion increases in those sectors that have higher levels of market competition. Sector IV—where workers have the highest level of negotiation power—has the smallest degree of wage dispersion. In contrast, Sector I—where workers have the lowest level of negotiation power—has the highest degree of wage dispersion. In Sectors II and III the levels of wage inequality are intermediate. For both men and women and in both time periods, the levels of wage dispersion follow the ordering of the sectors in terms of the level of “worker power” over market forces.

Across this time period, employment in Sector I increased by about 11 percentage points for male workers (i.e., from .637 to .750) whereas employment in the other sectors declined as shown in Table 2. For example, employment in the unionized private sector (i.e., Sector III) shrank by almost half. Though somewhat less pronounced, the same basic pattern is also evident for female workers.

Regarding educational composition, Table 2 indicates that the proportion of the labor force that is less educated declined whereas the proportion that is more educated increased across this time period for both men and women. Across all of the sectors, mean log wage increased by .027 for male workers and .158 for female workers over this time period. The standard deviation of log wage increased by .031 for men and by .068 for women.

Kernel Density Distribution

Figure 1 shows the changes in the density distribution of log wage for the four sectors.¹⁰ The graph in the upper left of Figure 1 shows the distributions

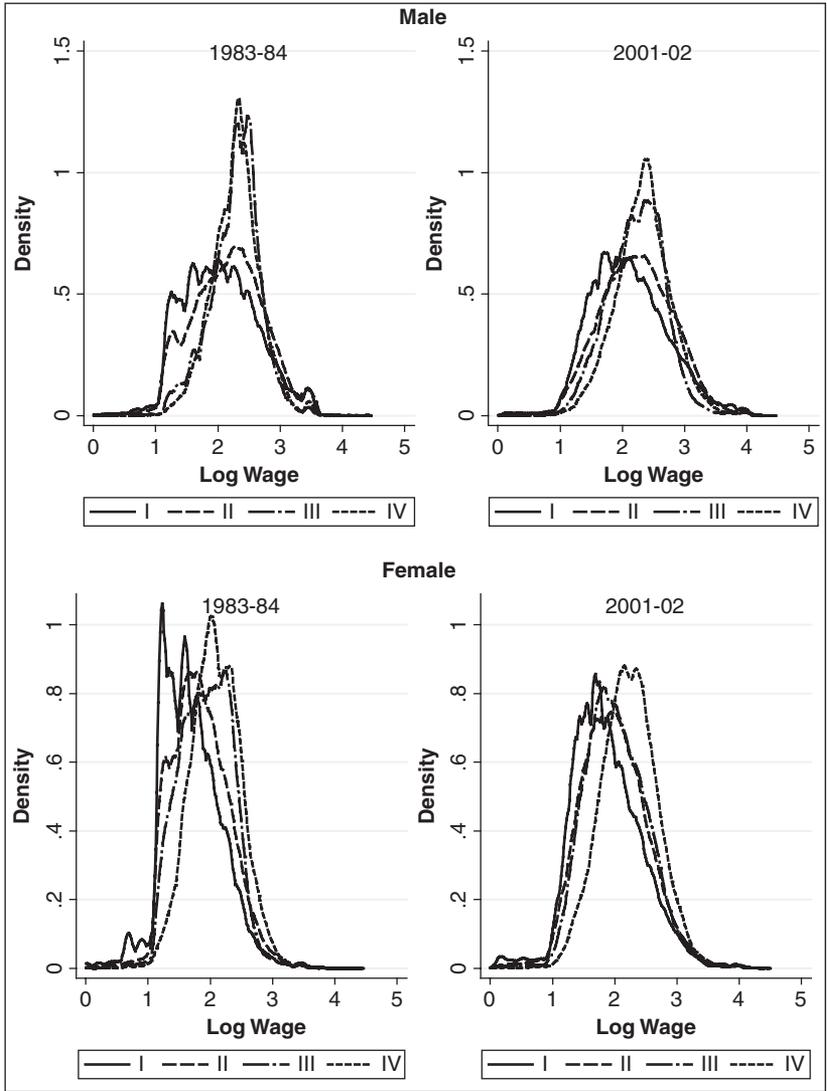


Figure 1. Kernel density estimation of log wage by gender, 1983-1984 and 2001-2002

for male workers in 1983-1984, and it indicates a clustering around two separate patterns. That is, Sectors I and II (i.e., the nonunion sectors) have very similar density distributions whereas Sectors III and IV (i.e., the unionized

sectors) closely resemble each other with their density distributions. Consistent with the discussion of Dickens and Lang (1988), these results suggest the greater significance of union status relative to public sector employment in regard to wage determination.

As was discussed above in regard to the descriptive statistics, the wage distributions for the nonunion Sectors I and II are more unequal and hence fatter than the distributions for the unionized Sectors III and IV (as shown in the upper left panel of Figure 1 for male workers in 1983-1984). Sectors I and II also appear to have some truncation point on the left side of their distributions which reflects the impact of minimum wages. Far fewer unionized workers are being paid near the minimum wage although they are also less likely to be paid high wages because the distributions for Sectors III and IV have less positive skew.

The graph in the upper right of Figure 1 shows the distributions for male workers in 2001-2002. The distributions again show the resemblance between the two unionized sectors versus the two nonunionized sectors. However, the differences between these two clusters are less obvious in 2001-2002 than in 1983-1984. The distributions for the nonunion sectors appear to have been stretched out and the distributions for the unionized sectors have likewise become more unequal. The distributions for the unionized sectors are less peaked and are more spread out in a way that more closely resembles the distributions for the nonunionized sectors.

The distributions for female workers are shown in the bottom panels of Figure 1. For female workers, the distinctive difference in the distributions for the unionized versus the nonunionized sectors is less pronounced than for male workers. Union effects on the wage distribution are smaller for female workers. Nonetheless, the general pattern regarding the change across these two time periods is the same for female workers as for male workers. Comparing the figures for 1983-1984 versus those for 2001-2002, it is clear that the differences between the shapes of the distributions are reduced in the latter period for female workers. The distributions for the unionized sectors became more similar to those for the nonunionized sectors in 2001-2002.

This descriptive analysis can be further broken down by educational group. The distributions for male workers are shown in Figure 2. Although there are some minor differences in the distributions between the educational groups, the basic pattern regarding the change across the two time periods is again evident. That is, even after dividing the sample by educational levels, the shapes of the sector-specific wage distributions become more similar in 2001-2002 relative to 1983-1984.

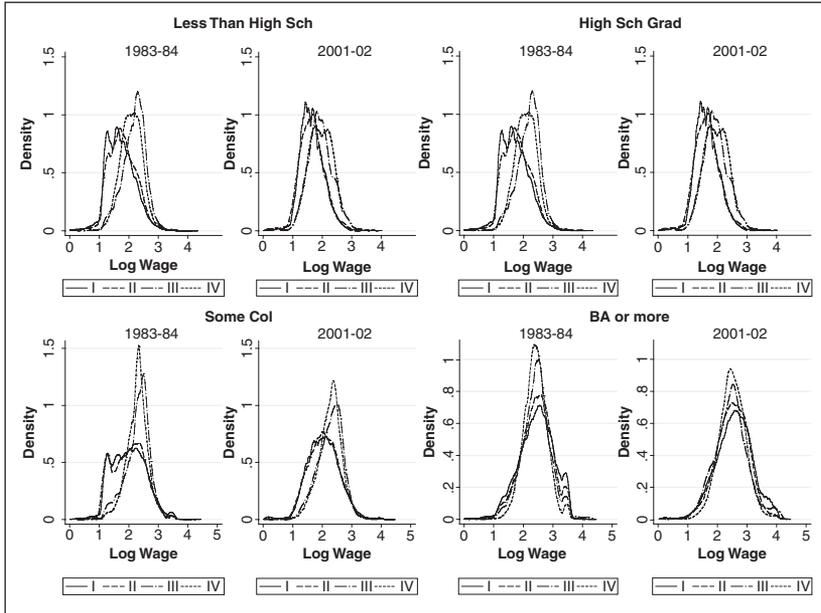


Figure 2. Kernel density estimation of log wage by sector for male workers, 1983-1984 and 2001-2002

Another important change is evident for male workers who have only a high school degree or less. For these workers, Figure 2 shows that in 1983-1984, the distributions for more competitive sectors (i.e., Sectors I and II) were wider with less concentration around the peaks. By 2001-2002, however, these patterns appear to be reversed. In the later period, the distributions for Sectors I and II appear to be narrower with higher peaks than Sectors III and IV. These results imply that within-group wage dispersions for the more competitive sectors have declined while they have increased for the more institutionally protected sectors.

As shown in Figure 3, this reversal across the sectors is not evident for female workers. Nonetheless, Figure 3 does show for female workers the same general pattern of increasing similarity in the shapes of the sector-specific wage distributions in 2001-2002 relative to 1983-1984 as was also evident in Figure 2 for male workers. Indeed, for most of the educational groups, sector differences by 2001-2002 appear to be relatively minor for female workers. The one exception is for female workers with less than a high school degree for whom the most competitive sector has a high concentration around

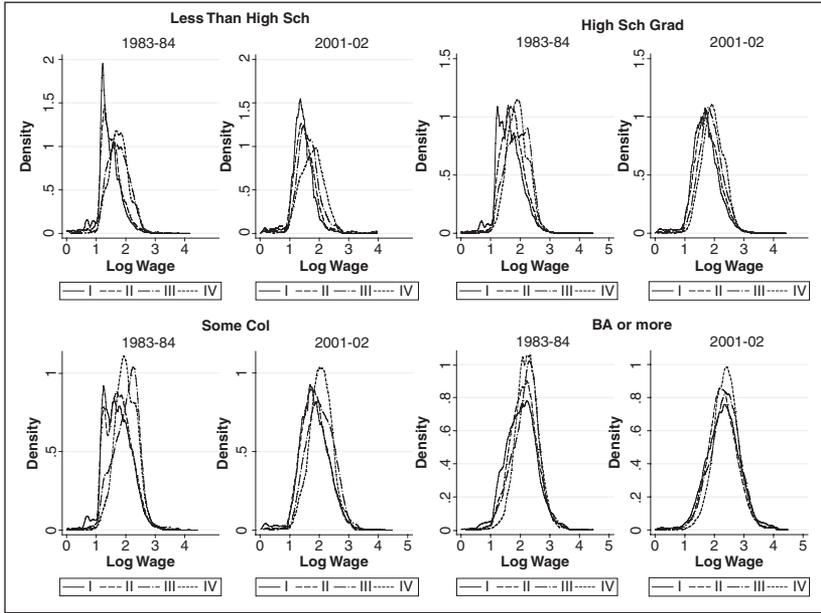


Figure 3. Kernel density estimation of log wage by sector for female workers, 1983-1984 and 2001-2002

the minimum wage levels whereas the most institutionally protected sector has a greater degree of dispersion, including a significant portion of workers being paid at somewhat higher wage levels.

Convergence Across Sectors in the Mean Wage and Wage Dispersion

To ascertain how the changes in mean wages and within-group wage dispersions contribute to the growth of inequality, we analyze their trends from 1983 to 2005 using sector-by-education cells. First, we examine the trend in the differences in mean wages between the educational groups. Table 3 shows the results of the following time series regression:

$$\frac{\bar{X}_{\ln(WAGE_{skilled})}}{\bar{X}_{\ln(WAGE_{unskilled})}} = a + b(YEAR) + e, \tag{14}$$

Table 3. Changes of the Ratio of Mean Log Wage Between Skilled and Unskilled Workers, 1983-2005, by Sector and Gender^{a,b}

	A. Male			
	Private	Public	Private	Public
	$(W_{BA+})/(W_{LTHS})$		$(W_{BA+})/(W_{HSG})$	
Nonunion	I +.0053***	II +.0068***	I +.0018**	II +.0029***
Union	III +.0090***†	IV +.0082***†	III +.0033***†	IV +.0031***
	B. Female			
	Private	Public	Private	Public
	$(W_{BA+})/(W_{LTHS})$		$(W_{BA+})/(W_{HSG})$	
Nonunion	I +.0085***	II +.0089***	I +.0043***	II +.0035***
Union	III +.0111***†	IV +.0077***	III +.0068***†	IV +.0030***

a. Based on the regression of $[\text{Mean of } \ln(WAGE_{BA+})]/[\text{Mean of } \ln(WAGE_{LTHS})] = a + b(\text{YEAR}) + e$ or the regression of $[\text{Mean of } \ln(WAGE_{BA+})]/[\text{Mean of } \ln(WAGE_{HSG})] = a + b(\text{YEAR}) + e$.
 The signs in the cells indicate the statistical significance and sign of the parameter estimates of b . -, significantly negative; +, significantly positive; Δ, not significant at $\alpha = .05$.
 * $p < .05$; ** $p < .01$; *** $p < .001$ (with regard to statistical significance relative to 0).
 † $p < .05$; ‡ $p < .01$ (with regard to statistical significance relative to Sector I).

where the dependent variable is the ratio between the mean wages of skilled workers and unskilled workers in each sector and the independent variable is time measured in terms of year starting at 1983. Here we define skilled workers as those who have a bachelor’s degree (or some higher degree) whereas unskilled workers are grouped into two categories that are considered separately (i.e., those who have a high school diploma but no bachelor’s degree, and then those who are high school dropouts). Plus signs shown in Table 3 indicate statistically significant, positive parameter estimates of b . Thus, plus signs signify that the mean wage gap between skilled workers and unskilled workers grew over this time period. Minus signs indicate statistically significant but negative estimates of b whereas triangles refer to estimates of b that are not statistically significant (i.e., the latter indicate a lack of evidence of a linear change in the wage gap between skilled and unskilled workers).

Table 3 shows that for all sectors and for both male and female workers, the wage gap between skilled and unskilled workers has grown over this time period. This conclusion applies to the comparisons relative to high school graduates as well as to high school dropouts. In case of male workers, the gap has grown faster in the less competitive sectors (i.e., Sectors III and IV). In the regressions using $[\text{Mean of } \ln(WAGE_{BA+})]/[\text{Mean of } \ln(WAGE_{LTHS})]$ as

Table 4. Changes of Standard Deviation of Log Wage, 1983-2005, by Education, Sector and Gender^{a,b}

		A. Male			
		Private	Public	Private	Public
		Less Than High School		High School Graduate	
Nonunion Union	I	--.0040***	II --.0041***	I --.0018***	II --.0010***†
	III	+0.0017***‡	IV +.0026***‡	III +.0021***‡	IV +.0027***‡
		Some College		BA+	
Nonunion Union	I	--.0026***	II --.0031***	I -.0002	II Δ.0002
	III	+0.0006***‡	IV +.0036***‡	III +.0032***‡	IV +.0033***‡
		B. Female			
		Private	Public	Private	Public
		Less Than High School		High School Graduate	
Nonunion Union	I	--.0022***	II --.0015*	I +.0007*	II +.0022***‡
	III	Δ-.0006†	IV Δ.0019‡	III Δ.0002	IV +.0018***‡
		Some College		BA+	
Nonunion Union	I	+0.0010**	II Δ.0006	I +.0022***	II +.0030***
	III	+0.0017***	IV +.0019***	IV +.0035***†	IV +.0031***

a. Based on the regression of $sd(\ln[WAGE]) = a + b(YEAR) + e.b$.

The signs in the cells indicate the statistical significance and sign of the parameter estimates of b . -, significantly negative; +, significantly positive; Δ, not significant at $\alpha = .05$.

* $p < .05$; ** $p < .01$; *** $p < .001$ (with regard to statistical significance relative to 0).

† $p < .05$; ‡ $p < .01$ (with regard to statistical significance relative to Sector I).

the dependent variable, Table 3 shows that the parameter estimates of b for male workers are .0053 and .0068 for Sectors I and II, respectively, whereas the estimates for Sectors III and IV are .0090 and .0082 (which are statistically significant relative to the estimate for Sector I, as indicated in Table 3), respectively. These results seem inconsistent with the standard SBTC explanation because market forces are most predominant in Sectors I and II where the skill differential has evidently grown the least. Although the patterns of growth in the skill differential are less clear for female workers, Table 3 does indicate that for this group too the growth has not been largest for Sectors I and II where the SBTC explanation should presumably be most applicable. The larger growth for Sector III is statistically significant relative to Sector I as indicated in Table 3.

Table 4 shows the results for time series regressions of the standard deviation of log wages for the sixteen sector-by-education cells. That is, the model specification is the same as Equation (14) except that the dependent variables

are the within-group standard deviations of log wages. The results for male workers in these regressions, shown in Table 4, also seem inconsistent with the SBTC prediction. For all of the educational groups, the within-group inequality declined across this period for male workers in Sectors I and II.¹¹ For all the educational groups, the greater growth for male workers in Sectors III and IV are statistically significant relative to Sector I as indicated in Table 4. These findings are unexpected by the SBTC view because, if market forces are the underlying source of rising inequality, then one would expect the greatest increases in dispersion to occur in those sectors where market forces are strongest. Contrary to the view of “ubiquitous increases in inequality” noted earlier, wage inequality in the most market-oriented sectors actually seems to have declined within groups defined by education and sector. Instead, Table 4 shows that growth in wage inequality for male workers has been positive in the more institutionally protected sectors (where inequality was formerly restrained to lower levels). The most institutionally protected sector (i.e., Sector IV) has had the greatest increases in inequality across all of the educational groups for male workers.

For female workers, Table 4 shows that within-group wage dispersions are growing for most (though not all) of the education-by-sector groups. As is the case for male workers, the growth has been largest in the less competitive sectors. The growth in inequality among women appears to be strongest among those with a college degree. Given that wage dispersion among female workers in Sectors I and II was substantially lower than for men in 1983-1984, and the inequality growth in these sectors is greater for women, there appears to be some convergence toward the level of inequality for male workers in Sector I.

To investigate this issue further, we estimate time series regressions of the trend in the wage differentials between Sector I and the other sectors. Figure 4 shows these results. In the graph in Figure 4A, each line shows the regression estimates based on the locally weighted regression of DW_{ijkt} on $YEAR_t$, where DW_{ijkt} refers to the differences in the mean log wage for gender i , sector j , and educational group k at time t relative to the mean log wage for male workers in the same educational group in the nonunionized private sector (i.e., Sector I) at time t . Figure 4A thus shows the wage differentials for each group in comparison to men with the same level of education in Sector I. As is evident in Figure 4A, the regression lines are converging toward zero over time. In other words, after controlling for educational levels, both gender and sectoral wage differences are diminishing over time.

The graph in Figure 4B shows the trend in the differentials for the standard deviations using the same sort of time series regression. As was the case

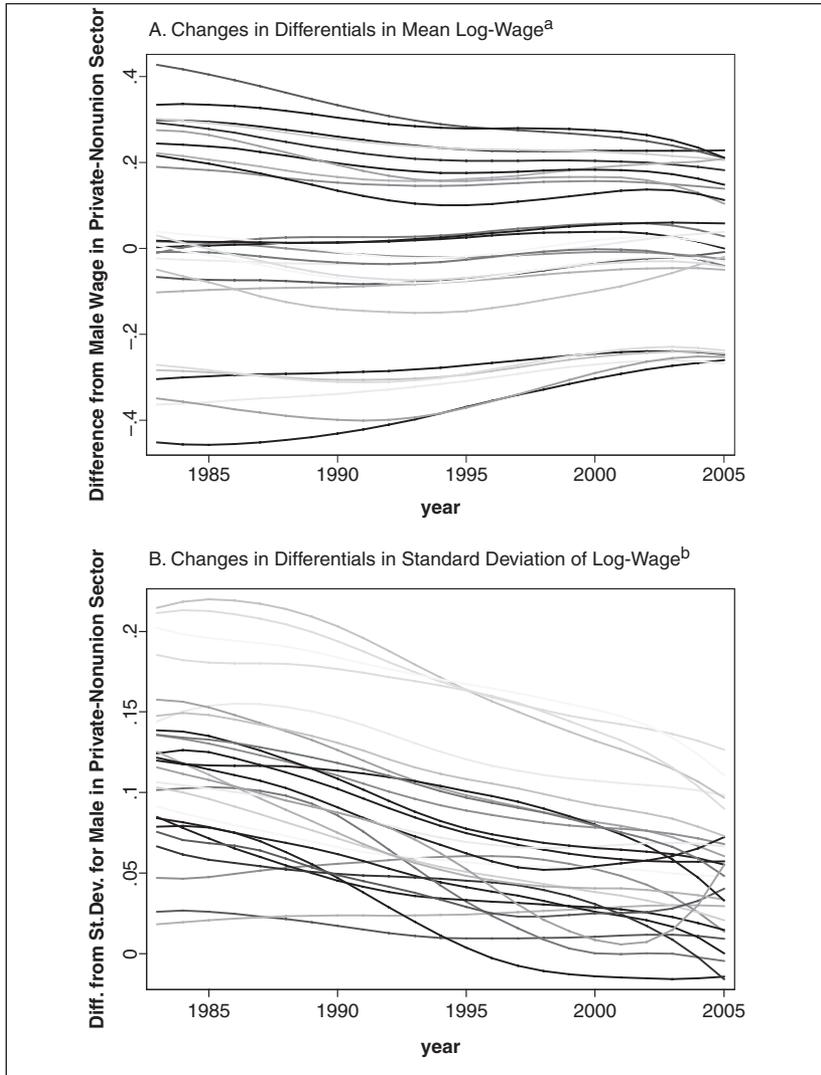


Figure 4. Changes in differences relative to the mean log wage and the standard deviation of log wage among male workers in Sector I (nonunion workers in the private sector) (A) Changes in differentials in mean log wage.^a (B) Changes in differentials in standard deviation of log wage.^b

a. Based on the estimates of the locally weighted regressions of DW_{ijkt} on $YEAR_t$, where $DW_{ijkt} = \bar{W}_{\text{male, private-nonunion, } kt} - \bar{W}_{ijkt}$. \bar{W}_{ijkt} refers to the mean log wage for a group given by gender i , sector j , educational level k , and time t .

b. Based on the estimates of the locally weighted regressions of Dsd_{ijkt} on $YEAR_t$, where $Dsd_{ijkt} = sd(W_{\text{male, private-nonunion, } kt}) - sd(W_{ijkt})$. W_{ijkt} refers to log wage for members of a group given by gender i , sector j , educational level k , and time t .

for the differentials in mean log wage, the differentials in wage dispersion (i.e., the standard deviation of log wage) across gender and sector are declining in the sense that they are all converging to the level of male workers with the same level of education in Sector I. We interpret these results as indicating that the institutional underpinnings of sectoral wage differentials are declining. In other words, these findings suggest that wage inequality is increasing over this time period because of institutional changes in employment relations rather than simply technological sources generating shifts in the supply and demand of human capital.

Decomposition: The Effects of Compositional Changes

Tables 5 and 6 show the results of the decompositions of the changes in log wage dispersion for male and female workers, respectively, between 1983-1984 and 2001-2002. All calculations are based on the counterfactual density estimates given by Equation (13). We decompose five different measures of inequality, including the standard deviation of log wage (*SD*), the Theil index (hereafter, Theil), the Gini index (hereafter, Gini), the ratio of 90th percentile to the 50th percentile (p_{90}/p_{50}), and the ratio of 50th percentile and 10th percentile (p_{50}/p_{10}).

In Table 5, Panel A shows the actual change in wage inequality for male workers over this period. The *SD* has increased by .0313 and the Gini has grown by .0280 between 1983-1984 and 2001-2002. The Theil and the p_{90}/p_{50} also indicate rising dispersion. However, the p_{50}/p_{10} has actually declined implying that the growth in overall inequality during this period is due to the changes in the upper tail of the wage distribution. This finding is consistent with the results of Kalleberg and Mouw (2006).

If we assume that only the composition of sector proportions change while all other factors are held constant, then the Gini is expected to grow by .0102 which constitutes a substantial component given that the total change in the Gini is .0280 over this period. Because of the presence of components with a negative sign, a percentage calculation is somewhat ambiguous, but for descriptive purposes we nonetheless show the percentages for each of the components in the third column for each of the inequality measures in Panel B of Table 5. For example, column 3 for the Gini in Table 5 indicates that sector composition component of .0102 represents about 36% of the total change of .0280. When only educational composition is allowed to vary, then the Gini increases by .0012 (or about 4% as shown in column 3 of Panel B). Although the SBTC view underscores the significance of human capital factors such as education in generating increased inequality, *this result indicates that changes*

Table 5. Decomposition of the Changes of Hourly Wage Dispersions for Male Workers, 1983-1984 to 2001-2002

	Standard Deviation ^a			Theil Index			Gini Index			p90/p50 ^b			p50/p10 ^b			
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
A. Actual change																
1983-1984	.5600			.1555			.3071			1.305			1.582			1.000
2001-2002	.5913	.0313	1.000	.1925	.0370	1.000	.3351	.0280	1.000	.1372	.067	1.000	1.493	-.089	1.000	
B. Marginal contribution by component																
Sector composition	.5731	.0131	.419	.1657	.0102	.275	.3173	.0102	.364	1.344	.039	.582	1.577	-.005	.056	
Education composition	.5646	.0046	.147	.1564	.0010	.026	.3083	.0012	.043	1.312	.007	.104	1.575	-.007	.079	
Mean	.5787	.0187	.597	.1721	.0166	.449	.3219	.0148	.529	1.340	.035	.522	1.567	-.015	.169	
Variance	.5495	-.0105	-.335	.1548	-.0006	-.017	.3064	-.0007	-.025	1.319	.014	.209	1.541	-.041	.461	
Total: composition + mean	.5888	.0288	.920	.1823	.0268	.724	.3303	.0232	.829	1.372	.067	1.000	1.541	-.041	.461	
+ variance																
Residual	.5625	.0025	.080	.1657	.0202	.276	.3119	.0048	.171	1.305	.000	.000	1.534	-.048	.539	
C. Marginal contribution of mean and variance changes by sector																
I: Private nonunion	.5628	.0028	.089	.1642	.0087	.235	.3142	.0071	.254	1.326	.021	.313	1.558	-.024	.270	
II: Public nonunion	.5581	-.0019	-.061	.1548	-.0007	-.018	.3071	.0000	.000	1.305	.000	.000	1.582	.000	.000	
III: Private union	.5620	.0020	.064	.1596	.0041	.111	.3106	.0035	.125	1.333	.028	.418	1.577	-.005	.056	
IV: Public union	.5637	.0037	.118	.1579	.0024	.066	.3097	.0026	.093	1.330	.025	.373	1.567	-.015	.169	
D. Marginal contribution of mean and variance changes by sector x component																
I: Private nonunion																
Mean	.5759	.0159	.508	.1671	.0116	.314	.3176	.0105	.375	1.326	.021	.313	1.582	.000	.000	
Variance	.5440	-.0016	-.511	.1510	-.0045	-.122	.3025	-.0046	-.164	1.319	.014	.209	1.541	-.041	.461	
II: Public nonunion																
Mean	.5615	.0015	.048	.1563	.0008	.023	.3083	.0012	.043	1.305	.000	.000	1.582	.000	.000	
Variance	.5564	-.0036	-.115	.1539	-.0016	-.042	.3060	-.0011	-.039	1.305	.000	.000	1.582	.000	.000	
III: Private union																
Mean	.5572	-.0028	-.089	.1567	.0012	.032	.3080	.0009	.032	1.333	.028	.418	1.550	-.032	.360	
Variance	.5640	.0040	.128	.1580	.0025	.067	.3097	.0026	.093	1.330	.025	.373	1.567	-.015	.169	
IV: Public union																
Mean	.5601	.0001	.003	.1557	.0002	.006	.3078	.0007	.025	1.319	.014	.209	1.567	-.015	.169	
Variance	.5623	.0023	.073	.1571	.0017	.045	.3087	.0016	.057	1.319	.014	.209	1.567	-.015	.169	

Note: Each column (1) shows a dispersion index, which is calculated based on counterfactual density estimates. Column (2) shows the differences of the counterfactual wage dispersion from the actual wage dispersion at Time 0 (1983-1984). Column (3) shows the proportion of the change of wage dispersion that is accounted for by counterfactual wage dispersion. That is, $[\text{Counterfactual dispersion} - \text{Actual dispersion}(t_0)] / [(\text{Actual dispersion}(t_1) - \text{Actual dispersion}(t_0))]$. a. Log hourly wage is used for standard deviation, p90/p50, and p50/p10.

Table 6. Decomposition of the Changes of Hourly Wage Dispersions for Female Workers, 1983-1984 to 2001-2002

	Standard Deviation ^a			Theil Index			Gini Index			p90/p50 ^b			p50/p10 ^c			
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
A. Actual change																
1983-1984	.4878		.1303	.1775	.0471	1.000	.2763			.1372			1.445			
2001-2002	.5561	.0683	1.000	.1348	.0045	.096	.3175	.0412	1.000	.1427	.055	1.000	1.439	-.006	1.000	
B. Marginal contribution by component																
Sector composition	.4922	.0044	.064	.1317	.0014	.029	.2801	.0038	.092	.1390	.018	.327	1.453	.008	-1.333	
Education composition	.4936	.0058	.085	.1495	.0269	.394	.2785	.0021	.052	.1350	-.022	-.400	1.481	.036	-6.000	
Mean	.5147	.0269	.394	.1495	.0192	.407	.2958	.0195	.473	.1378	.006	1.09	1.464	.019	-3.167	
Variance	.5083	.0205	.300	.1449	.0146	.310	.2903	.0140	.340	.1385	.013	.236	1.473	.028	-4.667	
Total: composition + mean + variance	.5531	.0653	.956	.1736	.0433	.919	.3175	.0412	1.000	.1410	.038	.691	1.481	.036	-6.000	
C. Marginal contribution of mean and variance changes by sector																
I: Private nonunion	.4908	.0030	.044	.1341	.0038	.081	.2763	.0000	.000	.1389	.017	.309	1.403	-.042	7.000	
II: Public nonunion	.5219	.0341	.499	.1560	.0257	.545	.2997	.0234	.569	.1383	.011	.200	1.447	.002	-.333	
III: Private union	.4951	.0073	.107	.1356	.0053	.113	.2813	.0049	.120	.1385	.013	.236	1.445	.000	.000	
IV: Public union	.4927	.0049	.072	.1344	.0041	.087	.2802	.0039	.094	.1372	.000	.000	1.445	.000	.000	
D. Marginal contribution of mean and variance changes by sector x component																
I: Private nonunion																
Mean	.5035	.0157	.230	.1439	.0135	.287	.2892	.0128	.311	.1383	.011	.200	1.447	.002	-.333	
Variance	.5009	.0131	.192	.1393	.0090	.190	.2852	.0089	.216	.1385	.013	.236	1.472	.027	-4.500	
II: Public nonunion																
Mean	.4887	.0009	.013	.1322	.0019	.040	.2784	.0021	.051	.1385	.013	.236	1.445	.000	.000	
Variance	.4906	.0028	.041	.1325	.0022	.046	.2783	.0020	.047	.1372	.000	.000	1.445	.000	.000	
III: Private union																
Mean	.4864	-.0014	-.020	.1314	.0011	.023	.2777	.0014	.033	.1372	.000	.000	1.445	.000	.000	
Variance	.4900	.0022	.032	.1319	.0016	.034	.2779	.0015	.037	.1372	.000	.000	1.445	.000	.000	
IV: Public union																
Mean	.4895	.0017	.025	.1328	.0025	.052	.2792	.0028	.069	.1385	.013	.236	1.445	.000	.000	
Variance	.4903	.0025	.037	.1323	.0020	.043	.2782	.0018	.044	.1372	.000	.000	1.445	.000	.000	

Note: Each column (1) shows a dispersion index, which is calculated based on counterfactual density estimates. Column (2) shows the differences of the counterfactual wage dispersion from the actual wage dispersion at Time 0 (1983-1984). Column (3) shows the proportion of the change of wage dispersion that is accounted for by counterfactual wage dispersion. That is, $[\text{Counterfactual dispersion} - \text{Actual dispersion}(t)] / [\text{Actual dispersion}(t) - \text{Actual dispersion}(t_0)]$. a. Log hourly wage is used for standard deviation, p90/p50, and p50/p10.

in educational composition by itself should have not substantially changed inequality as measured by the Gini. The findings using the Theil as shown in Table 5 yield the same substantive conclusion.

Decomposition: The Effects of Mean and Variance Changes

One finding that is consistent with the SBTC view is that the mean component for rising inequality is positive and large. As shown in Panel B of Table 5 for male workers, the mean component for the Gini increases by .0148, which represents 53% of the total growth in the Gini. Contrary to the SBTC views, however, changes in within-group variances do not contribute to the inequality growth. They instead reduce inequality. The variance component reduces the Gini by .0007, which constitutes a 3% decline in the Gini. Regarding the change in p_{90}/p_{50} , the mean component is .035, which is substantial (i.e., more than half of the total change). The mean component is less significant, however, in regard to the growth in p_{50}/p_{10} of which this component can account for only about 17%. The combined changes in composition, mean, and variances can account, however, for approximately 83% of the inequality growth (as measured by the Gini) over this time period.

The marginal contributions of changes in both the mean and the variance for particular sectors are shown in Panel C in Table 5. For Sector II, the marginal contribution of these changes is not positive but is instead negative for the Gini indicating that it served to reduce inequality growth in that sector. By contrast, the changes in the mean and the variance for Sector I increase the Gini by 25%. The changes for Sector III and IV are positive indicating that these sectors also contribute to rising inequality. The Gini increased by 13% because of these changes in Sector III and by 9% because of these changes in Sector IV.

Contrary to the expectation of the SBTC view, the relative contribution of Sector I is not larger than for other sectors after taking into account its much larger size. As shown in Equation (11), all counterfactual density estimates are based on weighted sums of employment (by education cells) in each sector. Given that the proportion of employment in Sector IV is just 8% in 1983-1984 whereas the proportion of employment in Sector I is 64% (as shown in Table 2), the marginal contribution of Sector I should be more than eight times greater (because $.64/.08 = 8$) than the contribution of Sector IV according to the SBTC explanation, which views Sector I as the vanguard of rising inequality. However, because the marginal contribution of Sector I is only 2.7 times larger than that of Sector IV, the estimated marginal effect of Sector I is actually quite small. A similar conclusion applies to Sector III.

Further decomposition of the sectoral effects into mean and variance changes provides additional information as shown in Panel D of Table 5. The mean changes for Sectors I and II lead to increased inequality. Reductions in inequality are generated, however, by changes in the within-group variances for those two sectors. On the other hand, for Sectors III and IV, both the mean and variance changes are sources of increased inequality.

An additional finding worth noting in Panel D of Table 5 is the change in $p50/p10$. The variance change for Sector I explains 46% of the decline in $p50/p10$ whereas the mean change for Sector III explains 36% of the decline in $p50/p10$. In short, the diminishing within-group variance in the most competitive sector and the decline in mean wages for union members explain a significant portion of declining inequality at the lower end of the wage distribution in each sector. Thus, focusing on only one dimension of change in the wage distribution probably cannot adequately explain the decline in $p50/p10$.

The Decomposition for Female Workers

Table 6 shows the results for the inequality decomposition for female workers. When compared to the results for men in Table 5 that were considered above, several noteworthy differences between men and women are evident in Table 6. First, the change in variances does play a significant role in the growth of inequality for female workers, but it reduced inequality for male workers. Second, the contribution of the change of sector composition for women is much smaller than men in terms of the Theil and the Gini, although for the $p90/p50$ the change of sector composition is the largest component. Third, for women in Sectors I and II, both mean changes and variance changes augment inequality.

This finding may in part reflect the increasing convergence of the wage distribution for women to that for men as discussed above. That is, the wages for most female workers have been rising over time while for male workers (especially low skilled men) wages are often deteriorating. At the same time, there is growing differentiation among highly educated female workers as some of them seem to be moving up to the top of the wage distribution which was once more thoroughly restricted to men. In sum, the gender gap has been narrowing somewhat over this time period but inequality among women has been rising.

Discussion

We interpret these findings as indicating that the rise of inequality in recent decades cannot be primarily attributed to technological changes that are

propelled by the presumed efficiency of unrestrained market forces. Contrary to the expectation of the SBTC view, changes in the variance of wages in the most competitive sector (i.e., Sector I, the nonunion private sector) actually reduce inequality rather than increase it. Although the increase in the demand for skilled workers certainly does have a significant role, shifts in labor demand represent only one small factor. The main sources of rising inequality include the “nonunion private sectorization” of all sectors (i.e., mean and variance changes converging toward the wage distribution characteristics of Sector I) and the reduction in the sizes of the institutionally protected market sectors (i.e., compositional changes).

These patterns of rising inequality can be best interpreted in terms of what we have described as the bargaining power view according to which labor market changes in part derive from conflict over control of the production process and over the distribution of the economic surplus (Budros, 1997; Davis et al., 1994; Granovetter & Tilly, 1988; Zuckerman, 2000). The reduction in the proportion of the labor force that is employed in the institutionally protected sectors reflects a major trend in the contours of “economic segmentation” implicated in the production process. This change may be related to rising market competitiveness associated with the rise of the New Economy, which Berg and Kalleberg (2001, p. 3) characterize as involving “the transition, in the American economy’s core, from nonprice to price competition” and “the return to ‘private’ sector markets of the types last seen in the 1930s.”

In regard to “worker power”—which refers to the capacity of the employees to extract the economic surplus generated by their firm—it is undoubtedly on the decline, which may explain much of trend toward the “nonunion private sectorization” of all sectors of the labor force. Related changes that are associated with this reduction in “worker power” include the dismantling of internal labor markets, the decline in the rewards to firm tenure, the ending of implicit long-term contracts, the shifting of employment risk back to employees, the increase in part-time employment and nonstandard work arrangements, and the decline in union membership (Cappelli, 2001; Cornfield & Fletcher, 2001; Kalleberg, 2001). As is evidenced in the decline of p50/p10, employees without high levels of “worker power” (such as advanced educational credentials, extremely scarce work skills, upper managerial authority, or privileged organizational position) are increasingly experiencing downward wage mobility, which is leading to a “polarization of the labor market” (Autor et al., 2006, p. 189).

The strong version of the SBTC view, which claims that increased inequality is ubiquitous, is not supported by our findings. Within-group wage dispersions have been reduced among less skilled workers especially in the more

competitive sectors. The weaker version of the SBTC view—arguing for “the human capital model with heterogeneous returns”—still attributes the rise of inequality to the increased demand for skilled workers and predicts an increase in within-group inequality for skilled workers only (Lemieux, 2006a, 2006b) as well as compositional growth for this group. This argument is only partially supported by our results, however, because once we control for sectoral composition, the change in educational composition does not raise inequality. The increase in inequality is thus because of the decline of unionization and public sector employment, not to the increase of college educated workers.

Although the growth rates for within-group inequalities are higher among college educated workers, this trend is much less obvious by sector. Among male workers, within-group inequality growth rates for the four educational groups in Sectors III and IV are higher than the growth rate for college educated workers in Sector I. Among female workers, within-group inequality growth rates for the four educational groups in Sector IV are as high as the growth rate for college educated workers in Sector I. These findings are difficult to reconcile with conventional economic explanations based on competitive market theories.

Although we would not argue that competitive market processes are unimportant, we believe that human capital theory is overly reductionist and should be construed as representing only one part of a broader model that needs to incorporate issues pertaining to bargaining power if we are to adequately account for rising inequality (Hirsch & Soucey, 2006; Kim & Sakamoto, 2008a). Our finding of a rising mean wage among college educated workers is indeed congruent with the expectations of competitive labor market theories, but the pattern of our other results indicate the need for a broader framework. The significance of organizational processes is also suggested by case studies which argue that organizational changes mediate the effects of technological advances (Autor, Levy, & Murnane, 2002). Thus, we concur with the general conclusion that “human capital theory should be nested within a larger theory that accounts for the ability of institutions to change the ‘rules of the game’ when allocating rewards among workers” (Carbonaro, 2006, p. 1837).

In this regard, our findings also point to the need for further research on the changing nature of unionization in the U.S. context. Prior research based on cross-sectional data found that within-group inequality is lower among union members than nonunion members (Freeman 1993; Freeman & Medoff, 1984; Volscho, 2007). Although we also find lower inequality in the union sectors at any cross-sectional point in time, our results further reveal a much

higher rate of inequality growth in the union sectors in recent decades for both genders. This pattern suggests that, in addition to losing their percentage representation in the labor force, unions may also be losing their power as universal wage setters in organizations and across occupations (Kim & Sakamoto, 2008a; Mitchell, 1985). Organizational and workplace changes in the union sector therefore need to be more fully delineated and analyzed (Cornfield, 1991) rather than simply studying the percentage unionized (Kim & Sakamoto, 2008a).¹² Our findings showing a high rate of inequality growth in the union sectors can at this stage simply be summarized as suggesting the “nonunion private sectorization” of unions and implies that deeper structural changes may be occurring.¹³ For example, as Nelson (2001) points out, firms in the New Economy may be becoming more successful at promoting among union members the profit-oriented values of managers that embrace rising inequality.¹⁴

Organizational changes in the union sector may be related with its membership changes. Cornfield (2007) distinguishes three periods of labor movements in the United States. The third moment includes the current situation in which the labor movement is moving away from craft unionism (i.e., the first movement) or universalistic industrial unionism (i.e., the second movement) to the service economy (pp. 237-244). Third-movement unionism tends to organize more diverse workers in terms of ethnic and socioeconomic backgrounds. These workers include less skilled service workers “who are often replaceable and lack ‘positional power’ to disrupt multiple economic sectors” (p. 243). Increased diversity within unions along with the lack of positional power are sources of changing inequality within unions. These organizational changes in unions have been caused and propelled by the emergence of the New Economy.

Another noteworthy set of findings pertain to the differences between men and women. For male workers, mean changes increase inequality whereas variance changes reduce it. In contrast, for female workers, both mean changes and variance changes increase inequality. Some previous studies (e.g., Card, 2001; Fortin & Lemieux, 1997) interpret gender differences as something peculiar to gendered labor markets but do not provide a broader analytical reasoning for this separation. Several previous studies investigate whether the gender wage gap is diminishing (e.g., Bernhardt, Morris, & Handcock, 1995; McCall, 2001; Peterson & Morgan, 1995), but they do not integrate their analyses with the any theoretical considerations pertaining to the general rise in wage inequality.¹⁵ Our findings suggest that the gender wage gap is evolving in the context of the more general trend toward “non-union private sectorization” or the convergence of labor market sectors toward the organizational structures and wage distribution of the most competitive

sector. Although undoubtedly specifically gender-related processes continue to affect the gender wage gap, it nonetheless seems to be unfolding in an environment characterized by the increased market competitiveness of the New Economy. At a minimum, our findings point to the need for further research integrating our understanding of the sources of the gender wage gap with the more general trend toward rising wage inequality.

Conclusions

Although our main objective has not been to propose a precise alternative theory to the SBTC view, social scientists need to more fully engage in tackling this important task in a sufficiently detailed yet comprehensive way. To be successful, this endeavor must recognize that inequality is increasing even within sectors where traditional labor market institutions once served to substantially moderate it. In seeking to explain the “polarization of the labor market” in the New Economy, understanding the sources of compositional sectoral change in terms of increased privatization is certainly important. At the same time, however, social scientists need to acknowledge that a conventional sectoral explanation is unlikely to provide a satisfactory model of increasing inequality because this sort of approach typically does not adequately address why some workers within a given sector increasingly prosper whereas many others are downgraded. Although the SBTC explanation seeks to explain this latter phenomenon, we have shown how that theory is limited in regard to the actual empirical evidence. The consequences of being increasingly exposed to immediate market forces therefore needs to be understood not simply as being differentiated by work skills and human capital but also in terms of organizational sources of power relations that may sometimes provide a favored market situation or monopolistic advantage to a small group of particularly privileged employees. Our findings underscore the need for further research on how market processes relate to the changing nature of power relations both inside workplace organizations as well as the broader political and economic environments within which firms operate.

Authors’ Note

An earlier version of this study was presented in New York at the 2007 Annual Meeting of the American Sociological Association.

Acknowledgements

We thank Philippe Van Kerm for his help in the statistical analysis. For helpful comments on this article, we thank an anonymous reviewer and Daniel B. Cornfield.

Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the authorship and/or publication of this article. **[AQ: 1]**

Funding

The author(s) received no financial support for the research and/or authorship of this article. **[AQ: 2]**

Notes

1. An application of this approach could be extended, for example, to the analysis of Alon and Haberfeld (2007) who find that the effects of educational attainment among women vary by years of accumulated labor force experience as well as by race and ethnicity.
2. Respondents who report membership in a union are coded as being in the union sector (*union* = 1) whereas respondents who report working for federal, state, or local governments are coded as being in the public sector (*public* = 1). Thus, Sector I is for those for whom *union* = 0 and *public* = 0; Sector II refers to *union* = 0 and *public* = 1; Sector III refers to *union* = 1 and *public* = 0; and Sector IV refers to *union* = 1 and *public* = 1.
3. Some economists have used age and education mix skill groups instead of simple educational grouping (e.g., Lemieux, 2006a), but researchers have found consistently that age (which serves as a proxy for labor market experience) does little to account for the recent growth of wage inequality (e.g., Lemieux 2006a, 2006b).
4. A kernel density distribution is similar to an elementary frequency distribution (or histogram of the data) except that the former has the advantages of being a completely continuous function and of being independent of the choice of the bins (or categories of scores on the variable). In the estimation of the kernel density distribution, the bins are effectively allowed to overlap.
5. Intuitively speaking, Equation (1) shows that the frequency distribution (or histogram) for a variable can be broken down into additive components that are the frequency distributions (or histograms) given by each of the constituent, mutually exclusive labor market groups. Equation (2) uses a basic algebraic identity that is often used in decompositions, that is, $ab - cd = (a - c)b + c(b - d)$.
6. Jenkins and Van Kerm (2005) refer to these three components as sliding, stretching, and squashing, respectively.
7. Equation (5) is an application of the change-in-variables theorem from calculus. This equation shows that the value of a function at the next time period is equal to its value in the first time period multiplied by its rate of change. More specifically, the equation shows that the frequency distribution (or histogram) at the next time period is equal to the frequency distribution (or histogram) at the first time period

- multiplied by the rate of change in its cumulative distribution. Note that these functions are applied for each of our labor market groups.
8. The seminal study by DiNardo et al. (1996) introduced the use of kernel density decomposition methods to the study of inequality. The advantage of our model is that it includes the effects of within-group variance changes, which are not considered by DiNardo et al. but are important for understanding rising inequality.
 9. Volscho (2007) investigates the effects of unionization and government employment on family income inequality across metropolitan areas. Although suggestive, the effects of unions and government employment on the wage distribution cannot be precisely discerned from data on family income inequality because the latter are substantially influenced by processes affecting family structure, assortative mating, and the distributions of other sources of income.
 10. For the descriptive purposes of Figure 1, we do not weigh sectors by their shares. Thus, the sum of these four density distributions does not yield the density distribution for total workers.
 11. The only exception in this regard are male workers with a bachelor's degree in Sector II for whom the point estimate is very slightly positive (i.e., .0002). The latter is not statistically significant, however, suggesting essentially no change in inequality for that group.
 12. Hedström and Swedberg's (1985) international comparison shows that the strength of unions cannot predict the direction of inequality changes over time.
 13. We do not rule out the possibility that different organizational changes may have occurred in the 1980s and the 1990s. Fligstein and Shin (2004) identify two waves of work organization. The first wave begins in the early 1980s and targets blue-collar and service workers whereas the second wave begins in the early 1990s and mainly affects lower managerial and other white-collar workers.
 14. By comparing data from 1973-1974 and 1993, Card (2001) contends that the increase in union membership in public sectors explains their slower inequality growths. As shown above, however, this is not true for the changes between 1983-1984 and 2001-2002.
 15. Ornick and Jacobs (1998) claim that privatization increases the gender wage gap by eliminating the higher relative standing of women in the public sector, but our findings cast doubt on the significance of this process given the trend toward the "nonunion private sectorization" in the U.S. case.

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