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WHAT DO GOVERNMENT UNIONS DO? PUBLIC SECTOR UNIONS AND NONUNION WAGES, 1977-2015

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Abstract

In this article we investigate the connection between public sector union memberships and nonunion worker pay. We leverage nearly four decades of Current Population Survey (CPS) data on millions of U.S. workers to test whether public sector union density, measured at the state-level, is associated with higher average wages among unorganized workers. We find stable and substantively large positive effects of state-level public sector union strength on nonunion public sector workers' wages. These results are robust to the inclusion of a range of state-level controls, including GDP, average educational attainment, public sector size, and the strength of private sector unions. Analyses of public sector unions and nonunion private sector pay reveal a robust positive relationship – but one limited to women, revealing how occupational segregation interacts with pay-setting institutions to influence wage outcomes.

Keywords

Organized labor; public sector; inequality

INTRODUCTION

Recent research on organized labor and inequality has focused on private sector unions and private sector workers. This is especially true for research on union spillover effects. The latest studies on the topic contend that union decline is a core determinant of wage trends for many workers, not only through the wage losses experienced by formerly organized workers, but also through the positive "spillover" effects strong unions once provided unorganized workers (Rosenfeld, Denice, and Laird 2016; Western and Rosenfeld 2011). Spillover effects can operate through various channels, including through the well-documented threat effects a strong union presence exerts on nonunion employers (Farber 2005; Leicht 1989; Podgursky 1986). In addition to threat effects, Western and Rosenfeld

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(2011: 517-519) outline cultural, political, and institutional channels. Importantly, both the theoretical underpinnings and empirical evidence of this research on union spillovers highlights the key role private sector unions once played in propping up wages among unorganized, private sector workers.

Yet decades of union decline in the private sector has produced a contemporary union movement evenly split between its public and private sector memberships. And while wage stagnation has been most pronounced in the private sector, especially among men lacking a college degree, years of "new governance" restructuring and state funding cutbacks have eroded the economic standing of many government employees (Cohen and Gebeloff 2018; Laird 2017; Wilson, Rosigno, and Huffman 2015). These developments merit a fresh examination of public sector union spillover effects. In this article, we provide an extensive investigation into the connection between public sector union power and nonunion worker pay. We leverage nearly four decades of data on millions of U.S. workers to test whether public sector union density, measured at the state-level, helps raise average wages among unorganized workers in both the public and private sectors. Given that public sector unions are now "driving the American labor movement" (Moe 2006: 5), a focus on their abilities to buttress the pay of nonunion workers speaks to ongoing debates about economic inequality. And unlike their private sector counterparts, with few exceptions, public sector unions are concentrated in disproportionately female-dominated occupations. In 2015, nearly two-thirds of private sector union members were men, compared to just over 40% of public sector union members. Existing theory suggests union spillovers are largest within the industries and occupations with sizable union memberships. Public sector unions' effects on nonunion pay are therefore likely concentrated in female-dominated occupations. A focus on public sector union spillover effects carries implications for ongoing debates about gender pay disparities in the contemporary economy.

Our investigation is empirically innovative in a few key ways. First, in all of our analyses we include controls for private sector union strength. Second, unlike other treatments on the topic (Frandsen 2016; Ichniowki, Freeman, and Lauer 1989; Zwerling and Thomason 1995), we investigate spillover effects for all non-managerial workers, not just those in specific occupations like teaching, policing, and fire protection. Third, we focus on public sector union strength, measured by state-level membership rates, instead of the presence or absence of state laws permitting collective bargaining in the public sector. Fourth, we analyze data on decades of state-level public sector unionization, instead of restricting our analysis to a single year (Belman, Heywood, and Lund 1997). And fifth, ours is the first investigation to test for public sector spillovers to private sector, nonunion workers.

This last empirical innovation requires a theoretical underpinning. Recent research on labor and inequality either ignores the role of public sector unions (Rosenfeld, Denice, and Laird 2016; Western and Rosenfeld 2011), or suggests that private and public sector unions exist in tension with one another, and that public sector unions are unlikely to have similar effects on nonunion workers as private sector ones (Ahlquist 2012; DiSalvo 2015). Research in this vein emphasizes the tax burden for nonunion private sector workers that may result from outsized public sector union contracts. And while an earlier literature found substantial spillover effects within the public sector (Belman, Heywood, and Lund 1997; Zwerling and

Thomason 1995), none has investigated whether union power in the public sector spills over into similar occupations in the nonunion private sector. Instead, researchers tend to emphasize how public-private compensation comparisons are difficult given the unique nature – and therefore lack of comparability – of certain public sector occupations, especially the protective services (Lewin, Keefe, and Kochan 2012: 773).

Policing and fire protection are two occupations without clear private sector corollaries. But other large occupations in the government sector, such as teachers, custodians, and administrative assistants, have plenty of private sector counterparts. Are the salaries of private school teachers or custodians in private facilities affected by prevailing wages in the public sector? Especially in places where public sector unions are strong? We suggest they are, and situate public sector unions at the center of recent developments in public *and* private sector earnings, arguing that the same channels through which private sector unions may influence nonunion private sector pay should operate for public sector unions as well.

Yet a key difference between public and private sector union memberships is their gender composition (Rosenfeld 2014: Table 2.5). Unlike in the private sector, women are overrepresented in public sector unions because public sector unions concentrate in disproportionately-female occupations. Research on gender pay gaps and the public sector finds that government employment offers women an earnings premium in the U.S. (Gornick and Jacobs 1998: Table 5), with smaller overall gender pay gaps than found in the private sector (Mandel and Semyonov 2014). We argue that public sector institutions can help buttress the pay of *private* sector female earnings. Thus our analysis speaks to ongoing research on gender earnings inequality as well as institutional accounts of wage stagnation and inequality in the contemporary U.S. Researchers contend that the public sector and union employment serve as “protectionist” pockets that offer some refuge from the broader labor market that historically has disadvantaged women and racial/ethnic minorities (Laird 2017; Rosenfeld and Kleykamp 2012). We suggest that when it comes to pay for women, the “protections” public sector unions provide extend to places in the nonunion private sector where government unions are strong.

To foreshadow our results, we find substantial spillover effects among nonunion public sector workers. Our analyses of public sector unions and nonunion private sector pay reveal a robust positive relationship – but one limited to women. We also find that public sector union spillovers vary by occupation, with some of the largest effects in the public sector in fire, police, and protection and transportation occupations. Among private sector nonunion women, the largest spillover effects are among teachers, financial sales, and management-related occupations.

PUBLIC SECTOR UNIONS

With few exceptions (such as the railway industry), federal law – most notably, the National Labor Relations Act (NLRA) – governs collective bargaining in the private sector. There is no corollary federal legislation for public sector unions. Public sector unions emerged later than private sector ones, partly as a result of state-level actions granting varying degrees of license for state and local government workers to bargain with their employers. Researchers

disagree about the relative impact of these state-level policy decisions on initial public sector union growth, with some arguing that the legislation was decisive (Freeman 1986), and others suggesting that organization and mobilization among government employees often preceded and helped precipitate union-friendly state laws (Belman, Heywood, and Lund 1997; Goldfield and Bromsen 2013). But there is little debate about the contemporary correlation between public sector union power and the comprehensiveness (or lack thereof) of state laws governing collective bargaining (Farber 2005; Freeman and Han 2012). Certain states, such as North Carolina, bar collective bargaining between government employees and state agencies. Other states such as New York grant nearly all the rights private sector unions enjoy under the NLRA to their state and local employees. Today, states like North and South Carolina, where government workers enjoy few rights to bargain collectively with their employers, have public sector unionization rates 1/7th and 1/10th that of New York.

Not only do public sector unionization rates vary across states, they vary by level of government. Unionization rates in the public sector are higher at the local and state levels than they are at the federal level. Across all states and years in our data, approximately 41% of public sector workers at the local level are unionized, 29% are unionized at the state level, and 17% are unionized at the federal level.

These rates have held relatively steady across the past few decades – a period in which private sector organization rates plummeted. Why the divergent fates between public and private sector unions? The passage of union-friendly policies at the state-level signifies an employer – the government – "amenable to labor unions, and thus unlikely to fight unionization drives" (Rosenfeld 2014: 34; see also Freeman 1988: 70-72), leading to an initial upsurge in organizing campaigns across major public sector occupations such as teachers in the 1960s and 1970s. And until very recently, elected officials in states with high public sector densities have been unwilling to erode government unions' gains, unlike the concerted, sustained attack launched by employers against organized labor in the private sector.

SPILLOVER EFFECTS IN THE PUBLIC SECTOR

Much of the early research on union spillovers examines whether a union presence poses an economic threat to nonunion competitors (Farber 2005; Leicht 1989; Podgursky 1986). A strong union presence can threaten the economic well-being of a nonunion establishment in two primary ways. First, it may spark a unionization effort at the employer's plant. To avoid this outcome, nonunion employers may raise their pay and benefits packages to match union levels. This strategy was once common, with industry leaders such as Eastman Kodak monitoring and matching union pay scales closely in order to placate its nonunion workforce (Jacoby 1997). Second, a strong union presence may attract nonunion workers to the higher pay that often accompanies a union job. Narrowing pay differentials between the union and nonunion ranks should reduce the prospects of losing talented workers to an organized establishment. More recently, scholars have suggested that the potential influence of unions on nonunion pay extends beyond economic threat. Western and Rosenfeld's (2011: 517-519) broader categorization includes cultural, political, and institutional channels. Culturally, the broad "norms of economic fairness" (Ahlquist 2017: 412) a powerful labor movement may

advance should operate to the benefit of average nonunion workers. Politically, unions' push for higher minimum wages, to take one prominent example, raises the pay of bottom-rung occupations within industries. The institutional channel also helps boost wages within occupations. In 2015, New York State's Fast Food Wage Board, which included a Secretary Treasurer of the Service Employees International Union (SEIU), recommended increasing fast-food employees' pay to $15/hour, significantly raising compensation levels for the food service occupation within the fast food industry.

We suggest that the theoretical mechanisms connecting union power to nonunion government workers' pay are similar to those outlined in the private sector union literature. Threat effects, for example, should operate similarly in unorganized public sector establishments. So too should the political channel, as powerful public sector unions often lobby to raise standards among a broad range of workers, not simply those belonging to public sector unions. These various pathways through which unions boost nonunion pay in existing studies, as in the present one, are largely unobserved (although some of our supplemental models do include tests of political channels). Instead, we observe union power, proxied by public sector membership rates at the state-level, alongside workers' wages and a range of other individual- and state-level determinants of pay. What is important for our purposes is not which mechanism is most impactful, but whether we find evidence for the presence of public sector union spillovers, including among private sector workers.

Most of the existing research on union spillovers focuses on private sector dynamics. But a few studies have documented spillovers from public sector unions to nonunion public sector workers. Belman, Heywood, and Lund (1997; but see Waters et al. 1994), for example, analyze Current Population Data (CPS) for 1991 and find that a 10 point increase in a state's public sector unionization rate is associated with a 4% increase in nonunion state workers' wages. They also find substantial spillovers among unorganized employees of local governments. Zax and Ichniowski (1988) likewise find evidence that nonunion workers in municipalities with a strong government union presence earn more than similar public sector workers in municipalities without a union presence.

PUBLIC SECTOR UNIONS AND PRIVATE SECTOR WORKERS

To the extent that researchers have hypothesized about possible spillovers from public sector unions to private sector workers, the presumed effects are negative. The wage premiums and generous benefits powerful public sector unions secure, if coupled with stable (or increasing) public sector employee levels, may strain budgets and precipitate higher taxes (DiSalvo 2015). Other research counters that the moving van and ballot box help check outlandish demands by public sector unions, as taxpayers can simply relocate to less-costly environs or pressure their elected representatives to abrogate contracts (Freeman 1986; but see Bruekner and Neumark 2014). In a recent study Freeman and Han (2012) test these competing expectations by examining the fiscal impact of government unions in a state-level analysis of budget deficits and public sector union strength. Using data from 2001 to 2010, the authors find a positive relationship between public sector union density and deficits, although they stress the effect is "modest" and limited to certain model specifications (398). In a similar

analysis focused on the recessionary years of 2009 and 2010, Allegretto, Jacobs, and Lucia (2011) also estimate a modest positive relationship between government unions and budget deficits. However, including a measure of changes in housing prices renders the union effect statistically non-significant.

Even if public sector unions are not major drivers of state budget deficits, they still may not have any positive spillover effects on the largest segment of the workforce - nonunion, private sector employees. Some analysts suggest that public sector unions lack the interest or capabilities to improve the working conditions and lift the wages of unorganized private sector workers (Ahlquist 2012; Gunderson 2005). Ahlquist argues that government employee unions are incapable "of using their own position to provide an effective floor for wages and working conditions elsewhere in the economy… " and that there is not "much direct political activity by public sector unions on behalf of private sector workers" (2012: 2-7). The perception that public sector unions are self-interested rent extractors helped spark backlash among private sector nonunion workers, contributing to these unions' recent troubles in certain states (Cramer 2014). As Cramer (2016: 143) discovered in her interviews with Wisconsinites, resentment toward the state's public employees stemmed in part from the bureaucrats' connection to "greedy" public sector unions. From this perspective, then, the normative, economic, and political mechanisms through which the labor movement has been found to lift the wages of nonunion workers are limited to unions in the private sector.

We challenge this argument. We contend that public sector unions potentially influence nonunion private sector wages through similar channels as private sector unions. Take the two variations of threat effects, in which employers match union pay scales to avoid a unionization drive or to retain workers otherwise tempted by higher-paying jobs in organized establishments. While the vast majority of fulltime teachers in 2015 (over three million) work in public schools, nearly 500,000 are employed in private schools (National Center for Education Statistics 2016: Table 205.40). And while a majority of these are employed in religious schools, perhaps limiting threat effects, approximately 1/3 work for nonsectarian schools. Healthcare is another field in which there is a sizable public sector unionized workforce as well as a large number of nonunion, private sector employees. And beyond the professions, research suggests that comparatively low-paid occupations such as office assistant, janitor, and bus driver earn more in government workplaces, due in part to the contracts public sector unions are able to secure (DiSalvo 2015). There is no theoretical reason why private employers in locales with strong public sector unions would not feel threatened by a possible organizing drive or by losing employees to better-paying jobs in the public sector. After all, many unions today, including the SEIU, are comprised of mixed memberships that cross sectors. And many public sector establishments offer greater pay transparency than in the private sector, providing nonunion private sector workers with a clear benchmark for pay comparisons (Rosenfeld 2017).

Regarding the norms that a powerful labor movement may establish, here too we believe that public sector unions play a similar role as that hypothesized for private sector unions. During the fiscal-crises of the 1970s, many private employers sought to weaken public sector unions, worried about the standards these organizations were setting for workers in nonunion, private sector firms (Fraser and Freeman 2011: 95). And public sector unions

have been active players in political efforts that would benefit unorganized private sector workers. For example, in 2007, the American Federation of State, County, and Municipal Employees (AFSCME) and other public sector unions contributed to the effort to pass a living wage ordinance for big box retailers in Chicago (Hennessy 2013: 488). The National Education Association (NEA) – the largest labor union in the U.S. with nearly three million members – has lobbied on behalf of federal efforts to raise the minimum wage, including the 2014 Minimum Wage Fairness Act.[1] SEIU has been instrumental in providing the organizational and financial resources behind the "Fight for 15" campaign on behalf of low-wage workers (Andrias 2016). Much of the criticism of public sector unions as purely self-serving political organizations seems to stem from the actions of the protective services. But there are nearly as many building cleaning and pest control workers in the public sector as there are police officers. And the number of administrative and office employees working for state, local, and federal governments far exceeds the total number of firefighters in the U.S.

There is likely a difference in who benefits from a strong public sector union presence compared to a strong private sector union presence. In the private sector, once-heavily unionized occupations such as construction, transportation, and steel manufacturing are disproportionately male. In the public sector, heavily unionized occupations that lack private sector counterparts, in particular the protective services, are also disproportionately male. Heavily unionized public sector occupations with analogous private sector workers, such as teaching, nursing, and administrative assistants, are, by contrast, overwhelmingly female. According to the CPS, in 2015 over four-fifths of elementary and middle school teachers were women, as were 90% of licensed registered nurses. Thus gender segregation combined with union strength in the public sector should operate to influence the pay of female-dominated occupations in the private sector. As a result, compared to men, unorganized private sector women should benefit from a strong public sector union presence.

Another critical distinction between public and private sector unions, we suggest, is the level at which spillover effects likely operate. The interstate heterogeneity in policies regulating public sector unions suggest to us that any effects public sector unions may have on private sector wages are contained within states. Moreover, requirements and licensing for certain large public sector occupations also vary by state. Take teaching: a teacher transferring to an out-of-state district must navigate a new set of licensing rules and regulations, and, depending on the state he or she is transferring from, may have to pass an additional set of tests. Such state-specific factors likely mean that private sector employers and employees looking at public sector wages as guideposts do so within states, not across such disparate policy and regulatory contexts. Political channels through which public sector unions might influence nonunion wages are also largely bound by state or sub-state borders, such as state-level minimum wage campaigns or living wage ordinances at the municipal level.

Thus our investigation tests whether state-level public sector unionization rates affect the pay of public and private sector nonunion workers. We do not disaggregate further by occupation. This is due largely to data constraints: using our core 26-occupation measure would result in a state-by-occupation analysis with 1,326 state-occupations,[2] with cell count

[1] See http://www.nea.org/home/58968.htm.

sizes far too small to generate meaningful results in many state-occupations. We suggest that our approach is conservative, as we are not focusing our analysis on workers in the same occupation, where spillover effects are most likely to be the largest. Based on the preceding discussion, we hypothesize that public sector union density at the state-level is positively correlated with nonunion public sector pay for men and women, and with nonunion private sector wages for women.

DATA AND METHODS

We rely on various series of the CPS as the primary data source used in our analyses. The CPS is a monthly survey conducted by the Bureau of Labor Statistics of between fifty- and sixty-thousand households, and is commonly used to investigate wage trends and the role of unions given its rich set of economic and demographic variables and large samples. The CPS began asking respondents about union membership in its 1973 May survey. Our analyses begin in 1977 for two reasons. One, the CPS did not include a full set of state identifiers until the 1977 May survey. Two, the CPS altered the wording of the union question beginning in 1977, rendering comparisons with earlier years problematic, especially in analyses of public sector unions (Hirsch and Macpherson 2003: 351). We end our series in 2015 because core measures of state economic prosperity and economic growth, GDP per capita and GDP growth rates, are only available through 2015. Beginning in 1983, the CPS included its union question in the larger Outgoing Rotation Group (ORG) files. For 1977-1981 we use the May files, and for 1983-2015 we use the ORG files (we exclude 1982 data as no union question was asked in that year).

Following recent research on related topics, we limit our samples to fulltime (those working 30+ hours per week), nonunion employees with positive earnings who are not self-employed or senior managers or executives (Rosenfeld, Denice, and Laird 2016). We exclude senior managers and executives, as our focus is on wage trends among average American workers. We drop outlier earners from our samples by excluding respondents reporting hourly earnings below $1/hour or above $100/hour in 1979 dollars (Lemieux 2006). We omit allocated earners from our data since the CPS does not include union status or sector in its allocation model (Brueckner and Neumark 2014: 210). To identify allocated earners across the 1977-2015 series, we follow the procedure outlined by Hirsch and Schumacher (2004: Table 2). No valid allocation flags exist for 1994 and for three-quarters of the 1995 surveys. Given this, we exclude all 1994 data and retain only those respondents from the 1995 survey with valid allocation flags.

Constructing a real weekly wage series from 1977 to 2015 requires adjusting for inflation and top-coded values. We convert weekly wages to 2015 dollars using a hybrid deflator. We use the CPI-U-X1 for 1977-1978 and the CPI-U-RS for 1979-2015 (Baker 2007). For the results presented in the tables, we follow Lemieux (2006) and multiply the weekly wages of respondents with top-coded earnings by 1.4. In supplemental analyses we experimented with other approaches, including multiplying top-coded values by the Pareto estimates of mean earnings above the top-code provided by Hirsch and Macpherson (2017). We also modeled

[2]Fifty states plus the District of Columbia multiplied by 26 occupations is equal to 1,326.

median weekly wages, thus avoiding the need to adjust top-coded values. Both sets of supplemental analyses produced results similar to those shown and are available upon request.

Our individual-level covariates, drawn from the CPS files, include education (4-category measure), potential experience and its square[3], race/ethnicity (5-category variable), metropolitan status (3-category), region, and hours worked per week. We generate a 26-category occupation measure based on a time-consistent system developed by Autor and Dorn (2013) and Dorn (2009). We provide a full list of the occupations in the Data Appendix. Occupations with a disproportionate fraction of government employees include professionals (excluding teachers and nurses, who comprise their own categories), janitorial workers, fire / police / correctional workers (over 98% are in the public sector), and teachers. Occupations with comparatively few government workers include retail sales workers, financial sales workers, and miners (nearly all of whom are in the private sector).

Our primary independent variable is a state-level measure of public sector union density for each state-year. The numerator is the total number of public sector union members employed in a state for each year, based off of the CPS item asking respondents whether they are a member of a labor union or employee association similar to a union. The denominator represents the total number of employed public sector respondents who are not self-employed in that state per year. A major empirical challenge in estimating public sector spillover effects is the lack of temporal variation in unionization rates, at least for the years in which state-level data is available. We cannot include state fixed-effects since 94% of the variation in public sector unionization is between-state at the state-year level. For this reason, it is imperative to include a rich set of state-level covariates that may be jointly correlated with both public sector union strength and average wage levels for nonunion workers. Our models adjust for private sector density at the state-level, given the strong correlation between public and private sector membership rates (Goldfield and Bromsen 2013; Kochan 1973). If public sector union strength is correlated with a state's relative prosperity, estimates of public sector union effects on wages that lack controls for the economic health of the state will be biased. We adjust for state prosperity with measures of the percentage of residents with a BA or higher, a lagged measure of the state's employment rate, GDP per capita (in real 2015 dollars), and the GDP annual growth rate. GDP per capita should proxy for a state's general cost of living and affluence while the employment and GDP growth rates capture short-term business cycle effects (Brady, Baker, and Finnigan 2013: 879). Our state GDP measures are drawn from the U.S. Bureau of Economic Analysis. We modify their measure by excluding the labor compensation component since this is a function of our dependent variable (workers' wages).

We also control for public sector size. Existing research is mixed as to whether public sector unions raise overall government employment levels (Trejo 1991; Anzia and Moe 2015), but if unions pursue this strategy in bargaining, the greater number of employees to pay may

[3]The CPS does not ask about workforce experience, so we define potential experience as age minus years of education minus 4, approximating the potential time spent out of school. While it is more standard to define potential experience as age minus education minus 6, doing so results in a significant number of negative values given the minimum age of 16 for our sample. Using the standard measure and converting negative values to zeroes produces similar results.

translate to lower wages within the public sector. Two final state-level covariates help us adjust for the impacts of other dominant explanations for wage stagnation in the modern economy. To control for manufacturing decline associated with the opening up of global trade, we include a measure of the percentage of workers in each state in the manufacturing industry. To control for technological change and the automation of many jobs, we include an index measuring the routine task content of each occupation to adjust for that occupation's risk of automation (Autor and Dorn 2013). This index increases from 0 to 10 in the prevalence of routine tasks in each occupation.[4] We then aggregate this index to the state-level by calculating the average routine task content among all workers in each state and year.

Following recent related studies that include state-level predictors (see Bahrami, Bitzan, and Leitch 2009; Brady, Baker, and Finnigan 2013), we do not include cost of living indicators.[5] Cost of living data are not available for our full observation period. And while cost of living measures based on variation in prices for housing and goods generally overstate true cost differences, controlling for region (as we do) can serve as a good proxy for cost of living variation (Dumond, Hirsch, and Macpherson 1999). There is a lot of variation in cost of living within states, and a state-level cost of living measure would mask this variation. Finally, our models already include measures that partially capture cost of living differences. For instance, GDP and cost of living are positively correlated. At the state-year level, we calculate a correlation of .55 between GDP and cost of living. California, in 2010, ranked 11th on our measure of GDP and 8th on our measure of cost of living; other states also have similar rankings on these two measures.

We present our main set of results in Tables 2 and 3. Table 2 displays the results of models on our sample of nonunion public sector workers; Table 3 displays the results of models on our sample of nonunion private sector workers. For the models shown in the two tables, we specify standard log-linear OLS model of weekly wages. Random effects models simply reduce to the OLS since much of the between-state variation in log weekly wages is explained by between-state variation in the state-level covariates. As mentioned, models with state fixed-effects are inappropriate for this investigation given that nearly all the variation in public sector union strength is cross-state.

The OLS models provide coefficient estimates of public sector union effects on nonunion wages. The next stage of our analysis involves translating these effects into dollar magnitudes. Generating predictions from standard log-linear models requires deciding on an appropriate smearing factor to retransform the dependent variable, and there is no consensus regarding what smearing factor is preferable (Rosenfeld, Denice, and Laird 2016: 31). To

[4]We explored two additional ways of operationalizing the risk for automation, and obtained substantively similar results across specifications. First, to address the concern that some occupations have high values on more than one type of task, we created a measure of routine task intensity by subtracting the natural log of both manual task content and abstract task content from the natural log of routine task content. Second, we calculated a measure of routine employment share, defined as the proportion of workers in a given state who work in an occupation in the top third of routine task intensity. See Autor and Dorn (2013: 1570-1573) for additional details on the construction of these measures.

[5]We also omit a right-to-work (RTW) indicator from our main analyses. In supplemental tests that include a RTW dummy and a RTW x public sector union strength interaction term we find that the presence or absence of RTW legislation in a given year is not significantly related to the wages of nonunion public and private sector workers, nor does controlling for RTW legislation affect the relationship between public sector unionization and workers' wages.

generate predicted values in level form, we re-estimate GLM versions of the models from Tables 2 and 3 specifying a log-link and gamma distribution family (Kleykamp 2013; and Rosenfeld, Denice, and Laird 2016 employ a similar strategy). This approach does not require transformation of the dependent variable in the first place. Based on these GLM models, we predict wages for nonunion workers if public sector unions were as weak as private sector ones. We provide a full set of results from these models in Tables A1 and A2 of the Appendix; significance levels and signs for the coefficients of key covariates are similar to the log-linear estimates.

The final stage of the analysis involves disaggregating spillover effects by occupation. Recall we hypothesize that among nonunion private sector workers, public sector spillovers should only be found among women, given their concentration in occupations with large public sector counterparts. Teasing out the public sector union effect for each of our 26 occupations allows us to test this hypothesis. We rerun our core models from Tables 2 and 3, adding state public sector unionization x occupation interaction terms, and then estimate marginal effects of public sector unionization in each occupation. We present these effects in Figures 3 and 4; a full set of model results is available upon request.

Table 1 below displays descriptives for our key variables disaggregated by sector. Among both public and private sector nonunion workers, log weekly wages are higher for men than women. Average log weekly wages are higher among public than private sector workers, attributable to the higher education levels of public sector workers. The state-level measures, on the other hand, display little variation by sector given the high degree of aggregation to the state-level that cuts across occupations and industries. One exception is state-level public sector union density. An average private sector worker comes from a state where 36% of the public sector workforce is organized, compared to 29% and 30% public sector representation rates for public sector respondents. This likely reflects the fact that states with higher shares of its workers in the private sector also have higher public sector unionization rates and larger workforces in general. The individual-level covariates indicate the samples are disproportionately white and, among the private sector sample, evenly split between those with at least some college experience and those without. Over two-thirds of public sector workers, meanwhile, have at least some college experience. Average potential experience levels are likewise higher for public sector workers. Public sector respondents are more likely to be from the South than those in the private sector.

RESULTS

Figures 1 and 2 provide a first approximation of the relationship between public sector union strength and nonunion wages. Figure 1 shows public sector unionization rates for each state in 1977 and 2015 alongside the corresponding median log wage for public and private sector nonunion male workers; Figure 2 presents the corresponding relationships between nonunion wages and public sector unionization rates for women. In general, public sector wages are higher than private sector wages, and a comparison across the figures reveals higher wages for nonunion men compared to women. Critically, both figures reveal upward slopes between state-level public sector union strength and nonunion weekly wages. Also evident from the pictures are the relatively similar public sector unionization rates in 1977

and 2015. Finally, the picture reveals the extraordinary variation in public sector unionization rates across states in both years, ranging from South Carolina, which today has a public sector unionization rate about as low as the national private sector rate, to states like New York and Connecticut, where two-thirds of government employees remain organized.

Does the positive relationship between public sector unions and public sector nonunion wages remain after adjusting for our set of state- and individual-level correlates of pay? We present our model results in Table 2 below. State-level controls include public sector size, state GDP and GDP growth, state employment rates, the proportion of each state with at least a BA degree, the proportion of workers in manufacturing, and the proportion at risk of automation. These state-level measures help differentiate the relationship between government unionization and nonunion pay from other key explanations for wage trends in the public and private sectors. We also adjust for private sector union strength at the state-level to ensure that any public sector spillover effects are not simply proxying for the strength of private sector unions. All models also adjust for common individual-level correlates of wages, including race, sex, education, and hours worked per week. We estimate standard log-linear wage models with standard errors clustered by state, and include region identifiers.

The model results provide evidence of significant spillover effects among nonunion women and men in the public sector. Other state-level measures positively related to nonunion public sector pay include GDP, average education levels, and, for men, the risk of automation.[6] GDP growth is negatively associated with weekly wages in both models, consistent with related research that finds GDP growth is positively associated with working poverty at the state-level in models that also control for GDP levels, as ours do (Brady, Baker, and Finnegan 2013: Table 1). There are a few possible explanations for the finding. Wages may be a lagging indicator of an improving state economy, and indeed lagging the growth measure by five years results in a non-significant relationship. Also, in recent decades much of the benefits of economic growth have been captured by top-end earners, as reflected in research finding that state-level economic growth is positively related to inequality (Frank 2009). Finally, our measure of GDP growth is dominated by capital income, and in the contemporary period the share of capital income has increased at the expense of labor income.[7] In both models, the private sector union effect is not significantly related to nonunion wages in the public sector. The individual controls operate as expected. Education, hours worked, and potential experience (although at a diminishing rate) are all positively associated with log weekly wages, while white respondents, on average, earn more than African-Americans and Hispanic public sector workers.

What does the positive association between nonunion public sector pay and public sector union strength translate to in terms of wage levels? To generate predicted wages in level

[6]In supplemental tests (available upon request) we relaxed the assumption that the effects of the state-level covariates are stable over time by including year interaction terms. We interacted each state-level covariate with either a linear or a dummy specification of year. In these models the public sector union effects remain similar to those shown in Tables 2 and 3. Additionally, models with public sector unionization x year interactions indicate that the public sector union effect is relatively stable over time, with a slight increase in the early 1980s.

[7]See https://www.cbo.gov/publication/42537 for more.

form, we re-estimate GLM versions of the models from Tables 2 specifying a log-link and gamma distribution family. (We present the full results of these models in Table A1 of the Appendix). From these models we predict wages for nonunion public sector workers if their state's public sector unionization rates were as low as their private sector rates in 2015, the last year of our data. That is, our counterfactual indicates what wages for nonunion public sector workers would be if public sector union densities were as low as private sector densities are today. We first predict mean weekly wages based on Table 2's model specification, allowing unionization to vary at the state-level as it does in the data. Second, we fix public sector unionization rates at their private sector levels in 2015, allowing all other controls to vary, and predict mean weekly wages under this counterfactual scenario. Subtracting the counterfactual wages from the predicted wages under the first scenario gives us our estimate of the size of the union effect (Rosenfeld and Kleykamp 2012; Rosenfeld, Denice, and Laird 2016 follow a similar approach). Overall, we estimate that weekly wages for public sector nonunion women would be $57 lower if each state's public sector unionization rate was as low as its private sector rate in 2015. That would translate to an annual wage loss of $2,964 for a fulltime, year-round employee. For public sector nonunion men, the counterfactual reveals that weekly wages would be $79 lower if their state's public sector unionization rate were as low as the private sector rate.

The main effects estimates of Table 2 obscure substantial occupational variation in public sector union spillovers. Figure 3 below is based on a model that replicates the specification of Table 2, but includes state-level public sector unionization x occupation interactions. (Full model results available upon request). This specification allows us to tease out the influence of a state's public sector unionization rate for each of our 26 occupations. We show the average marginal effects on weekly wages of a 10-percentage point increase in the state-level public sector unionization rate for each occupation. Among nonunion public sector women, the size of the union influence varies, ranging from non-significant effects in such occupations as health, recreational, and child service workers, to substantial positive effects among cleaning and food service workers, and administrative support employees. How substantial? For nonunion, public sector transportation workers, the model estimates that if the state's public sector unionization rate increased by 10 percentage points, average wages would increase by 5%. Similar effect sizes among women are found for mechanical workers and fire, police, and correctional employees. Interestingly, our models do not find significant spillover effects for teachers, consistent with recent related research (Frandsen 2016).[8] Results are generally similar for nonunion men in the public sector, including the non-significant effect for nonunion teachers. The largest effects are found among fire, police, and correctional employees (also consistent with Frandsen 2016), mechanical, and transportation workers.

Next we turn to testing whether strong public sector unions exert positive wage spillovers to nonunion workers in the private sector. Table 3 below displays the results. The models provide evidence that public sector unionization is associated with higher nonunion private sector wages, but only for women. Among men, the public sector unionization coefficient is

[8]No estimate was obtained for public sector women miners, since there is only 1 in our sample.

not significant. In both models, the private sector union effect is not significantly related to nonunion wages, indicating that the effects of private sector unions on nonunion pay previously established at the industry-region level (Western and Rosenfeld 2011; Rosenfeld, Denice, and Laird 2016) do not extend to a state-level analysis, at least according to this specification.[9] Other state-level covariates that are significantly related to average nonunion private sector wages include our measures of a state's economic health, and, in the model for men, the proportion of a state's workers at risk of automation. GDP per capita and the proportion of the state with at least a BA are associated with higher average wages for nonunion private sector workers. Our measure of economic growth is negatively associated with nonunion pay, similar to Table 2's models. The individual-level controls again operate as expected.

Next we repeat the counterfactual exercise described above, except on our sample of nonunion private sector workers. Full results from this GLM model are presented in Table A2 of the Appendix. We only estimate the counterfactuals for women, given the lack of a significant relationship between nonunion private sector wages and public sector union densities for men (in both our log-linear and GLM-level specifications). Overall, we estimate that weekly wages for private sector nonunion women would be $31 lower if each state's public sector unionization rate was as low as its private sector rate in 2015. That would translate to an annual wage loss of $1,612 for a fulltime, year-round employee.

As the final stage of our analyses, we estimate public sector unionization x occupation interaction models on our sample of nonunion private sector workers. We present the marginal effects for each occupation in Figure 4 below. As shown in the figure, among women the spillover effect is largest among financial sales, management-related, technical support, administrative support, and retail sales occupations.[10] Notable as well is the significant, positive spillover effect for nonunion, private sector teachers. For each of these groups of workers, a 10 point increase in their state's public sector unionization rate is predicted to increase their weekly pay by approximately 2-3%. Recall from Table 3 that state-level public sector unionization is only significantly related to nonunion, private sector wages among women. The right-side of Figure 4 presents the predicted effects for men in our 26 occupations. The vast majority of the union effects cluster around 0, with the exceptions of financial sales and management-related occupations.

Among nonunion private sector workers, teachers, administrative support, retail sales, and management-related occupations are dominated by women, while the gender balance is more evenly split in financial sales. Men disproportionately comprise technical support occupations. Somewhat surprisingly then, it is not the case that public sector union spillovers to the private sector are restricted solely to female-dominated occupations. In a few gender-balanced or male-dominated occupations, women (and men in financial sales and management-related positions) benefit from a strong public sector union presence.

[9] In models with state fixed-effects, the private sector unionization coefficients are positive and significant for men.
[10] While the largest point estimate is fire, police, and correctional workers, the 95% confidence interval crosses zero due to small sample sizes for that particular private sector occupation.

DISCUSSION AND CONCLUSION

Using data from 1977 to 2015 on millions of public and private sector employees, our analyses reveal sizable spillover effects from public sector unions to unorganized workers. Our first set of analyses finds significant spillovers for unorganized men and women in the public sector. We estimate that average weekly wages would be $57 (for women) and $79 (for men) lower if public sector unions had suffered the same fate as private sector ones. Our second set of analyses represents the first tests of public sector spillover effects to private sector workers. We find evidence that the boundaries of "protected" segments of the labor market extend into less protected realms: a strong public sector union presence is associated with higher pay for nonunion, private sector women. Counterfactuals reveal that nonunion private sector women would earn, on average, $31 less per week if public sector memberships were at their current private sector rate. Nonunion women in such occupations as teaching, financial sales, and management related occupations benefit the most from a strong public sector union presence in their state.[11]

As with any investigation of such scope, shortcomings remain. Future research, especially of the historical and qualitative variety, should seek to distinguish analytically the various channels through which unions help raise nonunion pay. Large-scale employee-based datasets like the CPS do not allow us to differentiate economic from norm-based mechanisms, especially given the lack of employer information in the surveys. In supplemental analyses (available upon request) we did model various political covariates to see whether they moderated the relationship between public sector union strength and nonunion pay. These variables included a measure of the state's NOMINATE score for each year, obtained from Berry et al. (2010), and an annual 5-category measure of the partisan balance of the state legislature, obtained from Jordan and Grossman (2016).

The NOMINATE variable captures the conservative or liberal ideological leaning of each state's legislature, while the partisan balance variable indicates which party controls one or both chambers (for bicameral state legislatures) of the legislature. Neither measure is available for all years of our analyses, and in truncated versions of our state-level models neither one is significantly related to nonunion public or private sector wages.[12] Nor does their inclusion alter the relationships between public sector union strength and pay. We do not view these results as dispositive proof that unions' influence on nonunion pay does not operate through political channels - research that concentrates on other levels of analysis, including unions' roles in local politics, is needed (see Moe 2006 for one example). What these supplemental results do indicate to us is that economic and normative channels are likely the largest drivers of our findings in both sets of analyses.

Future analyses that are able to distinguish between the various spillover channels can also answer a question emerging from our analyses of public sector union effects on nonunion

[11]An examination of detailed occupations within the categories of management-related reveals that a sizable fraction are analysts of various sorts, including auditors and accountants. Among financial sales, the majority of nonunion private sector women are retail sales supervisors.

[12]Given the correlation between these measures, we entered them individually as well as together. In no case was either one significantly related to worker pay.

private sector workers. As hypothesized, these effects are significant for women but not for men (Table 3). This stems, in part, from the greater fraction of women in large public sector occupations such as administrative support and teaching that have sizable private sector corollaries (Figure 4). What remains unresolved is why, in certain occupations such as teaching, unorganized private sector men do not seem to benefit from public sector union strength but women do. After all, while women dominant the teaching ranks, there are plenty of men teaching at public and private schools.

Another limitation lies in the CPS's union membership question. Beginning in 1977, the CPS added the phrase "employee association," to its question and likely thereafter picks up some workers who belong to professional employee organizations that are related to, but distinct from, traditional labor unions (Hirsch and Macpherson 2003: 351). Another important next step for researchers would be to move beyond the CPS (as well as any other currently publicly available datasets) when analyzing public sector union effects in order to differentiate labor union spillover effects from the effects of other types of professional organizations.

Any investigation into public sector unions must confront the analytical limitation presented by a lack of over-time variation in organization rates (Anzia and Moe 2015: 121). What this means for our investigation is that we can only capitalize on inter-state variation in public sector unionism. Our models adjust for the effects of dominant rival explanations for wage trends, but there may be unobserved state characteristics that correlate with public sector union strength and nonunion pay. Here recent developments in states like Wisconsin – while disastrous from the perspective of public sector unions – offer researchers an opportunity to home in on intra-state, cross-time changes in public sector union strength. A supplemental test of wage patterns among private sector nonunion workers in Wisconsin and neighboring Minnesota reveal diverging trends. We estimate a comparative interrupted time series model that compares wage trends for private sector nonunion women in the two states before and after Wisconsin's passage of Act 10 in 2011, which limited collective bargaining for most public employees. (A fUll set of results is available upon request). Average wages in both states held fairly flat through 2010; both states saw their wages decline in 2011, but while wages in Minnesota rebound through 2015, wages in Wisconsin have remained flat. But more time needs to elapse and more states need to undergo substantial shifts in public sector union memberships before a comprehensive test that focuses on both inter- *and* intra-state change is possible.

Finally, the pay benefits for nonunion workers of a strong public sector union presence should be weighed against any negative impact public sector unions have on employment levels. A higher tax burden precipitated by government unions' generous contracts may lower private sector employers' incentives to expand, hurting employment rates in states with strong public sector unions. Our samples are necessarily constrained to respondents non-missing on sector and occupation. As a result, of those not currently working, we capture only those who do report a sector and occupation (likely from their prior job). Still, in supplemental tests (available upon request) we ran a series of logistic models of employment for private sector nonunion workers. We find no significant association between public sector union strength and the likelihood of employment for private sector nonunion

women. Among men, however, the relationship is significant, and negative, although the effects are substantively small. Future research utilizing a broader employment measure should further investigate this potential wage-employment tradeoff.

Limitations aside, our results broaden our understanding of organized labor's reach in supporting the paychecks of nonunion Americans by revealing the robust relationship between public sector union power and nonunion pay for men and women in the public sector and women in the private sector. Ongoing attacks on public sector unions threaten to remove this buttress. Speaking of the concerted efforts to cripple public sector unions in the immediate aftermath of the Great Recession, Freeman and Han write that "The 'war on public sector collective bargaining' was the most widespread and substantive attack on collective bargaining in the US since the 1930s' battles in the private sector" (2012: 387). Six years on, the war continues with no end in sight. At the federal level, the Supreme Court's decision in Janus v. AFSCME has made the entire public sector "right-to-work," allowing government employees covered by union contracts to opt out of paying union dues (Liptak 2017). At the state level, in Texas the governor demanded – and the Senate passed – a bill banning automatic dues deduction from most public sector union members (Pollock 2017). And at the municipal level, the reduction in funding from state capitals to heavily-unionized cities like Chicago has pit unions representing government workers against cash-strapped mayors, often leading to union concessions and employment cuts (Miller 2017).

The consequences of losing this war are usually depicted as limited to the economic standing of public sector unions and their members, or, less frequently, to the health of the Democratic Party. What our analyses demonstrate is that the impact would reach wider. While public sector union memberships are high relative to rates in the private sector, compared to our peer nations, they are actually quite low. In Canada, for example, over two-thirds of the public sector is organized.[13] In the U.S., two-thirds are not. What our investigation makes clear is that these unorganized workers benefit from a strong public sector union presence. As this presence declines, so too should the economic standing of the millions of government employees who do not belong to a labor union.

Meanwhile, the unorganized private sector is the largest segment of the contemporary workforce. Nonunion, private sector women's wages have grown substantially from the late-1970s onward, helping to cushion the impact of flat wages for those households with a male and female wage earner. While this growth has various causes, the second part of our empirical analyses suggests steady public sector union strength helped support the economic standing of nonunion women in the private sector. If Governor Scott Walker's successful attacks on public sector workers in Wisconsin are a harbinger of a broader retreat for public sector unions, this support will collapse, and, perhaps along with it, the upward trend in pay for nonunion women.

[13]See http://www.statcan.gc.ca/pub/11-630-x/11-630-x2015005-eng.htm.

DATA APPENDIX

Below we list all covariates and values used in the models. We exclude upper-level managers and executives, the self-employed, and respondents missing on occupation from our samples. Samples limited to respondents aged 16 to 64.

State public sector unionization: a weighted proportion of public sector workers in each state and year who belong to a union.

State private sector unionization: a weighted proportion of private sector workers in each state and year who belong to a union.

State lagged employment rate: a weighted proportion of individuals who are employed; measured by state and year, and lagged by one year.

State GDP: the total of 3 components (gross operating surplus, taxes on production and imports, and subsidies) of each state's Gross Domestic Product per capita (Bureau of Economic Analysis), measured in $10,000 and in constant 2015 dollars.

State GDP growth: the year-to-year change in each state's GDP.

State proportion with at least a BA: a weighted proportion of individuals in each state and year who have completed at least 4 years of college.

State proportion in manufacturing: a weighted proportion of workers in each state and year who work in the manufacturing sector (the manufacturing of durables, nondurables, and transportation equipment).

State risk of automation: an index increasing from 0 to 10 as the task content of an occupation rises (Autor and Dorn 2013); we aggregate this index up to a weighted average by state and year.

Race/ethnicity effects (5): white (ref.), African-American, Hispanic, other, missing.

Potential experience

Potential experience^2

Education effects (4): less than high school (ref.), high school or equivalent completion, some college (but less than 4 years), at least 4 years of college.

Weekly hours worked

Metro effects (3): resides in a metropolitan area (ref.), resides outside a metropolitan area, missing.

Region effects (4): northeast (ref.), north central, south, west.

Occupation fixed-effects: (1) management-related; (2) professional specialty; (3) technicians and related support; (4) financial sales and related; (5) retail sales; (6)

administrative support; (7) firefighting, police, and correctional institutions; (8) farm operators and managers; (9) other agricultural and related; (10) mechanics and repairers; (11) construction trades; (12) extractive; (13) precision production; (14) machine operators, assemblers, and inspectors; (15) transportation and material moving; (16) housekeeping and cleaning; (17) protective service (security guards, crossing guards, etc.); (18) food preparation and service; (19) health care support; (20) building and grounds cleaning and maintenance; (21) personal appearance; (22) recreation and hospitality; (23) child care workers; (24) miscellaneous personal care and service; (25) nurses; and (26) teachers. These occupation codes are based on a system developed by Autor and Dorn (2013; see also Dorn 2009) that reconciles changes made to the Census occupation classification scheme over time.

Year effects (37): 1977 (ref.) through 2015.

Table A1.

Effects of state unionization on weekly wages for fulltime, nonunion workers in the public sector, GLM models, 1977-2015

	Men	Women
State-level measures		
Public sector unionization	.314*** (.077)	.290*** (.066)
Private sector unionization	.295 (.204)	.409* (.200)
Proportion of workforce in public sector	.442 (.232)	.444 (.252)
Lagged employment rate	.179 (.592)	−.041 (.527)
GDP	.058*** (.015)	.052*** (.012)
GDP growth	−.179*** (.028)	−.116** (.039)
Proportion with at least a BA	1.019*** (.186)	1.042*** (.169)
Risk of automation	.152* (.067)	.097 (.068)
Proportion in manufacturing	−.140 (.163)	−.034 (.189)
Individual-level controls		
Race (ref.=white)		
Black	−.136*** (.014)	−.056*** (.013)
Hispanic	−.080*** (.021)	−.073*** (.015)
Other	−.033* (.016)	.003 (.017)
Missing	−.020 (.017)	.002 (.013)
Experience	.046*** (.001)	.026*** (.001)
Experience squared	−.001*** (.000)	−.000*** (.000)
Education (ref.=less than HS)		
HS	.140*** (.006)	118*** (.010)
Some college	.232*** (.008)	.188*** (.012)
At least 4 years of college	.476*** (.013)	.455*** (.013)
Hours worked per week	.015*** (.000)	.022*** (.001)
Metro (ref.=in city)		
In rest of SMSA	−.145*** (.009)	−.131*** (.009)

	Men	Women
Not in SMSA	−.097*** (.013)	−.092*** (.016)
Region (ref.=northeast)		
North central	.037 (.024)	.035 (.025)
South	.090*** (.028)	110*** (.030)
West	109*** (.025)	104*** (.026)
Intercept	4.274*** (.595s)	4.438*** (.573)
N	150,829	188,010
Number of parameters	86	86
AIC	15.753	15.190

Notes: Results provide GLM estimates of models in Table 2. Robust standard errors clustered by state are in parentheses. All models also include year and occupation fixed-effects. Statistical significance (two-tailed tests) is indicated by:
*** p<.001,
** p<.01,
* p<.05.

Table A2.

Effects of state unionization on weekly wages for fulltime, nonunion workers in the private sector, GLM models, 1977-2015

	Men	Women
State-level measures		
Public sector unionization	.052 (.046)	.137** (.048)
Private sector unionization	.352* (.144)	.162 (.143)
Proportion of workforce in public sector	−.305 (.178)	−.366 (.199)
Lagged employment rate	−.211 (.246)	−.335 (.280)
GDP	.080*** (.011)	.064*** (.012)
GDP growth	−.184*** (.026)	−.128*** (.021)
Proportion with at least a BA	.695*** (.125)	.866*** (.124)
Risk of automation	.187*** (.046)	.065 (.053)
Proportion in manufacturing	−.191 (.119)	−.004 (.136)
Individual-level controls		
Race (ref.=white)		
Black	−.172*** (.006)	−.080*** (.007)
Hispanic	−.197*** (.014)	−.135*** (.014)
Other	−.090*** (.009)	−.049*** (.008)
Missing	−.016** (.006)	−.004 (.011)
Experience	.041*** (.001)	.026*** (.000)
Experience squared	−.001*** (.000)	−.000*** (.000)
Education (ref.=less than HS)		
HS	.154*** (.006)	.134*** (.008)
Some college	.260*** (.008)	.241*** (.010)
At least 4 years of college	.551*** (.010)	.506*** (.012)
Hours worked per week	.021*** (.000)	.028*** (.000)

	Men	Women
Metro (ref.=in city)		
In rest of SMSA	−.096*** (.007)	−.130*** (.007)
Not in SMSA	−.036** (.013)	−.092*** (.012)
Region (ref.=northeast)		
North central	−.006 (.016)	−.009 (.014)
South	.029 (.018)	.030 (.018)
West	.065*** (.016)	.058*** (.017)
Intercept	4.694*** (.267s)	4.888*** (.294)
N	1,202,178	1,033,069
Number of parameters	86	86
AIC	15.486	14.878

Notes: Results provide GLM estimates of models in Table 3. Robust standard errors clustered by state are in parentheses. All models also include year and occupation fixed-effects. Statistical significance (two-tailed tests) is indicated by:
*** p<.001
** p<.01
* p<.05.

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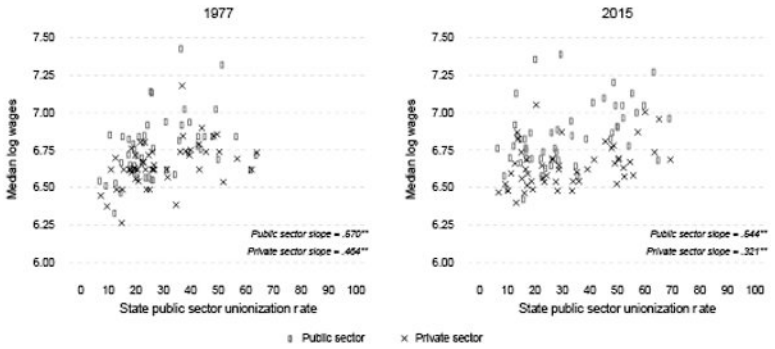

Figure 1.

State public sector unionization and non union median log weekly wages, men

Notes: Authors' calculations from CPS data. Median log wages are measured in constant 2015 dollars. Slopes refer to the β_1 coefficient from the regression equation $Y_j = \beta_0 + \beta_1 X_j$, where Y_j is the median log weekly wages for state j and X_j refers to the state-level public sector unionization rate; we estimated separate models by sector and year. Statistical significance of the slopes is indicated by: *p<.05, **p<.01, ***p<.001.

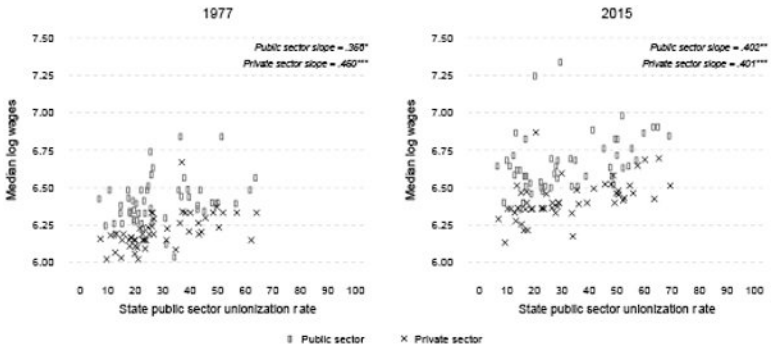

Figure 2.

State public sector unionization and non union median log weekly wages, women

Notes: Authors' calculations from CPS data. Median log wages are measured in constant 2015 dollars. Slopes refer to the β_1 coefficient from the regression equation $Y_j = \beta_0 + \beta_0 + \beta_1 X_j$, where Y_j is the median log weekly wages for state j and X_j refers to the state-level public sector unionization rate; we estimated separate models by sector and year. Statistical significance of the slopes is indicated by: *p<.05, **p<.01, ***p<.001.

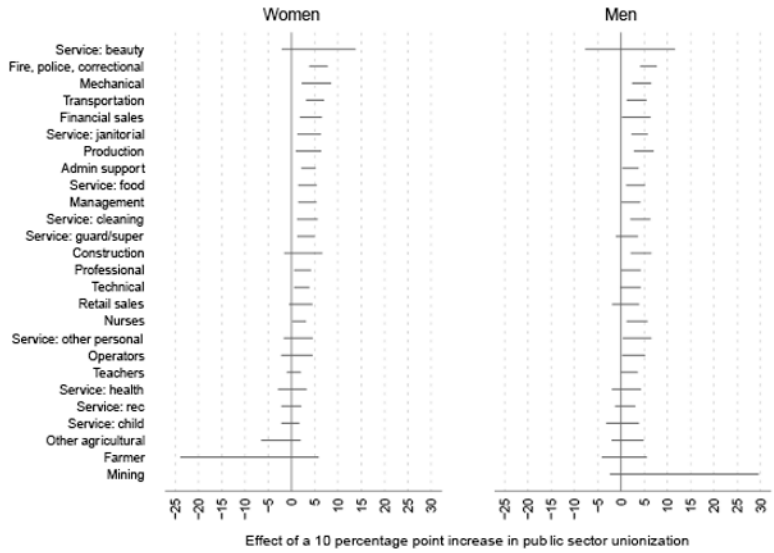

Figure 3.

Effect of public sector unionization by occupation among non union public sector workers

Notes: Figure shows the effect of public sector union strength on the weekly wages of nonunion men and women working in the public sector. Occupation-specific estimates of the relationship between public sector unionization and weekly wages are based on the models in Table 2 with the addition of occupation x public sector unionization interactions. Dots indicate the predicted percentage change in weekly wages given a 10 percentage point increase in public sector unionization, and lines represent 95% confidence intervals around those point estimates.

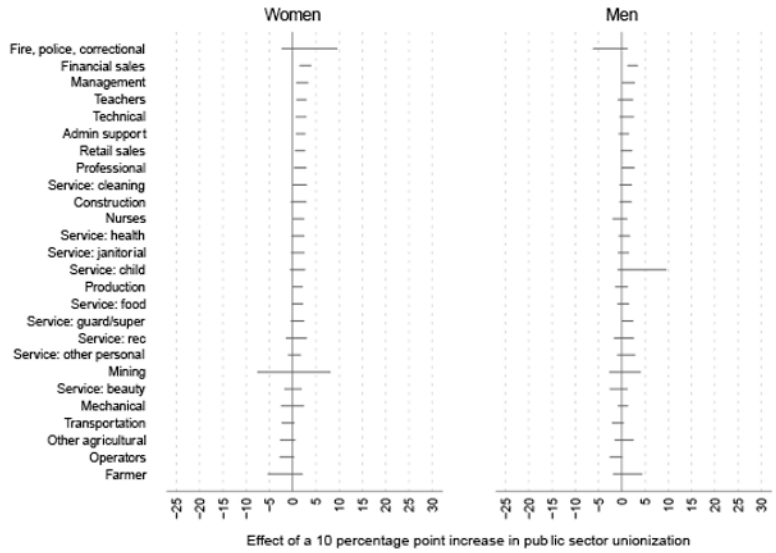

Figure 4.

Effect of public sector unionization by occupation among nonunion private sector workers

Notes: Figure shows the effect of public sector union strength on the weekly wages of nonunion men and women working in the private sector. Occupation-specific estimates of the relationship between public sector unionization and weekly wages are based on the models in Table 3 with the addition of occupation by public sector unionization interactions. Dots indicate the predicted percentage change in weekly wages given a 10 percentage point increase in public sector unionization, and lines represent 95% confidence intervals around those point estimates.

Table 1.

Descriptive statistics

	Public sector workers		Private sector workers	
	Men	**Women**	**Men**	**Women**
Log weekly wages	6.79	6.53	6.64	6.38
State-level measures				
Public sector unionization	0.30	0.29	0.36	0.36
Private sector unionization	0.09	0.08	0.10	0.10
Proportion of workforce in public sector	0.17	0.17	0.16	0.16
Lagged employment rate	0.94	0.94	0.94	0.94
GDP	1.98	2.00	2.05	2.03
GDP growth	0.03	0.03	0.03	0.03
Proportion with at least a BA	0.29	0.29	0.30	0.30
Risk of automation	4.01	4.01	4.00	4.00
Proportion in manufacturing	0.13	0.13	0.14	0.14
Individual-level measures				
Race				
White	0.74	0.71	0.70	0.72
Black	0.12	0.16	0.08	0.11
Hispanic	0.08	0.08	0.16	0.11
Other	0.05	0.04	0.05	0.05
Missing	0.01	0.01	0.01	0.01
Experience	22.42	22.24	19.42	19.90
Education				
Less than HS	0.07	0.04	0.17	0.11
HS	0.24	0.26	0.34	0.36
Some college	0.25	0.27	0.25	0.31
At least 4 years of college	0.44	0.43	0.24	0.22
Hours worked per week	42.03	40.18	42.97	39.81
Metro				
In city	0.74	0.73	0.80	0.81
In rest of SMSA	0.24	0.25	0.19	0.18
Not in SMSA	0.02	0.02	0.02	0.01
Region				
Northeast	0.10	0.09	0.17	0.18
North central	0.19	0.20	0.23	0.24
South	0.50	0.53	0.38	0.37
West	0.22	0.19	0.23	0.21
N	150,829	188,010	1,202,178	1,033,069

Notes: Data come from CPS Survey from 1977 to 2015; we rely on the CPS-May files for 1977-1981, and the CPS-merged outgoing rotation group (ORG) files for 1983-2015. Means and proportions are weighted.

Table 2.

Effects of state unionization on log weekly wages for fulltime, nonunion workers in the public sector, 1977-2015

	Men	Women
State-level measures		
Public sector unionization	.290*** (.077)	.258*** (.066)
Private sector unionization	.284 (.209)	.370 (.203)
Proportion of workforce in public sector	.440 (.239)	.401 (.261)
Lagged employment rate	.275 (.586)	−.021 (.508)
GDP	.057*** (.016)	.055*** (.012)
GDP growth	−.180*** (.032)	−.116** (.040)
Proportion with at least a BA	1.035*** (.187)	998*** (.169)
Risk of automation	.138* (.067)	.097 (.068)
Proportion in manufacturing	−.097 (.165)	−.047 (.195)
Individual-level controls		
Race (ref.=white)		
Black	−.142*** (.014)	−.059*** (.013)
Hispanic	−.088*** (.019)	−.077*** (.015)
Other	−.051*** (.015)	−.004 (.015)
Missing	−.022 (.017)	.004 (.013)
Experience	.046*** (.001)	.025*** (.001)
Experience squared	−.001*** (.000)	−.000*** (.000)
Education (ref.=less than HS)		
HS	.139*** (.006)	124*** (.011)
Some college	227*** (.008)	192*** (.012)
At least 4 years of college	.457*** (.012)	.451*** (.013)
Hours worked per week	.013*** (.000)	.021*** (.001)
Metro (ref.=in city)		
In rest of SMSA	−.142*** (.009)	−.127*** (.008)
Not in SMSA	−.092** (.014)	−.088*** (.016)
Region (ref.=northeast)		
North central	.032 (.025)	.039 (.026)
South	.082** (.030)	107*** (.031)
West	.107*** (.026)	.103*** (.026)
Intercept	4.263*** (.608)	4.472*** (.577)
N	150,829	188,010
Number of parameters	86	86
R^2	.489	.461

Notes: Robust standard errors clustered by state are in parentheses. All models also include year and occupation fixed-effects. Statistical significance (two-tailed tests) is indicated by:

*** $p<.001$

** $p<.01$

* $p<.05$.

Table 3.

Effects of state unionization on log weekly wages for fulltime, nonunion workers in the private sector, 1977-2015

	Men	Women
State-level measures		
Public sector unionization	.049 (.045)	.136** (.045)
Private sector unionization	.275 (.146)	.079 (.145)
Proportion of workforce in public sector	−.325 (.183)	−.344 (.207)
Lagged employment rate	−.084 (.245)	−.222 (.275)
GDP	.076*** (.010)	.062*** (.012)
GDP growth	−.185*** (.026)	−.129*** (.023)
Proportion with at least a BA	.726*** (.123)	.833*** (.123)
Risk of automation	.186*** (.046)	.068 (.054)
Proportion in manufacturing	−.112 (.114)	.037 (.128)
Individual-level controls		
Race (ref.=white)		
Black	−.170*** (.005)	−.076*** (.006)
Hispanic	−.199*** (.014)	−.132*** (.013)
Other	−.101*** (.009)	−.053*** (.008)
Missing	−.019*** (.005)	−.007 (.009)
Experience	.039*** (.001)	.024*** (.000)
Experience squared	−.001*** (.000)	−.000*** (.000)
Education (ref.=less than HS)		
HS	.147*** (.006)	.125*** (.008)
Some college	.243*** (.007)	.220*** (.009)
At least 4 years of college	.502*** (.010)	.459*** (.011)
Hours worked per week	.020*** (.000)	.026*** (.000)
Metro (ref.=in city)		
In rest of SMSA	−.096*** (.007)	−.124*** (.007)
Not in SMSA	−.041** (.013)	−.086*** (.012)
Region (ref.=northeast)		
North central	−.004 (.017)	−.005 (.014)
South	.021 (.018)	.023 (.018)
West	.061*** (.016)	.055*** (.016)
Intercept	4.611*** (.258)	4.864*** (.282)
N	1,202,178	1,033,069
Number of parameters	86	86
R^2	.514	.519

Notes: Robust standard errors clustered by state are in parentheses. All models also include year and occupation fixed-effects. Statistical significance (two-tailed tests) is indicated by:

*** $p<.001$

** $p<.01$

* $p<.05$.