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CORPORATE TAXES AND UNION WAGES IN THE UNITED STATES

R. Alison Felix
James R. Hines, Jr.

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ABSTRACT

This paper evaluates the effect of U.S. state corporate income taxes on union wages. American workers who belong to unions are paid more than their non-union counterparts, and this difference is greater in low-tax locations, reflecting that unions and employers share tax savings associated with low tax rates. In 2000 the difference between average union and non-union hourly wages was $1.88 greater in states with corporate tax rates below four percent than in states with tax rates of nine percent and above. Controlling for observable worker characteristics, a one percent lower state tax rate is associated with a 0.36 percent higher union wage premium, suggesting that workers in a fully unionized firm capture roughly 54 percent of the benefits of low tax rates.

R. Alison Felix
Federal Reserve Bank of Kansas City
1 Memorial Drive
Kansas City, MO 64198-0001
alison.felix@kc.frb.org

James R. Hines, Jr.
Department of Economics
University of Michigan
343 Lorch Hall
611 Tappan Street
Ann Arbor, MI 48109-1220
and NBER
jrhines@umich.edu

1. Introduction

There is lively debate over just who bears what part of the corporate tax burden. The simple fact that corporate tax payments are remitted by corporations is an institutional detail that carries no implication for the ultimate incidence of these taxes, since in a competitive market the forces of demand and supply determine the extent to which corporate tax burdens are shifted onto workers in the form of lower wages or are absorbed by capital owners in the form of reduced returns. Empirical investigation has the potential to identify the effect of corporate taxes on wages and returns to capital owners, but in practice faces daunting challenges in attempting to establish what wages and investment returns would have been in the absence of taxation.

Economic theory indicates that the incidence of a corporate tax in a competitive market is determined by the effect of the tax on marginal incentives. High rates of corporate income taxation discourage business activity by reducing returns to investment. As a result, high tax rates generally depress demand for capital and labor, thereby reducing the returns earned by workers and capital owners. Hence the distribution of corporate tax burdens between labor and capital is a function of demand and supply in relevant markets.

In settings in which some firms earn economic rents that they may share with employees and other stakeholders, high corporate income taxes affect the distribution of economic returns not only by influencing marginal incentives but also by reducing the total volume of economic rents available to be shared. This process is most evident in the case of firms with unionized workforces. Firm profitability affects the terms of negotiated agreements between unions and employers, and high tax rates generally reduce this profitability. As a result, high taxes can be expected to reduce the wages earned by unionized workers, and thereby reduce the difference between union wages and non-union wages.

This paper analyzes the rent sharing aspect of corporate tax incidence by considering the extent to which unionized workers bear the burden of corporate income taxes in the form of reduced wages. Specifically, the paper estimates the impact of U.S. state corporate income tax rates on differences between union wages and non-union wages in 2000. The evidence points to substantial tax effects: the average gap between union and non-union hourly wages is $1.88 higher in the lowest-tax states than in the highest-tax U.S. states. This difference persists in

regressions controlling for observable worker and firm characteristics, and is greater for wages in capital-intensive industries, which are the most heavily impacted by high rates of corporate income taxation. Distinguishing states by those with and without right-to-work laws, the effect of corporate taxes on union wages appears to be stronger in those without right-to-work laws, where unions have more power, and where their ability to extract rents from profitable firms is correspondingly greater.

One aspect of examining union wage premiums rather than wage levels is that state-specific factors, such as local cost of living differences and unmeasured characteristics of local labor or local firms, do not influence the resulting estimates as long as they affect union and non-union wages equally. The evidence suggests that, among firms earning economic rents that can be shared with unions, the costs of corporate taxation are likewise shared with unions. The estimates imply that if a firm's workforce is entirely unionized, then roughly 54 percent of the cost of higher tax rates is borne by union members in the form of lower wages. The paper does not directly estimate the impact of corporate taxes on non-union wages, though the estimates may carry implications for the part of labor compensation that represents rent-sharing, including any rent-sharing outside of collective bargaining agreements.

The second section of the paper discusses the incidence of corporate taxes and the effects of unionization on wages. The third section presents a framework for empirical estimation of the effects of corporate taxation on union wages. The fourth section describes the data, and the fifth section presents the results of estimating the determinants of union wage premiums. The sixth section considers issues presented by multijurisdictional firms, and the seventh section is the conclusion.

2. Corporate Tax Incidence and the Determinants of Union Wages

The effect of corporate income taxes on factor returns depends on the impact of taxes on factor demands and the extent to which firms share after-tax rents with workers. The modern general equilibrium treatment of corporate tax incidence began with Harberger's (1962) study that identifies the possibility that labor might bear the burden of corporate taxes, yet estimates that in practice corporate and non-corporate capital together bear roughly the entire burden of a corporate tax in a closed economy. Gravelle and Kotlikoff (1993) add product differentiation to

the closed economy model, finding that capital continues to bear approximately the entire burden of the tax. These models take markets to be perfectly competitive, from which it follows that labor is paid its marginal product without any opportunity for a premium.

In economies that are open to international trade and capital flows there is less scope for capital to bear the burden of corporate taxes, since domestic capital must earn the after-tax rate of return available elsewhere or else it is apt to flee. As a result, high tax rates are likely to be associated with high pretax rates of return and correspondingly reduced capital investment, which depresses labor productivity and therefore wages, effectively shifting the burden of corporate taxes onto labor. Several recent studies suggest that labor bears a substantial portion of the corporate tax burden in open economies. Revisiting the incidence of the corporate tax with an open economy model, Harberger (1995) finds that the burden of a corporate tax can be more than fully shifted onto labor in the form of lower real wages. Using a simple general equilibrium model, Randolph (2006) reports that labor bears 70 percent of the U.S. corporate income tax burden in a model in which the worldwide capital stock is fixed and the United States accounts for 30 percent of world capital. Gravelle and Smetters (2006) show that labor may bear less than 70 percent of the corporate tax burden in a model in which international trade and capital flows are impeded by imperfect substitutability of products produced in different countries, thereby rendering the economy effectively less open.

Several recent empirical studies estimate the effect of national corporate taxes on wages.[1] Hassett and Mathur (2006) analyze data on average manufacturing wages in 72 countries from 1981-2002, reporting that one percent higher statutory corporate tax rates are associated with one percent lower wages. Felix (2007) analyzes survey data for 19 countries from 1979-2002, finding that one percent higher corporate tax rates are associated with 0.7 percent lower wages after controlling for observable worker characteristics. Arulampalam, Devereux and Maffini (2007) use company-level European data to estimate the wage effects of tax burdens that differ between firms; they report that firms with greater tax obligations pay lower wages, the estimates implying that labor bears close to 100 percent of the corporate tax burden in the long run. Desai, Foley and Hines (2007) use data on U.S. outbound investment between 1989-2004 to estimate

[1] Auerbach (2006) and Gentry (2007) offer thoughtful surveys of recent contributions to the literature on corporate tax incidence.

the effects of taxation on local wages and capital returns, constraining the effects to sum to total tax burdens; the results imply that local labor bears between 45-75 percent of the corporate tax burden. Each of these studies uses different data and methodologies, yet all conclude that labor bears a substantial burden of the national corporate tax.[2]

Studies of state corporate taxes likewise point to the conclusion that much of the corporate tax burden is borne by labor. Mieskowski and Zodrow (1985) note that, in theory, a higher corporate tax should induce capital flight, thereby reducing wages in the state imposing higher taxes and increasing wages elsewhere.[3] McLure (1981) considers the impact of formulas used by states to apportion income for tax purposes, hypothesizing that the tax burden from the part of income apportioned according to labor expenses will be borne by immobile labor in the form of lower real wages. Using 1980 data on wages from 125 U.S. cities, Gyourko and Tracy (1989) estimate that one percent higher state corporate tax rates are associated with one percent lower wages. Using data from 1977 to 2005, Felix (2009) finds a smaller effect: a one percent increase in the state corporate tax rate is estimated to lower wages between 0.14 and 0.36 percent, though the magnitude of this effect appears to have increased over this sample period.

Although the empirical literature consistently finds a negative relationship between corporate tax rates and wages, the need to identify what wages would have been in the absence of taxation poses an important challenge in attempting to isolate the effect of corporate taxes on wages. Observed wages reflect many local economic and labor conditions, some of which are inevitably unmeasured and therefore omitted from explanatory variables included in empirical specifications. To the extent that important omitted variables are correlated with corporate tax rates, there is the potential for bias and therefore misleading inference. In the U.S. state context, if union and non-union workers are similarly affected by important omitted state-specific characteristics, then in comparing how their labor market outcomes are affected by taxation it may be possible to avoid this source of potential bias.

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[2] Riedel (2007) offers a rather different answer based on an analysis of the determinants of wages in multinational firms located in 15 European countries from 1996-2005. She reports that 10 percent higher tax rates are associated with 4 percent higher local wages and 1 percent lower wages paid by the same firms in other countries, attributing the difference to the incentive to incur deductible labor expenses in places where tax rates are high.

[3] Mieszkowski and Zodrow also find that state corporate taxes lower the return to capital in both taxing and non-taxing states. Consumers in the taxing state face higher prices as a result of corporate taxes but this is offset by the lower prices faced in non-taxing states.

In comparing the wages of union and non-union workers it is helpful to understand the sources of apparent union wage premiums. Freeman and Medoff (1984) report that relatively high union wages reflect both the ability of unions to exploit their bargaining positions with employers and the role of union organizational practices in contributing to labor productivity. Cross-sectional evidence consistently shows union workers to earn higher wages than apparently comparable non-union workers, though the problems posed in accurately identifying relevant worker characteristics are responsible for estimated union wage premiums that vary between 30 percent and zero.[4] The study by Hirsch (2004) uses an estimation approach that is typical of the older literature, analyzing cross-sectional data from the U.S. Current Population Survey to measure the extent to which unionization and various worker characteristics influence wages. Hirsch argues that earnings imputations and union status misclassifications biased downward previous estimates of union wage premiums; after correcting for these two problems, Hirsch reports a union wage premium of 24 percent. DiNardo and Lee (2004) use a regression discontinuity approach to compare wages in firms where unions barely won certification elections to wages in firms where unions barely lost certification elections. DiNardo and Lee report very little difference between wages in these two cases, suggesting that unions have little effect on wages and implying that the cross-sectional evidence of significant union wage premiums might reflect unmeasured worker heterogeneity in which union workers would have commanded higher wages even without unions. The literature's modal interpretation of the evidence is that the true union premium probably lies somewhere between these two extremes, near 15 percent (Hirsch 2004).

Unions are able to command wage premiums for their members only in circumstances in which employers have rents that can be shared with workers. There is ample evidence that union wage premiums are higher in more profitable firms, and moreover, that firm and industry profitability is also positively correlated with wages for non-unionized workers, suggesting that there is an important rent-sharing component to market wages.[5] Corporate executive

[4] Lewis (1986) offers a detailed review of the early union wage gap literature, and Belman and Voos (2004) provide a treatment of more recent contributions.

[5] Svejnar (1986), Currie and McConnell (1992) and Abowd and Lemieux (1993) offer evidence that union wages are higher in more profitable firms, and Christofides and Oswald (1992) and Budd and Slaughter (2004) similarly find that union wages are higher in more profitable industries. Interindustry wage studies (e.g., Dickens and Katz, 1987; Krueger and Summers, 1987, 1988; Katz and Summers, 1989; Blanchflower, Oswald and Sanfey, 1996) consistently

compensation typically includes a substantial and explicit rent-sharing component (e.g., Hall and Liebman, 1998) designed to align the incentives of managers with the interests of shareholders. Consequently union wages represent just one of potentially many channels through which owners of firms share their rents with other stakeholders.

The apparent union wage premium peaked in 1984 and subsequently trended downward (Blanchflower and Bryson, 2004).[6] Hirsch, Macpherson and Schumacher (2002) examine factors contributing to the decline in union wage premiums between 1986 and 2001, finding that 46 percent of the decline is due to changes in the union wage gap, 16 percent is due to changes in worker characteristics and 38 percent is due to sectoral shifts in employment. Belman and Voos (2004) offer evidence that the decline in union wage premiums varied across industries, and that the union wage premium actually increased in 11 (of 78) industries between the late 1970s and mid 1990s. Bratsberg and Ragan (2002) find that differences in union wage premiums between industries have fallen over time.

There is considerable evidence (e.g., Clark, 1984) that firms with unionized workforces earn lower investment returns than other firms, which is consistent with the apparent effect of unions in raising wages and thereby extracting some of the rents that would otherwise go to investors. Lee and Mas (2009) report that stock prices of newly unionized firms fall an average of 10 percent over the following 18 months, and that union vote shares in certification elections are negatively correlated with subsequent stock returns.[7] Combining the corporate tax incidence literature with the union literature suggests that state corporate taxes may affect union workers in two ways: by decreasing the wages of all workers and by lowering union wage premiums. This second effect occurs as corporate taxes reduce firm profitability which in turn leaves unions and firms with less to share.

3. Corporate Taxes and Wages

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report that wages are higher in more profitable industries, and firm-level evidence (e.g., Hildreth and Oswald, 1997, and Budd, Konings and Slaughter, 2005) indicates that wages are higher in more profitable firms.

[6] Blanchflower and Bryson examine estimates between 1973 and 2002. Estimates of the union wage premium seem to have increased in 2001 and 2002, but it is still early to know if this trend will continue.

[7] Lee and Mas use a regression discontinuity method similar to that employed by DiNardo and Lee. They reconcile the apparent difference in findings by noting that the effect of unionization on stock returns might depend on how aggressively firms and unions court voters in certification elections.

In order to estimate the impact of corporate taxes on union wages it is helpful to specify a model of the firm that incorporates union wage determination. Since labor expenses are deductible in calculating taxable income, that portion of a firm's rents that are shared with unions is not directly impacted by high tax rates. This tax treatment, in turn, has the potential to affect the kind of bargain that firms strike with unions, so it is very useful to identify the source of any tax effects on union wage premiums.

Consider the case in which a corporation produces output with a production function $Q(K,L)$, in which *K* denotes capital inputs and *L* denotes labor inputs. The specification of $Q(K,L)$ includes the possibility that the corporation has market power and therefore sells output at a price above cost; the associated rents are captured in a higher value of $Q(K,L)$. The market wage is *w*, but unionized workers in the firm have the potential to earn compensation that exceeds market wages. *R* denotes the aggregate amount by which labor compensation exceeds reservation wages, so the firm's total labor cost equals $wL + R$. The corporation is entirely equity financed with capital that is capable of earning an after-tax rate of return of *r* if deployed elsewhere. Profits are subject to tax at rate τ.

Owners of the corporation receive economic rents on their investment denoted ρ, where:

$$\rho = (1-\tau)[Q(K,L) - wL - R] - rK. \tag{1}$$

In expression (1) firms are not entitled to deduct the opportunity cost of capital from their taxable incomes, which is why taxation influences their capital input decisions. Owners of the firm choose K and L to maximize the value of ρ, subject to any constraints imposed by union bargaining, in particular the determination of *R*.

It is useful first to consider the case in which the firm negotiates with its union over the magnitude of *R* independent of the firm's total employment. In a standard Nash bargaining setup (see, e.g., Cahuc and Zylberberg, 2004, pp. 382-390), the negotiation chooses *R* to maximize ψ, in which:

$$\psi = R^{\alpha}\rho^{1-\alpha} = R^{\alpha}\{(1-\tau)[Q(K,L) - wL - R] - rK\}^{1-\alpha}. \tag{2}$$

The condition $\frac{d\psi}{dR} = 0$ implies that:

(3) $$R = \frac{\alpha}{(1-\alpha)(1-\tau)}\rho,$$

or

(4) $$R = \alpha\left[Q(K,L) - wL - \frac{rK}{(1-\tau)}\right].$$

High tax rates reduce the profits available to distribute to capital owners, whereas rents allocated to labor unions are deductible in calculating taxable income and therefore not directly affected by high tax rates. The deductibility of labor expenses reduces the cost of distributing rents to union members relative to distributing rents to capital owners, but equation (4) indicates that despite this relative price effect higher taxes reduce union rents by depressing after-tax returns. Equation (4) implies that union rents as a fraction of total labor compensation can be expressed as:

(5) $$\frac{R}{wL} = \frac{\alpha Q(K,L)}{wL} - \alpha - \frac{\alpha rK}{wL(1-\tau)}.$$

In order to evaluate (5) it is helpful to incorporate the standard effects of high tax rates in increasing the cost of capital and thereby depressing capital demand, which does not apply to the cost of labor. The firm's first-order conditions with respect to choices of *K* and *L* are given by differentiating (1), producing:

(6) $$\frac{\frac{\partial Q(K,L)}{\partial K}}{\frac{\partial Q(K,L)}{\partial L}} = \frac{r}{w(1-\tau)}.$$

Consider the case in which the firm earns inframarginal rents but its production function can be approximated by a constant returns to scale Cobb-Douglas function:

(7) $$Q(K,L) = aK^{\gamma}L^{1-\gamma}.$$

This production function together with the first order condition (6) implies that factor demands take the form $\frac{K}{L} = \frac{(1-\tau)w}{r}\frac{\gamma}{(1-\gamma)}$ and $\frac{Q}{wL} = \frac{a}{w}\left(\frac{K}{L}\right)^{\gamma}$. Applying these conditions to (5) produces:

$$\frac{R}{wL} = \alpha\left[\left(\frac{\gamma}{1-\gamma}\right)^{\gamma}\frac{a}{r^{\gamma}w^{1-\gamma}}(1-\tau)^{\gamma} - \frac{1}{(1-\gamma)}\right]. \tag{8}$$

Expression (8) indicates that union rents as a fraction of total labor compensation is a scalar function of α, the union's bargaining power, and a declining function of τ, conditional on *w*. One complication in interpreting (8) is that *w* is potentially a function of τ, since in a competitive environment higher profit tax rates generally depress wages. Equation (8) implies that:

$$\frac{d\left(\frac{R}{wL}\right)}{d\tau} = -\alpha a\left[\frac{\gamma}{r(1-\gamma)}\right]^{\gamma}(1-\tau)^{\gamma-1}w^{\gamma-2}\left[\gamma w + (1-\gamma)(1-\tau)\frac{dw}{d\tau}\right]. \tag{9}$$

Equation (9) indicates that a higher tax rate reduces the union wage premium (measured as a fraction of total compensation) if the elasticity of wages with respect to one minus the tax rate is small in magnitude: if $\frac{dw}{d(1-\tau)}\frac{(1-\tau)}{w} < \frac{\gamma}{(1-\gamma)}$.

How responsive should wages be to corporate tax rates? Consider the case in which the supply of corporate capital is perfectly elastic at the after-tax rate of return *r*, and (taxed) corporations are the only demanders of labor. Corporations earning an after-tax return of *r* must have pretax profits equal to $\frac{rK}{(1-\tau)}$, and therefore tax obligations of $\frac{rK\tau}{(1-\tau)}$. Their labor costs are *wL*. In order to maintain a positive supply of corporate capital, given its infinite supply elasticity, total costs (at unchanging factor demands) must not change as tax rates change, which requires that:

(10) $$\frac{dw}{d\tau} = -\frac{Kr}{L(1-\tau)^2}.$$

Equation (10) characterizes the extent to which wages would need to fall in order to prevent taxed corporations from incurring greater total costs as tax rates rise. Since this condition reflects aggregate economic conditions, and not the features of a single firm, the capital-to-labor ratio on the right side of (10) presumably reflects an economy average, which in turn equals $\frac{(1-\tau)w}{r}\frac{\bar{\gamma}}{(1-\bar{\gamma})}$, where $\bar{\gamma}$ is the relevant average value of γ, the share of capital in output. Making this substitution, it follows that (10) implies:

(11) $$\frac{dw}{d\tau} = -\frac{w\bar{\gamma}}{(1-\tau)(1-\bar{\gamma})}$$

In evaluating (9), it is useful to replace $\frac{dw}{d\tau}$ with $-\mu\frac{w\bar{\gamma}}{(1-\tau)(1-\bar{\gamma})}$, in which $0 \le \mu \le 1$ reflects the extent to which average wage declines offset the cost of tax increases for taxable corporations: $\mu = 1$ corresponds to a complete offset, whereas $\mu = 0$ corresponds to no compensating change in wages. Then (9) becomes:

(12) $$\frac{d\left(\frac{R}{wL}\right)}{d\tau} = -\alpha a\left[\frac{\gamma}{r(1-\gamma)}\right]^{\gamma}\gamma(1-\tau)^{\gamma-1}w^{\gamma-1}\left[1-\mu\frac{(1-\gamma)}{(1-\bar{\gamma})}\frac{\bar{\gamma}}{\gamma}\right].$$

Equation (12) indicates that if $\mu = 1$ and $\gamma = \bar{\gamma}$ then $\frac{d\left(\frac{R}{wL}\right)}{d\tau} = 0$: in a setting in which corporate taxes do not reduce profits, they also do not influence the fraction by which union wages exceed market wages. For firms in industries in which the labor share exceeds the economy average, higher taxes even increase the union premium measured as a fraction of market wages, assuming that labor bears the full cost of corporate income taxes.

A union worker receives hourly compensation of $\left(w + \frac{R}{L}\right)$, which equals $w\left(1 + \frac{R}{wL}\right)$.

Taking the union wage premium to be modest, it follows from a first-order approximation that the log of the union wage is given by:

$$\ln\left(w + \frac{R}{L}\right) = \ln w + \ln\left(1 + \frac{R}{wL}\right) \approx \ln w + \frac{R}{wL}. \tag{13}$$

An individual's wage is determined by:

$$\ln w = \beta_1 X + u, \tag{14}$$

in which X is a vector of individual, occupational, and potentially state characteristics, and u is a residual. The union premium is given by:

$$\frac{R}{wL} = \beta_2 X + \beta_3 X\tau + \varepsilon, \tag{15}$$

in which β_3 reflects the impact of using mean values of the variables appearing on the right side of equation (12) – other than the employer's capital intensity, which is the element of X that varies in this expression. It follows from equations (13)-(15) that an individual's observed wage is given by:

$$\ln\left(w + \frac{R}{L}\right) \approx (\beta_1 + D\beta_2)X + D\beta_3 X\tau + (u + D\varepsilon), \tag{16}$$

in which D is a dummy variable taking the value one for a union worker and zero otherwise. The empirical work described in section 5 estimates variants of equation (16).

4. Current Population Survey Data for 2000

The empirical work in section 5 considers the determinants of wages in 2000, a recent year at the end of a long economic expansion, for which there are copious data on wages of union members and nonmembers. Individual-level data for 2000 are available in the Outgoing

Rotation Group public use sample from the monthly Current Population Survey (CPS).[8] The CPS data are widely used in union wage studies because they provide individual-level information on both union status and wages. The entire 2000 sample contains data on more than 280,000 individuals, though cleaning and restricting the data for analysis leaves 57,426 individual records. The sample is restricted to full-time private sector workers between ages 20 and 65, inclusive, and excludes students, self-employed individuals, and those who work in agriculture.

The goal of the analysis is to understand the determinants of the hourly wage rate, which is calculated by dividing weekly earnings by usual hours worked per week. As displayed in Table 1, the median hourly wage is $13.54. The CPS imputes earnings for about 30 percent of the sample. As Hirsch (2004) shows, including individuals with imputed earnings leads to a downward biased estimate of the union wage gap. Using 2001 data, Hirsch finds that excluding individuals with imputed earnings increases the union wage gap estimate by five percentage points. Consequently, individuals with imputed earnings are excluded from the analysis, as are individuals who report earning less than $5.00 per hour, reflecting (with allowance for rounding error in reporting) the federal minimum wage of $5.15. In addition, the CPS assigns a top code to weekly earnings over a specified value. Following the *rule-of-thumb* as described by Burkhauser, Feng and Jenkins (2009), top coded earnings are assigned a value equal to 150 percent of the top code value in the analysis.

Another important individual variable is union status. An individual is classified as a union member if they identify themselves as a union member or if they are covered by a union contract. Eleven percent of individuals in the sample are union members, and as expected, union members on average earn more than non-union members. The median wage is $16.25 for union members and $13.06 for non-union members. Union members are older than non-union members, and a higher percentage of union members are male.

[8] The Current Population Survey is a monthly household survey that started in 1968. Households are interviewed in four consecutive months, ignored for eight months and then interviewed again the next four months. Each household is asked about union status and weekly earnings during their fourth and eighth interview. Therefore, we restrict our sample to these interviews which are termed the "Outgoing Rotation Group". The National Bureau of Economic Research (2000) provides extracts of the CPS data that include only individuals in these outgoing rotation groups.

The CPS data include several demographic characteristics that are typically correlated with wages. The regressions that follow include controls for age, age-squared, gender, race, marital status, and years of education. The regressions also include dummy variables for residence in a metropolitan area, employment by a non-profit firm, occupation dummies, and in some specifications industry dummies. Occupation dummies are defined using a 2-digit detail occupation recode provided by NBER (2000) based on the 2000 Census occupation codes; the sample includes 22 occupations.[9] Industry dummies are based on an NBER (2000) created 2-digit NAICS-based detailed industry classification code, and distinguish 46 industries.[10]

The analysis focuses on the effect of state corporate taxes, using the highest marginal state corporate tax rate and adjusting for deductibility of federal corporate taxes.[11] The mean state corporate tax rate is 6.3 percent. Some of the analysis that follows compares labor market outcomes in states with very low taxes from outcomes in states with very high taxes, where low-tax states are those with top marginal corporate income tax rates of four percent or lower, and high-tax states are those with tax rates greater than or equal to nine percent. The top marginal state personal income tax rate and the general sales tax rate are also frequently included as controls. The CPS data do not indicate state of employment, so tax rates are attributed according to state of residence, which introduces some measurement error in cases in which people live in one state and work in another.

Right-to-work laws have the potential to influence union bargaining outcomes by permitting those who are not union members to work in unionized firms; right-to-work laws are generally thought to weaken the power of labor unions. In 2000, 21 states had right-to-work laws (United States Department of Labor, 2009).

Theory predicts that an employer's labor-to-capital ratio influences any tax effects on union wages, since corporate taxes are more burdensome in capital-intensive industries. Industry

[9] There are a total of 23 occupations in the data, but the private sector restriction excludes those who work for the armed forces.
[10] There are 50 industries in the dataset in 2000, but those who work in agriculture, private households, public administration and armed services are excluded from the sample.
[11] The highest marginal corporate tax rate is available from several sources including the Tax Foundation (2009) and the World Tax Database from the Office of Tax Policy Research (2009). In 2000, five states allowed complete or partial deductions for federal corporate taxes; the state tax rate is correspondingly adjusted following the formula provided in Chirinko and Wilson (2008).

labor-to-capital ratios are calculated from tax return data reported by the Internal Revenue Service (2000) by dividing salary and wages by total assets. This measure varies by industry and ranges from a low of 0.01 in the management of companies and enterprises industry to a high of 0.87 in the health care services (excluding hospitals) industry.

5. Evidence on Corporate Taxes and Union Wages in 2000

A first pass at the CPS evidence reveals a strong negative association between state corporate tax rates and union wage premiums. Figure 1 depicts median hourly wages for four samples of workers: unionized and non-unionized workers living in two groups of states: those with very high tax rates and those with very low tax rates. For this purpose, high-tax states are those with corporate tax rates of nine percent and higher, whereas low-tax states are those with corporate tax rates of four percent or lower. As the figure illustrates, the difference between median wages of union members and non-union members is significantly larger in low-tax states than is the same difference in high-tax states. A similar difference appears when mean wages are used in place of median wages, as is apparent in the underlying data reported in Appendix Table A1.

The theory sketched in section 3 predicts not only that union wage premiums should be higher in low-tax states, but that the effect of taxation should be most pronounced among workers whose firms have low ratios of labor-to-capital. This is entirely sensible, since the corporate tax is a tax on capital, and therefore most heavily impacts firms for which capital costs represent higher fractions of their total costs. Figure 2 repeats the exercise depicted in Figure 1, this time first distinguishing workers by the labor-to-capital ratios of the industries in which they are employed.[12] The four leftmost bars in Figure 2 present median wages in industries with high labor-to-capital ratios: the difference between hourly union and non-union wages is substantial ($2.54) in low-tax states, and nonexistent in high-tax states. The four rightmost bars in Figure 2 present median wages in industries with low labor-to-capital ratios. In this comparison, the union wage premium is considerably larger in low-tax states than in high-tax states, the

[12] Appendix Table A2 presents variable means and medians distinguished by state tax rates and industry labor-to-capital ratios. It is noteworthy that some of the union cells depicted in Figure 2 have small numbers of observations, so there may be considerable sampling variability in comparisons among these cells.

difference ($4.34) greatly exceeding the corresponding difference in industries with high labor-to-capital ratios.

Table 2 presents regressions that formalize the comparisons depicted in Figures 1 and 2, in the process controlling for observable worker attributes that plausibly affect their wages. Column I of Table 2 reports estimated coefficients from a regression in which log wage is the dependent variable; the independent variables include worker characteristics, 46 dummy variables (not reported) for employer industry, 22 occupation dummy variables, a dummy variable for non-profit employers, and a dummy variable for urban location. Reported standard errors are bootstrapped (1,000 replications) and clustered at the state level to adjust for lack of independence among observations of workers in the same states. The standard patterns appear in the coefficients reported in column I: wages are higher for union members, older workers (though the marginal effect of additional years declines with age), male workers, married male workers, Caucasian workers, those with greater years of education, and those in urban areas.

The regression presented in column II of Table 2 removes the industry dummy variables and adds corporate tax rates, the interaction of union membership and corporate tax rates, industry labor-to-capital ratio, the interaction of industry labor-to-capital ratio and union membership, the interaction of industry labor-to-capital ratio, union membership, and the corporate tax rate, and state personal and sales tax rates. The -1.1833 coefficient implies that high state corporate tax rates are associated with lower union wage premiums, while the 4.2198 coefficient on the interaction of industry labor-to-capital ratio, union membership, and the corporate tax rate implies that the effect of corporate taxes on union wages is strongest in industries with low labor-to-capital ratios, as theory suggests it should be.

Using the mean labor-to-capital ratio of 0.194 reported in Table 1, it follows from the coefficients reported in column II of Table 2 that a one percent higher state corporate tax rate (e.g., the difference between a seven percent tax rate and a six percent tax rate) is associated with roughly a 0.36 percent reduction in union wage premiums (1.1833 – 4.2198*0.194 = 0.3647). In order to judge the magnitude of this effect it is helpful to use the most recent IRS data, covering tax year 2006, which indicate that U.S. corporations had $1,170 billion of taxable income, together with salary and wage expenses of $1,720 billion. For a very large firm representing one

tenth of one percent of the corporate sector, a one percent increase in the corporate tax rate imposes a cost of $11.7 million. If the firm's workforce is entirely unionized, the aggregate union wage premium paid by the firm is estimated to fall by $6.27 million (0.003647*1,720 = 6.27), offsetting 54 percent of the cost of the tax increase.

Another way to gauge the significance of the tax effects reported in column II is to compare them to the estimated union effects. Using mean values for the corporate tax rate (0.063) and the labor-to-capital ratio (0.194), union membership increases wages by 17.8 percent (0.3063 – 1.1833*0.063 – 0.5454*0.194 + 4.2198*0.194*0.063 = 0.178), which is almost identical to the 17.5 percent union wage effect estimated without tax and labor intensity variables and reported in column I. It is possible to use the coefficients to determine the state tax rate at which union wage effects are estimated to disappear. Again setting the labor-to-capital ratio equal to its mean value of 0.194, union wages are 20.0 percent higher than comparable non-union wages in the absence of taxation (0.3063 – 0.5454*0.194 = 0.200), but then decline by 0.365 percent for every additional one percent of state taxation (1.1833 – 4.2198*0.194), which implies that union wage effects disappear at a state tax rate of 55 percent (0.20/0.365 = 0.55). Such an extrapolation goes well beyond the range over which there are any relevant data (the highest state corporate tax rate during that period was 12 percent, and only 10.1 percent after adjusting for the deductibility of federal taxes), and therefore is somewhat conjectural, but it is nonetheless reasonable to expect that a firm facing a state corporate tax rate of 55 percent together with the U.S. federal corporate tax rate of 35 percent would have very few if any rents left to share with a unionized workforce.

Column III of Table 2 reports estimated coefficients from a regression that repeats the regression reported in column II, except that it does not include the state personal and sales tax rates as independent variables. Omitting these variables has very little effect on the estimated coefficients of terms including union and tax interactions. The regression reported in column IV includes 46 industry dummy variables (and therefore omits the industry labor-to-capital ratio). The estimated coefficients on interactions between union membership and corporate tax rates are somewhat smaller than their counterparts reported in column II, though they remain statistically significant and imply a tax effect on union wage premiums that is of almost identical magnitude when evaluated at mean labor-to-capital ratios.

The regressions reported in Table 2 identify tax effects from cross-state differences in tax rates and within-state differences in capital intensities of different industries interacted with state tax rates. Table 3 presents wage regressions that abstract entirely from cross-state level differences by including a complete set of state dummies as explanatory variables. As a result, these regressions identify tax effects simply from differences in the impact of unionization, and unionization interacted with industry capital intensities, in states with differing corporate tax rates.

The first column of Table 3 presents estimated coefficients from a wage regression that includes state dummy variables but omits any tax terms. The estimated effects of demographic variables including age, gender, marital status, race, and years of education are similar to those appearing in column I of Table 2, and the effect of union membership (15.4 percent higher wages) is only slightly smaller than that (17.5 percent) obtained without including state dummy variables. Column II of Table 3 presents estimated coefficients from a regression corresponding to that presented in column II of Table 2, with the addition of 50 state dummy variables. The estimated -0.8578 coefficient on the interaction of union membership and the corporate tax rate, and the estimated 3.5582 coefficient on the union membership and labor-to-capital ratio with the corporate tax rate, are only somewhat smaller than the corresponding coefficients reported in Table 2, though together they imply that one percent higher tax rates (evaluated at the mean labor-capital ratio of 0.194) are associated with a 0.1675 percent reduction in union wages. Repeating the same exercise as before, this implies that a fully unionized workforce receives 25 percent of the benefits or costs of state tax rate changes.

The third column of Table 3 adds a complete set of industry dummy variables, which entails dropping the labor-to-capital ratio as an independent variable. The estimated tax effects reported in column III are little more than half the magnitude of those reported in column II, though the impact of the interaction of union status, labor-to-capital ratio, and state corporate tax rate is at the borderline of statistical significance. Appendix Table A3 presents estimated coefficients from regressions that do not include state dummy variables but instead include dummy variables for nine Census divisions of the country, thereby controlling for one aspect of geography while continuing to identify tax effects from cross-state variation. The four

regressions reported in Appendix Table A3 present estimated tax coefficients that are only slightly smaller than the corresponding coefficients appearing in Table 2.

The regressions in Tables 2 and 3 pool union members and other workers into the same sample for estimation purposes, imposing that the coefficients on other variables, such as age and education, are the same for the two groups. Table 4 presents regressions that relax this requirement.

The first two columns of Table 4 present regressions run separately for union members and other workers. The -0.6706 and 4.3105 coefficients in the first column of Table 4 indicate that union workers in states with high corporate tax rates receive lower wages (though this effect by itself is statistically insignificant), and that this effect is attenuated for those who work in more labor-intensive industries. The 0.6205 and 0.7422 coefficients in column II imply that a very different pattern appears among non-unionized workers.[13] Other regressors, such as age, gender, education and marital status, have similar coefficients in the regressions reported in columns I and II, with the magnitudes of the implied effects perhaps a bit smaller in the case of union workers. The regression reported in column III pools the two samples and permits the coefficients on variables such as age and gender to vary by union status. In this regression the -1.3872 and 3.9811 coefficients again imply that union wage premiums are negatively affected by high corporate tax rates, particularly in industries with low labor intensity. The estimated tax effects in this regression are larger than those implied by the regression in column II of Table 2, in which union members and non-union workers are constrained to have the same coefficients on other variables. Appendix Table A4 repeats these regressions adding a complete set of industry dummies, reporting somewhat smaller estimated tax effects.

The regressions reported in Tables 2-4 take the statutory corporate tax rate to be a measure of corporate tax burdens. In fact, states differ not only in their statutory tax rates but also in many aspects of their tax bases. These tax base differences are not easily categorized, and since tax burdens are clearly very heavily influenced by the readily measured statutory tax rates, the standard procedure of empirical researchers is to use statutory tax rate differences as indicators of relative tax burdens, understanding that these measures are likely to be imprecise.

Table 5 presents estimated coefficients from regressions that replace the statutory corporate tax rate with dummy variables indicating whether the statutory tax rate is nine percent or higher, or alternatively is less than four percent. The idea behind this replacement is to use a tax measure that is a coarse function of statutory rates and that thereby captures significant differences in tax burdens between groups of states. The estimated coefficients in the regression reported in the first column of Table 5 are consistent with those in Table 2 and elsewhere. The -0.0924 coefficient on the interaction of union membership and residence in a high-tax state indicates that union members earn lower wage premiums in high-tax states, whereas the (statistically insignificant) 0.0433 coefficient on the interaction of union membership and residence suggests that the opposite is the case for union members in states with very low tax rates. The estimated effects of labor-to-capital ratios, interacted with union membership and tax rate dummy variables, are likewise consistent with earlier regression results. The 0.0778 coefficient indicates that high labor-to-capital ratios reduce the effect of high taxes on union wage premiums, and the -0.3264 coefficient indicates that the same is true in a comparison of very low-tax states and the excluded middle states with statutory tax rates between four percent and nine percent.

Column II of Table 5 presents estimated coefficients from a regression in which the sample is restricted to residents of very high-tax states and very low-tax states; as a result, the sample size of 22,647 observations is significantly smaller than the sample of 57,426 observations used to estimate the regression reported in column I. The -0.1385 and 0.4161 coefficients together indicate that union wage premiums in the highest-tax states are lower than they are in the lowest-tax states, and that this difference is more pronounced for workers in industries with low labor-to-capital ratios. Evaluated at the mean labor-to-capital ratio of 0.194, the coefficients imply that the union wage premium is 5.8 percent lower (as a fraction of total earnings) in the highest-tax states than it is in the lowest-tax states (-0.1385 + 0.194*0.4161 = -0.0578). Hence significant tax effects on union wage premiums appear even when using a coarse transformation of statutory corporate tax rates to approximate tax burdens. Appendix Table A5 repeats these regressions adding industry dummy variables, reporting somewhat smaller, though nonetheless significant, estimated tax effects.

[13] In column II of Table 4 the interaction of the labor-to-capital ratio, union dummy and corporate tax rate is

U.S. states differ in their legal treatment of unions, the most noticeable difference being that in states with "right-to-work" laws it is not necessary to belong to a union in order to work for a firm whose workforce is unionized. It is widely understood that right-to-work laws diminish the power of unions, and thereby potentially reduce wages generally.[14] From the standpoint of analyzing the determinants of union wage premiums, reduced union power in states with right-to-work laws should correspond to significantly smaller tax effects in these states.

A first pass at the evidence is consistent with this prediction. The four leftmost bars in Figure 3 present median wages for workers in states with right-to-work laws, distinguishing those in the highest-tax states and the lowest-tax states (observations for those in states with statutory tax rates between four and nine percent are excluded in constructing Figure 3). The by now familiar pattern of higher union wage premiums in the lowest-tax states does not appear in states with right-to-work laws, very possibly reflecting the inability of unions in these states to extract any of the rents associated with low tax rates. The four rightmost bars in Figure 3 present median wages for workers in states without right-to-work laws, and here there does appear to be a difference in wage premiums ($2.81 an hour, according to the figures in Appendix Table A6) between the lowest-tax states and the highest-tax states.

Table 6 presents regressions that distinguish states by their right-to-work regimes. The first column of Table 6 presents estimated coefficients from a regression estimated using data from states with right-to-work laws. The -0.0908 coefficient on the interaction of union membership and the corporate tax rate is small and not statistically different from zero. The 4.2074 coefficient in column I suggests that union wage premiums in industries with low labor-to-capital ratios are less negatively affected by state tax rates, but this coefficient is also statistically indistinguishable from zero.

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replaced by the interaction of the labor-to-capital ratio and the corporate tax rate.

[14] After reviewing the existing literature, Moore (1998) concludes that right-to-work laws have the effect of reducing unions' organizing efforts and successes. It follows that right-to-work laws have led to a decline in unionization over the long-run. The evidence on the effects of right-to-work laws on wages is more mixed. According to Moore (1998), most empirical evidence suggests that right-to-work laws have no impact on wages. There are exceptions: Carroll (1983) and Garofalo and Malhotra (1992) report large negative effects of right-to-work laws on average wages of all workers. Farber (1984) finds that union wage premiums are slightly larger in states with right-to-work laws, interpreting this difference to reflect higher nonpecuniary costs incurred by workers who join unions in states with right-to-work laws. As a result, these workers may earn higher union wage premiums but lower rents than their unionized counterparts in states without right-to-work laws.

The second column of Table 6 presents estimated coefficients from the same regression run on data for workers in states that do not have right-to-work laws. The estimated -1.2574 coefficient on the interaction of union membership and the corporate tax rate is sizable and statistically significant, as is the 4.0229 coefficient on the interaction of these variables and the labor-to-capital ratio. Tax interactions clearly have much stronger effects on union wage premiums in data drawn from workers located in states without right-to-work laws, as should be expected from the impact of right-to-work laws on the ability of unions to demand a share of the tax savings in low-tax locations. The regression reported in column III of Table 6 pools these data and includes interactions of the union terms with a dummy variable indicating whether a state has right-to-work laws. The -1.1246 and 3.9625 coefficients in this column are quite consistent with the results reported in column II for states without right-to-work laws, as they indicate that in the absence of right-to-work laws union wage premiums are smaller in high-tax states and that this effect is most pronounced in industries with low labor-to-capital ratios. The 1.0282 coefficient on the interaction of the tax and union terms with a dummy variable for right-to-work laws implies that the effect of corporate taxes on union wage premiums largely disappears for workers in states with right-to-work laws. Appendix Table A7 repeats these regressions adding industry dummy variables, with very similar-looking results.

Table 7 presents estimated coefficients from regressions that repeat the specifications reported in Table 6, this time adding state dummy variables, and thereby controlling for wage effects of individual states and their policies. The estimated -1.0543 and 3.3553 coefficients appearing in column III of Table 7 are just slightly smaller than the corresponding coefficients in column III of Table 6, and imply larger tax effects on union wage premiums for firms with mean labor-to-capital ratios, thereby suggesting that the estimated tax effects in Table 6 reflect something other than general wage effects that differ across states.

The evidence presented in Figure 3 and Tables 6 and 7 points strongly toward heterogeneous effects of taxation on union wage premiums, in which the effects of taxation greatly diminish in places where unions have reduced power due to the underlying legal regime. This consideration suggests that it could be important to include right-to-work laws as explanatory variables in the regressions reported in Table 2. Table 8 presents estimated coefficients from additional specifications of the regressions appearing in columns II and IV of

Table 2, this time adding dummy variables for right-to-work laws, and, in the even-numbered columns, an interaction of this dummy variable and a dummy variable for union membership. As is evident from the table, the estimated tax effects are similar to the corresponding estimates that appear in Table 2. Thus, despite the importance of right-to-work laws in affecting the influence of taxation on union wages, explicit treatment of this consideration does not change the prior pattern that union wage premiums are higher in states with low tax rates.

6. Multijurisdictional Firms

The analysis to this point concerns the effects of corporate taxes on firms located entirely within individual states. It is useful to consider how the analysis might be modified in cases in which firms span several states. There are at least two potentially significant consequences of having operations in multiple states. The first is that the taxation of multistate firms differs from the taxation of firms confined to single states: the amount of a multijurisdictional firm's income taxed in each state is determined using formulas that apportion the firm's national income based on the fraction of its sales, employment, and capital located in the state. The second potential consequence of multistate operation is that labor bargains struck in one state might affect contract terms elsewhere.

Firms with unitary operations in multiple states do not use separate accounting to determine how much taxable income is earned in each state; instead, they use simple formulas that apportion national income to a state based on the state's fraction of total sales, employment and capital located within the state.[15] States differ in their reliance on alternative factors to apportion national income, and these components of the apportionment formulas interact with tax rates to create burdens that differ among states. Some states apportion taxable income based one-third each on sales, employment, and capital, though more commonly half of the apportionment is based on the location of sales, one quarter on employment, and one quarter on capital – and other formulas are also used.

[15] Operations are unitary only if they have sufficient connection to each other. Thus, a national petroleum company with centralized management, procurement and distribution as well as service stations in all 50 states would use formulas to calculate its taxable income in each state, whereas a New Jersey electronics firm that also owns restaurants in Hawaii would not: that firm would pay tax on its electronics income to New Jersey, and its restaurant income to Hawaii. Gordon and Wilson (1986), Goolsbee and Maydew (2000) and Anand and Sansing (2000) consider the effects of state apportionment formulas on factor demands and the resulting incentives for states to adopt differing formulary weights.

The use of formulary methods to apportion taxable income discourages firms from configuring their operations in ways that would attribute high levels of income to high-tax states. In particular, there is a tax cost associated with paying high union wage premiums in high-tax states whose apportionment formulas place significant weight on labor factors, since the labor portion of the apportionment formula assigns taxable income based on labor compensation, inclusive of union premiums. A high union premium therefore has the effect of attributing greater taxable income to the state, which is costly to the extent that the state has a high corporate tax rate. As a result, bargaining between employers and unions will tend to produce smaller union premiums in states with high tax rates and significant labor shares in apportionment formulas, and this is in addition to the effect of high tax rates (together with the interaction of factor weights in apportionment formulas and the location of sales, employment, and capital) in reducing the surplus available to distribute to union members. The Appendix amends the model of section 3 to consider the implications for a firm with unitary operations distributed across 50 states, and whose state tax obligations are therefore determined by formulas, concluding that the relevant state tax variable becomes the product of the state tax rate and one minus the sales share in the apportionment formula.

It is not known what fraction of corporate income is earned by firms with unitary multistate operations whose state taxes are therefore determined by formulary apportionment. In the extreme case in which all firms are subject to formulary apportionment, it is appropriate to modify the state tax variable in the regressions by multiplying it by one minus the sales factor weight. Table 9 presents the results of re-running the regressions reported in columns II-IV of Table 2 using this modified tax variable. The results of the two specifications are very similar, though the estimated tax effects reported in Table 9 are larger in magnitude than the corresponding effects in Table 2, reflecting that the modified tax variable has a smaller mean due to the sales factor adjustment. The -1.5953 coefficient reported in column I indicates that higher state corporate tax rates (adjusted for sales apportionment) are associated with lower union wage premiums, and the 6.2956 coefficient indicates that this effect is most pronounced in industries with low labor-to-capital ratios. Columns II and III report estimated coefficients from regressions that omit personal and sales taxes, and add industry dummy variables, without changing the qualitative nature of the results. Consequently the empirical pattern evident in the

Table 2 regressions likewise appears when using a tax variable modified for firms with state tax obligations determined by formulary apportionment.

Firms with operations in multiple states may have national unions that demand common compensation packages despite differences across states in costs of living, workforce characteristics, and state taxes. Strict adherence to common contracts should have the effect of reducing, or for some firms eliminating, the impact of state taxes on local union wage premiums. Multistate firms whose employment is concentrated in individual states are likely to offer union contracts that reflect those states' tax features, and the employee data will reflect that pattern, since the bulk of the observations of a firm's employment will be those of employees whose state of residence matches the state whose tax policies influence wages the most. Furthermore, firms facing such national contracts have incentives to undo their effects with selective hiring, choosing to employ only those workers generating the most surplus in states where the associated after-tax cost is the highest, and more generally choosing to concentrate operations in states where the common employment contract restriction is least burdensome. Thus, while the existence of national union contracts will mitigate the impact of state taxes on local union wage premiums in some cases, the ability of employers to choose their locations and their employees, together with the natural concentration of firm activity in individual states, implies that there should remain a significant effect of state taxes on local union wage premiums.

7. Conclusion

High corporate income taxes reduce the after-tax profits of firms earning rents, which are the same firms that are in positions to pay above-market wages to their employees. Since high taxes mean that there is less for everyone, it can hardly be surprising that high taxes ultimately depress union wages, particularly in capital-intensive industries where corporate taxes have the most impact on a firm's bottom line.

The evidence that high tax rates reduce union wage premiums does not directly address the impact of corporate taxes on wages for the majority of U.S. workers who are not union members. In the case of perfectly competitive labor markets, the incidence of the corporate tax depends on how the tax affects demand for labor, which in turn is a function of the effects of taxation on labor-capital substitution and the reallocation of economic activity between sectors of

the economy. But to the extent that there is a rent-sharing aspect of wages in settings without labor unions, it may be reasonable to expect that the same dynamics would appear, in that higher taxes would be associated with reduced wages. A similar process could apply to executive compensation, rent and royalty payments, and any other firm expenses that plausibly include sharing of economic rents. Consequently, the inframarginal burden of the corporate income tax may be shared among a number of a corporation's stakeholders, thereby distributing corporate tax burdens among the parties who normally benefit from surplus produced within the firm.

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Appendix

This appendix analyzes the implications of formulary apportionment of state corporate tax rates for the specification of possible tax effects on union wage premiums.

Suppose that a firm has unitary operations in more than one state. The firm's tax obligation to state *i* is then:

$$\text{(A1)} \qquad \left[Q(K,L) - wL - R\right]\tau_i \left[s_i \frac{w_i L_i + R_i}{\sum_{j=1}^{n} w_j L_j + R_j} + \bar{s}_i \frac{K_i}{\sum_{j=1}^{n} K_j} + (1 - s_i - \bar{s}_i)\frac{S_i}{\sum_{j=1}^{n} S_j} \right],$$

in which the first bracketed term of (A1) represents the firm's total U.S. taxable profits, while the second bracketed term represents the product of the portion of those profits taxed by state *i* and state *i*'s tax rate. s_i is the labor expense weight in state *i*'s three-factor formula, $\bar{s}_i$ is the capital share weight, and $(1 - s_i - \bar{s}_i)$ is therefore the sales weight; L_i denotes the number of workers the firm employs in state *i*, and w_i the wages non-union workers are paid in state *i*, R_i represents total union premiums in state *i*, K_i is the firm's capital stock in state *i*, and S_i denotes total firm sales in state *i*. For simplicity we take the location of final sales to be unaffected by the location of production. The firm's total tax obligation to all states is the sum of tax obligations in all states in which the firm has nexus, and this can be defined as $\left[Q(K,L) - wL - R\right]\bar{\tau}$, in which $\bar{\tau}$ is the average state tax rate, weighted by apportionment weights and the extent of firm activity in a state, as reflected in the second bracketed term of (A1).

The tax consequences of operations in state *i* need not equal a firm's tax obligation to state *i*, since operations in *i* affect the firm's tax obligations to all states as determined by the apportionment formulas. The analysis that follows assumes that the union and the firm negotiate over the allocation of rents arising from operations in state *i*, including the tax consequences of these operations. Denoting the tax consequences as Tax_i, and firm rents arising from operations in state *i* by ρ_i, the analogue to equation (2) becomes:

(A2) $$\overline{\psi}_i = R_i^{\alpha}\rho_i^{1-\alpha} = R_i^{\alpha}\left[Q(K_i, L_i) - w_i L_i - R_i - rK_i - Tax_i\right]^{1-\alpha}.$$

The condition $\frac{d\overline{\psi}_i}{dR_i} = 0$ implies that:

(A3) $$R_i = \frac{\alpha}{(1-\alpha)}\frac{\rho_i}{\left(1+\frac{dTax_i}{dR_i}\right)}$$

Denoting the firm's total national profits by π, it follows from the definition of $\overline{\tau}$ that:

(A4) $$\frac{dTax_i}{dR_i} = -\overline{\tau} + \pi\left[\frac{\tau_i s_i\left(\sum_{j=1}^{n} w_j L_j + R_j\right) - \sum_{j=1}^{n}\tau_j s_j\left(w_j L_j + R_j\right)}{\left(\sum_{j=1}^{n} w_j L_j + R_j\right)^2}\right]$$

Letting $\overline{\tau s} \equiv \frac{\sum_{j=1}^{n}\tau_j s_j\left(w_j L_j + R_j\right)}{\sum_{j=1}^{n} w_j L_j + R_j}$ denote the average value of $\tau_j s_j$, weighted by labor expenses,

(A4) can be simplified to:

(A5a) $$\frac{dTax_i}{dR_i} = -\overline{\tau} + \frac{\pi}{\sum_{j=1}^{n} w_j L_j + R_j}\left(\tau_i s_i - \overline{\tau s}\right)$$

By a similar set of calculations, $\frac{dTax_i}{d(w_i L_i)} = \frac{dTax_i}{dR_i}$, and it also follows that:

(A5b) $$\frac{dTax_i}{dK_i} = \frac{\pi}{\sum_{j=1}^{n} K_j}\left(\tau_i \overline{s}_i - \overline{\overline{\tau s}}\right),$$

in which $\overline{\overline{\tau s}}$ is the average value of $\tau_j \overline{s}_j$, weighted by capital in place. The assumption that the location of sales is independent of the location of production produces:

(A5c) $$\frac{dTax_i}{dQ_i} = \bar{\tau} .$$

In order to evaluate (A3) it is necessary to include an expression for Tax_i, for which it is helpful to use the following approximation:

(A6) $$Tax_i \cong \frac{dTax_i}{d\left(w_i L_i + R_i\right)}\left(w_i L_i + R_i\right) + \frac{dTax_i}{d\left(K_i\right)} K_i + \frac{dTax_i}{dQ_i} Q_i .$$

Applying (A5a-A5c) to (A6) produces:

(A7) $$Tax_i = \bar{\tau}\left[Q\left(K_i, L_i\right) - w_i L_i - R_i\right] + \pi\left[\frac{w_i L_i + R_i}{\sum_{j=1}^{n} w_j L_j + R_j}\left(\tau_i s_i - \overline{\tau s}\right) + \frac{K_i}{\sum_{j=1}^{n} K_j}\left(\tau_i \bar{s}_i - \overline{\bar{\tau} s}\right)\right].$$

Combining (A3), (A5a), and (A7) produces:

(A8) $$R_i = \alpha \frac{Q\left(K_i, L_i\right)\left(1-\bar{\tau}\right) - rK_i\left(1 + \frac{\pi}{r\sum_{j=1}^{n} K_j}\left(\tau_i \bar{s}_i - \overline{\bar{\tau} s}\right)\right)}{\left[1 - \bar{\tau} + \frac{\pi\left(\tau_i s_i - \overline{\tau s}\right)}{\sum_{j=1}^{n} w_j L_j + R_j}\right]} - \alpha w_i L_i .$$

In evaluating (A8) it is helpful to apply the firm's first-order conditions for profit maximizing choices of factor inputs. The first order condition for the choice of labor inputs is: $\frac{\partial Q\left(K_i, L_i\right)}{\partial L_i} - \frac{dTax_i}{dQ_i}\frac{\partial Q\left(K_i, L_i\right)}{\partial L_i} = w_i\left(1 + \frac{dTax_i}{d\left(w_i L_i\right)}\right)$, which in turn implies:

(A9a) $$\frac{\partial Q\left(K_i, L_i\right)}{\partial L_i} = w_i\left[1 + \frac{\pi\left(\tau_i s_i - \overline{\tau s}\right)}{\left(1-\bar{\tau}\right)\sum_{j=1}^{n} w_j L_j + R_j}\right].$$

By a similar logic, the first order condition for the profit maximizing choice of K_i is:

(A9b) $$\frac{\partial Q(K_i, L_i)}{\partial K_i} = \frac{r}{(1-\bar{\tau})}\left[1 + \frac{\pi(\tau_i s_i - \bar{\tau}\bar{s})}{r\sum_{j=1}^{n} K_j}\right].$$

Using the Cobb-Douglas production function in (7), and taking the ratio of (A9a) to (A9b) produces:

(A10) $$\frac{rK_i}{w_i L_i} = \frac{\gamma}{(1-\gamma)} \frac{\left[1 - \bar{\tau} + (\tau_i s_i - \bar{\tau}\bar{s})\frac{\pi}{\sum_{j=1}^{n} w_j L_j + R_j}\right]}{\left[1 + (\tau_i \bar{s}_i - \bar{\tau}\bar{s})\frac{\pi}{r\sum_{j=1}^{n} K_j}\right]}.$$

Dividing both sides of (A8) by $w_i L_i$, and applying (A10) produces:

(A11) $$\frac{R_i}{w_i L_i} = \alpha \frac{Q(K_i, L_i)}{w_i L_i} \frac{(1-\bar{\tau})}{\left[1 - \bar{\tau} + \frac{\pi(\tau_i s_i - \bar{\tau}\bar{s})}{\sum_{j=1}^{n} w_j L_j + R_j}\right]} - \frac{\alpha}{(1-\gamma)}.$$

Again applying the production function in (7) yields:

(A12) $$\frac{R_i}{w_i L_i} = \alpha a\left[\frac{\gamma}{(1-\gamma)r}\right]^{\gamma} w_i^{\gamma-1} \frac{(1-\bar{\tau})}{\left[1 - \bar{\tau} + \frac{\pi(\tau_i s_i - \bar{\tau}\bar{s})}{\sum_{j=1}^{n} w_j L_j + R_j}\right]^{1-\gamma}\left[1 + \frac{\pi(\tau_i \bar{s}_i - \bar{\tau}\bar{s})}{r\sum_{j=1}^{n} K_j}\right]^{\gamma}} - \frac{\alpha}{(1-\gamma)}.$$

Equation (A12) is analogous to equation (8) for a setting in which tax obligations are determined by formulas; if a firm operates in only one state, then $\bar{\tau} = \tau_i$ and (A12) is identical to equation (8).

Consider the case of a firm with operations in all 50 states, diversified so that no single state strongly affects the value of $\bar{\tau}$; such a case maximizes the extent to which the apportionment formulas influence tax effects. Differentiating both sides of (A12) with respect to $\tau_i s_i$ produces:

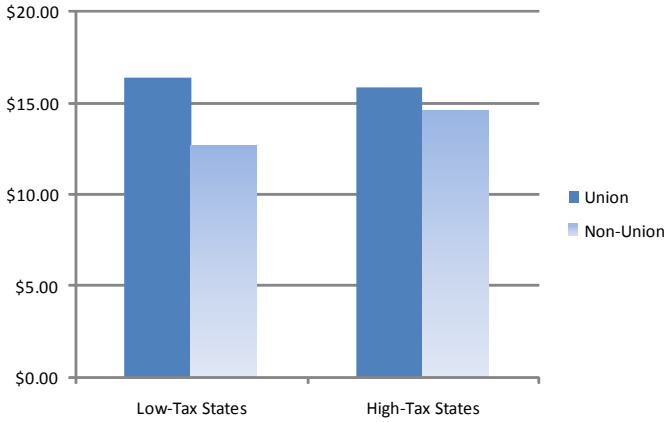
$$\text{(A13)} \quad \frac{d\left(\frac{R_i}{w_i L_i}\right)}{d(\tau_i s_i)} = -\alpha a \left[\frac{\gamma}{(1-\gamma)r}\right]^{\gamma} w_i^{\gamma-2}(1-\bar{\tau}) M_1^{\gamma-1} M_2^{-\gamma}(1-\gamma)\left[\frac{\pi}{\sum_{j=1}^{n} w_j L_j + R_j} w_i M_1^{-1} + \frac{dw_i}{d(\tau_i s_i)}\right],$$

in which $M_1 \equiv \left[1 - \bar{\tau} + \frac{\pi(\tau_i s_i - \overline{\tau s})}{\sum_{j=1}^{n} w_j L_j + R_j}\right]$ and $M_2 \equiv \left[1 + \frac{\pi(\tau_i \bar{s}_i - \overline{\tau \bar{s}})}{r\sum_{j=1}^{n} K_j}\right]$. By a similar calculation,

$$\text{(A14)} \quad \frac{d\left(\frac{R_i}{w_i L_i}\right)}{d(\tau_i \bar{s}_i)} = -\alpha a \left[\frac{\gamma}{(1-\gamma)r}\right]^{\gamma} w_i^{\gamma-2}(1-\bar{\tau}) M_1^{\gamma-1} M_2^{-\gamma}(1-\gamma)\left[\frac{\gamma}{(1-\gamma)} \frac{\pi}{r\sum_{j=1}^{n} K_j} w_i M_2^{-1} + \frac{dw_i}{d(\tau_i \bar{s}_i)}\right].$$

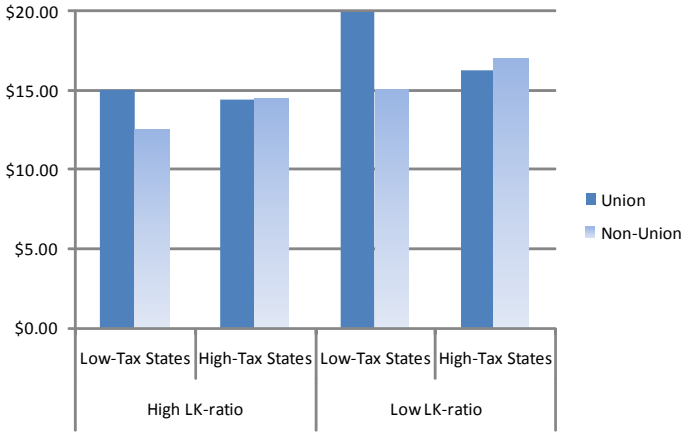
While the values on the right sides of (A13) and (A14) are not identical, they are nonetheless approximately equal, given that $\frac{\gamma}{(1-\gamma)}$ is roughly equal to the ratio of capital's share of total output to labor's share, and that the low state tax rates (Table 1 reports a mean value of 0.063) imply that M_1 does not differ greatly from M_2. The effect of tax changes on w_i depends on whether marginal labor demanders are subject to formula apportionment, but it is reasonable to take the effects to be similar across taxes apportioned according to capital and labor shares. Consequently, tax effects are proportional to $\tau_i s_i + \tau_i \bar{s}_i$, which is the product of the local statutory tax rate and one minus the sales apportionment factor.

Figure 1: Median Hourly Wages in Low- and High-Tax States



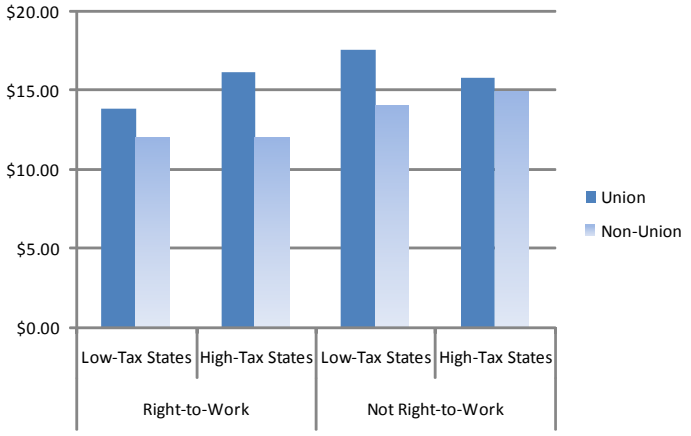
Note: The first 2 bars display median wages of union members and non-union members, respectively, living in low-tax states. The last 2 bars display median wages of union members and non-union members, respectively, living in high-tax states. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. The hourly wage is calculated by dividing weekly earnings by the usual number of hours worked per week. Union members include individuals who are members of unions or are covered by union contracts. Non-union members include all other individuals.

Figure 2: Median Hourly Wages in Industries with High and Low Labor-to-Captial Ratios



Note: The first 2 bars display median wages of individuals living in low-tax states and working in industries with high labor-to-capital ratios. The next 2 bars display median wages of individuals living in high-tax states and working in industries with high labor-to-capital ratios. The fifth and sixth bars display median wages of individuals living in low-tax states and working in industries with low labor-to-capital ratios. The last 2 bars display median wages of individuals living in high-tax states and working in industries with low labor-to-capital ratios. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. High labor-to-capital ratio industries have labor-to-capital ratios greater than 0.25. Low labor-to-capital ratio industries have labor-to-capital ratios less than 0.05. The hourly wage is calculated by dividing weekly earnings by the usual number of hours worked per week. Union members include individuals who are union members or who are covered by union contracts. Non-union members include all other individuals.

Figure 3: Median Hourly Wages in States with and without Right-to-Work Laws



Note: The first 2 bars display median wages of individuals working in low-tax states with right-to-work laws. The next 2 bars display median wages of individuals working in high-tax states with right-to-work laws. The fifth and sixth bars display median wages of individuals working in low-tax states without right-to-work laws. The last 2 bars display median wages of individuals working in high-tax states without right-to-work laws. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. The hourly wage is calculated by dividing weekly earnings by the usual number of hours worked per week. Union membership includes individuals who are union members or who are covered by union contracts. Non-union membership includes all other individuals.

Table 1: Summary Statistics

	I	II	III	IV	V	VI
	Whole Sample		**Union Members**		**Non-Union Members**	
	Mean	Median	Mean	Median	Mean	Median
Hourly wage	16.886	13.542	17.810	16.250	16.773	13.060
Corporate tax rate	0.063	0.069	0.065	0.078	0.062	0.068
Labor-to-capital ratio	0.194	0.131	0.147	0.097	0.199	0.132
Personal income tax rate	0.051	0.060	0.055	0.060	0.051	0.060
Sales tax rate	0.052	0.060	0.053	0.060	0.052	0.060
Age	38.452	38.000	41.068	41.000	38.136	37.000
Male dummy	0.590	1.000	0.718	1.000	0.574	1.000
Married dummy	0.606	1.000	0.654	1.000	0.600	1.000
White dummy	0.844	1.000	0.818	1.000	0.848	1.000
Black dummy	0.099	0.000	0.133	0.000	0.095	0.000
Asian dummy	0.047	0.000	0.040	0.000	0.048	0.000
Native American dummy	0.009	0.000	0.009	0.000	0.009	0.000
Years of education	13.407	13.000	12.812	12.000	13.481	13.000
Union member dummy	0.108	0.000	1.000	1.000	0.000	0.000
Non-profit dummy	0.068	0.000	0.061	0.000	0.069	0.000
Metro-area dummy	0.831	1.000	0.823	1.000	0.833	1.000
Observations	57603	57603	6195	6195	51408	51408

Note: Columns I and II display variable means and medians for the entire sample. Columns III and IV display variable means and medians for union members only, and columns V and VI display variable means and medians for non-union workers only. The hourly wage is weekly earnings divided by the usual number of hours worked per week. The corporate tax rate is the marginal state corporate tax rate for the highest income bracket adjusted for the deductibility of federal corporate income taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns, and varies by industry. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if the individual is a union member or is covered by a union contract. The non-profit dummy equals one if the individual works at a non-profit firm. The metro-area dummy equals one if the individual lives in a metropolitan area. All statistics are weighted using the earnings weight provided by the CPS.

Table 2: The Effect of Corporate Income Taxes on the Union Wage Premium

Dependent Variable: Ln(Hourly Wage)

Variable	I	II	III	IV
Corporate tax rate		0.7502	0.6119	0.7203
		(0.5456)	(0.3099)	(0.5486)
Corp tax rate * union		-1.1833	-1.1727	-0.8618
		(0.4408)	(0.4271)	(0.3882)
Labor-to-capital ratio		-0.1744	-0.1738	
		(0.0122)	(0.0127)	
LK ratio * union		-0.5454	-0.5468	-0.3574
		(0.1016)	(0.0953)	(0.0903)
LK ratio * union * corp tax		4.2198	4.2308	2.6179
		(1.2569)	(1.1844)	(1.1664)
Pers income tax rate		-0.1817		-0.1561
		(0.5999)		(0.6136)
Sales tax rate		0.1485		0.1393
		(0.7070)		(0.7178)
Union member	0.1747	0.3063	0.3057	0.2568
	(0.0103)	(0.0332)	(0.0323)	(0.0293)
Age	0.0384	0.0409	0.0409	0.0384
	(0.0017)	(0.0017)	(0.0018)	(0.0017)
Age-squared / 1000	-0.3886	-0.4147	-0.4150	-0.3894
	(0.0179)	(0.0189)	(0.0195)	(0.0180)
Male dummy	0.1161	0.1156	0.1157	0.1164
	(0.0060)	(0.0061)	(0.0062)	(0.0059)
Married dummy	0.0016	0.0050	0.0050	0.0022
	(0.0064)	(0.0065)	(0.0068)	(0.0063)
Male * married dummy	0.1152	0.1229	0.1228	0.1152
	(0.0074)	(0.0077)	(0.0076)	(0.0074)
White dummy	0.0522	0.0607	0.0620	0.0505
	(0.0179)	(0.0178)	(0.0187)	(0.0169)
Black dummy	-0.0631	-0.0554	-0.0541	-0.0627
	(0.0209)	(0.0204)	(0.0210)	(0.0200)
Asian dummy	0.0057	0.0022	0.0019	0.0036
	(0.0191)	(0.0181)	(0.0198)	(0.0185)
Years of education	0.0585	0.0640	0.0640	0.0584
	(0.0013)	(0.0015)	(0.0015)	(0.0013)
Non-profit dummy	0.0105	-0.0484	-0.0486	0.0092
	(0.0115)	(0.0108)	(0.0107)	(0.0110)
Metro-area dummy	0.1468	0.1485	0.1505	0.1444
	(0.0126)	(0.0117)	(0.0132)	(0.0107)
Industry dummies	Yes	No	No	Yes
Occupation dummies	Yes	Yes	Yes	Yes
R^2	0.4857	0.4587	0.4586	0.4871
Observations	57426	57426	57426	57426

Note: The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations. Columns I and IV include 46 industry dummy variables.

Table 3: The Effect of Corporate Income Taxes on the Union Wage Premium (Adding State Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

Variable	I	II	III
Corp tax rate * union		-0.8578	-0.5383
		(0.3765)	(0.3411)
Labor-to-capital ratio		-0.1727	
		(0.0125)	
LK ratio * union		-0.5211	-0.3421
		(0.0862)	(0.0873)
LK ratio * union * corp tax		3.5582	2.0704
		(1.0248)	(1.0906)
Union member	0.1542	0.2699	0.2208
	(0.0097)	(0.0263)	(0.0247)
Age	0.0376	0.0401	0.0376
	(0.0016)	(0.0017)	(0.0015)
Age-squared / 1000	-0.3797	-0.4054	-0.3800
	(0.0174)	(0.0189)	(0.0165)
Male dummy	0.1160	0.1154	0.1160
	(0.0058)	(0.0062)	(0.0060)
Married dummy	0.0077	0.0105	0.0078
	(0.0056)	(0.0063)	(0.0055)
Male * married dummy	0.1130	0.1206	0.1128
	(0.0068)	(0.0072)	(0.0071)
White dummy	0.0373	0.0451	0.0370
	(0.0132)	(0.0142)	(0.0131)
Black dummy	-0.0763	-0.0702	-0.0761
	(0.0144)	(0.0152)	(0.0147)
Asian dummy	-0.0401	-0.0384	-0.0398
	(0.0162)	(0.0177)	(0.0166)
Years of education	0.0582	0.0638	0.0582
	(0.0015)	(0.0017)	(0.0015)
Non-profit dummy	0.0085	-0.0463	0.0088
	(0.0100)	(0.0095)	(0.0102)
Metro-area dummy	0.1034	0.1067	0.1036
	(0.0099)	(0.0110)	(0.0099)
Industry dummies	Yes	No	Yes
Occupation dummies	Yes	Yes	Yes
State Dummies	Yes	Yes	Yes
R^2	0.5017	0.4742	0.5021
Observations	57426	57426	57426

Note: The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 50 states. Columns I and III include 46 industry dummy variables.

Table 4: The Effect of Corporate Income Taxes on Union and Non-Union Hourly Wages

Dependent Variable: Ln(Hourly Wage)

	I	II	III
Variable	**Union**	**Non-Union**	**Whole Sample**
Corporate tax rate	-0.6706	0.6205	0.7710
	(0.7033)	(0.5383)	(0.5056)
Corp tax rate * union			-1.3872
			(0.5439)
Labor-to-capital ratio	-0.6161	-0.2307	-0.1779
	(0.1035)	(0.0286)	(0.0126)
LK ratio * union			-0.4544
			(0.1043)
LK ratio * union * corp tax	4.3105	0.7422	3.9811
	(1.2740)	(0.4481)	(1.2747)
Pers income tax rate	0.1769	-0.2247	-0.2190
	(0.7500)	(0.5996)	(0.5870)
Pers income tax rate * union			0.4495
			(0.5628)
Sales tax rate	-0.0919	0.1628	0.1764
	(0.9766)	(0.7216)	(0.6938)
Sales tax rate * union			-0.2586
			(0.6261)
Union member			0.7199
			(0.1030)
Age	0.0355	0.0414	0.0415
	(0.0040)	(0.0017)	(0.0017)
Age * union			-0.0057
			(0.0039)
Age-squared / 1000	-0.3399	-0.4230	-0.4231
	(0.0480)	(0.0188)	(0.0180)
Age-squared / 1000 * union			0.0780
			(0.0471)
Male	0.1173	0.1158	0.1080
	(0.0216)	(0.0061)	(0.0066)
Male * union			0.0695
			(0.0210)
Married	-0.0193	0.0073	0.0073
	(0.0227)	(0.0073)	(0.0071)
Married * union			-0.0280
			(0.0213)
Male * married	0.0904	0.1263	0.1276
	(0.0262)	(0.0081)	(0.0082)
Male * married * union			-0.0344
			(0.0279)
White	0.0298	0.0616	0.0627
	(0.0500)	(0.0164)	(0.0159)
White * union			-0.0350
			(0.0455)
Black	-0.0877	-0.0525	-0.0516
	(0.0534)	(0.0190)	(0.0188)
Black * union			-0.0459
			(0.0500)
Asian	-0.0899	0.0136	0.0162
	(0.0586)	(0.0180)	(0.0177)
Asian * union			-0.1386
			(0.0605)

Years of education	0.0482	0.0645	0.0658
	(0.0021)	(0.0016)	(0.0016)
Years of education * union			-0.0209
			(0.0021)
Non-profit	0.0109	-0.0537	-0.0552
	(0.0156)	(0.0118)	(0.0113)
Non-profit * union			0.0762
			(0.0173)
Metro-area	0.1096	0.1510	0.1529
	(0.0182)	(0.0116)	(0.0119)
Metro-area * union			-0.0468
			(0.0160)
Occupation dummies	Yes	Yes	Yes
R^2	0.3621	0.4670	0.4603
Observations	6174	51252	57426

Note: The regression reported in Column I includes observations of union members only; the regression reported in Column II includes observations of non-union members only; and the regression reported in Column III includes observations of all individuals and allows individual characteristics to vary by union status. The interaction of the labor-to-capital ratio, union dummy and corporate tax rate is replaced by the interaction of the labor-to-capital ratio and the corporate tax rate in column II. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations.

Table 5: The Effect of Corporate Income Taxes on the Union Wage Premium in High- and Low-Tax States

Dependent Variable: Ln(Hourly Wage)

Whole Sample		**Only High-Tax and Low-Tax States**	
Variable	I	Variable	II
Low-tax dummy	0.0073		
	(0.0391)		
High-tax dummy	0.0686	High-tax dummy	0.0726
	(0.0274)		(0.0620)
Low-tax * union	0.0433		
	(0.0269)		
High-tax * union	-0.0924	High-tax * union	-0.1385
	(0.0240)		(0.0297)
Labor-to-capital ratio	-0.1743	Labor-to-capital ratio	-0.1862
	(0.0128)		(0.0245)
LK ratio * union	-0.2228	LK ratio * union	-0.5628
	(0.0447)		(0.0694)
LK ratio * union * low-tax	-0.3264		
	(0.0741)		
LK ratio * union * high-tax	0.0778	LK ratio * union * high-tax	0.4161
	(0.0672)		(0.0792)
Pers income tax rate	0.1689	Pers income tax rate	-0.0984
	(0.5701)		(0.7879)
Sales tax rate	-0.0088	Sales tax rate	-0.1629
	(0.7631)		(1.6198)
Union member	0.2405	Union member	0.2880
	(0.0136)		(0.0213)
Age	0.0408	Age	0.0406
	(0.0017)		(0.0019)
Age-squared / 1000	-0.4141	Age-squared / 1000	-0.4075
	(0.0193)		(0.0214)
Male	0.1155	Male	0.1156
	(0.0062)		(0.0105)
Married	0.0052	Married	0.0112
	(0.0070)		(0.0102)
Male * married	0.1225	Male * married	0.1102
	(0.0070)		(0.0118)
White	0.0573	White	0.0319
	(0.0168)		(0.0337)
Black	-0.0568	Black	-0.0757
	(0.0201)		(0.0364)
Asian	-0.0014	Asian	-0.0431
	(0.0182)		(0.0388)
Years of education	0.0637	Years of education	0.0652
	(0.0016)		(0.0019)
Non-profit	-0.0497	Non-profit	-0.0485
	(0.0099)		(0.0111)
Metro-area	0.1506	Metro-area	0.1480
	(0.0104)		(0.0183)
Occupation dummies	Yes	Occupation dummies	Yes
R^2	0.4600	R^2	0.4618
Observations	57426	Observations	22647

Note: Column I reports estimated coefficients from a regression that includes all individuals and uses a low-tax dummy and a high-tax dummy instead of using corporate tax rates. The low-tax dummy equals one if the highest marginal corporate tax rate is less than 4 percent, whereas the high-tax dummy equals one if the corporate tax rate is greater than or equal to 9 percent. Column II reports estimated coefficients from a regression that includes observations of only those individuals living in either low-tax or high-tax states. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations.

Table 6: The Effect of Corporate Income Taxes on the Union Wage Premium in States with and without Right-to-Work Laws

Dependent Variable: Ln(Hourly Wage)

Variable	I **Right-to-Work States**	II **Not RTW States**	III **Whole Sample**
Corporate tax rate	-0.6762	0.6543	0.2679
	(0.8109)	(0.6699)	(0.4639)
Corp tax rate * union	-0.0908	-1.2574	-1.1246
	(0.6243)	(0.5382)	(0.5376)
Corp tax rate * union * rtw			1.0282
			(0.8199)
Labor-to-capital ratio	-0.1607	-0.1784	-0.1743
	(0.0156)	(0.0173)	(0.0119)
LK ratio * union	-0.5639	-0.5339	-0.5133
	(0.1466)	(0.1626)	(0.1618)
LK ratio * union * rtw			-0.0800
			(0.2290)
LK ratio * union * corp tax	4.2074	4.0229	3.9625
	(2.7245)	(1.9573)	(1.9531)
LK ratio * union * corp tax * rtw			0.0518
			(3.5998)
Pers income tax rate	0.6334	-0.9363	-0.3754
	(0.6610)	(0.6567)	(0.4946)
Sales tax rate	-0.1097	0.4596	0.2099
	(2.0402)	(0.6171)	(0.6573)
Union member	0.2604	0.2927	0.2790
	(0.0368)	(0.0433)	(0.0421)
Union * right-to-work			-0.0068
			(0.0595)
Right-to-work dummy			-0.0870
			(0.0197)
Age	0.0387	0.0420	0.0405
	(0.0015)	(0.0024)	(0.0017)
Age-squared / 1000	-0.3951	-0.4251	-0.4101
	(0.0172)	(0.0265)	(0.0184)
Male	0.1197	0.1134	0.1151
	(0.0104)	(0.0073)	(0.0062)
Married	0.0088	0.0060	0.0079
	(0.0081)	(0.0095)	(0.0065)
Male * married	0.1255	0.1187	0.1221
	(0.0137)	(0.0074)	(0.0075)
White	0.0599	0.0622	0.0647
	(0.0230)	(0.0231)	(0.0185)
Black	-0.0701	-0.0308	-0.0409
	(0.0254)	(0.0235)	(0.0200)
Asian	-0.0260	0.0062	-0.0010
	(0.0359)	(0.0221)	(0.0200)
Years of education	0.0586	0.0662	0.0636
	(0.0019)	(0.0016)	(0.0016)
Non-profit	-0.0373	-0.0611	-0.0510
	(0.0142)	(0.0127)	(0.0106)
Metro-area	0.1383	0.1434	0.1375
	(0.0154)	(0.0130)	(0.0105)
Occupation dummies	Yes	Yes	Yes
Right-to-work dummy	No	No	Yes
R^2	0.4390	0.4664	0.4631
Observations	22328	35098	57426

Note: The regression reported in Column I includes observations of only those individuals living in states with right-to-work laws. The regression reported in Column II includes observations of only those individuals living in states without right-to-work laws. The regression reported in Column III includes the whole sample and adds a right-to-work dummy and interaction terms with the right-to-work dummy. The right-to-work dummy equals one if an individual lives in a state with a right-to-work law. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations.

Table 7: The Effect of Corporate Income Taxes on the Union Wage Premium in States with and without Right-to-Work Laws (Adding State Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

Variable	I **Right-to-Work States**	II **Not RTW States**	III **Whole Sample**
Corp tax rate * union	0.0144	-1.0697	-1.0543
	(0.5678)	(0.5359)	(0.5562)
Corp tax rate * union * rtw			1.1549
			(0.7986)
Labor-to-capital ratio	-0.1619	-0.1769	-0.1729
	(0.0156)	(0.0182)	(0.0122)
LK ratio * union	-0.5671	-0.5086	-0.4904
	(0.1240)	(0.1588)	(0.1522)
LK ratio * union * rtw			-0.1023
			(0.2134)
LK ratio * union * corp tax	4.4640	3.4187	3.3553
	(2.1875)	(1.8774)	(1.8081)
LK ratio * union * corp tax * rtw			0.8651
			(3.3926)
Union member	0.2514	0.2778	0.2728
	(0.0349)	(0.0429)	(0.0429)
Union * right-to-work			-0.0162
			(0.0562)
Right-to-work dummy			-0.1041
			(0.0741)
Age	0.0381	0.0417	0.0401
	(0.0015)	(0.0024)	(0.0017)
Age-squared / 1000	-0.3888	-0.4199	-0.4058
	(0.0171)	(0.0269)	(0.0184)
Male	0.1206	0.1124	0.1153
	(0.0098)	(0.0073)	(0.0059)
Married	0.0114	0.0101	0.0106
	(0.0073)	(0.0087)	(0.0060)
Male * married	0.1238	0.1179	0.1206
	(0.0136)	(0.0077)	(0.0073)
White	0.0580	0.0369	0.0451
	(0.0205)	(0.0200)	(0.0147)
Black	-0.0791	-0.0625	-0.0703
	(0.0211)	(0.0210)	(0.0159)
Asian	-0.0443	-0.0416	-0.0384
	(0.0338)	(0.0212)	(0.0173)
Years of education	0.0591	0.0663	0.0637
	(0.0019)	(0.0019)	(0.0017)
Non-profit	-0.0273	-0.0583	-0.0463
	(0.0139)	(0.0123)	(0.0096)
Metro-area	0.1164	0.1004	0.1065
	(0.0151)	(0.0134)	(0.0103)
Occupation dummies	Yes	Yes	Yes
Right-to-work dummy	No	No	Yes
State dummies	Yes	Yes	Yes
R^2	0.4479	0.4771	0.4744
Observations	22328	35098	57426

Note: The regression reported in Column I includes observations of only those individuals living in states with right-to-work laws. The regression reported in Column II includes observations of only those individuals living in states without right-to-work laws. The regression reported in Column III includes the whole sample and adds a right-to-work dummy and interaction terms with the right-to-work dummy. The right-to-work dummy equals one if an individual lives in a state with a right-to-work law. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 50 states.

Table 8: The Effect of Corporate Income Taxes and Right-to-Work Laws on the Union Wage Premium

Dependent Variable: Ln(Hourly Wage)

Variable	I	II	III	IV
Corporate tax rate	0.2592	0.2853	0.2581	0.2750
	(0.4536)	(0.4699)	(0.4417)	(0.4567)
Corp tax rate * union	-0.7933	-1.0042	-0.5592	-0.7001
	(0.4213)	(0.3795)	(0.3489)	(0.3564)
Labor-to-capital ratio	-0.1741	-0.1741		
	(0.0117)	(0.0126)		
LK ratio * union	-0.5419	-0.5430	-0.3597	-0.3608
	(0.0917)	(0.0917)	(0.0895)	(0.0910)
LK ratio * union * corp tax	4.1355	4.1065	2.5781	2.5626
	(1.1197)	(1.1303)	(1.1437)	(1.1621)
Pers income tax rate	-0.3628	-0.3630	-0.3281	-0.3279
	(0.4574)	(0.4921)	(0.4738)	(0.4661)
Sales tax rate	0.2082	0.2070	0.2017	0.2011
	(0.6090)	(0.6048)	(0.6513)	(0.6287)
Union member	0.2574	0.2820	0.2183	0.2347
	(0.0332)	(0.0273)	(0.0281)	(0.0264)
Right-to-work	-0.0869	-0.0833	-0.0820	-0.0797
	(0.0197)	(0.0200)	(0.0189)	(0.0175)
Union * right-to-work	0.0398		0.0266	
	(0.0187)		(0.0169)	
Age	0.0404	0.0404	0.0380	0.0380
	(0.0017)	(0.0017)	(0.0016)	(0.0016)
Age-squared / 1000	-0.4096	-0.4097	-0.3846	-0.3847
	(0.0189)	(0.0184)	(0.0174)	(0.0172)
Male	0.1152	0.1151	0.1162	0.1162
	(0.0061)	(0.0062)	(0.0060)	(0.0059)
Married	0.0079	0.0078	0.0050	0.0050
	(0.0069)	(0.0063)	(0.0060)	(0.0058)
Male * married	0.1220	0.1222	0.1145	0.1146
	(0.0074)	(0.0068)	(0.0074)	(0.0073)
White	0.0649	0.0647	0.0548	0.0547
	(0.0186)	(0.0179)	(0.0178)	(0.0178)
Black	-0.0405	-0.0409	-0.0483	-0.0486
	(0.0199)	(0.0193)	(0.0199)	(0.0192)
Asian	-0.0012	-0.0012	0.0002	0.0002
	(0.0197)	(0.0190)	(0.0198)	(0.0191)
Years of education	0.0636	0.0636	0.0581	0.0581
	(0.0016)	(0.0016)	(0.0014)	(0.0014)
Non-profit	-0.0509	-0.0509	0.0058	0.0059
	(0.0104)	(0.0102)	(0.0108)	(0.0106)
Metro-area	0.1374	0.1373	0.1339	0.1339
	(0.0104)	(0.0094)	(0.0100)	(0.0099)
Industry dummies	No	No	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Right-to-work dummy	Yes	Yes	Yes	Yes
R^2	0.4631	0.4630	0.4910	0.4909
Observations	57426	57426	57426	57426

Note: The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The right-to-work dummy equals one if an individual lives in a state with a right-to-work law. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state-level. All regressions include dummy variables for 22 occupations and state right-to-work laws.

Table 9: The Effect of Corporate Income Taxes and the Sales Apportionment Weight on the Union Wage Premium

Dependent Variable: Ln(Hourly Wage)

Variable	I	II	III
Corporate tax rate * (1- sales weight)	0.4379	0.5381	0.4236
	(0.8200)	(0.6357)	(0.7752)
Corp tax rate * (1-sales) * union	-1.5953	-1.6276	-1.1929
	(0.6504)	(0.6593)	(0.5215)
Labor-to-capital ratio	-0.1732	-0.1732	
	(0.0125)	(0.0121)	
LK ratio * union	-0.4512	-0.4497	-0.3252
	(0.1001)	(0.0937)	(0.0746)
LK ratio * union * corp tax * (1-sales)	6.2956	6.2497	4.6508
	(2.4534)	(2.2720)	(1.8584)
Pers income tax rate	0.1364		0.1474
	(0.5083)		(0.4937)
Sales tax rate	0.2036		0.1965
	(0.7852)		(0.7553)
Union member	0.2775	0.2790	0.2377
	(0.0228)	(0.0236)	(0.0184)
Age	0.0409	0.0409	0.0384
	(0.0017)	(0.0018)	(0.0016)
Age-squared/1000	-0.4143	-0.4141	-0.3890
	(0.0187)	(0.0194)	(0.0173)
Male dummy	0.1155	0.1154	0.1164
	(0.0061)	(0.0063)	(0.0058)
Married dummy	0.0049	0.0050	0.0022
	(0.0067)	(0.0070)	(0.0061)
Male * married dummy	0.1225	0.1226	0.1148
	(0.0072)	(0.0073)	(0.0074)
White dummy	0.0633	0.0640	0.0530
	(0.0179)	(0.0178)	(0.0168)
Black dummy	-0.0537	-0.0534	-0.0611
	(0.0206)	(0.0206)	(0.0199)
Asian dummy	0.0023	0.0042	0.0036
	(0.0195)	(0.0206)	(0.0184)
Years of education	0.0641	0.0641	0.0585
	(0.0015)	(0.0015)	(0.0013)
Non-profit dummy	-0.0474	-0.0473	0.0105
	(0.0102)	(0.0110)	(0.0106)
Metro-area dummy	0.1508	0.1516	0.1465
	(0.0113)	(0.0132)	(0.0108)
Industry dummies	No	No	Yes
Occupation dummies	Yes	Yes	Yes
R-Squared	0.4579	0.4578	0.4864
Observations	57426	57426	57426

Note: The dependent variable is the log of hourly wages. The corporate tax variable is defined as the product of the state corporate tax rate and one minus the sales share in the apportionment formula. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations. Column III includes 46 industry dummy variables.

Table A1: Summary Statistics for Low- and High-Tax States by Union Status

	I	II	III	IV	V	VI	VII	VIII
	Low-Tax & Union		**Low-Tax & Non-Union**		**High-Tax & Union**		**High-Tax & Non-Union**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Hourly wage	17.512	16.400	16.419	12.667	17.702	15.850	18.489	14.545
Corporate tax rate	0.015	0.022	0.011	0.000	0.094	0.090	0.094	0.095
Labor-to-capital ratio	0.121	0.095	0.188	0.131	0.180	0.097	0.208	0.142
Pers income tax rate	0.023	0.034	0.016	0.000	0.062	0.069	0.061	0.065
Sales tax rate	0.059	0.060	0.058	0.063	0.052	0.060	0.053	0.060
Age	41.200	41.000	37.833	37.000	41.547	41.000	38.715	38.000
Male dummy	0.740	1.000	0.605	1.000	0.679	1.000	0.560	1.000
Married dummy	0.669	1.000	0.617	1.000	0.639	1.000	0.596	1.000
White dummy	0.825	1.000	0.872	1.000	0.835	1.000	0.876	1.000
Black dummy	0.145	0.000	0.082	0.000	0.120	0.000	0.071	0.000
Asian dummy	0.019	0.000	0.037	0.000	0.041	0.000	0.050	0.000
Native American dummy	0.011	0.000	0.009	0.000	0.004	0.000	0.004	0.000
Years of education	12.709	12.000	13.296	13.000	12.965	12.000	13.847	14.000
Union member dummy	1.000	1.000	0.000	0.000	1.000	1.000	0.000	0.000
Non-profit dummy	0.061	0.000	0.058	0.000	0.084	0.000	0.086	0.000
Metro-area dummy	0.788	1.000	0.824	1.000	0.862	1.000	0.852	1.000
Observations	1163	1163	9169	9169	1755	1755	10634	10634

Note: Columns I and II display variable means and medians of union members living in low-tax states; columns III and IV display variable means and medians for non-union members living in low-tax states. Columns V and VI display variable means and medians for union members living in high-tax states, and columns VII and VIII display variable means and medians for non-union members living in high-tax states. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. Union members include individuals who are members of unions or are covered by union contracts. Non-union members include all other individuals. The hourly wage is weekly earnings divided by the usual number of hours worked per week. The corporate tax rate is the marginal state corporate tax rate for the highest income bracket adjusted for the deductibility of federal corporate income taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns, and varies by industry. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The non-profit dummy equals one if the individual works at a non-profit firm. The metro-area dummy equals one if the individual lives in a metropolitan area. All statistics are weighted using the earnings weight provided by the CPS.

Table A2: Summary Statistics for Individuals Working in Low and High Labor-to-Capital Industries in Low- and High-Tax States

	I	II	III	IV	V	VI	VII	VIII
	Low-Tax & High LK-ratio		**High-Tax & High LK-ratio**		**Low-Tax & Low LK-ratio**		**High-Tax & Low LK-ratio**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Hourly wage	16.144	12.500	18.219	14.400	18.970	15.850	21.009	16.825
Union hourly wage	15.538	15.000	16.660	14.400	19.519	20.000	18.401	16.325
Nonunion hourly wage	16.175	12.459	18.411	14.400	18.842	15.000	21.560	16.988
Corporate tax rate	0.011	0.000	0.094	0.095	0.014	0.022	0.094	0.090
Labor to capital ratio	0.400	0.298	0.424	0.298	0.028	0.025	0.027	0.026
Pers income tax rate	0.016	0.000	0.060	0.065	0.021	0.034	0.061	0.065
Sales tax rate	0.059	0.063	0.052	0.060	0.058	0.060	0.052	0.060
Age	37.313	36.000	38.974	38.000	39.317	39.000	39.352	39.000
Male dummy	0.457	0.000	0.426	0.000	0.677	1.000	0.624	1.000
Married dummy	0.592	1.000	0.560	1.000	0.657	1.000	0.627	1.000
White dummy	0.844	1.000	0.843	1.000	0.871	1.000	0.876	1.000
Black dummy	0.105	0.000	0.098	0.000	0.086	0.000	0.070	0.000
Asian dummy	0.045	0.000	0.056	0.000	0.034	0.000	0.050	0.000
Native American dummy	0.006	0.000	0.003	0.000	0.008	0.000	0.004	0.000
Years of education	13.799	14.000	14.307	14.000	13.389	13.000	13.873	14.000
Union member dummy	0.048	0.000	0.110	0.000	0.188	0.000	0.177	0.000
Non-profit dummy	0.139	0.000	0.202	0.000	0.008	0.000	0.008	0.000
Metro-area dummy	0.847	1.000	0.871	1.000	0.786	1.000	0.832	1.000
Observations	2739	2739	3972	3972	2295	2295	2400	2400

Note: Columns I and II display variable means and medians for individuals living in low-tax states and working in industries with high labor-to-capital ratios; columns III and IV display variable means and medians for individuals living in high-tax states and working in industries with high labor-to-capital ratios. Columns V and VI display variable means and medians for individuals living in low-tax states and working in industries with low labor-to-capital ratios; columns VII and VIII display means and medians for individuals living in high-tax states and working in industries with low labor-to-capital ratios. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. High labor-to-capital ratio industries have labor-to-capital ratios greater than 0.25. Low labor-to-capital ratio industries have labor-to-capital ratios less than 0.05. The hourly wage is weekly earnings divided by the usual number of hours worked per week. The corporate tax rate is the marginal state corporate tax rate for the highest income bracket adjusted for the deductibility of federal corporate income taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns, and varies by industry. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if the individual is a union member or is covered by a union contract. The non-profit dummy equals one if the individual works at a non-profit firm. The metro-area dummy equals one if the individual lives in a metropolitan area. All statistics are weighted using the earnings weight provided by the CPS.

Table A3: The Effect of Corporate Income Taxes on the Union Wage Premium (Adding Regional Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

Variable	I	II	III	IV
Corporate tax rate		-0.1025	-0.2068	-0.1200
		(0.6200)	(0.3721)	(0.6029)
Corp tax rate * union		-0.9237	-0.9171	-0.6134
		(0.4047)	(0.3940)	(0.3652)
Labor-to-capital ratio		-0.1732	-0.1729	
		(0.0124)	(0.0123)	
LK ratio * union		-0.5358	-0.5357	-0.3537
		(0.0919)	(0.0844)	(0.0893)
LK ratio * union * corp tax		3.8878	3.8824	2.3593
		(1.1209)	(1.0469)	(1.1236)
Pers income tax rate		-0.1231		-0.1065
		(0.5811)		(0.6120)
Sales tax rate		-0.0141		0.0174
		(0.7167)		(0.7264)
Union member	0.1594	0.2779	0.2774	0.2296
	(0.0097)	(0.0290)	(0.0273)	(0.0266)
Age	0.0378	0.0402	0.0402	0.0377
	(0.0016)	(0.0017)	(0.0017)	(0.0016)
Age-squared / 1000	-0.3826	-0.4072	-0.4072	-0.3819
	(0.0173)	(0.0190)	(0.0182)	(0.0171)
Male dummy	0.1160	0.1150	0.1150	0.1158
	(0.0059)	(0.0063)	(0.0063)	(0.0060)
Married dummy	0.0068	0.0098	0.0098	0.0071
	(0.0057)	(0.0064)	(0.0064)	(0.0058)
Male * married dummy	0.1142	0.1220	0.1219	0.1141
	(0.0072)	(0.0072)	(0.0074)	(0.0074)
White dummy	0.0471	0.0554	0.0552	0.0460
	(0.0144)	(0.0152)	(0.0155)	(0.0144)
Black dummy	-0.0574	-0.0507	-0.0513	-0.0578
	(0.0146)	(0.0159)	(0.0161)	(0.0146)
Asian dummy	-0.0237	-0.0255	-0.0263	-0.0243
	(0.0179)	(0.0186)	(0.0208)	(0.0171)
Years of education	0.0582	0.0638	0.0637	0.0582
	(0.0014)	(0.0017)	(0.0017)	(0.0015)
Non-profit dummy	0.0039	-0.0511	-0.0511	0.0044
	(0.0099)	(0.0094)	(0.0100)	(0.0101)
Metro-area dummy	0.1266	0.1297	0.1301	0.1258
	(0.0116)	(0.0115)	(0.0122)	(0.0111)
Industry dummies	Yes	No	No	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
R^2	0.4929	0.4652	0.4652	0.4934
Observations	57426	57426	57426	57426

Note: The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 9 Census divisions. Columns I and IV include 46 industry dummy variables.

Table A4: The Effect of Corporate Income Taxes on Union and Non-Union Hourly Wages (Adding Industry Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

	I	II	III
Variable	**Union**	**Non-Union**	**Whole Sample**
Corporate tax rate	-0.2550	0.6575	0.7448
	(0.5510)	(0.5441)	(0.5421)
Corp tax rate * union			-1.0767
			(0.4840)
LK ratio*union			-0.2648
			(0.1005)
LK ratio * union * corp tax	3.1200	0.3935	2.4097
	(1.0653)	(0.3843)	(1.2444)
Pers income tax rate	0.1380	-0.2006	-0.1945
	(0.6642)	(0.6034)	(0.6180)
Pers income tax rate * union			0.4489
			(0.4774)
Sales tax rate	-0.1216	0.1534	0.1633
	(0.9096)	(0.7152)	(0.7132)
Sales tax rate * union			-0.2172
			(0.5445)
Union member			0.6751
			(0.0979)
Age	0.0325	0.0389	0.0390
	(0.0036)	(0.0016)	(0.0016)
Age * union			-0.0060
			(0.0039)
Age-squared / 1000	-0.3086	-0.3968	-0.3973
	(0.0427)	(0.0177)	(0.0179)
Age-squared / 1000 * union			0.0779
			(0.0476)
Male	0.1045	0.1181	0.1094
	(0.0214)	(0.0062)	(0.0063)
Male * union			0.0643
			(0.0225)
Married	-0.0152	0.0041	0.0041
	(0.0202)	(0.0066)	(0.0067)
Married * union			-0.0211
			(0.0207)
Male * married	0.0860	0.1178	0.1195
	(0.0239)	(0.0081)	(0.0080)
Male * married * union			-0.0337
			(0.0276)
White	0.0178	0.0515	0.0538
	(0.0468)	(0.0156)	(0.0157)
White * union			-0.0459
			(0.0480)
Black	-0.1037	-0.0576	-0.0556
	(0.0517)	(0.0189)	(0.0192)
Black * union			-0.0705
			(0.0530)
Asian	-0.0803	0.0132	0.0164
	(0.0549)	(0.0176)	(0.0175)
Asian * union			-0.1281
			(0.0640)

Years of education	0.0411	0.0589	0.0601
	(0.0020)	(0.0014)	(0.0014)
Years of education * union			-0.0201
			(0.0024)
Non-profit	0.0282	0.0065	0.0029
	(0.0261)	(0.0124)	(0.0121)
Non-profit * union			0.0556
			(0.0192)
Metro-area	0.0919	0.1478	0.1480
	(0.0156)	(0.0113)	(0.0112)
Metro-area * union			-0.0395
			(0.0168)
Industry dummies	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes
R^2	0.4111	0.4957	0.4884
Observations	6174	51252	57426

Note: The regression reported in Column I includes observations of union members only; the regression reported in Column II includes observations of non-union members only; and the regression reported in Column III includes observations of all individuals and allows individual characteristics to vary by union status. The interaction of the labor-to-capital ratio, union dummy and corporate tax rate is replaced by the interaction of the labor-to-capital ratio and the corporate tax rate in column II. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 46 industries.

Table A5: The Effect of Corporate Income Taxes on the Union Wage Premium in High and Low Tax States (Adding Industry Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

Whole Sample		**Only High-Tax and Low-Tax States**	
Variable	I	Variable	II
Low-tax dummy	0.0043		
	(0.0347)		
High-tax dummy	0.0642	High-tax dummy	0.0727
	(0.0257)		(0.0631)
Low-tax * union	0.0264		
	(0.0227)		
High-tax * union	-0.0779	High-tax * union	-0.0985
	(0.0198)		(0.0260)
LK ratio * union	-0.1413	LK ratio * union	-0.3526
	(0.0418)		(0.0657)
LK ratio * union * low-tax	-0.2392		
	(0.0687)		
LK ratio * union * high-tax	0.0230	LK ratio * union * high-tax	0.2355
	(0.0726)		(0.0836)
Pers income tax rate	0.1667	Pers income tax rate	-0.1159
	(0.5103)		(0.8039)
Sales tax rate	-0.0020	Sales tax rate	-0.2258
	(0.7651)		(1.6530)
Union member	0.2119	Union member	0.2326
	(0.0126)		(0.0182)
Age	0.0384	Age	0.0382
	(0.0016)		(0.0018)
Age-squared / 1000	-0.3889	Age-squared / 1000	-0.3830
	(0.0179)		(0.0205)
Male	0.1162	Male	0.1224
	(0.0061)		(0.0086)
Married	0.0025	Married	0.0092
	(0.0066)		(0.0105)
Male * married	0.1148	Male * married	0.1007
	(0.0074)		(0.0110)
White	0.0474	White	0.0219
	(0.0157)		(0.0313)
Black	-0.0639	Black	-0.0851
	(0.0187)		(0.0342)
Asian	0.0002	Asian	-0.0391
	(0.0188)		(0.0367)
Years of education	0.0581	Years of education	0.0589
	(0.0013)		(0.0015)
Non-profit	0.0080	Non-profit	-0.0033
	(0.0107)		(0.0151)
Metro-area	0.1462	Metro-area	0.1457
	(0.0109)		(0.0171)
Industry dummies	Yes	Industry dummies	Yes
Occupation dummies	Yes	Occupation dummies	Yes
R^2	0.4882	R-Squared	0.4921
Observations	57426	Observations	22647

Note: Column I reports estimated coefficients from a regression that includes all individuals and uses a low-tax dummy and a high-tax dummy instead of using corporate tax rates. The low-tax dummy equals one if the highest marginal corporate tax rate is less than 4 percent, whereas the high-tax dummy equals one if the corporate tax rate is greater than or equal to 9 percent. Column II reports estimated coefficients from a regression that includes observations of only those individuals living in either low-tax or high-tax states. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 46 industries.

Table A6: Summary Statistics for Individuals Working in Low- and High-Tax States with and without Right-to-Work Laws

	I	II	III	IV	V	VI	VII	VIII
	Low-Tax & RTW		**High-Tax & RTW**		**Low-Tax & Not RTW**		**High-Tax & Not RTW**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Hourly wage	15.696	12.000	14.810	12.500	17.671	14.550	18.607	15.000
Union hourly wage	15.384	13.840	17.153	16.150	18.648	17.640	17.734	15.789
Nonunion hourly wage	15.719	12.000	14.467	12.000	17.469	14.000	18.755	14.956
Corporate tax rate	0.005	0.000	0.101	0.101	0.020	0.022	0.094	0.090
Labor to capital ratio	0.188	0.131	0.190	0.115	0.170	0.108	0.205	0.132
Pers income tax rate	0.007	0.000	0.090	0.090	0.029	0.034	0.059	0.064
Sales tax rate	0.058	0.063	0.050	0.050	0.058	0.060	0.053	0.060
Age	37.607	37.000	38.491	38.000	39.018	39.000	39.162	39.000
Male dummy	0.618	1.000	0.573	1.000	0.623	1.000	0.577	1.000
Married dummy	0.623	1.000	0.651	1.000	0.622	1.000	0.599	1.000
White dummy	0.850	1.000	0.965	1.000	0.890	1.000	0.864	1.000
Black dummy	0.106	0.000	0.017	0.000	0.066	0.000	0.081	0.000
Asian dummy	0.036	0.000	0.016	0.000	0.033	0.000	0.051	0.000
Native American dummy	0.008	0.000	0.002	0.000	0.011	0.000	0.004	0.000
Years of education	12.965	12.000	13.304	13.000	13.581	13.000	13.748	13.000
Union member dummy	0.069	0.000	0.135	0.000	0.170	0.000	0.145	0.000
Non-profit dummy	0.048	0.000	0.106	0.000	0.072	0.000	0.085	0.000
Metro-area dummy	0.835	1.000	0.540	1.000	0.798	1.000	0.874	1.000
Observations	6608	6608	841	841	3724	3724	11548	11548

Note: Columns I and II display variable means and medians for individuals working in low-tax states with right-to-work laws; columns III and IV display variable means and medians for individuals working in high-tax states with right-to-work laws. Columns V and VI display variable means and medians for individuals working in low-tax states without right-to-work laws; columns VII and VIII display variable means and medians for individuals working in high-tax states without right-to-work laws. Low-tax states are defined as states with marginal corporate tax rates less than 4 percent; high-tax states are defined as states with marginal corporate tax rates greater than or equal to 9 percent. The hourly wage is weekly earnings divided by the usual number of hours worked per week. The corporate tax rate is the marginal state corporate tax rate for the highest income bracket adjusted for the deductibility of federal corporate income taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns, and varies by industry. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if the individual is a union member or is covered by a union contract. The non-profit dummy equals one if the individual works at a non-profit firm. The metro-area dummy equals one if the individual lives in a metropolitan area. All statistics are weighted using the earnings weight provided by the CPS.

Table A7: The Effect of Corporate Income Taxes on the Union Wage Premium in States with and without Right-to-Work Laws (Adding Industry Dummy Variables)

Dependent Variable: Ln(Hourly Wage)

	I	II	III
	Right-to-Work	**Not RTW**	**Whole Sample**
Variable	**States**	**States**	
Corporate tax rate	-0.5425	0.6116	0.2649
	(0.7473)	(0.6601)	(0.4449)
Corp tax rate * union	0.0250	-0.8673	-0.8574
	(0.5805)	(0.4375)	(0.4093)
Corp tax rate * union * rtw			0.9089
			(0.7691)
LK ratio * union	-0.3605	-0.3500	-0.3570
	(0.1695)	(0.1322)	(0.1371)
LK ratio * union * rtw			-0.0100
			(0.2121)
LK ratio * union * corp tax	2.4737	2.4223	2.6667
	(2.6280)	(1.7115)	(1.7253)
LK ratio * union * corp tax * rtw			-0.5819
			(3.1804)
Pers income tax rate	0.5787	-0.8432	-0.3379
	(0.6031)	(0.6812)	(0.4558)
Sales tax rate	-0.0102	0.4319	0.2033
	(2.0881)	(0.6209)	(0.6019)
Union member	0.2109	0.2417	0.2385
	(0.0411)	(0.0349)	(0.0301)
Union * right-to-work			-0.0181
			(0.0545)
Right-to-work dummy			-0.0821
			(0.0196)
Age	0.0368	0.0392	0.0380
	(0.0014)	(0.0024)	(0.0016)
Age-squared / 1000	-0.3746	-0.3959	-0.3850
	(0.0157)	(0.0265)	(0.0175)
Male	0.1178	0.1158	0.1162
	(0.0110)	(0.0066)	(0.0057)
Married	0.0067	0.0028	0.0051
	(0.0088)	(0.0078)	(0.0059)
Male * married	0.1168	0.1126	0.1145
	(0.0142)	(0.0070)	(0.0073)
White	0.0537	0.0508	0.0547
	(0.0213)	(0.0218)	(0.0174)
Black	-0.0713	-0.0433	-0.0486
	(0.0231)	(0.0230)	(0.0186)
Asian	-0.0237	0.0074	0.0004
	(0.0320)	(0.0234)	(0.0185)
Years of education	0.0536	0.0599	0.0580
	(0.0015)	(0.0016)	(0.0014)
Non-profit	0.0172	-0.0054	0.0057
	(0.0188)	(0.0113)	(0.0105)
Metro-area	0.1389	0.1358	0.1340
	(0.0139)	(0.0130)	(0.0094)
Industry dummies	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes
Right-to-work dummy	No	No	Yes
R^2	0.4699	0.4945	0.4910
Observations	22328	35098	57426

Note: The regression reported in Column I includes observations of only those individuals living in states with right-to-work laws. The regression reported in Column II includes observations of only those individuals living in states without right-to-work laws. The regression reported in Column III includes the whole sample and adds a right-to-work dummy and interaction terms with the right-to-work dummy. The right-to-work dummy equals one if an individual lives in a state with a right-to-work law. The dependent variable is the log of hourly wages. The corporate tax rate is defined as the marginal state corporate tax rate for the highest income bracket adjusted to allow for the deductibility of federal corporate taxes. The labor-to-capital ratio is defined as salaries and wages divided by total assets as reported on federal corporate tax returns. The individual income tax rate is the marginal state individual income tax rate for the highest income tax bracket. The sales tax rate is the tax rate imposed on general sales. The union member dummy equals one if an individual is a union member or is covered by a union contract. The non-profit dummy equals one if an individual works for a nonprofit organization. The metro-area dummy equals one if an individual lives in a metropolitan area. The columns report estimated OLS coefficients; standard errors are bootstrapped (1,000 replications) and clustered at the state level. All regressions include dummy variables for 22 occupations and 46 industries.