

Capital Structure as a Strategic Variable: Evidence from Collective Bargaining

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Abstract

Market power in the hands of a supplier – such as a labor union – affects a firm’s optimal debt policy. If a firm maintains a high level of liquidity, workers may be encouraged to raise wage demands. In the presence of external finance constraints, a firm has an incentive to use the cash flow demands of debt service payments to improve its bargaining position. Using both cross-sectional estimates of firm-level collective bargaining coverage as well as state changes in labor law to identify changes in union bargaining power, I show that firms indeed appear to use financial leverage strategically to influence collective bargaining negotiations. These estimates suggest that strategic incentives from union bargaining have a substantial impact on financing decisions.

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Leverage means debt. More debt for Eastern meant greater pressure to cut costs. . . . We're going to have a fiasco in this country, because twenty percent of the [passenger aircraft] capacity in this country has been allowed to come under the control of a highly leveraged company which is embarked on a confrontation between labor and interest costs. It's not labor and management. It's labor and interest cost.

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1 Introduction

The product-market and input-market effects of capital structure link the financial and real activities of a firm. A vast theoretical literature relates financial structure to market conduct and postulates that firms use leverage strategically.² However, empirical work in this area is far less developed. There is considerable evidence that changes in firm capital structure affect product-market behavior, including entry, exit, and pricing (Chevalier 1995a,b; Chevalier and Scharfstein 1996; Zingales 1998).³ But how do firms respond to such incentives? This paper fills an important gap by showing that strategic incentives from input markets have a substantial impact on financing decisions.

A firm may use its financial structure to alter the behavior of competitors, customers, and suppliers. For example, the presence of debt, and particularly debt due in the near-term (“current debt”), may improve a firm’s bargaining position with suppliers or customers who possess market power. This paper focuses specifically on the effects of union power, which is widely associated with raising wages and imposing other costs on employers (Lewis 1986).⁴ Although U.S. firms are required by law to bargain with employee collectives in good faith, firms can also act to reduce the impact of bargaining on profits. Just as some firms attempt to prevent unions from organizing in the first place (Freeman 1986), they may also undertake costly actions that improve their negotiating position. One possible strategy is increasing leverage to reduce liquidity. By increasing the cash flow demands of debt service, firms may credibly commit to be tougher in labor negotiations.⁵

¹ *Frontline*, “The Battle for Eastern Airlines,” January 31, 1989.

² For surveys, see Harris and Raviv (1991) and Franck and Huyghebaert (2004).

³ Other related empirical papers include Opler and Titman (1994), Phillips (1995), Kovenock and Phillips (1997), Campello (2003), Campello and Fluck (2004), and Brown, Fee, and Thomas (2005). The Franck and Huyghebaert (2004) survey article also covers this literature.

⁴ A recent paper by Dinardo and Lee (2004) is an exception.

⁵ Various other actions may improve a firm’s bargaining position as well, such as underfunding pension plans

Delta Airlines' recent experience exemplifies how excessive liquidity can hurt a firm's bargaining position with workers. Delta was generally considered to be one of the strongest carriers leading up to the September 11, 2001, shock to the U.S. airline industry. Following its history of fiscally conservative management, Delta weathered this downturn by building up cash and liquidity. But increased liquidity also reduced the need to cut costs, hurting Delta's bargaining position with workers (Perez 2004).⁶ By 2004, Delta found itself far behind the other big carriers in restructuring, and in severe financial distress.

To illustrate the impact of collective bargaining on a firm's optimal debt policy, I embed efficient Nash bargaining over the wage bill in an agency-cost model of corporate financing. I show that market power in the hands of a supplier (such as organized labor) has two effects on the firm's capital structure: a balance sheet effect and a strategic effect. First, collective bargaining effectively weakens the balance sheet of the firm by redistributing project returns from investors to workers, forcing the firm to hold more current debt. Second, the firm uses additional current debt strategically to reduce excess liquidity and improve its bargaining position.⁷ Distinguishing these effects is important; while the balance sheet effect is a response to the outcome of labor negotiations, the strategic effect is an attempt to influence them.

Existing evidence on the link between collective bargaining and capital structure determination relies on cross-sectional comparisons that may be affected by omitted variables bias. For example, Bronars and Deere (1991) show that unionization rates are correlated with financial leverage at the industry level. This correlation may be interpreted as evidence that non-unionized firms issue debt when faced with the threat of unionization, but this relation is also consistent with a range of noncausal scenarios.⁸ This sort of simple correlation also fails to distinguish strategic increases in

(Ippolito 1985) and strategically fashioning managerial compensation (Wilson 2004). For some firms, employment policy may also serve as an anti-takeover device (Pagano and Volpin 2005). To encourage specific capital investment, labor may also be interested in making pre-commitments to reduce the holdup problem, such as organizing in multiple, separate unions (Ulph 1989) and choosing a certain type of union leader (Skatun 1997).

⁶Delta's then-CEO, Leo Mullin, said in a recent interview, "Because we managed ourselves in a financially responsible way, . . . we ended up in the tougher bargaining position." Then-board member, James Broadhead, describes, "The pilots wouldn't give anything until the last possible minute." Many of the other legacy carriers, who face powerful unions throughout their workforce, are highly leveraged, and labor has claimed that the use of leverage is strategic (for example, see the quote on page 1).

⁷The firm adopts this strategy in order to attract investors in the capital market. When a credit-constrained firm is unionized, it would have difficulty obtaining financing if not for the greater levels of current debt.

⁸For example, unions are likely attracted to established, profitable industries, which may have a greater capacity for debt. In other cross-sectional analyses, Hirsch (1991) finds that the ratio of debt to equity is higher in union companies. Sarig (1998) finds that an estimate of labor's share of the firm's quasi-rent is positively correlated with

debt from the more “mechanical” balance sheet effect.⁹

I identify the strategic effect empirically using variation in profit variability across firms, which reflects differences in the specific product markets in which firms compete. When labor and management bargain, a union can claim a portion of a firm’s excess liquidity — its operating cash flow net of any required debt payments. Collective bargaining thus imposes a greater threat to a firm when the firm maintains higher levels of excess liquidity. With limited liability and positive debt balances, greater underlying profit variability is one factor that increases expected excess liquidity and a firm’s exposure to union rent seeking. Greater variability in the profitability of potential projects implies that the firm must, on average, maintain greater excess liquidity in order to fund the same marginal project.¹⁰ Firms with greater profit variability are thus more vulnerable to union rent seeking and have a greater incentive to use debt to shield liquidity from workers in bargaining. Consequently, evidence of the strategic effect can be found by analyzing the interaction between union bargaining power and profit variability.

I explore these implications using two very different estimation strategies. Both approaches regress measures of financial debt on proxies for union bargaining power and exploit the interaction between union bargaining power and profit variability to capture the strategic effect. The first approach measures cross-sectional correlations using data on collective bargaining coverage (a direct measure of union power) for samples of manufacturing firms from the 1970s, 1980s, and 1990s. The second approach is less direct but avoids the potential biases of cross-sectional estimation by using state adoption of right-to-work laws in the 1950s and state repeal of unemployment insurance work stoppage provisions in the 1960s and early 1970s as sources of exogenous variation in union power.

The results suggest that union bargaining power leads firms to increase financial leverage, with larger increases in current debt at firms with greater profit variability. Estimates suggest this

financial leverage. Gorton and Schmid (2004) use data on German firms to show that firms subject to codetermination laws (requiring partial employee corporate control) have greater leverage than other firms. Hanka (1998) finds that debt is negatively correlated with employment, wages, and pension funding, and positively correlated with the use of part-time and seasonal employees. Kale and Shahrur (2004) show that a firm’s leverage is negatively related to the R&D intensity in its supplier and customer industries. Brown, Fee, and Thomas (2005) find that leveraged buyouts are associated with a reduction in firms’ costs of goods sold.

⁹While I do not know of any papers that explicitly aim to disentangle the balance sheet and strategic effects, empirical correlations presented in Cavanaugh and Garen (1997) can be interpreted as evidence of the strategic effect. They show that the correlation between collective bargaining and debt increases with rough proxies for the specificity of a firm’s assets.

¹⁰A union’s claim on excess liquidity can be thought of as a real option. Greater underlying variability increases the value of the option.

effect is sizeable: for firms with profit variability one standard deviation above the mean, the ratio of current debt to total firm value is 5 to 10 percent greater when an additional 10 percent of employees bargain collectively. In contrast, for firms with little profit variability, differences in union coverage rates seem to have little to no effect. Because profit variability increases exposure to union rent seeking, the effect of its interaction with union power is evidence of the strategic effect.

Analysis of the effects of changes in labor laws also suggests that strategic considerations with respect to input markets substantially influence capital structure determination. After states adopt legislation that reduces union bargaining power, firms that face concentrated labor markets and have more variable profits decrease current debt relative to otherwise similar firms with less variable profits. For firms with profit variability one standard deviation above the mean, the ratio of current debt to total firm value decreases by up to two-thirds after a right-to-work law is passed, and by one-fifth after a work stoppage provision is repealed. In contrast, these changes in labor law have little effect on firms with little profit variability. As a falsification test, I show that these changes in labor law also do not affect financial policy at firms in industries with low union presence. Various tests demonstrate the robustness of the profit variability interaction.

The remainder of the paper is organized as follows. Section 2 develops a model of capital structure determination at a firm with collective bargaining and derives comparative statics which can be tested empirically. Cross-sectional estimates are presented in Section 3, and the labor law evidence is presented in Section 4. Section 5 verifies that, in contrast to their use of debt service, firms are unable to use dividend policy as a commitment device with respect to organized workers. Section 6 concludes.

2 Theoretical model

Since Modigliani and Miller (1958), economists have been studying frictions that affect a firm's choice of financial structure.¹¹ In one traditional explanation, financial leverage is thought to mediate agency problems within firms. Easterbrook (1984) and Jensen (1986) consider the free cash flow problem at cash-rich firms which generate cash inflows exceeding their efficient reinvestment

¹¹Other than product/input market interactions, theories of capital structure determination focus on agency costs, asymmetric information, corporate control considerations, and taxes (Harris and Raviv 1991).

needs. Such firms have excess liquidity that must be “pumped out” to prevent it from being spent unprofitably, such as on poor projects, unwarranted diversification, or wasteful perks. Just as the cash flow demand of debt service payments may serve this function, it may be used to influence negotiations with suppliers, including organized labor. At a firm with collective bargaining, debt may commit a firm to disgorge excess free cash flow which might otherwise bolster wage demands.

I use generalized Nash bargaining to model negotiations with unionized workers to show how supplier market power affects a firm’s optimal debt policy. A key feature of debt policy is that it is generally set unilaterally, without labor’s consent (Baldwin 1983). Management fixes a firm’s capital structure subject to capital market constraints. When a union has market power but cannot commit to future negotiating positions (Grout 1984), management will likely consider labor market ramifications in choosing its debt policy.¹² Even with efficient bargaining over wages, employment levels, and work rules, firms will structure financing to maximize the returns to shareholders at the expense of efficiency.¹³

Notions of the capacity to use debt as a means to partially control wage demands date back to Baldwin (1983), if not before, and formal models were developed by Bronars and Deere (1991) and Dasgupta and Sengupta (1993).¹⁴ Bronars and Deere focus specifically on the use of debt by a firm facing the threat of unionization, and Dasgupta and Sengupta model a firm where labor is already organized. But these papers conflate the distinct channels through which unionization affects a firm’s capital structure. In addition to providing a strategic incentive for debt financing, union bargaining likely weakens the balance sheet of a firm by increasing wages, leading to additional increases in leverage. At a credit-constrained firm, interactions of the various functions of capital

¹²If the union could commit to future negotiating positions, and the firm aims to maximize the returns to shareholders, and labor is interested in maximizing total income, then a generalized Nash bargaining solution implies that the capital structure will not depend on bargaining power and that economic profit will be shared by labor and the firm. However, without the ability to credibly commit not to demand more later, and without deep enough pockets to subsidize the debt issuance *ex ante*, labor cannot ensure there is efficient continuation.

¹³Grout (1984) and Baldwin (1983) adopt similar approaches in modeling investment. In their models, shareholders find it optimal to underinvest in fixed assets, because the quasi-rents generated by such investments accrue partly to workers when there is collective bargaining. Similar to the strategic debt policy considered in this paper, this underinvestment can be interpreted as reducing the cash flows available to the union in bargaining (Bronars and Deere 1991).

¹⁴Based on similar intuition, Perotti and Spier (1993) develop a model to motivate the LBO wave of 1980s, whereas Sarig (1998) argues that leverage weakens shareholders’ bargaining posture vis-à-vis employees who possess firm-specific human capital. Spiegel and Spulber (1994) argue that regulated utilities have an incentive to increase leverage to elicit greater retail prices from regulators. In a sense, the use of debt in “bootstrap acquisitions” can also be interpreted as leverage being used strategically to impact “bargaining” between a corporate raider and target shareholders over takeover gains (Müller and Panunzi 2004).

structure generate these effects. Current debt serves the dual functions of (1) specifying the contingencies for continued financing and (2) removing excess liquidity from the firm. The model presented here embeds collective bargaining within a broader model of debt maturity structure, incorporating the various functions of capital structure and generating a testable implication of the *strategic* use of debt at unionized firms.

To fully understand how a supplier’s bargaining power influences a firm’s optimal capital structure, it is important to consider how some sort of financing friction can drive a wedge between internal and external financing. I introduce managerial moral hazard into a model of multi-stage financing, building on the Holmström and Tirole (1996) model of liquidity management. Firms are considered “cash-rich” ongoing entities, generating cash beyond any investment cost overruns that must be paid to complete the project. To ensure the firm does not overinvest, investors hold current debt, thereby pumping the excess cash out of the firm.

The timing of the model is depicted in Figure I. There are three periods. At date 0, a firm with wealth A faces an investment opportunity whereby an initial investment I returns R if the project succeeds and 0 if it fails. To finance the fixed investment cost I , the firm needs to borrow $I - A$. In exchange for receiving $I - A$ at date 0, the firm agrees to pay investors at least d at date 1 (or face liquidation) and D at date 2 (if the project succeeds). Management of the firm is protected by limited liability, and the financial markets are competitive with investors demanding a rate of return equal to 0. Management, labor, and investors, are risk neutral.

At date 1, the investment yields a deterministic payoff $r \geq 0$. However, the firm also experiences a liquidity shock, ν , that it must withstand in order to continue with the project. The amount of ν is unknown ex ante and has a cumulative distribution function $F(\nu)$ with density $f(\nu)$ on $[0, \infty)$. This liquidity shock can simply be interpreted as a need for cash to cover operating expenditures and any investment cost overrun, but it can equivalently be considered a shortfall in date 1 earnings (Tirole 2004, p. 280). In addition to paying ν , continuation requires hiring workers. If the firm is unionized, the wage bill, $w(\nu)$, is the outcome of Nash bargaining, described further below, and is paid at date 1 from the firm’s current cash flow. Otherwise, the firm pays workers their alternative wage, which is normalized to 0. If ν is paid and workers are hired, the project continues and a final payoff is realized at date 2. If the firm fails to either reinvest or hire workers, it is liquidated with value equal to 0.

Once the firm withstands the liquidity shock and successfully hires workers, management privately chooses the probability p that the project succeeds, subjecting investment to moral hazard. Management can either put forth high or low effort. If management is diligent, the probability of success is p_H ; whereas if it slacks, it enjoys a private benefit $B > 0$ but reduces the probability of success to p_L , where $p_H - p_L \equiv \Delta p > 0$. Assume the project's net present value is positive if management is diligent but not if it shirks. Given that the firm is cash-rich, a sufficient condition is:

$$p_H R - I > 0 > p_L R - I + r + B$$

The moral hazard drives a wedge between the project's net present value (expected return) and its pledgeable income (expected return to investors), constraining the borrowing opportunities of the firm.

At date 0, the firm contracts with outside investors, specifying the amount that investors will contribute and the distribution of the proceeds of investment, i.e., d and D . As in Holmström and Tirole (1996), assume that the project outcome and the liquidity shock are verifiable. For simplicity, also assume D cannot be refinanced at date 1.¹⁵ By constraining cash flows at the intermediate date, the contracted level of current debt, d , implicitly also determines the contingencies in which the project will be continued at date 1. Since continuation is attractive to the firm, it will continue whenever it is financially feasible, that is for all ν such that

$$\nu + w(\nu) \leq \nu^* \equiv r - d$$

In this sense, the firm uses current debt to credibly commit to investors that it will only continue the project beyond date 1 if the costs of continuation are low enough — below some agreed upon cutoff, denoted ν^* .

In addition to determining the continuation cutoff, the cash flow demands of debt service also crucially affect the negotiations between management and labor. When the time comes to hire

¹⁵Refinancing is infeasible if, for example, investors are dispersed and it is sufficiently costly to dilute their claims through renegotiation. Alternatively if renegotiation were feasible, the firm's soft budget constraint would increase current debt in the optimal capital structure. In fact, assuming workers are unable to hold up lenders (final wage negotiation follows refinancing) and the managerial agency problem is relatively mild ($\frac{B}{\Delta p}$ is sufficiently small relative to R), then the firm would strategically exploit refinancing by further increasing current debt, thereby decreasing wages, and relying on opportunities to refinance at date 1 to fund projects.

workers at date 1, it is common knowledge that the firm has $r - d - \nu$ in excess liquidity — cash on hand net of the impending current debt payment — from which to pay workers. If the parties cannot come to terms, the firm liquidates and is worth 0 and workers find work elsewhere (or collect unemployment benefits), also valued at 0.¹⁶ If the parties reach an agreement, the excess liquidity may be divided in any number of ways.

Following Grout (1984) and Baldwin (1983), I adopt a generalized Nash bargaining solution where management aims to maximize the returns to shareholders, labor is interested in maximizing total income, and union and management respective bargaining powers are $z \in [0, 1]$ and $1 - z$.¹⁷ Consequently, the workers are hired and paid a wage equal to

$$w(\nu) = z(\nu^* - \nu) = z(r - d - \nu) \quad (1)$$

Several observations are immediate. The negotiated wage is increasing in the workers' bargaining power, but decreasing in the level of current debt and the realized value of nonlabor operating costs. That is, if nonlabor costs overrun, the union will be less able to elicit a favorable wage. For the project at the continuation margin, $\nu = r - d$, the union is left with zero surplus, $w = 0$. Note that ν^* , the implicitly contracted cutoff in total continuation costs $\nu + w(\nu)$, is then also the firm's cutoff in ν ; the project will continue whenever $\nu \leq \nu^*$. Equation (1) also implies that, for any ν , current debt reduces the union rent.

The net present value of investment is maximized by continuing the project if and only if

$$\nu \leq \nu_1^* \equiv p_H R - z \frac{F(\nu_1^*)}{f(\nu_1^*)}$$

that is, whenever the expected return $p_H R$ from continuation exceeds the operating cost ν plus the

¹⁶One might ask whether workers might disagree with the firm to force it into bankruptcy and then attempt to divert some of d from creditors (Bronars and Deere 1991). If breaking off negotiations with the firm is sufficiently costly, it is not in the interest of workers to do so (Dasgupta and Sengupta 1993). Weiss (1990), for example, estimates that the direct costs of bankruptcy average 3 percent of the equity value of the firm, and the costs of a strike may be even greater. Furthermore, even when this may be a beneficial strategy in a one-shot game, it is unlikely to be optimal in a more realistic model which includes repeated interactions.

¹⁷The bargaining game can be formulated in any number of equivalent ways. For example, a crude model final offer arbitration allows both parties to propose a take-it-or-leave-it offer (Blanchard and Tirole 2004). Based on a random draw, the union offer is selected with probability z and the firm's offer is selected with probability $1 - z$. Then, the expected wage for any realization of ν is $z(r - d - \nu)$.

expected wage $z \frac{F(\nu_1^*)}{f(\nu_1^*)}$. The optimal cutoff is decreasing in union bargaining power, and allows less continuation than what is optimal for a nonunion firm. However, if investors are to ensure that management is diligent (chooses p_H), they cannot take the entire project return. Investors must structure their claim at date 2 to provide the appropriate incentives for management:¹⁸

$$(\Delta p)(R - D) \geq B$$

This moral hazard constraint reduces the project's expected return to investors below its NPV. In fact, pledgeable income is maximized by continuing the project if and only if

$$\nu \leq \nu_0^* \equiv p_H R - p_H \frac{B}{\Delta p} - z \frac{F(\nu_0^*)}{f(\nu_0^*)}$$

which is to say, whenever the expected return $p_H R$ from continuation exceeds the sum of the operating cost ν , the expected wage $z \frac{F(\nu_0^*)}{f(\nu_0^*)}$ paid to workers, and the moral hazard payment $p_H \frac{B}{\Delta p}$ made to the firm.

There are then four cases to consider, summarized in Figure II. To simplify notation, let $\rho_0 \equiv p_H R - p_H \frac{B}{\Delta p}$, and let $P(\nu^*)$ denote the maximal net income pledgeable to investors when the continuation cutoff is ν^* .

$$P(\nu^*) = r + F(\nu^*)\rho_0 - \left[I - A + \int_0^{\nu^*} \nu f(\nu) d\nu + \int_0^{\nu^*} z(\nu^* - \nu) f(\nu) d\nu \right]$$

If $P(\nu_1^*) \geq I - A$, then the firm is able to secure enough funding to implement its optimal cutoff ν_1^* . If $P(\nu_0^*) < I - A$, achieving funding is not feasible, as pledgeable income is insufficient to compensate investors. Let $\bar{P}(\nu^*)$ denote the maximal pledgeable income of a nonunionized firm.¹⁹ Over a subset of the infeasible range, $P(\nu_0^*) < I - A \leq \bar{P}(\rho_0)$, funding would be possible if the firm were not unionized.

The final case is the most interesting both theoretically and empirically.²⁰ If $P(\nu_1^*) < I - A \leq$

¹⁸When approaching the capital market to finance the new project, management represents the interests of incumbent shareholders, subject to the shirking temptation. This assumption is most natural when management is the sole proprietor before financing.

¹⁹Formally, $\bar{P}(\nu^*) = r + F(\nu^*)\rho_0 - \left[I - A + \int_0^{\nu^*} \nu f(\nu) d\nu \right]$.

²⁰Extensive empirical evidence of external financing constraints (e.g., Fazzari, Hubbard, and Petersen 1988; Lamont 1997; Rauh 2006) suggests this case is the most relevant for many firms.

$P(\nu_0^*)$, the firm will obtain some financing but not enough to support the unconstrained-optimal continuation cutoff. With a competitive capital market, the optimal contract for the credit-constrained firm has $d = r - \nu^*$ and $D = R - \frac{B}{\Delta P}$, where the cutoff $\nu^* \in [\nu_0^*, \nu_1^*]$ is given by the investors' breakeven condition:

$$r + F(\nu^*)\rho_0 = I - A + \int_0^{\nu^*} \nu f(\nu) d\nu + \int_0^{\nu^*} z(\nu^* - \nu) f(\nu) d\nu \quad (2)$$

With continuation cutoff ν^* , the expected returns accruing to investors, both at date 1 and at date 2, equal their expected investment outlays, including $I - A$ at date 0 and the operating expenses and union rent paid at date 1. Rearranging the terms in equation (2) and performing integration by parts yields another implicit expression for ν^* :

$$r + \int_0^{\nu^*} (\rho_0 - \nu) f(\nu) d\nu = I - A + z \int_0^{\nu^*} F(\nu) d\nu \quad (3)$$

Equation (3) shows that setting ν^* involves a tradeoff between the two inseparable products of continuation: (1) project surplus (net of moral hazard payment) created at the continuation margin, $\int_0^{\nu^*} (\rho_0 - \nu) f(\nu) d\nu$, and (2) labor rent $\int_0^{\nu^*} z F(\nu) d\nu$, which accrues infra-marginally and is increasing in union bargaining power. The strength of the union does not impact the magnitude of project surplus at the margin, because as shown above, the union does not earn rents from the marginal project. Rather, the union's rent accrues infra-marginally, with current debt (and the effective continuation cutoff) influencing the magnitude of its wage demands.

Key comparative static relationships follow directly from equation (3). As union bargaining power increases, the union rent increases, the project NPV decreases, the firm continues less often, and therefore carries more current debt.

$$\frac{\partial \nu^*}{\partial z} < 0, \quad \frac{\partial d}{\partial z} > 0 \quad (4)$$

Increasing the variability of the reinvestment need (or "profit shortfall"), by applying a mean preserving spread, has an ambiguous effect on the debt structure and the contingencies for optimal continuation. There is a tradeoff; for a given continuation threshold, increasing variability makes the project succeed less often, but when it does succeed, expected profits are greater. Because the

level of debt is being set by the investors' breakeven condition, whether more variability increases or decreases current debt depends on which effect dominates — that is, it relies on the distribution of ν .²¹

$$\frac{\partial \nu^*}{\partial \sigma} \geq 0, \quad \frac{\partial d}{\partial \sigma} \leq 0 \quad (5)$$

While the main effect of variability on current debt could be positive or negative, the interaction effect of increasing both union bargaining power and reinvestment cost/profit variability is always positive (regardless of distributional assumptions). Since unions do not earn a rent at the continuation margin, they do not affect the frequency with which the project succeeds, only the level of expected profits when the project is successful.²² Greater variability exposes more liquidity to union capture. As illustrated in equation (3), while the added liquidity does not impact the effect of union power on project surplus at the margin (it is already 0), it does increase the effect of union power on infra-marginal wage costs. The interaction leads investors to require the firm to continue less often and carry more current debt.

$$\frac{\partial^2 \nu^*}{\partial z \partial \sigma} < 0, \quad \frac{\partial^2 d}{\partial z \partial \sigma} > 0 \quad (6)$$

Thus, collective bargaining has two effects on the firm's capital structure: a balance sheet effect and a strategic effect. The balance sheet effect is in some sense mechanical; paying higher wages increases the costs of the project, reducing its attractiveness as well as the favorableness of the terms of financing. The strategic effect, on the other hand, comes from debt changing union behavior. Workers' demands in negotiations reflect the cash flow requirements imposed by debt service. Given costs, increasing the level of current debt decreases the negotiated wage, leaving more value on the table for the firm and its investors. While the balance sheet effect is a response to the outcome of labor negotiations, the strategic effect is an attempt to influence these negotiations.

The effects of the interaction of union power and profit variability provide the most direct evidence of firms using debt *strategically* to assuage the wage demands of unionized workers. Whereas the comparative static represented by equation (4) reflects a combination of the balance sheet and

²¹While perhaps a slight abuse of notation, I use $\frac{\partial}{\partial \sigma}$ to represent the effect of applying a mean preserving spread.

²²This claim is consistent with evidence presented by Freeman and Kleiner (1999), which suggests that while unions reduce profits, they do not generally demand so much as to force firms out of business.

strategic effects, the interaction effect represented by equation (6) isolates the strategic effect. Beginning with Brown and Medoff (1978), some researchers have argued that unions or labor relations improve productivity; for example, they may reduce turnover and improve morale and worker cooperation.²³ If unions or labor relations have positive externalities on project returns, the net balance sheet effect may not be positive, and straight empirical correlations might suggest that unions have little net effect on capital structure. The interaction effect, on the other hand, reflects only the strategic effect. As the combination of union power and profit variability increases the scope for union rent seeking, the interaction effect most closely reflects firms' *strategic* use of debt.

3 Cross-sectional evidence

While notions of using capital structure to influence collective bargaining are not new, the existing empirical evidence is weak.²⁴ Identifying a relationship is fraught with challenges. Union bargaining power is not a well-defined empirical construct; estimates of natural proxies — such as firm-level collective bargaining coverage — are rare; and identifying a source of variation in bargaining power presents an additional challenge.

I employ two very different estimation strategies to explore the predictions of the model developed in Section 2. Both approaches regress measures of financial debt on proxies for union bargaining power and exploit the interaction between union bargaining power and profit variability to specifically identify the strategic effect.²⁵ The first approach uses various cross-sections of primarily manufacturing firms from the 1970s, 1980s, and 1990s to establish the correlation of collective bargaining coverage, debt, and profit variability at the firm level. The latter approach uses changes in state labor laws in the 1950s, 1960s, and early 1970s to identify how changes in bargaining power affect debt levels at panels of firms in highly unionized industries.

²³Empirical evidence of union productivity effects is mixed. It seems labor relations, rather than unionization or collective bargaining per se, contribute to productivity. See summaries in Belman (1992) and Freeman (1992) and recent evidence presented by Kleiner, Leonard, and Pilarski (2004), Krueger and Mas (2004), and Mas (2004).

²⁴The existing evidence, described in Section 1, consists of cross-sectional correlations that may be affected by omitted variables bias. It also fails to distinguish between strategic and balance sheet effects.

²⁵Cross-sectional correlations, presented in Appendix Table A1, support notions of profit variability generating excess liquidity, which is partially captured by workers during collective bargaining. Based on the universe of Compustat firms in 1983, a firm with one standard deviation greater profit variability has, on average, 11 cents greater profits per dollar of assets and pays an 80 percent greater union wage premium.

3.1 Cross-sectional empirical approach

The degree of union bargaining power in negotiations with a given firm likely increases with the proportion of the firm’s employees covered by collective bargaining. At firms with greater coverage, union-organized job actions are more costly, and firm-wide policies are more likely to be affected by bargaining. I use firm-level data on collective bargaining coverage as a proxy for union bargaining power and estimate its effect on the firm’s choice of capital structure.

Firm-level estimates of collective bargaining coverage are not widely available. I obtained them from two different sources for cross-sections of firms in 1977, 1987, and 1999. Coverage estimates for 1977 and 1987 are derived primarily from a 1987 survey of manufacturing firms conducted by Barry Hirsch (1991).²⁶ The data for 1999 were compiled by Craig Eschuk (2001), mostly from company 10-K annual reports, and were provided to me by Richard Freeman. Each cross-section is supplemented with firm-level financial data from Compustat,²⁷ and summary statistics are presented in Table 1. The sample includes 656 firms in 1977, 368 firms in 1987, and 349 firms in 1999. The 10-K sample may provide less generalizable estimates, since non-unionized firms are not represented.²⁸ In each sample, a quarter to a third of employees are covered by collective bargaining at a representative manufacturing firm. For 1977 and 1987, these figures are similar to estimates derived from other sources.²⁹

I employ regression analysis to examine the correlation of collective bargaining coverage, debt, and profit variability at the firm level. Let $DEBT_{ij}$ be a measure of financial debt at firm i in industry j and $VALUE_{ij}$ represent the market value of the firm.³⁰

²⁶In addition to data from his own survey, Hirsch augments the 1977 sample using firm coverage data collected in an independent 1972 Conference Board Survey. See Hirsch (1991) for details.

²⁷Estimates of firms’ marginal tax rates before interest expense for 1987 and 1999 were provided by John R. Graham and are described in Graham, Lemmon, and Schallheim (1998). Compustat variables are winsorized at the 1% tails.

²⁸Information on collective bargaining coverage is not uniformly reported in the 10-K. Only companies for which union relations are material to the firm tend to report the figure. Eschuk contacted non-reporting firms, in total collecting data for about 65 percent of the original sample of manufacturing firms (Eschuk 2001, p.112). As reported in Table 1, all firms for which data was collected had at least some collective bargaining coverage.

²⁹Estimates from the Current Population Survey (CPS) suggest that approximately 35 percent of manufacturing workers were covered by collective bargaining in 1977, and 25 percent were covered in 1987 (Hirsch 1991). On the other hand, CPS estimates suggest that only 16.6 percent of manufacturing employees were covered by collective bargaining in 1999, and only 10.2 percent of private sector employees overall (Hirsch and Macpherson 2003). Selection in firm reporting of collective bargaining coverage in 10-Ks likely explains the greater rates present in the 1999 sample. See note 28.

³⁰The empirical results are robust to using total assets (rather than market values). Results for both types of specifications are reported below.

$$\frac{DEBT_{ij}}{VALUE_{ij}} = \alpha_1 COVERAGE_i + \alpha_2 VARIABILITY_i + \alpha_3 COVERAGE_i * VARIABILITY_i + X_i \beta + \omega_j + \varepsilon_{ij}$$

The level of debt as a fraction of the firm’s total value is modeled as a function of the proportion of employees covered by collective bargaining ($COVERAGE_i$), a measure of profit variability ($VARIABILITY_i$), the interaction of $COVERAGE_i$ and $VARIABILITY_i$, a set of financial controls X_i , and two-digit SIC industry fixed effects ω_j . Profit variability is measured using the standard deviation of the change in earnings before depreciation and amortization, divided by total assets.³¹ It is demeaned (with respect to the sample mean) before it is interacted with union coverage to allow for a more meaningful interpretation of the $COVERAGE_i$ main effect. The financial controls are those typically included in leverage regressions, specifically the proportion of fixed assets (a proxy for potential collateral), the marginal tax rate before interest expense (nondebt tax shields), the market-to-book ratio (investment opportunities), log sales (firm size), modified Altman’s z-score (probability of bankruptcy), and return on assets (profitability).³² Table 1 summarizes the financial variables in each of the sample years. On average, five percent of a firm’s capitalization is debt due within one year, whereas total debt represents a quarter to a third. Similar equations with different dependent variables are used to investigate the relationship between collective bargaining coverage and other variables.

³¹This measure of profit variability dates back to Brealey, Hodges, and Capron (1976), if not before, and is common in the finance literature. For a discussion of its relative merits, see Chaplinsky (1984). It is normalized by its standard deviation to ease the interpretation of the estimates. Measures of profit variability are meant to reflect the product market variability underlying each firm’s business. Depreciation and amortization are added back to earnings, because they are noncash charges. The estimates are robust to alternative calculations of variability, including using earnings also before interest and taxes (EBITDA), using cash-basis rather than accrual-basis measures of earnings (i.e., operating cash flows), and using sales (to avoid any bias introduced by including labor costs). Regressions using these alternative measures in the labor law analysis framework are reported in Appendix Table A3. Where available, data for up to the previous 10 years is included in the calculation of profit variability (e.g., 1967-1977 for 1977). Including more years of data does not change the results. An observation is dropped if fewer than 5 years of data are available.

³²These variables reflect the literature on capital structure, surveyed in Harris and Raviv (1991). They are the variables included in cross-sectional analysis in Rajan and Zingales (1995) plus other variables the authors state they would have included but for lack of data availability across their broad set of countries. Modified Altman’s z-score is

$$3.3 \frac{EBIT}{total\ assets} + 1.0 \frac{sales}{total\ assets} + 1.4 \frac{retained\ earnings}{total\ assets} + 1.2 \frac{working\ capital}{total\ assets}$$

(MacKie-Mason 1990). Note that while these financial variables are known to be correlated with total leverage ratios, there may be no reason to expect a correlation with measures of short-term debt. They also may be endogenous. For these and other reasons, some may worry that the financial variables actually distort measurement of the relationships between debt, union coverage, and the variability of profits. To address these concerns, I also estimate specifications without financial controls.

Theory ascribes a special role in influencing collective bargaining negotiations to any financial (or non-financial) instrument that places demands on current cash flows. Empirically, debt in current liabilities (what I have been calling “current debt”) most closely reflects the cash flow demands of debt service payments. It includes both short-term debt and the current maturities of long-term debt.³³ Debt with noncurrent maturity may not require any current period cash expenditure if the interest is paid later, such as with zero coupon bonds. Because the vast majority of debt service payments reflect principal versus interest (approximately 75 percent in my 1950s sample), current debt provides a better measure than total debt of the near-term need for cash that financial leverage imposes on a firm (Plesko 2001). Accordingly, I focus on current debt as the primary debt instrument available to a firm seeking to strategically reduce liquidity. Yet in theory, any cash flow demands imposed by debt before the project reaches completion may influence bargaining, and in practice, even debt with a long maturity can impose cash flow demands through covenant restrictions. Therefore, it is likely that firms also boost noncurrent debt to influence collective bargaining. Where available, I examine debt due within 2-5 years and total leverage in addition to current debt.

While this sort of cross-sectional approach provides important evidence, it is limited. When measuring the effect of collective bargaining using comparisons across firms, there will always be a suspicion that the controls included in the analysis are not exhaustive. These concerns are mitigated by identification of the strategic effect coming from the interaction with profit variability. Nevertheless, if an omitted firm characteristic differentially affects both the degree of unionization and capital structure determination at firms with greater profit variability, then it would be inappropriate to assign the estimates a causal interpretation. I address this important concern with a second empirical approach.

3.2 Cross-sectional estimates

Cross-sectional evidence of the effect of unionization on current borrowing is presented in Table 2. Each panel corresponds to analysis conducted for a cross-section of firms in 1977, 1987, and 1999, respectively. Raw correlations at the firm level provide inconsistent evidence on the relationship

³³The empirical results are robust to using the sum of debt in current liabilities and interest expense.

between collective bargaining coverage and the use of current debt (Column 1).³⁴ However, further analyses show that this obfuscates the importance of the relationship at firms with highly variable profits (Columns 2-4). The interaction term is positive and both statistically and economically significant. Greater variability exposes relatively more liquidity to union capture at firms with greater union coverage, apparently leading these firms to increase current debt. The interaction provides a margin for detecting strategic responses to collective bargaining, even in many empirical models where the causal union main effect is not independently identified.

The magnitude of the interaction effect is also significant. Consider two firms — one with one standard deviation greater profit variability than the other. An increase in a firm’s union coverage by 10 percentage points is associated with approximately a 30 to 50 basis point greater increase in current debt for the more exposed firm. This effect is sizeable, measuring 5 to 8 percent of mean current debt among sample firms. Stated differently using the main effect estimate for 1987, for firms with profit variability one standard deviation above the mean, the ratio of current debt to firm value is 5 to 10 percent greater when an additional 10 percent of employees bargain collectively.³⁵ In contrast, for firms with little profit variability, differences in union coverage rates seem to have little effect.

Analyses of other measures of near-term debt yield comparable estimates. Because debt due within 2 to 5 years also affects near-term cash flows, it, too, may be used strategically by firms to affect collective bargaining. As with the analysis of current debt, I interpret positive estimates of the interaction of collective bargaining coverage and profit variability as evidence of firms’ employing such a strategy. To account for the differing magnitudes of the various debt measures, I convert the interaction coefficients to “elasticities,” which are reported in Table 3. (More precisely, these are derivatives, with respect to profit variability, of the union coverage elasticity of debt, evaluated at the mean.) Each elasticity is from a separate regression, where the rows correspond to different dependent variables and the columns represent the cross-sections analyzed. Collective bargaining seems to influence the maturity structure of debt in favor of current borrowing. Its impact is

³⁴While the estimated 1977 and 1999 coefficients are close to zero, it is difficult to interpret these estimates, because they may be affected by omitted variables bias. Because its identification comes from an additional contrast, the interaction effect is arguably less susceptible to omitted variables bias.

³⁵For these firms, the marginal effect is 50 to 70 basis points, and the average ratio of current debt to firm value is about 7 percent.

greatest on debt due within one year and declines with each broader classification of near-term debt.

Cross-sectional analysis also suggests that collective bargaining may increase total debt. As reported in Table 4, the variables are highly positively correlated (Column 1). Total debt is on average 60 to 160 basis points (2 to 6 percent) greater at firms where an additional 10 percent of employees bargain collectively. However, financial controls seem to account for much, if not all, of the correlation (Column 3), complicating the interpretation of the correlation between unionization and total debt.³⁶ From this evidence, it is difficult to discern to what extent the financial variables control for selection in union organizing versus represent a causal mechanism through which union presence affects capital structure. Regardless, the cross-sectional interaction of collective bargaining and profit variability provides little support for a strategic effect on *total* borrowing (Columns 2-4).

Boosting the cash flow demands of capital structure is not the only tactic available to firms seeking to improve their bargaining position vis-à-vis workers. My empirical evidence of the strategic use of current debt relies heavily on the importance of profit variability in increasing expected excess liquidity and the degree of union rent seeking. Evidence of firms adopting other anti-union strategies specifically when profits are more variable provides a useful robustness check.³⁷ In search of such evidence, I examine inventory policy.

Ultimately, much of workers' bargaining power in collective bargaining negotiations is derived from credible threats to withhold labor services. To mitigate these threats, firms may strategically maintain costly "buffer" inventories, which increase the costs of a strike borne by workers relative to those borne by the firm (Christenson 1953).³⁸ Compared to materials and goods in earlier stages of the production process, inventories of finished goods provide the most effective insurance and deterrence against employee job actions. In fact, it would be surprising if inventories of raw materials had any correlation with worker-firm bargaining power.

³⁶In fact, the main effect of union coverage on debt divided by assets is negative and statistically significant in the 1999 sample (Panel C, Column 4). Given the selected nature of the 1999 sample (see note 28), this estimate should be interpreted carefully. Regardless of the magnitude it reports, that a firm includes union coverage at all in its 10-K suggests that the union has significant bargaining power.

³⁷The correlations presented in Appendix Table A1 provide an additional robustness check. See note 25.

³⁸In a study of the determinants of U.S. strike activity, Tracy (1986) finds that *total* inventories have no effect on strike activity. However, as he argues and as is demonstrated below, total inventories, which include raw materials and work-in-progress in addition to finished goods, provide a relatively poor measure of buffer stock.

Analyses of these inventory hypotheses are presented in Table 5, based on the cross-section of manufacturing firms in 1977. Unfortunately, inventory data for my later, smaller samples of firms are not sufficiently complete to provide meaningful analysis. In 1977, firms appear to have been using inventories of finished goods strategically in conjunction with collective bargaining negotiations. Although raw correlations suggest no relationship between collective bargaining and inventories (Column 1), the effect of the interaction between union coverage and profit variability suggests there is a strategic component in inventory policy — similar current debt.³⁹ Whereas profit variability is negatively correlated with inventories, perhaps because these firms are more liquidity constrained (Gertler and Gilchrist 1994), the opposite is true at majority-unionized firms (Columns 2-3). As developed in Section 2, the scope for union rent seeking increases with the interaction between unionization and profit variability. Regression analysis finds evidence of a sizeable strategic effect: given two sample firms, one with one standard deviation greater profit variability than the other, an increase in union coverage by 10 percentage points is associated with a greater increase in total inventories for the more exposed firm by 41 basis points (as a percent of sales), or 2.2 percent of mean inventories. As expected, the effect appears to be driven most by a build-up of finished goods (3.4 percent) and, to a lesser extent, increased work-in-progress inventories (2.8 percent). The estimates find no relationship with inventories of raw materials. Although these results are persuasive, corroboratory evidence from the labor law analysis would be ideal. Unfortunately, data breaking down inventories by stage-of-production is not readily available for the period of that analysis, and evidence based on total inventories is imprecise.

4 Exploiting state changes in labor law

The second set of empirical analyses uses state-specific changes in labor law to identify changes in union bargaining power. Over time, state policymakers have used legislation and public subsidies to influence the costs of union organizing and activism, altering workers' relative bargaining position.

³⁹ As with the other cross-sectional models, the union main effect measured here should not be assigned a causal interpretation. Even if firms boost inventories in response to unionization, the variables may not be correlated if, for example, worker organization drives are more successful at firms with otherwise lower inventory levels. Threat effects on nonunionized firms may also prevent detection. These straightforward explanations are much less trouble for interpretations of the interaction effect. Nevertheless, noncausal explanations of the interaction effect cannot be unambiguously refuted using cross-sectional estimates.

Two important policies in this context are right-to-work laws and unemployment insurance work stoppage provisions.

4.1 Right-to-work laws

Federal collective bargaining law was established by the National Labor Relations Act (the Wagner Act) in 1935. It set up the National Labor Relations Board (NLRB), an independent federal agency, which administers union elections and ensures that a union represents its constituent employees. Once a union is certified by the NLRB, the employer is required to bargain with the union in good faith. By preventing employers from discriminating against workers who join unions or participate in a strike, labor law confers significant market power to certified unions. The Wagner Act also allowed the parties to agree (through bargaining) to require anyone hired to join and financially support the union.

However, Republican Party gains in the 1946 mid-term Congressional elections and strong anti-labor sentiment following World War II, resulted in the Labor-Management Relations Act (the Taft-Hartley Act), which was passed over President Harry Truman's veto in 1947. Among other provisions which were broadly construed as anti-union, the Taft-Hartley Act granted states the power to pass so-called "right-to-work" (RTW) laws. RTW laws outlaw employment contract provisions that require employees to join or financially support a union. As such, the laws expose unions to a free rider problem, whereby non-union employees benefit from collective bargaining without paying dues. Figure III, Panel A, describes the history of state RTW legislation.

I use state adoption of RTW laws in the 1950s as a source of geographic changes in union bargaining power.⁴⁰ As surveyed by Moore (1998), the existing empirical evidence indicates that RTW laws impact union organizing activity and industrial development. By examining flows into unionization, Ellwood and Fine (1987) demonstrate that RTW laws have a sizeable impact on union organizing. A similar analysis is presented in Appendix Table A2. Using state-level data, I regress the log number of members of newly elected bargaining units on a RTW indicator, a pre-adoption indicator, and various controls. While organizing activity was comparable across states before adoption of RTW laws, it decreased by approximately 30 percent in adopting states

⁴⁰Limitations in the availability of Compustat data restricts my analysis to this period.

after the laws were passed. These estimates are consistent with RTW laws ultimately diminishing union membership by 5 to 10 percent, or 1 to 3 percentage points (Ellwood and Fine 1987, p.266).⁴¹ RTW laws may also encourage industrial development; Holmes (1998) uses comparisons across state borders to show that relative manufacturing employment is about one-third greater in states with RTW laws than in other states.

In addition to reducing the threat of new union organizing, RTW laws likely directly affect collective bargaining at firms with existing unions. Ellwood and Fine (1987, p.270) argue:

The most obvious explanation is simply that passage of an RTW law makes union membership less economically attractive to workers. Without the ability to enforce payment of dues or to fine those who cross the picket line, unions may prove less powerful. Their strike threats are diminished both by reduced financial resources and by less certain participation.

As a symbol of union defeat, the passage of RTW laws may also have a psychological effect on a union's appeal to workers (Ellwood and Fine 1987). Both economic and psychological channels weaken the union's bargaining position, thereby reducing the expected benefits of union membership, the marginal benefit of organization, and the supply of union jobs (Farber 1984).⁴²

4.2 Unemployment insurance work stoppage provisions

I believe that the work stoppage portion of the labor dispute disqualification provision is the most significant [feature of the unemployment insurance system] in affecting behavior of the parties in collective bargaining or industrial relations.

Sandra D. Dragon, Commissioner
Vermont Department of Employment and Training⁴³

Another plausibly exogenous source of variation in union bargaining power comes from changes in the unemployment insurance system. The United States unemployment insurance system invests states with considerable autonomy to establish rules governing claimant eligibility for benefits. State autonomy results in considerable variation across states and over time in the conditions under which

⁴¹These decreases in union membership are in addition to the losses that might occur if any members of existing bargaining units choose to not be union members when union shop rules are eliminated. Unfortunately, the dearth of comparable state-level data on the stock of union membership before and after the passage of RTW laws interferes with estimation of these losses. For a detailed discussion of data availability, see Ellwood and Fine (1987, p.253-4).

⁴²Theoretically, the effect of RTW laws on wages is ambiguous. While eroded union bargaining power may decrease wages, enhanced industrial development may boost both labor demand and wages. Empirical evidence on RTW wage effects varies widely (Farber 1984; Reed 2003).

⁴³Letter, dated December 28, 1981, quoted in Hutchens, Lipsky, and Stern (1992, p.340).

workers unemployed because of a labor dispute qualify for unemployment compensation. While eligibility rules generally exclude striking workers, a majority of states allow those unemployed because of a labor dispute to collect unemployment insurance benefits under specific (but not usual) conditions.

I focus on one such eligibility rule that has been shown empirically to be of particular importance: the work stoppage provision (WSP). In 1960, 35 states permitted strikers to collect unemployment benefits during a labor dispute if their employer continued to operate at or near normal levels. In these states, an eligible striker could collect benefits after the normal waiting period (generally one week after filing for benefits). In a sense, a WSP provided strikers with insurance for a failed strike. Striking workers could collect benefits only if employers succeeded in weathering the strike and continued to operate at or near normal levels.

WSPs have been shown to affect collective bargaining. Unions accrue bargaining power in negotiations from an implicit, if not explicit, threat to withhold labor services. While a variety of theories explain strike activity, it is relatively uncontroversial that workers' bargaining position is improved when striking is less costly (Kennan 1986). One theory of strike activity predicts that strikes are a decreasing function of the combined cost borne by workers and management (Reder and Neumann 1987). Because unemployment insurance premiums are only imperfectly experience-rated, joint cost theory predicts that paying benefits to strikers not only improves their bargaining position, but also increases strike activity. In an analysis of the influence of various government transfer programs on strikes, Hutchens, Lipsky, and Stern (1989) find that the repeal of unemployment insurance WSPs is associated with less frequent strike activity in states with relatively generous unemployment insurance programs.⁴⁴ Figure III, Panel B, depicts the history of state WSPs. Seven states repealed WSPs between 1960 and 1973.⁴⁵ I use this legal variation to identify changes in union bargaining power.

⁴⁴Hutchens, Lipsky, and Stern (1989) also find that innocent bystander rules increase strike activity in generous states. Changes in these rules are highly correlated with the repeal of WSPs, but they are less frequent. The authors find no evidence of a link between strike activity and other unemployment insurance rule changes, including those related to lockouts and interim employment, AFDC, food stamps, or general assistance.

⁴⁵The empirical estimates are robust to excluding New Jersey, which readopted a WSP shortly after repealing it in 1967.

4.3 Labor law empirical approach

I estimate the reduced form effect of RTW laws and WSPs on firms located in the affected states, and interpret the results as indicating the effects of changes in union bargaining power. To focus on sectors where these laws are most relevant, I restrict the sample to industries known to have relatively high union coverage. Included industries are listed in Appendix Table A3.⁴⁶ Let LAW_{st} indicate the presence of a RTW law or absence of a WSP in state s at time t .

$$\frac{DEBT_{ijst}}{VALUE_{ijst}} = \alpha'_1 LAW_{st} + \alpha'_2 LAW_{st} * VARIABILITY_i + \eta_i + \tau_{jt} + \xi_{ijst} \quad (7)$$

The specification includes firm fixed effects η_i , as well as industry-by-year fixed effects τ_{jt} .⁴⁷ Standard errors are clustered at the state level, allowing for unspecified within-state correlation over time.

Firms set capital structure based on a number of factors, many of which are at least partially unobservable. For example, firms expecting better future investment opportunities likely use less leverage. As long as these and any other unobservables which comprise ξ_{ijst} are not correlated with legislative changes to RTW laws or WSPs, the estimates of α'_1 and α'_2 in equation (7) have causal interpretations. This assumption of uncorrelation is the principal identification assumption of this approach.

Labor law almost certainly responds to economic conditions and trends in industrial relations, some of which may be correlated with the use of debt. Some of these factors may induce omitted variables bias in estimates of the effect of RTW laws and WSPs.⁴⁸ At the same time, a number of

⁴⁶The sample includes two-digit SIC industries with greater than 25 percent union coverage in 1983 as measured by the CPS. While selecting the sample in this regard limits us from generalizing the results to other firms, it does not bias estimates of strategic behavior *within* the sample. In fact, similar analyses of firms in scarcely unionized industries will provide a falsification test.

⁴⁷Firm fixed effects ensure that changes in debt levels are estimated from a consistent sample of firms. Since Compustat data is not available before 1950 and the sample size grows rapidly in the early 1960s, measures of profit variability are computed over each contemporaneous period, 1950-1960 and 1960-1973, and do not vary over time for a given firm. (The main profit variability effects are absorbed by the firm fixed effects.) Firms are assigned to a state and an industry based on Compustat header information relating to the company's last reported location and industry of primary operation. To the extent that firms may have moved locations or changed industries since the 1950s, these may represent noisy measures of the historical variables. While point estimates may be less precise, there is no obvious reason why this mismeasurement would bias the results. Manual checks against historical 10-Ks also suggest the location and industry information is generally accurate.

⁴⁸If anything, states are more likely to repeal a WSP following a protracted, high-profile labor dispute. As firms affected by a work stoppage are more likely to be in financial distress, this proposed relationship works against finding that the repeal of WSPs are associated with decreases in leverage.

factors support a causal interpretation. The states changing RTW laws in the 1950s and WSPs in the 1960s are not restricted to any particular geographic region (Figure III). Furthermore, analyses of pre-existing trends show that decreases in union organizing do not precede the passage of RTW laws (Ellwood and Fine 1987; Appendix Table A2), and the decreases in debt levels are greatest after changes to RTW laws and WSPs (see Section 4.4).

I use both the adoption of RTW laws during 1950-1960 and the repeal of WSPs during 1960-1973 to identify decreases in union bargaining power. Each has its strengths and weaknesses for this research. As compared to WSPs, RTW laws likely have greater impact on union power and industrial relations. RTW laws weaken unions both financially and organizationally. In addition to diminishing the financial resources available to unions, RTW laws reduce strike threats by rendering unions less able to discipline those who cross a picket line. Due to their potent impact on organizing, RTW laws also significantly impact the threat of new unionization at both partially-unionized and nonunionized firms. While the repeal of WSPs also diminishes strike threats, the magnitude of the effect on bargaining power is likely relatively modest.

On the other hand, the sample of firms in the WSP analysis is much larger than the RTW sample on two dimensions, enabling more precise estimation. Key features of each sample are presented in Table 6, Panel B. First, Compustat has far greater firm coverage in the later period.⁴⁹ The WSP analysis is based on almost four times as many firms (1,273) as the RTW analysis (326). Second, while seven states changed laws in each period, the states that changed WSPs happened to be larger than those that changed RTW laws (in the respective sample periods). Whereas only 2.3 percent of observations in the 1950-1960 sample are in states adopting RTW laws, 21.4 percent of observations in the 1960-1973 sample are in states repealing WSPs. For these reasons, I rely on both sources of variation in union bargaining power to present evidence on the strategic use of debt.

Table 6 also presents summary statistics for several relevant firm financial variables. The sample

⁴⁹Unlike in more recent years, the Compustat database does not include all firms with SIC filings in the period of these analyses. Screening for nonmissing total assets, Compustat includes 626 firms in 1950, 1000 in 1959, 1619 in 1960, and 4522 in 1973. According to information provided by Standard & Poor's, the product's vendor, the 1950s sample primarily includes companies in the S&P 425, and the 1960s sample also includes firms listed in the NYSE and ASE. The sample for the RTW analysis includes firms in 30 states, three of which adopted RTW laws in the 1950s (Indiana, Kansas, and Utah). The sample for the WSP analysis includes firms in all 50 states, seven of which repealed WSPs during the sample period (see Figure III, Panel B).

of firms in the WSP analysis (1960-1973) has similar average debt levels to the cross-sections of firms analyzed in Section 3 (1977, 1987, 1999), while the RTW firms (1950-1960) have slightly lower levels of average total debt. While the firms in the earlier periods are smaller on average (in terms of total assets and sales), a greater percentage of their assets are fixed and they tend to earn a greater return.

It is tempting to interpret the changes in labor laws as an instrument for collective bargaining coverage. Such a calculation is infeasible without firm-level (or even state-level) unionization data for the earlier periods. Regardless, assigning such an interpretation is conceptually unjustified. RTW laws and WSPs affect union bargaining power through channels other than just the percentage of employees covered. As explained above, the laws have both financial and psychological consequences in addition to any effects on participation. As such, the laws provide a proxy for union bargaining power, but not an instrument for collective bargaining coverage. I estimate reduced form effects and interpret the results as effects of changes in union bargaining power.

4.4 Labor law estimates

Using state changes in right-to-work laws and unemployment insurance work stoppage provisions to identify changes in bargaining power confirms that incentives from union bargaining have a substantial impact on capital structure determination. Figures IV and V present a graphical overview of these results. Focusing on firms located in states adopting RTW laws during 1950-1960 (Figure IV) or repealing WSPs during 1960-1973 (Figure V), I graph both current and total debt in the four years before and after the law was changed in their states. Each panel presents the graph for a different sample of firms. Figure IV, Panel A, shows that while there is apparently no pre-existing trend, average debt levels at firms in densely unionized industries decrease after a RTW law is adopted. In contrast, Figure IV, Panel B, shows that debt levels do not decrease in less unionized industries.⁵⁰ Both panels in Figure V focus on firms in densely unionized industries, but Panel A includes firms with profit variability in the top quartile, whereas Panel B includes firms in the bottom quartile. While there is no apparent pre-existing trend, average debt levels

⁵⁰The graph suggests total debt levels in these industries may actually increase after a RTW law is adopted. Regression analysis that controls for contemporaneous changes in these industries in other states finds this apparent effect is not statistically significant (Table 9, Panel III, Column 2).

decrease at firms with relatively variable profits after a WSP is repealed (Panel A). Yet the repeal of a WSP does not seem to affect the capital structure of firms with less variable profits (Panel B). The differential impact at firms with the excess cash flow exposure associated with greater profit variability suggests that these changes in labor law, which erode union bargaining power, apparently diminish a firm’s strategic incentive to carry debt. Comparing magnitudes across figures, the effect appears to be greater in magnitude for RTW laws than WSPs (as expected). Although they are strongly suggestive, these figures merely present unconditional means. They do not control for macroeconomic year effects or industry-wide trends. For those tests, I turn to the multivariate regression analysis described in Section 4.3.

Table 7 presents the effect of collective bargaining on current debt. Evidence from changes in RTW laws is presented in Panel A, and WSP evidence is in Panel B. While the direction of the effects of the laws on debt is the same, the magnitude of RTW law effects is substantially greater (as expected). While not statistically significant, the point estimates measuring the main effect of RTW laws on current debt are sizeable — approximately equal to the sample mean. The WSP main effect is much smaller in magnitude; while the estimates are close to zero, modest effects (on the order of 20 percent of the sample mean) cannot be ruled out. The econometric tests likely have insufficient power to identify the effect, as only a handful of states modify each law during the sample periods. Although I suspect additional precision would reveal an effect, there may in fact be no main effect. Such an interpretation suggests that unionization or amicable labor relations have positive externalities on profits — such as the productivity effects proposed by Brown and Medoff (1978) — in addition to the negative balance sheet effects described by the theory. While the main effects of these laws on debt are interesting, they do not specifically address the *strategic* use of debt to influence collective bargaining.

Evidence on the strategic use of debt is presented in the differential impact of the laws on firms with more variable profits. Since greater profit variability implies that more liquidity is subject to union capture, these firms have the greatest incentive to alter the maturity structure of their debt to reduce the union’s ability to expropriate quasi-rents. As found with the cross-sectional analyses, union bargaining power has a large and statistically significant differential effect on firms with highly variable profits. The inclusion of both firm and industry-by-year fixed effects ensures that the estimates measure within-industry-year comparisons of within-firm changes in debt across

states with different legislative patterns. The estimated effects are robust to including financial controls (the proportion of fixed assets, log sales, and the return on assets; Column 2) and measuring debt as a proportion of total assets (rather than the market value of the firm; Column 3).

By decreasing labor’s bargaining power, RTW laws and WSPs seem to lead firms with more variable profits to strategically employ less current debt. Consider two firms — one with profit variability one standard deviation greater than the other. As compared to the firm with less profit variability, the more exposed firm decreases the ratio of current debt to firm value by approximately 5 more percentage points after a RTW law is passed and by approximately 1 more percentage point after a WSP is repealed. Both effects are sizeable, but as expected, the WSP effect is more modest: for firms with profit variability one standard deviation above the mean, the ratio of current debt to total firm value decreases by up to two-thirds after a RTW law is adopted, and by one-fifth after a WSP is repealed.⁵¹ In contrast, these changes in labor law have little effect on firms with little profit variability.

Labor law evidence suggests that union power also leads firms to increase longer-term debt.⁵² RTW estimates definitively suggest that collective bargaining increases the total leverage employed by affected firms. As reported in Table 8, Panel A, firms in states adopting RTW laws decrease their total leverage by 11 percentage points — over half of the sample mean. Including financial controls and normalizing debt using total assets, rather than the market value of the firm, have little effect on the estimates (Columns 2 and 3). Table 8, Panel B, presents estimates of the effect of WSPs on total debt. Similar to the effect on current debt, the WSP main effect is much smaller in magnitude and close to zero.

The differential effect of WSPs on firms with more variable profits provides evidence of the strategic use of total debt to influence collective bargaining negotiations. As before, consider two firms — one with profit variability one standard deviation greater than the other. When a WSP is repealed, the more exposed firm decreases current debt by approximately 3 percentage points more than the less exposed firm — approximately 10 percent of the sample mean. The RTW

⁵¹For these firms, the marginal effect of RTW adoption (WSP repeal) is 9 to 10 (1.5 to 2.0) percentage points, and the average ratio of current debt to firm value is about 14 (7) percent.

⁵²The labor law results support the causal interpretation of the cross-sectional unconditional correlations reported in Table 4, Column 1. That is, they suggest that unions organize selectively (for example, at more profitable firms) generating a cross-sectional correlation between unionization and the financial control variables that seems to obfuscate a direct relationship between unionization and leverage.

interaction coefficients are slightly greater in magnitude (relative to average debt levels), but they are not statistically significant. In this sample, the approximately 3 percentage point differential effect between firms with different profit variabilities (by one standard deviation) corresponds to approximately 15 percent of the sample mean. While the point estimates are comparable to the WSP estimates, the standard errors of the RTW estimates are much greater due to the limited size of both the sample and the states adopting RTW laws during the sample period.

Although additional precision may reveal an effect, there may be suspicion that the observed effect of RTW laws on total leverage represents only a balance sheet effect of unionization and *not* a strategic effect. After all, cash flow is a well-known predictor of debt levels in that firms tend to pay down debt when cash flow increases. Unionization, therefore, “mechanically” increases debt by reducing profits. The robustness of the RTW main effect to adding financial controls addresses this concern. In improving the firm’s bargaining position with labor, RTW laws should increase profits, improving the balance sheet of the firm, enabling additional continuation, and leading to a decrease in leverage. However, the estimates are robust to financial controls (Column 2), including return on assets — a proxy for profitability.⁵³ Although the controls are imperfect, the fact that point estimates are unaffected strongly suggests the primary mechanism is actually the strategic effect.

These analyses of both current and total debt support the notion that firms use debt policy strategically to affect bargaining with suppliers. Recognizing that changing labor laws should have a greater impact on firms subject to greater union rent seeking motivates analyzing the profit variability interaction. Similar reasoning suggests that adopting a RTW law or repealing a WSP will have a stronger effect on firms with greater operating income. As a robustness check, I regress the various financial policy measures on a RTW or WSP indicator variable, an interaction of the law indicator and the firm’s average (pre-period) operating income, and a set of controls.⁵⁴ Operating income is before interest expense, payment of current debt maturities, taxes, depreciation, and amortization, is divided by lagged assets, and is normalized by its standard deviation to ease the

⁵³ Coefficient estimates for the controls are not reported to conserve space. The financial controls – the proportion of fixed assets, log sales, and ROA – are statistically significant with the expected signs ($p < 0.01$).

⁵⁴ The operating income main effect is absorbed by a firm fixed effect. Controls include firm fixed effects, industry-by-year fixed effects, and financial controls: the proportion of fixed assets, log sales, and ROA. The industry fixed effects are at the two-digit SIC level.

interpretation of the estimates.⁵⁵ The results, reported in Table 9, Panel I, support the strategic use of capital structure. Evidence from changes in RTW laws is presented on the left side of the table, and WSP evidence is on the right. Following the adoption of a RTW law, a standard deviation increase in operating income is associated with a 5 to 6 percentage point greater decrease in both current and total debt ($p < 0.01$). As expected, WSPs have a more moderate effect. A standard deviation increase in operating income is associated with a 1 to 2 percentage point greater decrease in both current and total debt following the repeal of a WSP ($p < 0.01$).⁵⁶

Tests for pre-existing trends also support a causal interpretation of the observed labor law effects on debt. In general, the level of debt changes at firms affected by the laws only after the laws are adopted. Regression estimates are presented in Table 9, Panel II. In addition to an indicator variable for the presence of a RTW law or WSP (and the related interaction term), I include an indicator variable for the two years prior to the adoption of the law. While the pre-period coefficients are negative, they are generally small in magnitude and not statistically significant. Two exceptions are the pre-period interaction coefficients in both the RTW and WSP *total* debt regressions. In the RTW regression, the pre-period interaction coefficient is similar in magnitude to the interaction coefficient in the adoption period, but the estimates are extremely imprecise (Column 2). In the WSP regression, the pre-period interaction coefficient is statistically significant, suggesting presence of a pre-existing trend. However, the point estimate of the interaction coefficient in the adoption period is much greater in magnitude than that for the pre-period, suggesting WSPs have impact (Column 4). In all, tests for pre-existing trends support attributing the observed capital structure effects to the changes in labor law, especially for current debt.

A final robustness test is also possible. Each of the preceding analyses demonstrates that RTW laws and WSPs affect the financial policy of firms in industries with concentrated labor markets. Because only firms in industries with high union presence should be affected by these

⁵⁵This measure would ideally also include the union rent (the portion of wages paid in excess of the workers' alternative wages). Unfortunately, such data is not available. The results are robust to including total labor related expenses, which reduces the sample almost by half. Although neither measure is perfect, they provide a useful robustness check.

⁵⁶Conceptually, inserting an average operating income interaction in the cross-sectional approach could provide a parallel robustness test. Such estimates are noisy. Furthermore, obvious simultaneity issues regarding collective bargaining coverage, operating income, and financial policy make any such estimates difficult to interpret.

laws, estimating the effect of the laws on firms in industries with low union presence provides an important falsification test. Regression estimates comparable to those in Tables 7 and 8 are presented in Table 9, Panel III. Adopting a RTW law or WSP is not associated with a statistically significant change in levels of current or total debt for these firms.⁵⁷

All in all, a variety of empirical evidence suggests that union bargaining power (and supplier market power more broadly) has far-reaching effects on firm financial strategy. The labor laws analyzed seem to have an acute impact on firms' current debt and total leverage. Cross-sectional evidence also suggests that firms use inventories strategically when engaged in collective bargaining with workers.⁵⁸

5 What about dividends?

Given its effect on optimal capital structure, it is natural to ask whether supplier market power also affects payout policy. Agency cost explanations of dividends argue that expected, continuing dividends discipline managers (Easterbrook 1984). In addition to boosting the degree of financial leverage, dividends compel managers to raise new money more frequently and thereby undergo more intensive monitoring. Consequently, stockholders often penalize firms making abrupt reductions in dividends (Lintner 1956).⁵⁹

While in theory dividends may be used strategically to commit managers to be tough in union

⁵⁷Although it is not statistically different than zero, the RTW-profit variability interaction point estimate for total debt is negative. Since RTW laws affect organizing, this may be because even some firms in industries with 25 percent union coverage are sensitive to the adoption of RTW laws. Consistent with this interpretation, the point estimate decreases in magnitude in regressions with lower "low union" cutoffs (not reported). WSPs are less likely to affect less-unionized firms and, in fact, point estimates for the WSP-profit variability interaction are positive, close to zero, and not statistically significant.

⁵⁸Unfortunately, limited data availability interferes with the analysis of buffer inventory during the RTW and WSP periods. Inventory figures are not broken down by stage-of-production in Compustat for most firms in the 1950s and 1960s. Data on total inventories is generally available, but it is less representative of a firm's strategic use of inventories to insure and deter against union job action. Although regression estimates (not reported) are not sufficiently precise to be distinguished from zero, the signs of both the main RTW effect and its interaction with profit variability are consistent with strategic motivations. The point estimates suggest firms may decrease total inventories by 10 percent following RTW law adoption. Presumably, this masks a greater reduction in finished goods inventories. In contrast, the WSP point estimates are essentially zero.

⁵⁹While stock repurchases perform a similar financial role to dividends, being irregular in nature they are less likely to serve as a commitment device. Evidence suggests that while repurchases have substituted for dividend payments over the last 10-15 years, regulatory constraints inhibited firms from aggressively repurchasing shares before 1983 (Grullon and Michaely 2002). Data on repurchases is not available in Compustat for the period of RTW analysis. Including the total value of repurchases in the cross-sectional regressions for the later periods provides qualitatively similar results.

negotiations, such a role is naturally limited by the degree to which dividends can be affected by labor through bargaining. Bronars and Deere (1991) implicitly assume that dividends are fully subject to union capture, and DeAngelo and DeAngelo (1991) present case studies showing that dividend reductions are correlated with union negotiations. Using the empirical framework employed above to study strategic capital structure, I confirm that dividends appear not to be used as a commitment device vis-à-vis organized labor.

In a recent paper, Ramírez-Verdugo (2005) also analyzes payout policy in the presence of a unionized workforce. Whereas I focus on dividends as a commitment device, he analyzes their role as a signal. He argues that unions interfere with firms ability to use payout policy to convey earnings information to investors. My finding that union bargaining power decreases dividend payments is broadly consistent with this interpretation. It is also consistent with collective bargaining simply reducing profits and therefore also reducing payouts to shareholders.

Evidence on the cross-sectional relationship between collective bargaining and dividends is mixed. As shown in Table 10, Panel A, there is a strong correlation in 1977 (Column 1). In that year, manufacturing firms with an additional 10 percent of employees covered by collective bargaining paid, on average, almost 1 cent greater dividends (per dollar of total capitalization), corresponding to 3.5 percent of mean dividends among sample firms. However, this correlation is not robust to normalizing dividends using the book value of assets (not reported), nor is it present in the 1987 or 1999 samples (Columns 2 and 3). The correlation in 1977 may be explained by either the targeting of union organizing efforts on the most profitable firms, or as a “mechanical” effect whereby unionization decreases profitability and the market value of the firm. Firms with more variable profits seem to pay smaller dividends, likely to provide greater financial flexibility, but the interaction of union coverage and profit variability is not statistically significant (Columns 1-3).

The effect of RTW laws, presented in Panel B, suggests that collective bargaining may moderately reduce dividends. The main empirical specification suggests that RTW laws increase dividend payments by approximately 35 basis points — 9 percent of the sample mean (Column 1). However, the estimates are not precise enough to rule out the possibility that these results are driven by either the decrease in debt levels documented above (Column 3) or a pre-existing trend (not reported). These results suggest that omitted variables, such as an unobserved dimension of firm quality, bias

upward the cross-sectional estimate for 1977 reported in Panel A. Estimates of the effect of WSPs on dividends are presented in Panel C. While not statistically significant, point estimates on the WSP main effect are also positive and smaller in magnitude than the RTW estimates.

At least two distinct factors may explain a negative effect of union bargaining power on dividends. First, collective bargaining may directly influence dividend payments. Whether negotiated explicitly or implicitly, case studies find “substantial and pervasive” dividend reductions clustered during union negotiations (DeAngelo and DeAngelo 1991). Collective bargaining may also dampen the use of dividends as an earnings signal (Ramirez-Verdugo 2005). Second, the dividend changes may simply be reflecting the financial position of the firm. For example, to the extent that RTW laws improve current or future earnings, managers likely feel compelled to share this financial windfall with shareholders (Lintner 1956). Either way, the empirical evidence is inconsistent with firms using *dividends* as a commitment device vis-à-vis workers.

6 Conclusion

In the past 20 years, many large unionized firms have filed for bankruptcy. Examples include at least eight major airlines and most recently auto-parts-maker Delphi. A natural question is whether collective bargaining led these firms to adopt a capital structure that made them more vulnerable to negative cash flow shocks. The results in this paper suggest the answer to this question may be yes. As a supplier with market power, a union can demand a share of a firm’s liquidity, which the firm maintains primarily to insure against negative shocks. To reduce the impact of collective bargaining on profits, the firm has the incentive to undertake costly actions that reduce its expropriable liquidity. Consequently, even efficient bargaining in the labor market terms yields outcomes that are not Pareto optimal.

While it is in the interest of both management and labor to produce institutional arrangements that lead to efficient contracts, this paper demonstrates a dimension in which they come up short. If collective bargaining leads firms to distort their capital structure, then labor market outcomes will be inefficient even if employment levels are set optimally.⁶⁰ Greater than efficient levels of debt are

⁶⁰The empirical literature on the efficiency of union contracting has focused predominantly on employment determination (see Farber 1986 for a survey). The implication of efficiency generally tested is whether employment levels are set optimally (for example, so as to equate the marginal revenue product of workers to their alternative

also likely to distort product-market competition (Brander and Lewis 1986) and investment (Myers 1974). For example, debt buildup may explain part of the negative effect of collective bargaining on investment (demonstrated empirically by Connolly, Hirsch, and Hirschey 1986, and Fallick and Hassett 1999).

Previous studies have suggested that firms use debt to counter union power, but they have not (1) made a strong case for causality or (2) distinguished between strategic and balance sheet effects. This distinction is important; while the balance sheet effect is a response to the outcome of labor negotiations, the strategic effect is an attempt to influence these negotiations. In this paper, I develop a testable implication for the *strategic* use of debt at unionized firms. An increase in the profit variability underlying a firm's operations increases its expected excess liquidity, leaving a firm with more variable profits more vulnerable to union rent seeking. Evidence that collective bargaining more dramatically affects the capital structure of firms with greater profit variability suggests a strategic motive on the part of firms and investors.

Using right-to-work laws and unemployment insurance work stoppage provisions as sources of plausibly exogenous variation in union bargaining power, I find that collective bargaining increases total financial leverage and likely leads firms to reduce the maturity structure of debt. Furthermore, firms with relatively variable profits, and thereby a greater exposure to union rent seeking, respond with the greatest increases in current debt. In contrast, dividends unsurprisingly do not appear to serve as a commitment device vis-à-vis workers to protect liquidity from organized labor. These findings complement previous studies (Chevalier 1995a,b; Chevalier and Scharfstein 1996; Zingales 1998) that demonstrate the real effects of apparently exogenous changes in capital structure. The evidence presented in this paper suggests that these sort of real-side strategic incentives have a substantial impact on financing decisions.

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wage). Using careful assumptions about union objective functions and data on membership and contract wages for the International Typographer's Union (ITU), MaCurdy and Pencaval (1986) find that employment levels are affected by bargaining. Nevertheless, using similar data but a different empirical approach, Brown and Ashenfelter (1986) conclude that the ITU labor agreements are not strongly efficient. Analyzing the debt structure of unionized firms expands this discussion by demonstrating another dimension in which collective bargaining may introduce inefficiency.

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Figure I: Timing of the Model

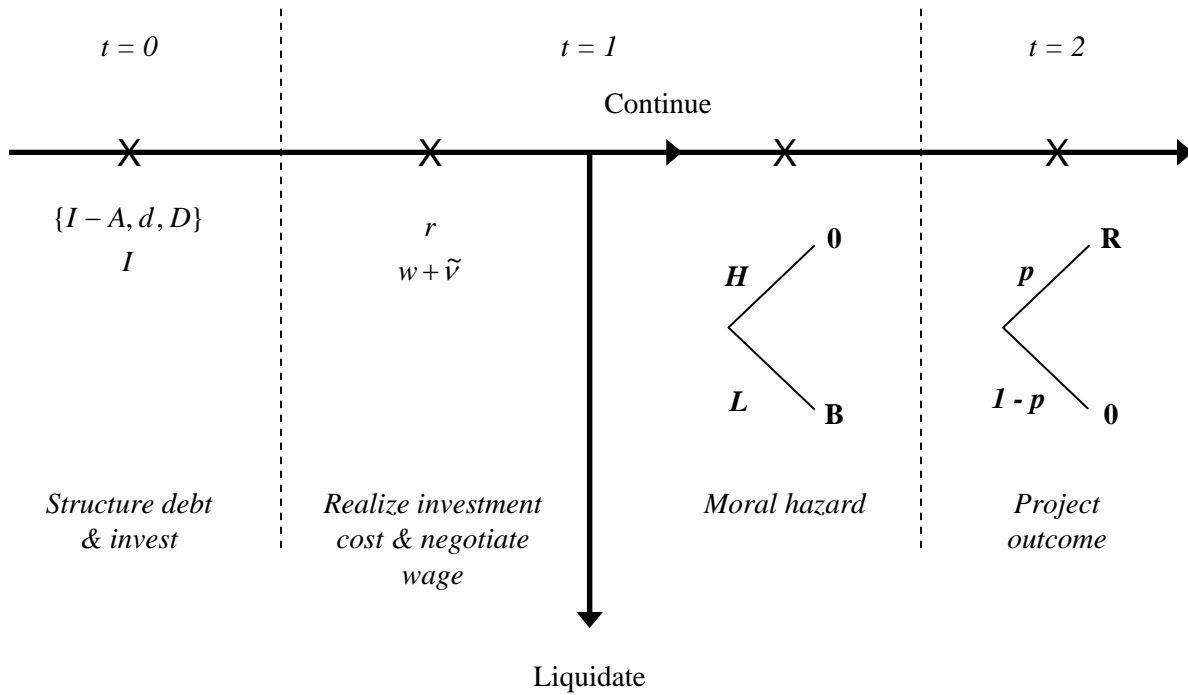


Figure II: Four Cases, Depending on Borrowing Need

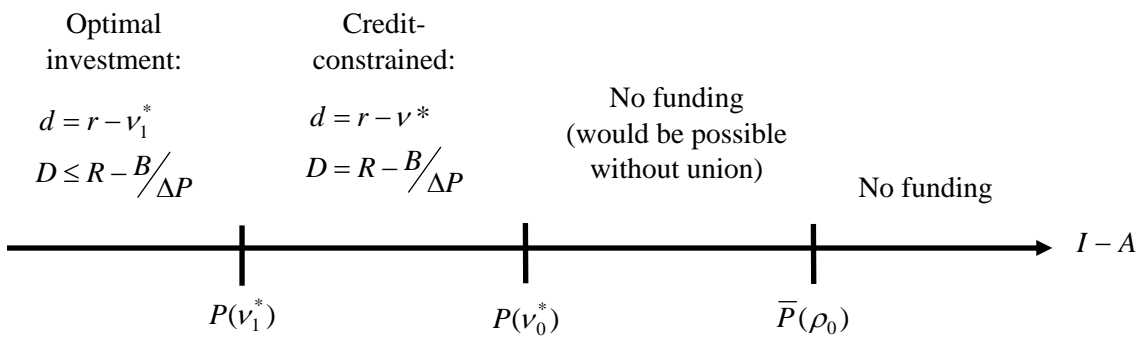
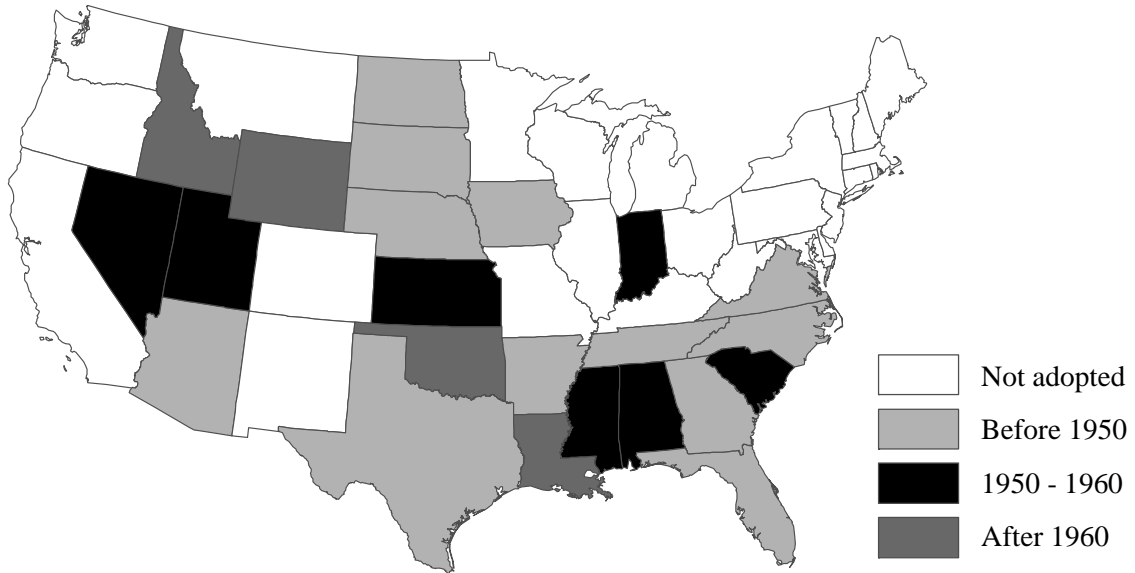
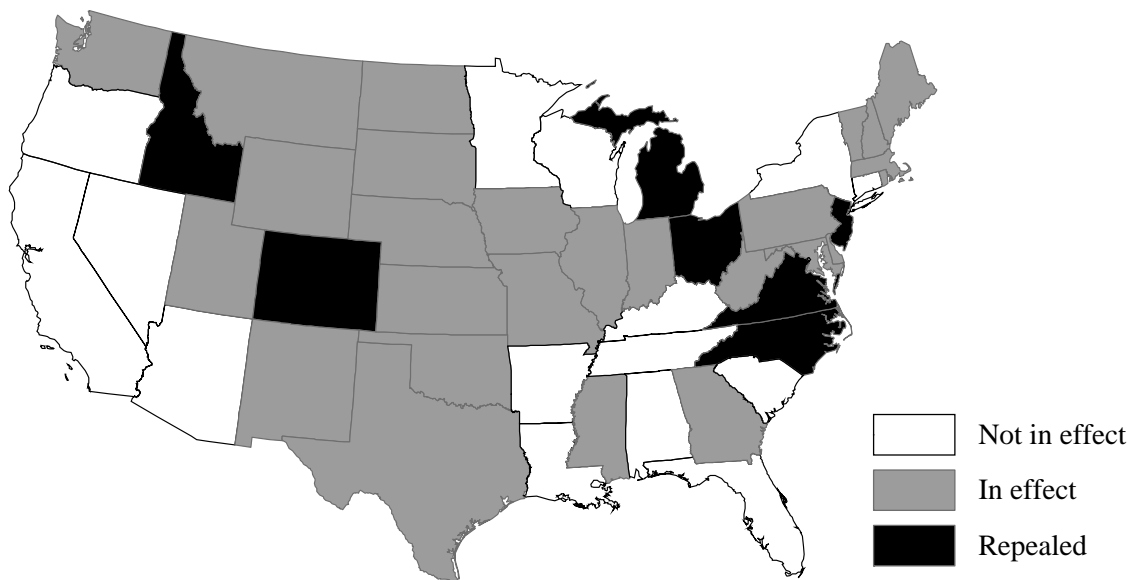


Figure III: Legislative History of Select State Labor Laws

A. Adoption of Right-to-Work Laws, 1947-2005



B. Unemployment Insurance Work Stoppage Provisions, 1960-1973

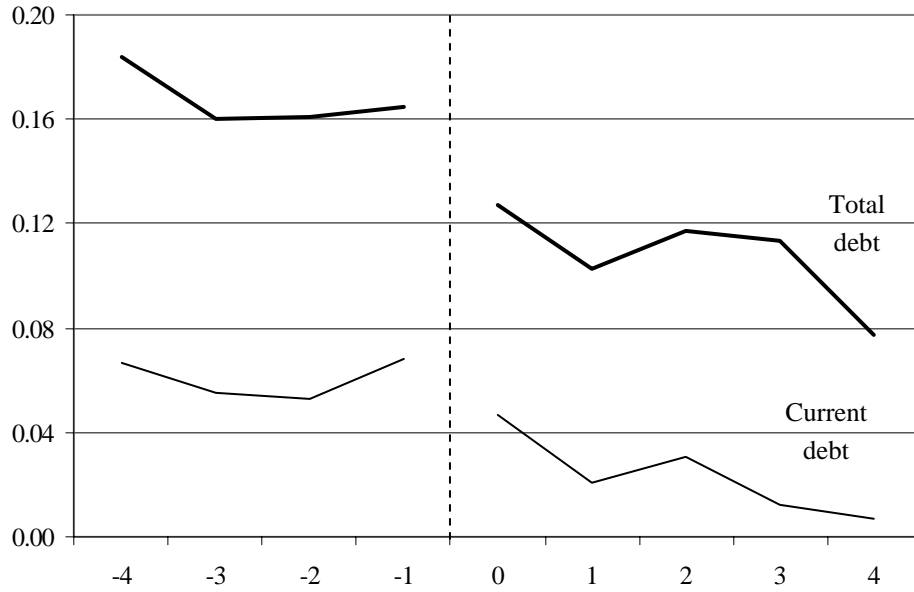


Note: The Indiana RTW law was later repealed, and the New Jersey WSP was re-adopted soon after it was abolished.

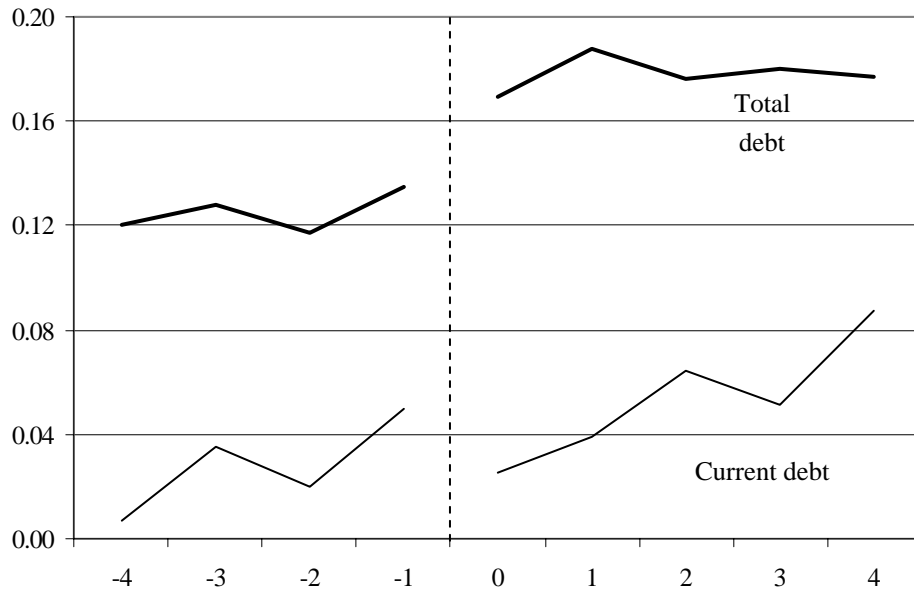
Source: Ellwood and Fine (1987); Hutchens, Lipsky, and Stern (1989)

Figure IV: Debt Around Right-to-Work Law Adoption, 1950-1960

A. Firms in industries with high union presence

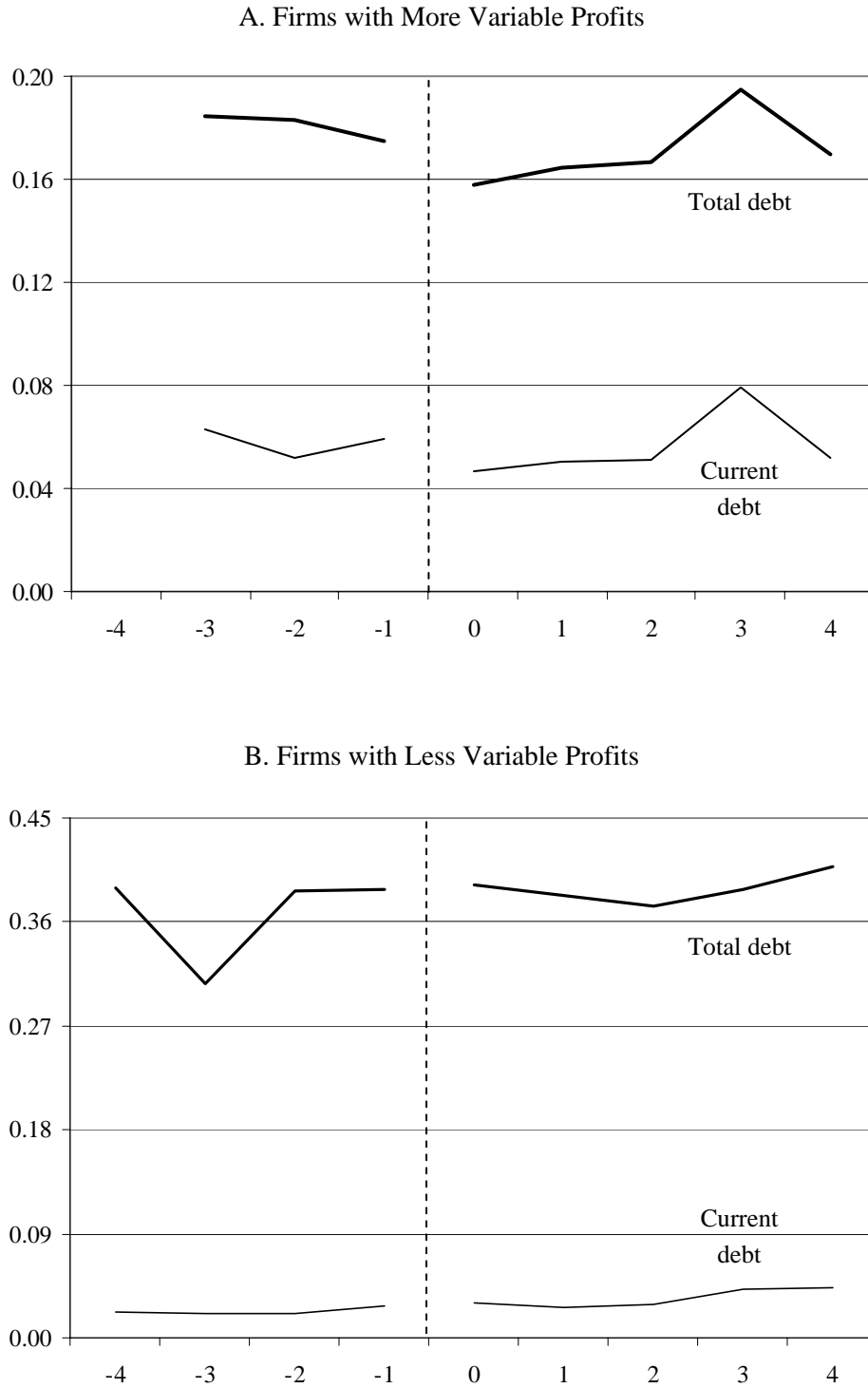


B. Firms in industries with low union presence



Note: These figures depict average debt divided by total assets in the four years before and after the adoption of RTW laws. Panel A includes firms in densely unionized industries (listed in Appendix Table A3), and Panel B includes firms in industries with low union presence.

Figure V: Debt Around Repeal of UI Work Stoppage Provisions, 1960-1973



Note: These figures depict average debt divided by total assets in the four years before and after adoption of the indicated labor law. Panel A includes firms with profit variability in the top quartile, and Panel B includes firms with profit variability in the bottom quartile.

Table 1: Cross-Sectional Analysis -- Summary Statistics

	1977	1987	1999
<i>A. Ratio of debt to market value of firm</i>			
Debt due within...			
1 year	0.060 (0.074)	0.063 (0.080)	0.053 (0.055)
2 years	0.087 (0.093)	0.090 (0.104)	0.089 (0.089)
3 years	0.113 (0.110)	0.112 (0.119)	0.124 (0.108)
4 years	0.137 (0.123)	0.134 (0.134)	0.171 (0.145)
5 years	0.161 (0.138)	0.159 (0.151)	0.200 (0.157)
Anytime	0.328 (0.218)	0.279 (0.206)	0.360 (0.216)
<i>B. Other key variables</i>			
Union coverage	0.333 (0.280)	0.254 (0.258)	0.326 (0.237)
% sample with any union coverage	77.3	71.2	100.0
Profit variability	1.224 (1.000)	1.159 (1.000)	0.848 (1.000)
Assets (\$ Mil 1999)	2,817 (7,727) [592]	4,077 (13,731) [644]	8,111 (17,589) [2,761]
<i>C. Financial control variables</i>			
Fixed assets (%)	0.343 (0.148)	0.352 (0.164)	0.414 (0.208)
Marginal tax rate		0.364 (0.065)	0.316 (0.081)
Market-to-book	1.108 (0.667)	1.708 (1.401)	2.822 (3.750)
Ln sales (\$ Mil)	5.833 (1.623)	6.429 (1.801)	7.669 (1.613)
Z-score	2.819 (0.727)	2.426 (0.885)	1.742 (0.952)
ROA	0.078 (0.054)	0.055 (0.071)	0.048 (0.067)
Observations	656	368	349

Note: Means are presented with standard deviations in parentheses. Median total assets are in brackets. The number of observations listed is for total and current debt (due in 1 year); some of the other debt variables have fewer observations. The samples consist of firms with at least five years of data underlying the measure of profit variability. Data for 1977 and 1987 include only manufacturing firms.

Table 2: Does Unionization Affect Current Debt? Cross-Sectional Evidence

	(1)	(2)	(3)	(4)
<i>A. Manufacturing firms, 1977 (n = 656)</i>				
Union coverage	0.001 (0.012)	0.011 (0.011)	-0.001 (0.011)	-0.009 (0.007)
Union coverage * Profit variability		0.036 (0.010)	0.027 (0.009)	0.016 (0.006)
Profit variability		0.009 (0.004)	0.005 (0.004)	0.002 (0.002)
R^2	0.05	0.11	0.28	0.21
<i>B. Manufacturing firms, 1987 (n = 368)</i>				
Union coverage	0.042 (0.019)	0.035 (0.019)	0.027 (0.017)	0.009 (0.014)
Union coverage * Profit variability		0.040 (0.016)	0.051 (0.014)	0.040 (0.011)
Profit variability		-0.003 (0.006)	-0.021 (0.005)	-0.017 (0.004)
R^2	0.09	0.12	0.30	0.21
<i>C. Manufacturing and non-manufacturing firms, 1999 (n = 349)</i>				
Union coverage	-0.002 (0.015)	-0.005 (0.015)	-0.004 (0.015)	-0.025 (0.016)
Union coverage * Profit variability		0.045 (0.015)	0.045 (0.015)	0.011 (0.015)
Profit variability		-0.015 (0.007)	-0.017 (0.007)	0.001 (0.007)
R^2	0.11	0.17	0.23	0.25
Financial controls			X	X
Book value				X

Note: Reported coefficients are estimated from regressions of debt in current liabilities divided by the market value of the firm (divided by assets in Column 4). Debt is regressed on the fraction of a firm's workforce covered by collective bargaining, the variability of the firm's profits, an interaction of those variables, and a set of controls. Profit variability is measured in units of standard deviations of $sd(\Delta \text{earnings})/\text{assets}$, where earnings is before depreciation and amortization. When uninteracted, the collective bargaining coverage coefficient measures the effect of the law at the mean of profit variability, and the profit variability coefficient measures the effect for non-unionized firms. Controls in all regressions include industry fixed effects at the two-digit SIC level. Where indicated, controls also include financial controls: the proportion of fixed assets, the before interest marginal tax rate (1987, 1999 only), the market-to-book ratio, log sales, modified Altman's z-score, and ROA. Standard errors are reported in parentheses. Sample consists of manufacturing firms with at least five years of pre-period data. Compustat variables are winsorized at the 1% tails. In Column (4), the mean (standard deviation) of the dependant variable is 0.042 (0.048).

Table 3: Does Unionization Affect Other Near-Term Debt Measures?

	1977	1987	1999
Debt due within...			
1 year	0.150 (0.061)	0.206 (0.057)	0.278 (0.093)
2 years	0.107 (0.046)	0.198 (0.058)	0.124 (0.094)
3 years	0.097 (0.038)	0.161 (0.051)	0.086 (0.080)
4 years	0.071 (0.037)	0.167 (0.048)	-0.025 (0.072)
5 years	0.066 (0.033)	0.140 (0.047)	-0.072 (0.069)

Note: Each estimate represents a separate regression and is the derivative, with respect to profit variability, of the union coverage elasticity of debt, evaluated at the mean. Reported elasticity effects are estimated from regressions similar to those reported in Table 2, Column 3, but for different dependent variables. These regressions are of debt due within the indicated number of years divided by the market value of the firm.

Table 4: Does Unionization Affect Total Debt? Cross-Sectional Evidence

	(1)	(2)	(3)	(4)
<i>A. Manufacturing firms, 1977 (n = 656)</i>				
Union coverage	0.062 (0.032)	0.085 (0.032)	0.000 (0.023)	-0.015 (0.016)
Union coverage * Profit variability		0.026 (0.029)	-0.011 (0.020)	-0.016 (0.014)
Profit variability		0.029 (0.010)	0.023 (0.008)	0.015 (0.005)
R^2	0.17	0.19	0.62	0.47
<i>B. Manufacturing firms, 1987 (n = 368)</i>				
Union coverage	0.168 (0.047)	0.162 (0.047)	0.094 (0.041)	0.019 (0.030)
Union coverage * Profit variability		0.028 (0.039)	0.065 (0.033)	0.037 (0.025)
Profit variability		0.026 (0.014)	-0.018 (0.013)	-0.010 (0.010)
R^2	0.14	0.16	0.41	0.34
<i>C. Manufacturing and non-manufacturing firms, 1999 (n = 349)</i>				
Union coverage	0.157 (0.053)	0.147 (0.054)	0.076 (0.044)	-0.089 (0.037)
Union coverage * Profit variability		-0.008 (0.055)	0.000 (0.043)	-0.060 (0.037)
Profit variability		0.016 (0.026)	-0.005 (0.021)	0.031 (0.018)
R^2	0.25	0.26	0.58	0.40
Financial controls			X	X
Book value				X

Note: Reported coefficients are estimated from regressions similar to those reported in Table 2, but for different dependent variables. These regressions are of total debt divided by the market value of the firm (divided by assets in Column 4). In Column (4), the mean (standard deviation) of the dependant variable is 0.225 (0.131).

Table 5: Does Unionization Affect Inventory Policy? Cross-Sectional Evidence (Manufacturing Firms, 1977)

	(1)	(2)	(3)	(1)	(2)	(3)
	<i>A. Total inventories / sales</i> (mean = 0.188, n = 651)			<i>B. Raw materials / sales</i> (mean = 0.068, n = 463)		
Union coverage	0.008 (0.012)	0.000 (0.012)	0.007 (0.010)	-0.007 (0.007)	-0.004 (0.007)	-0.001 (0.007)
Union coverage * Profit variability		0.043 (0.011)	0.041 (0.009)		0.005 (0.007)	0.003 (0.007)
Profit variability		-0.015 (0.004)	-0.025 (0.004)		0.002 (0.002)	-0.003 (0.002)
R^2	0.29	0.31	0.49	0.22	0.23	0.31
	<i>C. Work-in-progress / sales</i> (mean = 0.053, n = 376)			<i>D. Finished goods / sales</i> (mean = 0.076, n = 422)		
Union coverage	-0.001 (0.008)	-0.004 (0.009)	-0.004 (0.008)	0.011 (0.009)	0.003 (0.009)	0.001 (0.009)
Union coverage * Profit variability		0.017 (0.009)	0.015 (0.009)		0.029 (0.008)	0.026 (0.008)
Profit variability		-0.006 (0.003)	-0.009 (0.003)		-0.013 (0.003)	-0.013 (0.003)
R^2	0.38	0.39	0.44	0.13	0.18	0.24
Financial controls			X			X

Note: Reported coefficients are estimated from regressions similar to those reported in Table 2, but for different dependent variables.

Table 6: Labor Law Analysis -- Summary Statistics

	Right-to-Work Laws 1950-1960	UI Work Stoppage Provisions 1960-1973
<i>A. Debt</i>		
Current debt / Market value	0.048 (0.089)	0.061 (0.086)
Total debt / Market value	0.195 (0.181)	0.306 (0.215)
Current debt / Book value	0.036 (0.064)	0.055 (0.070)
Total debt / Book value	0.157 (0.137)	0.287 (0.182)
<i>B. Other key variables</i>		
States adopting/repealing law	7	7
% sample in adopting states	2.3	21.4
Profit variability	1.574 (1.000)	1.012 (1.000)
Assets (\$ Mil 1999)	2,003 (6,879) [487]	1,937 (7,580) [398]
<i>C. Financial control variables</i>		
Fixed assets (%)	0.378 (0.188)	0.480 (0.269)
Ln sales (\$ Mil)	4.853 (1.455)	4.546 (1.574)
ROA	0.122 (0.060)	0.107 (0.066)
Observations	3,277	14,150
Firms	326	1,273

Note: Means are presented with standard deviations in parentheses. Median total assets in brackets. Sample consists of firms in industries with high union coverage (listed in Appendix Table A4) and with at least five years of data.

Table 7: Effect of Changes in Labor Law on Current Debt

	(1)	(2)	(3)
<i>A. Right-To-Work Laws, 1950-1960</i>			
RTW law in effect	-0.045 (0.036)	-0.050 (0.041)	-0.041 (0.030)
RTW law in effect * Profit variability	-0.048 (0.010)	-0.056 (0.011)	-0.034 (0.006)
Observations	3,277	2,976	2,976
R^2	0.66	0.69	0.73
<i>B. Work Stoppage Provisions, 1960-1973</i>			
No WSP in effect	-0.006 (0.005)	-0.003 (0.007)	-0.004 (0.005)
No WSP in effect * Profit variability	-0.013 (0.005)	-0.011 (0.007)	-0.009 (0.004)
Observations	14,150	13,705	13,705
R^2	0.63	0.66	0.66
Financial controls		X	X
Book value			X

Note: Reported coefficients are estimated from regressions of debt in current liabilities divided by the market value of the firm (divided by assets in Column 3). Debt is regressed on a RTW law or WSP indicator variable, an interaction of that variable with the variability of the firm's profits, and a set of controls. (The profit variability main effect is absorbed by a firm fixed effect.) Profit variability is measured in units of standard deviations of $sd(\Delta \text{earnings})/\text{assets}$, where earnings is before depreciation and amortization. When uninteracted, the RTW indicator measures the effect of the law at the mean of profit variability. Controls in all regressions include firm and industry-by-year fixed effects. Where indicated, controls also include financial controls: the proportion of fixed assets, log sales, and ROA. Industry fixed effects are at the two-digit SIC level. Standard errors, clustered at state level, are reported in parentheses. Compustat variables are winsorized at the 1% tails. The sample includes firms in industries with high union coverage (listed in Appendix Table A4).

Table 8: Effect of Changes in Labor Law on Total Debt

	(1)	(2)	(3)
<i>A. Right-To-Work Laws, 1950-1960</i>			
RTW law in effect	-0.107 (0.053)	-0.108 (0.052)	-0.077 (0.024)
RTW law in effect * Profit variability	-0.030 (0.026)	-0.037 (0.023)	-0.013 (0.009)
Observations	3,277	2,976	2,976
R^2	0.78	0.82	0.83
<i>B. Work Stoppage Provisions, 1960-1973</i>			
No WSP in effect	-0.013 (0.007)	-0.007 (0.007)	-0.005 (0.007)
No WSP in effect * Profit variability	-0.030 (0.007)	-0.026 (0.007)	-0.013 (0.006)
Observations	14,150	13,705	13,705
R^2	0.80	0.83	0.86
Financial controls		X	X
Book value			X

Note: Reported coefficients are estimated from regressions similar to those reported in Table 6, but for different dependent variables. These regressions are of total debt divided by the market value of the firm (divided by assets in Column 3).

Table 9: Additional Robustness Checks, Effects of Changes in Labor Law

	<i>A. Right-To-Work Laws, 1950-1960</i>		<i>B. Work Stoppage Provisions, 1960-1973</i>	
	(1) Current Debt / Market Value	(2) Total Debt / Market Value	(3) Current Debt / Market Value	(4) Total Debt / Market Value
<i>I. Operating income as a alternative proxy for threat of union rent-seeking</i>				
RTW law in effect	-0.012 (0.017)	-0.077 (0.043)	No WSP in effect	-0.002 (0.006)
RTW law in effect * Average (pre-period) operating income	-0.059 (0.009)	-0.046 (0.016)	No WSP in effect * Average (pre-period) operating income	-0.016 (0.004)
Observations	2,488	2,488	Observations	7,787
R^2	0.70	0.82	R^2	0.63
<i>II. Operating income as a alternative proxy for threat of union rent-seeking</i>				
RTW law in effect	-0.050 (0.045)	-0.111 (0.067)	No WSP in effect	-0.009 (0.006)
RTW law in effect * Profit variability	-0.051 (0.009)	-0.040 (0.031)	No WSP in effect * Profit variability	-0.017 (0.006)
2 years prior to adoption	-0.018 (0.027)	-0.019 (0.044)	2 years prior to repeal	-0.005 (0.004)
2 years prior to adoption * Profit variability	-0.011 (0.008)	-0.037 (0.024)	2 years prior to repeal * Profit variability	-0.008 (0.005)
Observations	3,277	3,277	Observations	14,150
R^2	0.66	0.78	R^2	0.63
<i>III. Falsification test: Industries with low union presence</i>				
RTW law in effect	-0.005 (0.016)	0.030 (0.030)	No WSP in effect	0.001 (0.004)
RTW law in effect * Profit variability	0.010 (0.030)	-0.043 (0.046)	No WSP in effect * Profit variability	0.006 (0.004)
Observations	2,381	2,381	Observations	11,989
R^2	0.68	0.75	R^2	0.77

Note: In Panel I, reported coefficients are estimated from regressions similar to those reported in Tables 6 and 7, Column 2, but the law indicator variable is interacted with the firm's average (pre-period) operating income rather than with profit variability. Operating income is before interest expense, payment of current debt maturities, taxes, depreciation, and amortization, is divided by assets, and is normalized by its standard deviation (0.091). In Panel II, reported coefficients are estimated from regressions similar to those reported in Tables 6 and 7, Column 1, but they also include an indicator variable for the 2 years before the legal change and an interaction of that variable with profit variability. In Panel III, reported coefficients are estimated from regressions similar to those reported in Tables 6 and 7, Column 2, but on a different sample of firms. The sample includes observations of firms in industries with low rates of union coverage (less than 25 percent of the workforce covered by collective bargaining).

Table 10: Union Bargaining Power and Dividends

<i>A. Cross-sections of firms</i>			
	1977	1987	1999
RTW law in effect	0.0094 (0.0021)	0.0000 (0.0029)	0.0039 (0.0029)
RTW law in effect * Profit variability	0.0009 (0.0018)	-0.0010 (0.0024)	0.0000 (0.0028)
Profit variability	-0.0021 (0.0007)	-0.0030 (0.0009)	-0.0015 (0.0014)
Observations	651	368	348
R^2	0.36	0.29	0.44
<i>B. Right-To-Work Laws, 1950-1960</i>			
	(1)	(2)	(3)
RTW law in effect	0.0035 (0.0016)	0.0034 (0.0016)	0.0025 (0.0028)
RTW law in effect * Profit variability	0.0019 (0.0010)	0.0033 (0.0012)	0.0016 (0.0015)
Observations	3,277	2,976	2,976
R^2	0.74	0.77	0.83
Financial controls		X	X
Book value			X
<i>C. Work Stoppage Provisions, 1960-1973</i>			
	(4)	(5)	(6)
No WSP in effect	0.0012 (0.0009)	0.0011 (0.0009)	0.0006 (0.0009)
No WSP in effect * Profit variability	-0.0001 (0.0007)	-0.0007 (0.0009)	0.0001 (0.0009)
Observations	14,150	13,705	13,705
R^2	0.78	0.78	0.87
Financial controls		X	X
Book value			X

Note: Reported coefficients are estimated from regressions of common stock dividends divided by the market value of the firm (divided by assets in Columns 5 and 7). In Panel A, the specification is similar to those reported in Table 2, Column 3. The mean of the dependant variable is 0.025 in 1977, 0.017 in 1987, and 0.012 in 1999, and the standard deviation is 0.015, 0.013, and 0.012, respectively. In Panels B and C, the specifications are similar to those reported in Table 6. The mean of the dependant variable is 0.038 in Columns 1 and 2, 0.035 in Column 3, 0.020 in Columns 4 and 5, and 0.022 in Column 6, and the standard deviation is 0.023, 0.024, 0.015, and 0.019, respectively.

Appendix Table A1: Profit Variability, Expected Profit, and the Union Wage Premium, 1983

	<i>A. Profit</i>		<i>B. Log Hourly Wage</i>
	(1)		(2)
Profit variability	0.112 (0.025)	Union coverage * Profit variability	0.110 (0.032)
		Union coverage	0.137 (0.013)
Unit of analysis	Firm	Unit of analysis	Worker
Observations	4,555	Observations	47,969
R^2	0.13	R^2	0.55

Note: In Panel A, the dependant variable is profits (operating income before interest expense, payment of current debt maturities, taxes, depreciation, and amortization) divided by assets. Profits are regressed on the (firm's historical) variability of profits and a set of controls. Profit variability is measured in units of standard deviations of $sd(\Delta\text{profits/assets})$, calculated over the previous ten years. Controls include 4-digit SIC industry fixed effects. The standard error is reported in parentheses. In Panel B, Compustat data is merged at the 2-digit SIC level with employee wages and demographics from the Current Population Survey Outgoing Rotation Group Earnings Files. Log hourly wages are regressed on a variable indicating whether the employee is covered by a collective bargaining agreement, an interaction of union coverage with industry profit variability (the profit variability main effect is absorbed by a fixed effect), and a set of controls. The controls include age and age-squared as well as fixed effects for gender, race, years of education, occupation, and industry. Standard errors, clustered at the industry level, are reported in parentheses. Industry fixed effects and clustering are at the two-digit SIC level, and occupation fixed effects are for each of 408 census occupation codes. Compustat variables are winsorized at the 1% tails.

Appendix Table A2: Effect of Right-To-Work Laws on Union Organizing, 1950-1960

	(1)	(2)	(3)	(4)
RTW law in effect	-0.382 (0.122)	-0.347 (0.161)	-0.423 (0.112)	-0.336 (0.150)
2 years prior to adoption			-0.086 (0.098)	0.011 (0.083)
R^2	0.83	0.85	0.83	0.85
State and year fixed effects	X	X	X	X
State-specific linear trends		X		X

Note: Reported coefficients are estimated from regressions of the log number of new members of collective bargaining units. Union organizing is regressed on a RTW law indicator variable and a set of controls. Controls in all regressions include state and year fixed effects. Where indicated, controls also include an indicator for the two years before a RTW law is adopted and state-specific linear time trends. Standard errors, clustered at state level, are reported in parentheses.

Appendix Table A3: Additional Robustness Checks, Alternative Measures of Profit Variability

	Current Debt / Market Value			Total Debt / Market Value		
<i>A. Right-To-Work Laws, 1950-1960</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
RTW law in effect	-0.037 (0.035)	-0.026 (0.035)	-0.036 (0.037)	-0.099 (0.049)	-0.093 (0.049)	-0.098 (0.046)
RTW law in effect * Operating income variability	-0.041 (0.008)			-0.029 (0.016)		
RTW law in effect * Operating cash flow variability		-0.036 (0.006)			-0.024 (0.016)	
RTW law in effect * Sales variability			-0.029 (0.006)			-0.022 (0.012)
Observations	2,812	2,812	2,809	2,812	2,812	2,809
R^2	0.68	0.68	0.68	0.82	0.82	0.82
<i>B. Work Stoppage Provisions, 1960-1973</i>						
	(7)	(8)	(9)	(10)	(11)	(12)
No WSP in effect	-0.003 (0.007)	-0.002 (0.008)	-0.003 (0.007)	-0.008 (0.007)	-0.006 (0.008)	-0.006 (0.007)
No WSP in effect * Operating income variability	-0.010 (0.006)			-0.030 (0.011)		
No WSP in effect * Operating cash flow variability		-0.013 (0.007)			-0.016 (0.010)	
No WSP in effect * Sales variability			-0.018 (0.006)			-0.021 (0.013)
Observations	13,644	10,517	13,705	13,644	10,517	13,705
R^2	0.66	0.65	0.66	0.83	0.80	0.83

Note: Reported coefficients are estimated from regressions similar to those reported in Tables 6 and 7, Column 2, but the law indicator variable is interacted with alternative measures of variability. Each variability measure is in units of standard deviations of $sd(\Delta x)/\text{assets}$, but for a different financial variable x . Operating income is EBITDA, accrual-basis operating profits before interest expense, taxes, depreciation, and amortization. Operating cash flow is a cash-basis measure of operating profits, calculated from reported accounting measures using the Sloan (1995) adjustment for accruals.

Appendix Table A4: Industries Included in Labor Law Analyses (Tables 6-9)

Industry	Observations		Union Coverage Rate, 1983
	RTW analysis	WSP analysis	
Mineral industries			
Metal mining (10)	33	150	0.42
Coal mining (12)	21	62	0.63
Nonmetallic minerals, except fuels (14)	33	91	0.35
Construction industries			
General building contractors (15)	11	122	0.30
Heavy construction contractors (16)	43	125	0.30
Special trade contractors (17)	0	29	0.30
Manufacturing			
Food and kindred products (20)	519	1,423	0.37
Tobacco products (21)	66	84	0.40
Apparel and other textile products (23)	78	551	0.29
Paper and allied products (26)	213	593	0.51
Petroleum and coal products (29)	191	365	0.35
Rubber and miscellaneous plastics products (30)	137	525	0.30
Leather and leather products (31)	34	181	0.26
Stone, clay, glass, and concrete products (32)	179	506	0.40
Primary metal industries (33)	303	899	0.56
Fabricated metal products (34)	181	979	0.35
Electrical and electronic equipment (36)	315	1,582	0.26
Transportation equipment (37)	403	1,183	0.50
Transportation, communication, and utilities			
Railroad transportation (40)	0	132	0.85
Local and interurban highway passenger transit (41)	0	12	0.48
Motor freight transportation and warehousing (42)	37	298	0.39
Water transportation (44)	0	50	0.42
Transportation by air (45)	153	337	0.46
Communications (48)	119	522	0.52
Electric, gas, and sanitary services (49)	28	371	0.44
Retail trade			
Food stores (54)	138	500	0.30
Service industries			
Motion pictures (78)	42	121	0.26
Educational services (82)	0	24	0.44

Source: Hirsch and Macpherson (2003), based on the Current Population Survey Outgoing Rotation Group Earnings Files, 1983; Bureau of Census Technical Paper 59 (1989)

Note: Industries listed are those with at least 25 percent of workforce covered by collective bargaining agreements in 1983 and at least one firm with Compustat data during the 1950s. Two-digit SIC codes are reported in parentheses. Sample includes employed wage and salary workers, ages 16 and over.