Labor Unemployment Risk and Corporate Financing Decisions*

Ashwini K. Agrawal† and David A. Matsa‡

October 13, 2010

Abstract

This paper examines the impact of labor unemployment risk on corporate financing decisions. Theory suggests that firms choose conservative financial policies partly as a means of mitigating worker exposure to unemployment risk. Using changes in state unemployment insurance benefit laws as a source of variation in the costs borne by workers during layoff spells, we explore the connection between unemployment risk and the corporate financing decisions of public firms in the United States. We find that increases in legally mandated unemployment benefits lead to increases in corporate leverage. The impact of reduced unemployment risk on financial policy is especially strong for firms that have greater layoff separation rates, labor intensity, and financing constraints. The estimated premium required to compensate workers for unemployment risk due to financial distress is about 57 basis points of firm value for a BBB-rated firm. These findings suggest that labor market frictions have a significant impact on corporate financing decisions.

* We would like to thank David Autor, Jonathan Berk, Samuel Lee, Steven Kaplan, Mark Leary, Brian Melzer, Mitchell Petersen, Joshua Rauh, Philipp Schnabl, Morten Sorensen, Ilya Strebulaev, Amir Sufi, Sheridan Titman, David Yermack, and seminar participants at Columbia University, DePaul University, New York University, Northwestern University, the University of Pennsylvania, and the Vanderbilt University Human Capital and Finance Conference for helpful comments. We also thank Ed Altman and Brenda Karlin for generously providing data on bond defaults.

† The Stern School, New York University, KMC 9-75, 44 West 4th St, NY, NY 10012. Phone: 212-998-0913. Email: aagrawal@stern.nyu.edu.

‡ Kellogg School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208. Phone: 847-491-8337. Email: dmatsa@kellogg.northwestern.edu.

Workers bear significant costs during unemployment. A large literature in labor economics focuses on unemployment risk as a substantial source of concern for workers, none the least because laid off workers often endure significant reductions in consumption (Gruber 1997), long delays before reemployment (Katz and Meyer 1990), and significant wage cuts after returning to work (Farber 2005; Gibbons and Katz 1991). These costs are particularly evident amid the sustained high unemployment of the recent credit crisis and jobless recovery (e.g., Luo and Thee-Brenan 2009). Workers' concerns about becoming unemployed reduce labor demand even when a firm is far from bankruptcy, naturally affecting firms' human resources policies on layoffs and wage setting (Topel 1983, 1984, Li 1986; Hamermesh and Wolfe 1990). Despite their magnitude, however, workers' costs of unemployment are largely absent from standard theories in corporate finance, which typically assume that labor markets are frictionless.

This paper studies the impact of worker unemployment costs on corporate financing decisions. Specifically, we examine the hypothesis that firms choose conservative financial policies partly as a means of mitigating worker exposure to unemployment risk.[1] Workers require that firms provide a premium in wages or benefits to compensate them for potential job loss (Topel 1984, Abowd and Ashenfelter 1990). Firms can choose financial policies that decrease the risk of financial distress and costly layoffs, implicitly reducing the compensation required by workers to offset unemployment risk. Diminished exposure to unemployment risk through flexible financial policy is likely to be especially important in industries that experience relatively high layoff separation rates and tight financing constraints, as workers in these industries are more likely to experience job loss due to distress. This hypothesis builds on theory by Titman (1984) and Berk, Stanton, and Zechner (2010).

Empirical identification of the impact of workers' exposure to unemployment risk on corporate financing decisions is challenging for two reasons. The first obstacle is to precisely measure workers' exposure to unemployment risk. The second difficulty is to distinguish the impact of worker unemployment costs from other factors which otherwise impact financial policy, such as unobservable investment opportunities. Correlations between leverage and proxies for unemployment risk, such as firm size, capital intensity, and wages, are suggestive but open to many interpretations (Verwijmeren and Derwall 2010; Chemmanur, Cheng, and Zhang 2009).

To overcome these challenges, we exploit changes in state unemployment insurance (UI) benefit laws, and examine their relation with the corporate financial policies of U.S. firms from 1950 to 2008. Increases in UI benefits impact corporate financing through their impact on workers' exposure to unemployment risk. More generous state unemployment benefits make layoffs less costly and reduce

[1] As put by Stewart Myers, "To succeed a corporation requires a co-investment of financial capital from the outside and human capital that is built up inside the business…When you ask people to make an investment of human capital in your firm, you do not then do things – like raising the leverage ratio too high – that would needlessly put that investment at risk" (Myers et al. 1998, p.18-19).

workers' demands to be compensated by their employers for facing high unemployment risk (Topel 1984). Because firms have less incentive to use conservative financial policy to reduce worker exposure to job loss, they are able to raise leverage and profit from increased debt tax shields and other benefits associated with debt financing.

Our approach enables us to identify the impact of shocks to unemployment risk on corporate financial policies without requiring explicit measures of worker risk aversion to unemployment. We make the (plausible) assumption that legally mandated increases in unemployment insurance payments lead to reductions in the costs workers face in unemployment, because unemployment benefits partially replace foregone earnings that result from default-induced unemployment. This assumption is supported by a vast labor literature that finds theoretical and empirical support for the notion that unemployment insurance compensation is found to have economically meaningful effects on workers' behavior and aggregate labor supply (e.g., Topel and Welch 1980; Topel 1984; Meyer 1990; Meyer 1995; Meyer and Mok 2007; Liu, Gormley, and Zhou 2010). We further verify that changes making state UI benefit laws more generous are indeed associated with greater state UI payouts, suggesting that changes in legal mandated benefit allowances are suitable proxies for shocks to worker exposure to unemployment risk.

Increases in the generosity of state unemployment insurance benefits are associated with increases in firm leverage and interest coverage ratios. Doubling the maximum total UI benefit is associated with firms maintaining 4.1 percentage points greater average ratios of debt to assets and 15 percent lower interest coverage. These relations are empirically robust. The inclusion of controls for firm and year fixed effects implies that the results reflect average within-firm changes in capital structure among firms when their state increases the generosity of its UI system, after accounting for concomitant national trends. We include a variety of controls for firm financial characteristics and state economic conditions to ensure that the results are not driven by firm level variation in performance or macroeconomic factors. We also show that the results are robust to various alternative measures of UI benefit generosity. Furthermore, the relationship between UI benefits and leverage becomes even stronger when we exclude firms that have a geographically dispersed workforce for which we are likely to measure eligible UI benefits with error.

We find that the relation between UI generosity and leverage is particularly stark for subsamples of firms that are distinguished by various labor market characteristics and worker attributes. The relation is especially pronounced for firms in industries where workers face greater risk of unemployment, such as industries that experience frequent layoffs and industries with production technologies characterized by greater labor intensity. Increases in UI benefits are likely to have larger effects in these firms because of the greater likelihood that workers will collect benefits due to industry-related layoff incidence.

We also find that the relation between UI payments and financing decisions is stronger for firms in industries that employ low wage employees and workers who are more likely to draw UI benefits. Because of liquidity constraints, UI benefits are likely to have a greater impact on low wage employees (Browning and Crossley 2001, Bloeman and Stancanelli 2005, Chetty 2008, Berk and Walden 2010). Additionally, workers vary in the speed with which they are able to secure reemployment after job loss, due to either heterogeneous search costs or firm specific human capital; workers who can quickly find employment after job loss often do not take up any UI benefits (Anderson and Meyer 1997). Consistent with these ideas, we find that financing decisions in industries with many low wage workers and likely UI recipients are especially sensitive to changes in UI benefit laws.

We also find a stronger relation between UI generosity and leverage among firms that face tighter financing constraints, as measured by low operating cash flows and the absence of dividend payments. Tight financing constraints make it difficult for firms to raise capital if they experience a negative shock, raising the probability that such firms must resort to cost cutting through layoffs or reductions in wages and benefits (Ofek 1993, John, Lang, and Netter 1992). Workers in these firms therefore likely face greater unemployment risk, and increases in UI generosity should have a greater impact on the financial policies of these firms, as we document. Collectively, this broad set of evidence is supportive of theoretical models which predict that firms choose conservative financial policies partly as a means of mitigating worker exposure to unemployment risk.

We conduct a number of analyses to verify that our empirical framework identifies the causal impact of unemployment risk on corporate leverage. An important possibility to consider is that local economic downturns could simultaneously lead to both states increasing UI benefits and firms increasing their borrowing. In this scenario, the estimates may capture an endogenous relation rather than a causal effect of UI benefit changes on leverage. Extensive empirical analysis, however, finds little support for this hypothesis. First, controls for state unemployment rates and state GDP growth have minimal attenuating effect on our estimates; thus for an omitted variable to explain the results, the variable would have to be uncorrelated with these indicators of local economic health. Second, the variable would also have to be correlated with various firm and industry characteristics for which we find a particularly strong relationship between UI benefits and leverage. Third, we find that firms show no signs of unusually low operating profits or other signs of financial distress when benefits increase. Fourth, we show that the financing decisions of firms which generate most of their revenue from national commerce and are hence less likely to be affected by local economic shocks exhibit large, if not larger, sensitivities to UI laws than firms which generate most of their sales from local, intrastate markets. Fifth, as a falsification test, we show that bordering states' UI benefit levels, which would also be affected by regional economic

conditions, are not correlated with firms' leverage. Additional tests, described below, also support a causal interpretation of the results.

We also explore the empirical relevance of two alternative mechanisms that may explain the observed link between UI benefits and leverage. One possibility is that increases in unemployment insurance benefits increase firms' UI premiums and other costs, leaving them with less money to pay down debt; but when we examine the impact of increases in UI benefits on operating performance, we find evidence that increases in UI benefits are actually associated with *positive*, statistically insignificant changes in performance. A second possibility is that unemployment insurance impacts the ability of unionized workers to bargain with management for higher wages, and that in response, firms choose aggressive financial policies to toughen their bargaining position. We find, however, that the relation between UI generosity and financial policies is actually stronger for firms with *low* union coverage.

Finally, we provide numerical estimates of the overall importance of unemployment risk for firms' financing decisions. UI benefits can provide substantial compensation to unemployed workers, but do not fully account for all costs borne by workers during layoff spells. Using data on employment changes for firms in default and estimates from Topel (1984) on the size of compensation tied to unemployment risk, we estimate that the *ex ante* costs of financial distress due to unemployment risk compensation are quite large: an average BBB-rated firm pays workers about 57 basis points of firm value to bear layoff risk due to financial distress. For comparison, these costs explain nearly 90% of the difference between the tax benefits and risk-adjusted *ex post* costs of financial distress calculated by Almeida and Philippon (2007).

The central contribution of this paper is to provide novel empirical evidence that worker unemployment risk significantly impacts firms' corporate financial policies. The findings indicate that managers choose financial policy partly as a means of mitigating labor's exposure to unemployment risk, consistent with the predictions of models such as Titman (1984) and Berk, Stanton, and Zechner (2010). More broadly, the evidence suggests that frictions in labor markets affect corporate financial policies, a phenomenon of growing interest as human capital becomes an increasingly critical asset for firms (Zingales 2000). This paper also adds to a growing literature analyzing the interactions between labor economics and finance (including Matsa 2010; Benmelech and Bergman 2009; Chen, Kacperczyk, and Ortiz-Molina 2010; Simintzi, Vig, and Volpin 2009). While those papers tend to focus on the use of leverage as a strategic input in the bargaining process between workers and firms, our paper examines a unique channel through which financial policy is used to mitigate the costs borne by workers resulting from involuntary unemployment.

Section 1 describes our theoretical framework. Section 2 provides institutional background on unemployment insurance in the United States. Section 3 describes the data and empirical framework.

Section 4 presents the empirical findings, and Section 5 discusses alternative mechanisms. Section 6 provides estimates of the overall importance of unemployment risk for firms' financing decisions, and Section 7 concludes.

1. Theoretical framework

Workers bear significant costs when they become involuntarily unemployed, including long delays before securing another job (Katz and Meyer 1990) and significant wage discounts when they eventually find reemployment (Farber 2005; Gibbons and Katz 1991). These costs could result from costly job search (Diamond 1982; Mortensen 1986; Mortensen and Pissarides 1994), layoff discouragement effects (Jahoda 1982), a limited supply of match-specific job opportunities (Lazear 2003), imperfect information about worker productivity (Harris and Holmstrom 1982), or other labor market frictions. Whatever the underlying causes, the impact of these unemployment costs on worker and firm behavior is significant and has been the subject of extensive study in labor economics. Given the high costs of unemployment, a number of theoretical and empirical papers find that workers require compensation in the form of higher wages, additional benefits, or improved working conditions to compensate for unemployment risk, giving rise to what is commonly referred to as "compensating wage differentials."

The notion that wage differentials must compensate workers for bearing unemployment risk dates back to Adam Smith (1776/1976, p.120):

> *"The wage of labor in different occupations vary with the constancy or inconstancy of employment.…What he earns, therefore, while he is employed, must not only maintain him while he is idle, but make him some compensation for those anxious and desponding moments which the thought of so precarious a situation must sometimes occasion.…The high wages of those workmen, therefore, are not so much the recompense of their skill, as the compensation for the inconstancy of their employment."*

A number of papers formalize these ideas in theoretical models which collectively reach the conclusion that workers face non-trivial costs of job mobility that impose constraints on short run labor supply. Because firms cannot credibly commit to fully insure workers against these costs, firms must compensate workers *ex ante* to bear these risks (Abowd and Ashenfelter 1981; Topel 1984; Li 1986; Rosen 1986; Hamermesh and Wolfe 1990). The risks – and thus the size of the compensation – increases with the probability of unemployment, the degree of worker risk aversion, the duration of job loss, and the costs incurred by workers during unemployment spells.

A variety of empirical evidence based on worker micro data supports the importance of compensating wage differentials for unemployment risk. Abowd and Ashenfelter (1981) find that compensating differentials for unemployment risk vary across industries and are large – up to 14 percent of total wages – in the presence of significant unemployment risk. Topel (1984) estimates that a

percentage point increase in anticipated unemployment raises an individual's wage by about 1 percent in the presence of mean UI wage replacement, and by about 2.5 percent in the absence of any UI compensation. Li (1986) and Hamermesh and Wolfe (1990) find that 14 to 41 percent of total inter-industry wage differentials can be explained by differences in unemployment risk.

Compensating wage differentials for unemployment risk are likely to affect firms' optimal leverage ratios. Financial leverage affects a firm's probability of financial distress and hence workers' exposure to layoff risk, as firms in distress are often forced to lay off workers in order to meet outstanding debt obligations (Ofek 1993; Asquith, Gertner, and Scharfstein 1994). Increasing leverage can therefore increase the costs required to compensate workers for bearing greater exposure to the risk of financial distress and unemployment.

These considerations can be understood as an additional term in the tradeoff weighed by firms when taking on additional leverage:

$$NPV[Debt\ Issue] = NPV[Tax\ Shield] + NPV[Costs\ of\ Financial\ Distress] + \Delta\ Labor\ Expense \quad (1)$$

In the traditional tradeoff theory of capital structure, a firm issuing debt balances the value obtained from debt tax shields with the potential value lost should the debt cause the firm to encounter financial distress (for example, see Graham 2000). The present value of the costs of financial distress are the product of the probability of financial distress times the magnitude of ex post direct and indirect costs of distress, discounted at the appropriate discount rate (Almeida and Philippon 2007).

The contribution of this paper is to provide empirical support for the inclusion of an additional term in the adjusted present value equation that typically characterizes the tradeoff theory of capital structure. Because debt financing increases the probability of layoffs in distress, it also raises the compensation premium that workers require today to bear increased unemployment risk. While costs of financial distress typically refer to *ex post* costs realized if the firm eventually becomes financially distressed, the final term in equation (1) represents costs paid *ex ante* due to labor market frictions.[2]

Taking on debt can lead workers to require higher wages even if workers do not directly observe financial leverage decisions. The impact of leverage on unemployment risk is likely to be manifest in informative signals from coworkers, management, the business press, and other aspects of the economic environment. In a recent paper, Hortascu, et al. (2010) find that auto dealers and customers respond to high-frequency fluctuations in manufacturers' corporate distress risk; if customers can perceive such changes in distress risk, it is all the more likely that the firm's employees perceive these changes as well. That compensating wage differentials do in fact respond empirically to unemployment risk further

[2] Leverage may impose ex ante costs on the firm through the product market as well. For example, Titman (1984) argues that high leverage potentially reduces sales of long-lived goods because customers anticipating a bankruptcy liquidation expect higher costs of parts and servicing.

supports this conclusion (Abowd and Ashenfelter 1981; Topel 1984; Li 1986; Hamermesh and Wolfe 1990).

In the empirical analysis that follows, we examine changes in workers' unemployment insurance benefits as shocks to the final term in equation (1): unemployment insurance benefits reduce the costs borne by workers during unemployment. Because unemployment is less costly when workers are eligible for more generous UI benefits, they require a lower compensating differential per unit of layoff risk. For example, Topel (1984) finds that unemployment insurance significantly reduces wage premiums for unemployment risk, and estimates that the full replacement of wages by UI payments would cause compensating wage premiums to decline to zero. Reduced wage premia thus reduce the costs of debt issuance, and allow firms to raise leverage and gain from increased debt tax shields, lower managerial agency costs, and other benefits associated with debt financing.

2. The unemployment insurance system in the United States

The unemployment insurance system of the United States provides temporary income to eligible workers who become involuntarily unemployed and are willing and able to find alternative sources of employment. Congress created the system as part of the Social Security Act of 1935, in response to the hardships of job loss experienced during the Great Depression. The Act created a national system of unemployment insurance but gave each State the autonomy to set many of the program's parameters. The joint federal-state structure has led to a system of unemployment insurance where the basic framework of insurance provision and administration is common throughout the country, yet there is substantial diversity among the States in taxable wage limits, tax rates, benefit eligibility, and benefit amounts.

There are two primary purposes of unemployment insurance in the U.S. (Blaustein 1993). First, unemployment insurance benefits are designed to help the individual worker maintain his living standards during unemployment and to facilitate his ability to find other work. Second, in doing so, unemployment insurance benefits provide economic stability for the economy, particularly during recessions.

The structure of the unemployment insurance system has not changed much over the last 75 years, but there have been substantive changes in the benefits provided to workers by state governments. There are three key features of unemployment insurance benefits: eligibility, wage benefit amounts, and duration. In order to receive unemployment insurance benefits, a worker must be eligible for benefits according to regulations passed by legislative bodies of the state in which he resides. Typically, all private sector workers who are involuntarily unemployed and actively seeking new employment are eligible to receive benefits. The wage benefit provided to an eligible worker by the unemployment insurance system is set according to formulas determined by state law. A state's wage benefit formula typically calculates the highest earnings realized by the worker in 4 of the last 5 quarters, and seeks to

replace approximately 50% of those wages through weekly payments, subject to minimum and maximum bounds. There is some variation both across states and over time (within states) in the formulas used to calculate the benefits, but most of the variation comes from changes to the maximum bounds. States also set the duration (i.e., the number of weeks) for which the claimant is eligible to receive the weekly benefit payment as long as he is still unemployed and looking for work. There is also variation across states and over time in the number of weeks for which a claimant is eligible to receive UI benefits.

The funds used to finance unemployment insurance provisions come from taxes assessed on eligible firms in the United States. Currently, almost all firms that employ at least one worker for 20 weeks and maintain minimal levels of base wage payments are subject to unemployment insurance taxes. Tax rates are "experience rated," that is, firms that have a greater propensity to lay off workers (and thus draw more benefits) pay higher tax rates. These taxes are aggregated at the federal and state levels to finance UI programs. When a claimant files for UI benefits, payments are first made by state governments; when states exhaust their resources or hit certain rates of aggregate unemployment, they are eligible to tap federal funds for additional support.

As explained by Blaustein (1993), various factors lead to variation in unemployment insurance benefits across states and over time. The political process, including political party preferences, lobbying, and logrolling, plays a dominant role in establishing the generosity of benefits. Popular social trends in conservatism versus progressivism also affect the outlook of statutory bodies. Economic factors also play a role; for example, the degree of a state's industrial urbanization, underlying trends in unemployment rates, and higher average wage levels are thought to lead states to provide more generous benefits.

UI benefits have a substantial impact on unemployed workers. Gruber (1997) finds that unemployment insurance provides significant consumption smoothing benefits to workers; in the absence of unemployment insurance, he estimates that consumption would fall by one-third. Liu, Gormley, and Zhou (2010) find that unemployment insurance impacts workers' personal savings and investment decisions. Increases in unemployment insurance benefits also affect workers' searches for new employment and the durations of their unemployment spells (Topel and Welch 1980; Meyer 1990; Meyer 1995; Meyer and Mok 2007). The impact of UI benefits on unemployed workers, in turn, also appears to have significant effects on firms. For example, managers are more willing to layoff workers when benefits improve and workers face lower costs of unemployment (Topel 1983).

Changes in the generosity of unemployment insurance benefits thus provide meaningful shocks to the cost to workers of being laid off. We use these shocks, which feature substantial heterogeneity across states and over time, to examine whether firms account for workers' exposure to unemployment risk in setting financial policies. Variation in unemployment insurance laws affects workers' expected outcomes

in unemployment without directly impacting the firm itself, thus providing a clean setting to examine the relationship between financial policy and workers' exposure to unemployment risk.

3. Data and empirical framework

Raw data suggests that worker unemployment costs affect firm financial policy. Figure 1 shows the industry-level correlation between layoff propensities and market leverage ratios. The worker layoff separation rates are long-run averages from the U.S. Bureau of Labor Statistics's *Mass Layoff Statistics* (described in more detail below) and average market leverage is from Compustat for 2008. The graph shows a negative relationship between layoff propensities and leverage. The negative relation is consistent with greater layoff propensities exposing workers to greater unemployment risk, which in turn causes managers in these industries to choose conservative financial policies to protect workers from unemployment. Similarly, Titman and Wessels (1988) find a positive correlation between voluntary employees' quit rates and firms' leverage ratios; they conclude that low costs of job loss lead to greater voluntary unemployment and allow firms to increase debt financing.

It is possible, however, that the statistical relationships between layoffs, quit rates, and capital structure do not actually reflect causal relationships; high industry volatility, for example, may lead to both high layoff propensities and conservative financial policies. To more precisely measure and identify the impact of worker unemployment costs on financial policy, we collect data on state unemployment insurance benefit laws and firm balance sheet characteristics. Our information on unemployment insurance benefits is obtained from the U.S. Department of Labor's *Significant Provisions of State UI Laws* from 1950 through 2008. These annual publications detail the UI benefit schedules in each U.S state. Under each system, eligible claimants receive a weekly benefit payment for a set number of weeks, where the benefit amount and duration are determined by the worker's employment history during a base period. To measure the generosity of each state's UI system, we focus on the product of the maximum benefit amount and the maximum duration allowed.[3] The results are robust to other specifications for the generosity of the benefit criteria.

Summary statistics describing the generosity of unemployment insurance benefits are presented in Table 1. *Log max weekly benefit* is the log maximum weekly wage benefit allowance given to workers in an average state-year; the average log wage benefit, unadjusted for inflation, is 5.2 (approximately

[3] Much of the empirical research on UI generosity examines variation across individual workers in the ratio of the weekly UI benefit to weekly wages, called the "wage-replacement ratio." Although the wage-replacement ratio derives naturally from theoretical models of job search, it varies relatively little either across state programs or over time (Moffitt and Nicholson 1982). Because our study focuses on differences in UI across firms (and we lack employer-employee linked data), we rely on characteristics of UI generosity that display significant variation empirically across states and over time. Because these provisions have proven more flexible in practice, they are also more directly relevant to policymakers.

$186 per week). *Log max duration* is the log maximum number of weeks that a state provides unemployment insurance benefits to claimants; the average sample state-year amount is 3.3 (approximately 26 weeks). *Log max total benefit*, the log of the maximum number of weeks times the maximum weekly benefit amount, provides a proxy for the total unemployment insurance benefits that a UI claimant can receive in a given year (U.S. Congress 2004). Unadjusted for inflation, the average log max total benefit is 8.5 (approximately $4,876 per year). There is also significant variation across states; in 2009, for example, the maximum annual total benefit varies from about $6,000 in Mississippi to more than $28,000 in Massachusetts.

The evolution of state UI benefits over time is depicted graphically in Figures 2 and 3. Figure 2 illustrates relative increases in state maximum unemployment insurance benefits by decade. Each map corresponds to a different decade and displays the quartile of each state's increase in UI generosity, where darker shading indicates larger increases in UI benefits. This is the type of variation in UI generosity that we exploit in the analysis below. States display significant heterogeneity in relative UI benefit trends across decades, and within decades, the variation does not appear to be caused by regional trends. The changes in UI benefits are not dominated by a specific group of states, as at some point in time all states experience large changes in UI benefit laws relative to their peers. Figure 3 plots the distribution of the absolute magnitude of the changes in state UI benefit laws over each decade. States typically increase their UI generosity by 25 to 75 percent over a decade, and much larger increases, such as more than doubling maximum total benefits, are not uncommon.

There is no indication that states changes UI benefit laws at that same time that they adopt other laws that impact corporate borrowing. To explore a possible connection, we compare changes in UI generosity to changes in state corporate income tax rates, perhaps the most important driver of firms' leverage choices. We obtain historical data on states' highest marginal corporate income tax rate from the U.S. Tax Foundation for the years 2000 to 2009. Although the tax rate and log max total benefit display similar amounts of variation across states and over time, the partial correlation between the series, after accounting for state and year fixed effects, is only -0.0089 ($p \geq 0.850$). The changes in these laws appear to be unrelated.

The measures of UI generosity that we construct are reflected in the aggregate realized value of unemployment insurance benefits paid out by states. Using annual data on state UI payments from 1969 (the earliest year available) through 2008 from the U.S. Bureau of Economic Analysis's (BEA) *Regional Economic Accounts*, we regress log total UI compensation on the benefit criteria described above, as well as controls for macroeconomic conditions and state and year fixed effects. The results, reported in Table 2, indicate that the elasticity of maximum total benefits to actual compensation payments is approximately 0.9. Aggregate payouts are also correlated with states' maximum weekly benefit amounts

and maximum duration periods. The correlations are statistically significant and economically meaningful, and robust to controls for macroeconomic conditions, as represented by the state unemployment rate (available from the Current Population Survey since 1977) and the GDP growth rate (from the BEA).

These results complement a large literature in labor economics documenting the effects of unemployment insurance benefits on the behavior of eligible individuals. Studies show that increases in unemployment insurance benefits significantly affect the duration of workers' unemployment spells (for examples, see Moffitt 1985; Meyer 1990; Katz and Meyer 1990; Card 2004). Combined with our findings about aggregate payouts, these results strongly suggest that the unemployment insurance laws that we examine in this paper provide substantial assistance to laid-off workers.

To analyze the impact of worker unemployment costs on firms' financial policies, we combine our measures of the generosity of states' unemployment insurance systems with firms' balance sheet and income statement information from Compustat. The sample includes all firms (excluding financials and utilities) with nonmissing observations, which amounts to about 14,000 firms and 140,000 firm-years over the 1950 through 2008 period. The financial data are winsorized at 1 percent tails, and summary statistics are reported in Table 1. The ratio of debt to the market value of assets for the average firm is 29 percent.

We use panel regression analysis to examine the connection between UI generosity and financial policy at the firm-year level. We estimate a typical leverage regression (Rajan and Zingales 1995), and include the generosity of the UI system of the state where the firm is located as an additional regressor.[4] Specifically, let $DEBT_{ijt}$ be a measure of financial leverage at firm i in state j and year t, and $VALUE_{ijt}$ represent the market value of the firm. We then regress

$$\frac{DEBT_{ist}}{VALUE_{ist}} = \alpha_1 LN(MAX\ UI\ BENEFIT)_{st} + X_{ist}\beta + \nu_i + \omega_t + \varepsilon_{ist}, \qquad (2)$$

where the level of debt as a fraction of the firm's total value is modeled as a function of the log of the maximum annual unemployment insurance benefit (as defined above), a set of controls X_{it}, firm fixed effects ν_i, and year fixed effects ω_t. The controls include the financial variables commonly included in leverage regressions, namely the proportion of fixed assets (a proxy for potential collateral), the market-to-book ratio (investment opportunities), log sales (firm size), modified Altman's z-score (probability of

[4] Firms are assigned to a state based on the company's headquarters location. If some of a firm's plants are located in a different state than the firm's headquarters, then those plants would be subject to a different legal regime. Such mismeasurement may attenuate the results. When we exclude industries likely to have a more dispersed workforce (reported below), the magnitude of the estimates increase.

bankruptcy), and return on assets (profitability).[5] The firm fixed effects ensure that estimates for α_1 reflect actual changes in benefit generosity and leverage over time rather than simple cross-sectional correlations, and the year fixed effects account for transitory economy-wide factors such as aggregate macroeconomic conditions that could possibly affect both variables. The term X_{it} also includes the state unemployment rate and the state GDP growth rate to control for contemporaneous local macroeconomic conditions. Summary statistics for these variables are also presented in Table 1. The estimated standard errors in all regressions are corrected for clustering at the firm level.

4. Findings

4.1. Unemployment insurance generosity and corporate borrowing

The reduced-form relationship between unemployment insurance benefits and leverage is depicted graphically in Figure 4. The graph presents the variables' deviations from annual averages in the full-sample to account for aggregate time trends. The results are reported for the 6 U.S. states with the most Compustat firms. The figure shows a positive relationship between UI benefit generosity and leverage. The comovement of UI benefits and market leverage is striking, even as different states display vastly different trends in unemployment insurance benefits.

Regression analysis of the relation between the generosity of unemployment insurance laws and corporate borrowing confirm these results. The estimates, reported in Table 3, show that increases in UI benefit generosity are associated with increases in financial leverage. The relationship is economically meaningful and statistically significant: doubling the maximum total UI benefit is associated with 4.1 percentage points greater average leverage (column 1). Controls for firm and year fixed effects ensure that these results reflect average within-firm changes in capital structure among firms when their state increases the generosity of its UI system, after accounting for concomitant national economic conditions and leverage trends. The findings are robust to including financial controls (column 2) and macroeconomic conditions (column 3).

Workers are covered by the UI regime in the state where they work, whereas our empirical design measures the UI laws where their employer is headquartered. This disconnect may attenuate our estimates if some of a firm's workers are located in a different state than the firm's headquarters. To address this issue, we reestimate equation (2) after excluding industries where a large percentage of the

[5] These variables reflect the literature on capital structure, surveyed in Harris and Raviv (1991), and the variables included in cross-sectional analysis in Rajan and Zingales (1995). The modified Altman's z-score is

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

(MacKie-Mason (1990)).

workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. As expected, excluding these industries increases the estimate of α_1 by about a third to 4.1 percentage points (column 4). The results are also robust to using book (instead of market) leverage, although the estimate is slightly reduced (column 5).

These estimates are economically meaningful. The coefficient estimates for the financial control variables provide benchmarks for the magnitude of α_1. Doubling the maximum total UI benefit has a similar relationship with total leverage as increasing the proportion of fixed assets by 14 percentage points or doubling sales. Given that UI generosity varies by a factor of almost five between the most and least generous states, these magnitudes suggest that UI is quantitatively important in explaining average leverage.

The value of the tax shield associated with the additional leverage provides another estimate for the economic magnitude of the relation. Based on the estimate from column (3), doubling the maximum total UI benefit is associated with 3.0 percentage points greater average leverage. If the average firm faces an interest rate of 10 percent and marginal tax rate of 25 percent (Graham, Lemmon, and Schallheim 1998), then the incremenal tax shield totals approximately 0.08 percent of the firm's assets' value:

*3.0% increase in debt/assets * 10% interest rate * 25% marginal tax rate = 0.08%*

For example, for a $2 billion firm, this amounts to $1.5 million. In 2008, the average Compustat firm had $245,000 in asset value per employee. Thus the value of the incremenal tax shield associated with doubling the maximum total UI benefit amounts to about $185 per employee for the average firm (i.e., 0.075% * $245,000 = $185). Although this calculation is only approximate (for example, it may be an overestimate because it ignores costs of financial distress), it provides an estimate for the additional wages and benefits workers require to work for a firm with 3.0 percentage points greater average leverage.

Although much of the academic literature on leverage focuses on the debt-to-asset ratio, for workers worried about their firm becoming distressed, the most important measure of the firm's financing policy is perhaps its interest coverage. Interest coverage (the ratio of operating earnings before depreciation to interest expense) measures the firm's ability to use its current profits to cover the interest payments due on its outstanding debt. Measuring leverage by interest coverage ratios instead of debt ratios can lead to very different conclusions when a firm is expected to grow. Firms whose cash flows are expected to grow can appear to have low leverage when measured on a debt-to-asset ratio basis (debt is low relative to future expected cash flows), but high leverage when measured on an interest coverage basis (required interest payments are large relative to current cash flows).

The relation between UI benefit criteria and firms' interest coverage is presented in Table 4. Following Faulkender and Petersen (2006), we examine interest coverage in logs to account for the relatively greater importance of changes for low levels of interest coverage.[6] As with the debt-to-asset ratio, we find that when workers are eligible for greater benefits if unemployed, firms increase their leverage by maintaining less interest coverage (i.e., they have higher interest expense per dollar of earnings). The results are both economically and statistically significant: doubling the maximum total UI benefit is associated with firms maintaining 15 percent lower interest coverage (column 1). The estimates are robust to including financial controls (column 2) and measures of local macroeconomic conditions (column 3). Excluding industries where a large percentage of the workforce is likely to be geographically dispersed increases the estimate's magnitude to −18 percent (column 4). All of these results for interest coverage are statistically significant at the 1 percent level.

Across all of the specifications reported in Tables 3 and 4, we find significant associations between changes in unemployment insurance benefit criteria and firms' financing policies. Firms appear to increase total debt as a fraction of assets and maintain lower interest coverage when workers are eligible to receive higher benefits from state governments during unemployment. The empirical findings are consistent with the theory that firms boost their financial leverage when workers are better insulated from unemployment risk.

4.2 Identification analysis

One possible alternative explanation for the findings is that poor local economic conditions, such as high unemployment, lead both states to adopt more generous UI laws and firms to increase their borrowing, implying that there may not necessarily be a causal relationship between UI benefits and financial leverage. We explore the empirical relevance of this hypothesis in several ways. First, we include controls for local macroeconomic conditions, namely the state unemployment rate and state GDP growth rate, and find that the inclusion of these controls has minimal effects on estimates of the association between UI benefits and leverage (see column 3 of Tables 3 and 4). An omitted variable that explains the results would have to be uncorrelated with these indicators of local economic conditions.

Second, we estimate heterogeneity in the effect across numerous dimensions, and again find patterns consistent with a causal relationship. These heterogeneity analyses are presented below in Sections 4.3 though 4.5. An omitted variable that explains the results would also have to be correlated

[6] For example, an increase in coverage from 100 to 101 is not as meaningful as an increase from 1 to 2. Following Faulkender and Petersen (2006), we code interest coverage equal to zero when earnings are negative (the ratio is otherwise not well defined) and take the log of one plus interest coverage as the variable of interest. The log transformation also has the advantage of making the distribution more symmetric.

with all of the various industry, worker, and firm characteristics for which we find a particularly strong relationship between UI benefits and leverage.

Third, we point out that although most Compustat firms have relatively localized production facilities, the revenues of these large, publicly traded firms are typically spread across the country or the world. For such firms with *national* product markets, idiosyncratic changes in the economic conditions of the *local* areas in which they produce are unlikely to have much effect on their borrowing. Changes in national economic conditions will affect the demand for their goods which are sold nation- or worldwide, but these are captured by the year fixed effects.

To evaluate the extent to which local economic shocks may be impacting our results, we gather data from the 2007 U.S. Commodity Flow Survey to distinguish firms based on the fraction of total revenues realized from intrastate versus interstate transactions. If changes in UI laws are driven exclusively by changes in local economic conditions, then the relation between the laws and corporate borrowing should be greatest for firms which generate most of their sales from local, intrastate commerce. In Table 5, we present regression estimates of the relation between log max UI benefits and firm financing across samples of firms stratified by the fraction of industry sales that are generated from out-of-state consumers. The results cast doubt on the importance of residual, omitted local economic shocks driving the coefficient estimates. We find that the relation between UI generosity and corporate borrowing is as large, if not larger, when a high fraction of sales are generated out-of-state. Even when the sample is restricted to industries with more than 85 percent of sales generated out-of-state, max total UI benefits are associated with a 5.4 percentage point increases in leverage (Panel A, column 6) and a 30 percent reduction in interest coverage (Panel B, column 6).

Fourth, we examine firms' profits and find no signs of poor operating performance when benefits increase. Regression estimates of the relation between log max UI benefits and return on assets are reported in Table 6. Estimates in column 1 control for only firm and year fixed effects, those in column 2 add controls for the various firm financial characteristics, column 3 also includes controls for local macroeconomic conditions, and column 4 excludes industries with relatively dispersed workforces. Across all four specifications, the level of UI benefits has no significant relation to firms' operating performance. If anything, the point estimates suggest that increases in UI benefits may be associated with *increases* in operating performance.[7] These results contradict the notion that poor economic conditions lead firms to increase their bargaining at the same time that UI benefits improve.

[7] Furthermore, the coefficients weakly increase in absolute magnitude as more control variables are added to the regression, suggesting that the lack of a negative estimated coefficient does not stem from empirical misspecification or omitted variable bias.

Fifth, we undertake a falsification test whereby we examine the relation between firms' capital structures and the generosity of the UI systems in neighboring states. To the extent that a firm's operations are concentrated in its headquarter's state, the generosity of UI benefits in neighboring states should have no direct effect on the firm. However, if heterogeneity in regional economic conditions (orthogonal to our controls for state unemployment and GDP growth) affect UI benefit laws in the firm's state, then benefit laws in bordering states are likely to be affected as well. In this scenario, including bordering states' benefit criteria as additional controls in equation (2) would reduce estimates of α_1. To the contrary, the results reported in Table 7 find that our estimates of the relation between UI laws and firms' borrowing are unaffected by these controls. For both leverage (columns 1 and 2) and interest coverage (columns 4 and 5), the coefficient on *log max total benefit* is the same with and without controls for bordering states' UI benefits. Furthermore, even when we exclude controls for the generosity of benefits in the firm's home state, the relation between bordering states' benefits and leverage is relatively small and statistically insignificant; for interest coverage, the estimate suggests the relation is only one-sixth as large as $\hat{\alpha}_1$ (column 6). We conclude that the relation between home UI benefits and financing decisions do not appear to be driven by an omitted regional economic shock.

Sixth, the results are robust to using other measures of UI generosity. During periods of high unemployment, it is not uncommon for states (or the federal government) to adjust UI benefits by increasing the duration over which benefits can be drawn. The basic "extended benefits" program, which was enacted by Congress in 1970, provides up to 13 additional weeks of benefits when a state is experiencing high unemployment.[8] During these extensions, the criteria for weekly benefit amounts are *not* affected. To minimize concerns about omitted variables, we deliberately exclude these extended benefits from our calculations of maximum duration or total potential benefits used in this paper. Nevertheless, it is possible that even some permanent changes in benefit duration may be motivated by local economic shocks, so we separately examine the associations with leverage of weekly benefit allowances and benefit durations. Table 8 shows the correlation between maximum weekly benefits or maximum duration and financial leverage after controlling for financial covariates and macroeconomic indicators. Of the four estimates shown, all are sizable in magnitude and three are statistically significant at conventional confidence levels. Both weekly benefit levels and benefit duration are strongly correlated with firms' financing policies.

[8] Some states have also adopted a voluntary program to pay up to 7 additional weeks of extended benefits during periods of extremely high unemployment.

4.3 Importance of labor market characteristics

Theory suggests that increases in UI benefits impact corporate financing decisions through their effects on workers' exposure to unemployment risk. Because workers face non-trivial costs from unemployment, they require a compensating premium in wages unless firms choose conservative financial policies that reduce the risk of financial distress and layoffs. More generous state unemployment benefits make layoffs less costly for workers and enable managers to attract workers even with higher leverage. Under this model, we would thus expect to find a stronger relationship between UI benefits and corporate financial policies in industries that are more likely to be affected by labor unemployment risk. This section evaluates this hypothesis by separately examining industries with varying propensities to layoff workers and industries with production technologies of varying labor intensity.

Historically, layoffs are much more common in some industries than others. Differences in the long-run propensity for layoffs likely result from structural differences, such as the variability of demand and flexibility of production technologies. We calculate layoff propensities at the three-digit NAICS industry level using data from the U.S. Bureau of Labor Statistics's *Mass Layoff Statistics* for 1996 through 2008. We count the number of workers being separated from their jobs during extended mass layoffs, defined by the BLS as when at least 50 initial claims are filed against an establishment during a consecutive 5-week period and at least 50 workers have been separated from their jobs for more than 30 days. For each industry-year, we take the ratio of such separations to total industry employment (from the BEA), and then obtain the industry layoff separation rate by taking the simple average of these ratios over the full sample period.

A listing of the layoff separation rate in each industry is presented in Appendix Table A1. The average layoff separation rate is 1.5 percent (median is 0.8 percent), subject to substantial variation across industries. Separation rates are less than 0.1 percent in seven industries including real estate, various health care services, and auto parts dealers; the highest separation rates are in agriculture and forestry support activities (18.4 percent), passenger ground transportation (5.9 percent), and heavy construction (5.7 percent).

To exploit variation in the probability of layoffs across industries, we divide our main sample of firms into two groups based on whether their industry's layoff separation rate is above or below the sample median. Then we repeat our analysis of UI generosity and leverage separately for each group of firms. The results are reported in Table 9.

We find that the relation between maximum total UI benefits and firms' financial leverage is statistically significant only in the sample with high layoff separation rates. Point estimates are at least twice as high when layoff propensities are high, compared to when they are low. Doubling the maximum

total UI benefit is associated with a 4.1 percentage point increase in leverage in industries facing a high probability of layoffs ($p < 0.05$; column 1), compared to a 1.7 percent increase (statistically insignificant) in low layoff industries (column 5). Similarly, doubling the maximum total UI benefit is associated with a 21.8 percent reduction in interest coverage in industries with a high probability of layoffs ($p < 0.01$; column 2), compared to a 4.2 percent decrease (statistically insignificant) in low layoff industries (column 6). Consistent with theory, the findings indicate that the relation between UI generosity and firm financial policy is especially strong when workers face greater layoff risk.

UI benefits are also more likely to affect financing decisions among firms that are more labor intensive. Financial leverage increases the probability of layoffs and the compensation required by each individual worker to bear unemployment risk. The aggregate labor-related costs resulting from increased leverage grow when firms are more labor intensive, because unemployment risks and the associated compensation levels are multiplied across a greater number of workers. Managers of firms which rely heavily on human capital in the production process are thus more likely to take account of worker unemployment costs when making financing decisions. We measure labor intensity by the ratio of labor and pension expense to sales. Using Compustat data, we calculate the average labor intensity in 3-digit NAICS industries among firms that report their labor costs, and then divide our main sample of firms into two groups based on whether their industry's labor intensity is above or below the sample median. Finally, we repeat our analysis of UI generosity and leverage separately for each group of firms. The results are reported in Table 9.

We find that the impact of UI benefits on financing decisions of firms with above-median labor intensity is economically large and statistically significant. Doubling the maximum total UI benefit is associated with a 3.7 percentage point increase in leverage and a 20 percent reduction in interest coverage in labor intensive industries (columns 3 and 4). In contrast, the relation between UI benefits and firm financing is smaller and statistically insignificant in industries with below median labor intensity (columns 7 and 8). The findings illustrate that the link between UI benefits and firm financing decisions is particularly evident in industries where workers are an especially important component of the firm's production process.

4.4 Importance of worker characteristics

We also test whether the relation between unemployment insurance and firms' financing decisions is stronger in industries with worker characteristics that are likely to make unemployment insurance especially important. Because of liquidity constraints, unemployment is particularly costly for workers with limited savings. Browning and Crossley (2001) and Bloemen and Stancanelli (2005) find that the consumption smoothing benefits of UI are concentrated wholly among individuals who have no

assets at the time of job loss; and Chetty (2008) concludes that 60 percent of the increase in unemployment durations caused by UI benefits is due to liquidity constraints rather than distortions in marginal incentives to search. Low wage workers may also have a greater demand for unemployment insurance because of their limited participation in capital markets (Berk and Walden 2010). UI benefits are thus more likely to affect financing decisions in firms where many workers receive low wages, as lower wage workers are likely to have smaller savings and are especially vulnerable to liquidity constraints after job loss.

We empirically test whether the impact of UI benefits on firm financing decisions is stronger for industries with high fractions of low wage workers. Using the 2000 U.S. Population Census, we calculate the percentage of workers in each 3-digit NAICS industries with less than $40,000 in annual income, and then divide our main sample of firms into two groups based on whether their industry is above or below the sample median for low wage workers. We again repeat our analysis of UI generosity and leverage separately for each group of firms. The results are reported in Table 10.

Consistent with the hypothesis, the relationship between UI benefits and leverage is concentrated among industries with a high proportion of low wage workers. Doubling the maximum total UI benefit is associated with a 4.2 percentage point increase in leverage and an 18.1 percent reduction in interest coverage in industries with above median low wage workers (columns 1 and 2). In contrast, the relation between UI benefits and firm financing decisions is smaller in industries with fewer low wage workers, although the estimate for interest coverage is statistically significant (columns 5 and 6).

UI benefit levels are also more likely to affect financing decisions in industries where workers more frequently claim benefits when they become unemployed. The speed with which workers are able to secure reemployment after a layoff varies across industries, perhaps due to heterogeneous search costs or because some workers face limited demand for their specific skills and human capital. Furthermore, when workers regain employment after a layoff, they are no longer eligible for benefits, and many workers who expect to find employment quickly often do not take up benefits at all (Anderson and Meyer 1997). Firms whose workers are likely to claim UI benefits when they are laid off are thus likely to be especially sensitive to changes in UI laws when making financing decisions.

To test this hypothesis, we use the Current Population Survey to calculate the fraction of workers in each 2-digit SIC industry that receive income from unemployment insurance in each year the data are available – from 1988 through 2008. We obtain industry rates of unemployment insurance usage by averaging across years, weighting by the number of observations to reduce sampling variance. We then separate industries into two groups based on whether the fraction of workers receiving UI income is above or below the sample median. The results are presented in Table 10.

Columns 3 and 4 indicate that the relation between unemployment insurance and corporate capital structure is stronger for industries with above median fractions of workers receiving payments from unemployment insurance. In addition to any difference in layoff propensities, unemployed workers in these industries appear more likely to draw unemployment benefits when they become unemployed. Doubling the maximum total UI benefit is associated with a 4.1 percentage point increase in leverage and an 16.2 percent reduction in interest coverage for firms in these industries. In contrast, the relation between UI benefits and firm financing decisions is smaller in industries with relatively few UI recipients (columns 7 and 8). These findings offer further empirical support that the relation we find between UI benefits and financing decisions appears to result from firms using conservative financial policies to mitigate worker exposure to unemployment risk.

4.5 Importance of firm financial constraints

The relation between UI generosity and firms' financial policies should, in theory, also be stronger among financially constrained firms. Workers' concerns about job loss are likely to be heightened when firms are unable to raise external financing to buffer negative economic shocks, because many firms respond to performance declines by laying off workers (Ofek 1993, John, Lang, and Netter 1992). Increased unemployment risk due to financing frictions leads workers to require even higher wage premiums to stay at work and places strong pressure on firms to maintain conservative financial policies, but UI benefits can ease the pressure by reducing workers' expected costs of unemployment. To explore these implications, we groups firms based on indicators of financial constraints and examine the relation between UI benefits and corporate finance separately for each group. The results are reported in Table 11.

We start by classifying firms based on their dividend policy. There is a long tradition of using firms' observed payout practices to identify financially vulnerable firms that are likely to face relatively high costs of external finance (Fazzari, Hurbbard, and Petersen 1988; Kaplan and Zingales 1997). Firms that need to retain all of their capital are more likely to be financially constrained; their workers therefore face greater unemployment risk. Among these firms, we find that the relation between the generosity of UI benefits and firms' financial leverage is particulary strong: doubling the maximum total UI benefit is associated with a 5.0 percentage point increase in leverage (column 1) and a 28.9 percent decrease in interest coverage (column 2). Firms that can afford to pay dividends, on the other hand, are less likely to be at risk of financial distress, and there is no discernable relationship between UI generosity and either measure of leverage among these firms (columns 5 and 6).

Similar results are obtained when we divide the sample based on other measures of financial vulnerability, such as operating cash flows. Firms with low cash flows are potentially less able to pledge

capital to outside investors, thus making it more difficult to raise external financing. We find that UI generosity is linked with greater leverage (column 3) and lower interest coverage (column 4) among firms with low cash flows; the relationship is weaker among high-cash flow firms, which are likely to be less prone to financial distress and are able to provide improved job security for workers (columns 7 and 8). Collectively, these findings suggest that firms facing tighter financing constraints are more likely to take worker unemployment costs into account when setting financial policy, as limited access to external financing exacerbates workers' unemployment risk during difficult economic times. These results further strengthen our conclusion that firms use conservative financial policies partly to mitigate worker exposure to unemployment risk.

5 Alternative mechanisms

5.1 Pure cash flow effect

As described in Section 2, firms pay premiums for their workers' unemployment insurance. When UI benefits increase, firms' premium costs increase as well. With less money to pay down debt, these additional costs could weaken firms' financial positions, increasing leverage and reducing cash and corporate liquidity. In this scenario, the observed relation between UI benefits and leverage may represent purely a cash flow effect of UI generosity and not a response to workers' unemployment risk. UI generosity, therefore, may "mechanically" increase debt by reducing profits.

It is not obvious, however, that UI benefits reduce a firm's resources on net. Although premium costs increase, workers require less compensation for unemployment risk in wages, benefits, or workplace amenities that are costly for the firm to provide. In fact, if workers are risk averse and UI premiums are actuarially fair, then more generous unemployment benefits could make firms better off. Thus, the impact of UI generosity on firm profitability is an empirical question.

We address this hypothesis in two ways. First, the results reported above are robust to adding financial controls, including return on assets – a proxy for profitability (see column 2 of Tables 3 and 4). Although the controls are imperfect, the fact that the point estimates are unaffected by their inclusion suggests that the observed increases in leverage are not attributable to a mechanical cash flow effect. Second, we examine the impact of changes in UI benefit laws directly on accounting performance. If increases in UI benefit laws cause firms' costs to increase on net, their operating performance should decrease as profits are dissipated through higher UI premiums and related costs. As reported in Table 6, the level of UI benefits has no significant relation to firms' operating performance, and if anything, the point estimates suggest that increases in UI benefits may be associated with *increases* in operating performance. Thus both sets of evidence contradict the notion that UI benefits may affect financial policy through mechanical increases in firms' costs.

5.2 Strategic leverage

Another possibility is that UI benefit laws affect financial policy by impacting workers' outside options. If greater unemployment insurance benefits raise the reservation utility of employed workers, then the wage bargaining position of workers could improve. An optimizing firm may respond by raising leverage as means of maintaining a tougher bargaining stance with employees (Bronars and Deere 1991; Matsa 2010). In this scenario, the financial policies associated with increases in UI benefits could reflect changes in the worker-firm bargaining environment rather than changes in workers' unemployment risk.

Unemployment insurance benefits, however, are unlikely to raise the reservation utility of *employed* workers.[9] An individual worker who refuses to work because his employer denied him a raise would almost always be *ineligible* for UI benefits. One exception is for unionized employees in select states: while eligibility rules generally exclude striking workers from collecting UI benefits, many states allow those unemployed because of a labor dispute to collect unemployment insurance benefits under specific (but not usual) conditions.

One such eligibility criterion, the work stoppage provision, permits strikers to collect unemployment benefits during a labor dispute if their employer continues to operate at or near normal levels. In a sense, a work stoppage provision provides strikers with insurance for a failed strike, because it allows striking workers to collect benefits only if employers succeed in weathering the strike and continue to operate at or near normal levels. Consistent with work stoppage provisions improving workers' bargaining position, Hutchens, Lipsky, Stern (1989) find that their repeal is associated with less frequent strike activity in states with relatively generous unemployment insurance programs, and Matsa (2010) finds that firms respond to their repeal by reducing leverage.

To evaluate whether the corporate financial policies associated with increases in UI benefits appear to reflect changes in the worker-firm bargaining environment, we repeat our analysis separately for industries with high and low union presence. We classify industries based on the percentage of their workforce covered by collective bargaining agreements in 1983.[10] The results are reported in Table 12.

---

[9] UI generosity naturally improves the reservation utility for *unemployed* workers who are eligible for benefits. A large literature in labor economics finds that unemployment spells last longer when UI benefits are more generous (for examples, see Moffitt 1985; Meyer 1990; Katz and Meyer 1990; Card 2004). Longer unemployment spells may partly result from unemployed workers putting less effort into search, but may also partly result from workers being reluctant to take a new job unless the wages, benefits, and other amenities are adequate.

[10] Industries with at least 25 percent of workers covered by collective bargaining are classified as high union; industries with less than 25 percent are low union. Data on union coverage is from Hirsch and Macpherson (2003), based on a sample of employed wage and salary workers, ages 16 and over, from the Current Population Survey Outgoing Rotation Group Earnings Files for 1983, and are matched to SIC industry classifications using U.S. Bureau of Census (1989).

The strategic leverage hypothesis predicts that the relation between UI generosity and corporate financial policies should be concentrated among firms in highly unionized industries. In contrast, we find the relationship between UI benefits and leverage to be, if anything, stronger among firms in *low* union industries. Doubling the maximum total UI benefit is associated with a 4.3 percentage point increase in leverage and an 22.7 percent reduction in interest coverage in industries with low union coverage (columns 3 and 4). The relations between UI benefits and firm financing are slightly smaller and statistically insignificant in industries with higher union coverage (columns 1 and 2). These results are further reinforced by Hamermesh and Wolf (1990), who find that unionized workers do not receive larger compensating wage differentials for unemployment risk, presumably because unionization is not necessary for workers to receive compensatory wages in full. We conclude that the connection between UI and leverage does not appear to be driven by worker bargaining.

6. Overall importance of unemployment risk for leverage

Our analysis thus far analyzes the impact of workers' unemployment risk on firms' capital structures using reduced-form estimates of the effects of exogenous changes in states' UI benefit laws. Government insurance, however, only partially reduces a worker's risk of unemployment. UI typically replaces at most half of a worker's wages (irrespective of state benefit ceilings), so even workers facing a generous UI system will still demand a modest wage premium for bearing residual unemployment risk. To provide a more comprehensive measure of unemployment risk's effect on firms' financing decisions, this section develops numerical estimates for the present value of excess labor costs associated with using leverage.

Labor unemployment risk primarily affects capital structure by raising firms' wage costs as they increase financial leverage. To estimate these costs, we use results from Altman (2007) to assess the default probabilities associated with each rating, and Topel (1984) for the increase in wages required to compensate workers for bearing a unit of unemployment risk. For each credit rating, we calculate the additional labor costs required to compensate workers for their expected loss in utility should the firm default.

For this calculation, the key missing information among existing estimates is the unemployment risk associated with financial distress. We calculate the probability of being laid off conditional on default using data on bond defaults from 1977 to 2008, from the Altman-NYU Salomon Center Corporate Bond Default Master Database. For each default, we gather employment data for the issuer from Compustat, and calculate the percentage change in employment in a window from the one year before to

one year after the default event.[11] For issuers with multiple defaults, we analyze employment changes around the first event. The results are reported in Table 13, Panel A.

Among the 283 firms for which employment data are available in the immediate years around default, employment decreases by approximately 27 percent in the 2 years surrounding default. On average, about half of the decrease occurs in the year before the default while the remainder occurs in the year after. These estimates are lower bounds, however, because employment reductions are likely to be greater among firms that delist after default and are missing employment data in Compustat. Of such firms, 31 enter bankruptcy. Hotchkiss (1995) finds that the median firm entering bankruptcy suffers a 50 percent reduction in employment between the last fiscal year prior to bankruptcy and the first fiscal year after emerging. Applying this estimate in our sample (and dropping the remaining firms with missing data), the average decrease in employment around default is 29 percent. Alternative assumptions about employment changes for firms with missing data lead to similar overall measures of workforce adjustments around default.

To verify that our measures of employment change are related to financial distress rather than economic distress, we also examine the contemporaneous change in employment among other Compustat firms in the same 2-digit SIC industry as each defaulting issuer. These industry-level employment changes capture average workforce adjustments related to economic distress under the assumption that economic distress affects all firms within an industry. As reported in Panel A, the average industry employment change is +3 percent in the years surrounding default.[12] The estimates across various windows show little sign of economic distress causing layoffs among other firms. The positive counterfactual employment growth among comparable firms suggests that we may even be *under*estimating employment changes related to financial distress.

When a firm increases leverage, it increases the probability of default and exposes workers to a greater probability of job loss. Topel (1984) finds that, for every additional percentage point in unemployment risk, average equilibrium wages increase by 0.93 percent. This effect is moderated by the unemployment insurance system; Topel estimates that compensating wage differentials would increase to

[11] Compustat data allows us to calculate *net* changes in employment around a default event. If these firms are also hiring employees during the period, our estimates will understate the gross flow out of employment. On the other hand, our estimates may be too high if some firms might have laid off workers even in the absence of distress.

[12] This measure is precisely estimated; using more narrow industry classifications yields similar albeit noisier results. For example, restricting attention to firms in the same 4-digit SIC industry reveals an average contemporaneous employment change of 8% around default for sample firms.

2.5% in the absence of UI benefits.[13] The average value of the compensating wage premium, ω, per dollar of assets is then given by applying the average firm's labor intensity and capitalizing the annual wage premium:

$$\frac{\omega}{A} = \frac{p\upsilon\Pi \, L/A}{r_D + p}$$

where p is the probability of default, υ is the probability of unemployment conditional on default, Π is the per-unit required wage premium, L is labor expense, A is the market value of assets, and r_D is the expected return on debt.[14]

Estimates of the compensating wage premium are presented in Panel B of Table 13. Each row corresponds to a different credit rating. While wage premiums among highly rated firms are minimal (e.g., about 4 basis points of firm value for a AA-rated firm), they are substantially larger among more highly leveraged firms. For example, a BBB rating, which corresponds to a leverage ratio of about 0.33 (see Molina (2005)), requires a firm to pay about 57 basis points of firm value in additional wages in the presence of UI, and about 154 basis points in the absence of UI compensation. For a BB rating (leverage ratio of about 0.46), these figures jump to about 112 basis points with UI and 301 basis points without it. These estimates suggest that compensating wage premiums for unemployment risk can present substantial *ex ante* costs of increasing financial leverage.

These estimates provide a lower bound, as our employment figures do not capture layoffs that that occur in financial distress in the absence of default. Estimates of employment changes around default, reported in Panel A of Table 13, show that firms reduce employment by 15 percent in the year before a default. Distressed firms that are able to avoid default likely reduce employment as well. The full impact of distress related unemployment risk, therefore, is higher than these estimates imply.

For comparison, we also present estimates of expected *ex post* costs of financial distress and marginal tax benefits as reported by Almeida and Philippon (2007, Table VI), based on estimates from Andrade and Kaplan (1998), Graham (2000), Molina (2005), and their own analysis.[15] Using risk-neutral

[13] Using worker micro data from the Current Population Survey, Topel (1984) exploits differences in job loss rates across industries and regions to estimate the impact of unemployment risk on wages, controlling for demographic, industry, and policy-related factors.

[14] We use the historical default probability (Altman 2007) and spread over treasuries (Almeida and Philippon 2007) associated with each credit rating. The average ratio of annual labor expenses to market value of assets in Compustat from 1950 through 2008 is 25.6 percent. Following Almeida and Philippon (2007) and others, we assume the firm maintains a constant leverage ratio (and wage premium) until it defaults, at which point future wage premiums, distress costs, and tax shields are zero.

[15] We present these comparisons to help gauge the importance of unemployment risk relative to oft-cited measures of debt financing costs and benefits. Other costs and benefits of leverage include considerations related to agency costs, asymmetric information, and stakeholder bargaining.

default probabilities, a BBB rating is associated with *ex post* financial distress costs of about 4.53% of firm value. The tax benefits associated with a BBB rating are about 5.18% of firm value. The difference between estimated debt tax shields and *ex post* risk-adjusted costs of financial distress is about 0.65% percent of firm value. For a BBB-rated firm, our estimates indicate that *ex ante* compensating wage premiums account for almost 90 percent of the difference between tax shields and *ex post* costs of financial distress (i.e., 0.57% of the 0.65% in firm value).

These results show that the wage premium tied to unemployment risk associated with financial leverage represents a significant cost to shareholders. Furthermore, the size of this compensation grows as firms increase leverage and reduce workers' job security. The estimates imply that labor unemployment risk is an important determinant of firms' capital structures, particularly when government-provided unemployment insurance compensation is limited, leaving workers uninsured against costly layoff spells.

7. Conclusion

This paper examines the impact of workers' unemployment risk on corporate financing decisions. Exploiting variation in unemployment insurance benefit levels as shocks to worker unemployment costs, we find that reductions in labor unemployment risk are associated with increases in corporate leverage. Estimates indicate the average wage compensation for unemployment risk totals about 57 basis points of firm value for a BBB-rated firm. The impact of unemployment risk is particularly strong for firms in industries where layoffs occur with high frequency, for firms that produce with greater labor intensity, and for sectors that employ workers with low wages and high UI utilization rates. The relation between unemployment risk and financial policy is also stronger among firms facing tight financial constraints.

The findings illustrate that firms choose conservative financial policies partly as a means of mitigating workers' exposure to unemployment risk, supporting models such as Titman (1984) and Berk, Stanton, and Zechner (2010). Reducing leverage decreases the probability that a firm will encounter financial distress and subject workers to costly layoffs. By reducing leverage, managers are able to lower the wage bill required by workers as compensation for bearing unemployment risk. More broadly, in contrast to standard assumptions in finance, the evidence suggests that labor market frictions are an important feature of the corporate environment. Debt policy is but one of many ways for firms to mitigate workers' unemployment risk. Firms can also reduce the probability of distress by taking less risky projects, or reduce workers' losses in distress by redesigning job tasks to require fewer firm-specific skills (Jaggia and Thakor 1994). Exploring the implications of unemployment risk on additional corporate policies is an interesting area for future empirical research.

References

Abowd, John and Orley Ashenfelter, 1981, Anticipated Unemployment, Temporary Layoffs, and Compensating Wage Differentials, in Sherwin Rosen, ed.: *Studies in Labor Markets* (University of Chicago Press, Chicago).

Almeida, Heitor, and Thomas Philippon, The Risk-Adjusted Cost of Financial Distress, *Journal of Finance* 62, 2557-86.

Altman, Edward, 2007, About Corporate Default Rates, *NYU Salomon Center*, Special Report.

Anderson, Patricia M., and Bruce D. Meyer, 1997, Unemployment Insurance Takeup Rates and the After-Tax Value of Benefits. *Quarterly Journal of Economics* 112, 913-937.

Andrade, Gregor, and Steven Kaplan, 1998, How Costly is Financial (not Economic) Distress? Evidence from Highly Leveraged Transactions that Become Distressed, *Journal of Finance* 53, 1443-1493.

Asquith, Paul, Robert Gertner, and David Scharfstein, 1994, Anatomy of Financial Distress: An

Examination of Junk-Bond Issuers, *The Quarterly Journal of Economics* 109, 625-658.

Benmelech, Effi, Nittai Bergman, and Ricardo Enriquez, 2010, Negotiating with Labor under Financial Distress, Harvard University.

Berk, Jonathan, Richard Stanton, and Josef Zechner, 2010, Human Capital, Bankruptcy, and Capital Structure, *Journal of Finance* 65.

Berk, Jonathan and Johan Walden, 2010, Limited Capital Market Participation and Human Capital Risk, Stanford University Working Paper.

Blaustein, Saul J., 1993. *Unemployment Insurance in the United States: The First Half Century* (W. E. Upjohn Institute for Employment Research, With Wilbur J. Cohen and William Haber. Kalamazoo, Mich.).

Bloemen, Hans G., and Elena G. F. Stancanelli, 2005, Financial Wealth, Consumption Smoothing and Income Shocks Arising from Job Loss, *Economica* 72, 431-52.

Bronars, Stephen G., and Donald R. Deere, 1991, The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth, *Quarterly Journal of Economics* 106, 231-254.

Browning, Martin, and Thomas F. Crossley, 2001, Unemployment Insurance Benefit Levels and Consumption Changes, *Journal of Public Economics* 80, 1-23.

Card, David, and Phillip B. Levine, 2000, Extended Benefits and the Duration of UI Spells: Evidence from the New Jersey Extended Benefit Program, *Journal of Public Economics* 78, 107-138.

Chemmanur, Thomas and Yingmei Cheng and Tianming Zhang, 2009, Capital Structure and Employee Pay, Boston College Working Paper.

Chen, Jason, Marcin Kacperczyk, and Hernan Ortiz-Molina, 2010, Labor Unions, Operating Flexibility, and the Cost of Equity, *Journal of Financial and Quantitative Analysis*, forthcoming.

Chetty, Raj, 2008, Moral Hazard versus Liquidity and Optimal Unemployment Insurance, *Journal of Political Economy* 116, 173-234.

Diamond, Peter, 1982, Aggregate Demand Management in Search Equilibrium, *Journal of Political Economy* 90, 881-894.

Farber, Henry S., 2005, What Do We Know about Job Loss in the United States? Evidence from the Displaced Workers Survey, 1984-2004, *Federal Reserve Bank of Chicago Economic Perspectives* 29, 13-28.

Faulkender, Michael, and Mitchell A. Petersen, 2006, Does the Source of Capital Affect Capital Structure?, *Review of Financial Studies* 19, 45-79.

Fazzari, Steven M., Robert Glenn Hubbard, and Bruce C. Petersen, 1988, Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity n1*, 141-95.

Gibbons, Robert, and Lawrence F. Katz, 1991, Layoffs and Lemons, *Journal of Labor Economics* 9, 351-380.

Graham, John R., 2000, How Big Are the Tax Benefits of Debt?, *Journal of Finance* 55, 1901-1941.

Graham, John R., Michael L. Lemmon, and James S. Schallheim, 1998, Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status, *Journal of Finance* 53, 131-62.

Gruber, Jonathan, 1997, The Consumption Smoothing Benefits of Unemployment Insurance, *The American Economic Review* 87, 192.

Hamermesh, Daniel S. and John R. Wolfe, 1990, Compensating Wage Differentials and the Duration of Wage Loss, *Journal of Labor Economics* 8 (1, Part 2), S175-S197.

Harris, Milton and Bengt Holmstrom, 1982, A Theory of Wage Dynamics, *The Review of Economic Studies* 49(3), 315-333.

Harris, Milton, and Artur Raviv, 1991, The Theory of Capital Structure, *Journal of Finance* 46, 297-355.

Hirsch, Barry T., and David A. Macpherson, 2003, Union Membership and Coverage Database from the Current Population Survey: Note, *Industrial and Labor Relations Review* 56, 349-54.

Hortascu, Ali, Gregor Matvos, Chad Syverson, and Sriram Venkataraman, 2010, Are Consumers Affected by Durable Goods Makers' Financial Distress? The Case of Auto Manufacturers, University of Chicago.

Hotchkiss, Edith S., 1995, Post-Bankruptcy Performance and Management Turnover, *Journal of Finance* 50, 3-21.

Hutchens, Robert, David Lipsky, and Robert Stern, 1989. *Strikers and Subsidies: The Influence of Government Transfer Programs on Strike Activity* (W. E. Upjohn Institute for Employment Research, Kalamazoo, Mich.).

Jaggia, Priscilla Butt and Anjan V. Thakor, 1994, Firm-Specific Human Capital and Optimal Capital Structure, *International Economic Review* 35(2), 283-308.

Jahoda, Marie, 1982, Employment and Unemployment: A Social Psychological Analysis (Cambridge University Press, Cambridge, U.K.).

John, Kose, Larry H.P. Lang, and Jeffry Netter, 1992, The Voluntary Restructuring of Large Firms in Response to Performance Decline, *Journal of Finance* 47, 891-917.

Kaplan, Steven N., and Luigi Zingales, 1997, Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints, *Quarterly Journal of Economics* 112, 169-215.

Katz, Lawrence F., and Bruce D. Meyer, 1990, The Impact of the Potential Duration of Unemployment Benefits on the Duration of Unemployment, *Journal of Public Economics* 41, 45-72.

Lazear, Edward P., 2003, "Firm-Specific Human Capital: A Skill-Weights Approach," NBER Working Paper No. 9679.

Li, Elizabeth H., 1986, Compensating Differentials for Cyclical and Noncyclical Unemployment: The Interaction between Investors' and Employees' Risk Aversion, *Journal of Labor Economics* 4 (2), 277-300.

Liu, Hong, Todd A. Gormley, and Guofu Zhou, 2010, Limited Participation and Consumption-Saving Puzzles: A Simple Explanation and the Role of Insurance, *Journal of Financial Economics*.

Luo, Micheal, and Megan Thee-Brenan, 2009, Poll Reveals Trauma of Joblessness in U.S., New York Times, December 15.

MacKie-Mason, Jeffrey K., 1990, Do Taxes Affect Corporate Financing Decisions?, *Journal of Finance* 45, 1471-93.

Matsa, David A., 2010, Capital Structure as a Strategic Variable: Evidence from Collective Bargaining, *Journal of Finance* 65.

Meyer, Bruce D., 1990, Unemployment Insurance and Unemployment Spells, *Econometrica* 58, 757-782.

Meyer, Bruce D., 1995, Lessons from the U.S. Unemployment Insurance Experiments, *Journal of Economic Literature* 33, 91-131.

Meyer, Bruce D., and Wallace K. C. Mok, 2007, "Quasi-Experimental Evidence on the Effects of Unemployment Insurance from New York State," NBER Working Paper No. 12865).

Moffitt, Robert, 1985, Unemployment Insurance and the Distribution of Unemployment Spells, *Journal of Econometrics* 28, 85-101.

Moffitt, Robert, and Walter Nicholson, 1982, The Effect of Unemployment Insurance on Unemployment: The Case of Federal Supplemental Benefits, *Review of Economics and Statistics* 64, 1-11.

Molina, Carlos, 2005, Are Firms Underleveraged? An Examination of the Effect of Leverage on Default Probabilities, *Journal of Finance*, 60, 1427-1459.

Mortensen, Dale, 1986, Job Search and Labor Market Analysis, in Handbook of labor economics, Volume 2, edited by Orley Ashenfelter, Richard Layard, P. Richard G. Layard, David Edward Card, 849-919.

Mortensen, Dale and Christopher Pissarides, 1994, Job Creation and Job Destruction in the Theory of Unemployment, *Review of Economic Studies* 61, 397-415.

Myers, Stewart, J. McConnell, A. Peterson, D. Soter, and J. Stern, 1998, Roundtable on the Capital Structure Puzzle, Vanderbilt University, *Journal of Applied Corporate Finance* 11, 8-24.

Ofek, Eli, 1993, Capital Structure and Firm Response to Poor Performance: An Empirical Analysis, *Journal of Financial Economics* 34(1), 3-30.

Rajan, Raghuram G., and Luigi Zingales, 1995, What Do We Know about Capital Structure? Some Evidence from International Data, *Journal of Finance* 50, 1421-60.

Rosen, Sherwin, 1986, The theory of equalizing differences, Ch. 12 of Orley Ashenfelter and David Card, eds., *The Handbook of Labor Economics*, 1, 641-692.

Simintzi, Elena, Vikrant Vig, and Paolo Volpin, 2009, Labor and Capital: Is Debt a Bargaining Tool?, London Business School.

Smith, Adam, 1976, An Inquiry into the Nature and Causes of the Wealth of Nations, The Glasgow Edition of the Works and Correspondence of Adam Smith, vol. II., edited by R.H. Campbell and A.S. Skinner, Oxford University Press.

Titman, Sheridan, 1984. The Effect of Capital Structure on a Firm's Liquidation Decision, *Journal of Financial Economics* 13(1), 137-151.

Titman, Sheridan and Roberto Wessels, 1988. The Determinants of Capital Structure Choice, *Journal of Finance* 43(1), 1-19.

Topel, Robert, and Finis Welch, 1980, Unemployment Insurance: Survey and Extensions, *Economica* 47, 351-379.

Topel, Robert H., 1983, On Layoffs and Unemployment Insurance, *American Economic Review* 73, 541-559.

Topel, Robert H., 1984, Equilibrium Earnings, Turnover, and Unemployment: New Evidence, *Journal of Labor Economics* 2, 500-522.

U.S. Census Bureau, 1989, *Technical Paper 59: The Relationship Between the 1970 and 1980 Industry and Occupation Classification Systems* (U.S. Government Printing Office, Washington, DC).

U.S. Congress, U.S. House of Representatives, Committee on Ways and Means, 2004, *2004 Green Book, Background Material and Data on Programs Within the Jurisdiction of the Committee on Ways and Means*, 108th Congress, 2nd Session, WMCP: 108-6 (U.S. Government Printing Office, Washington, D.C.).

Verwijmeren, Patrick, and Jeroen Derwall, 2010, Employee Well-Being, Firm Leverage, and Bankruptcy Risk, *Journal of Banking and Finance* 34, 956-964.

Zingales, Luigi, 2000, In Search of New Foundations, *Journal of Finance* 55, 1623-1653.

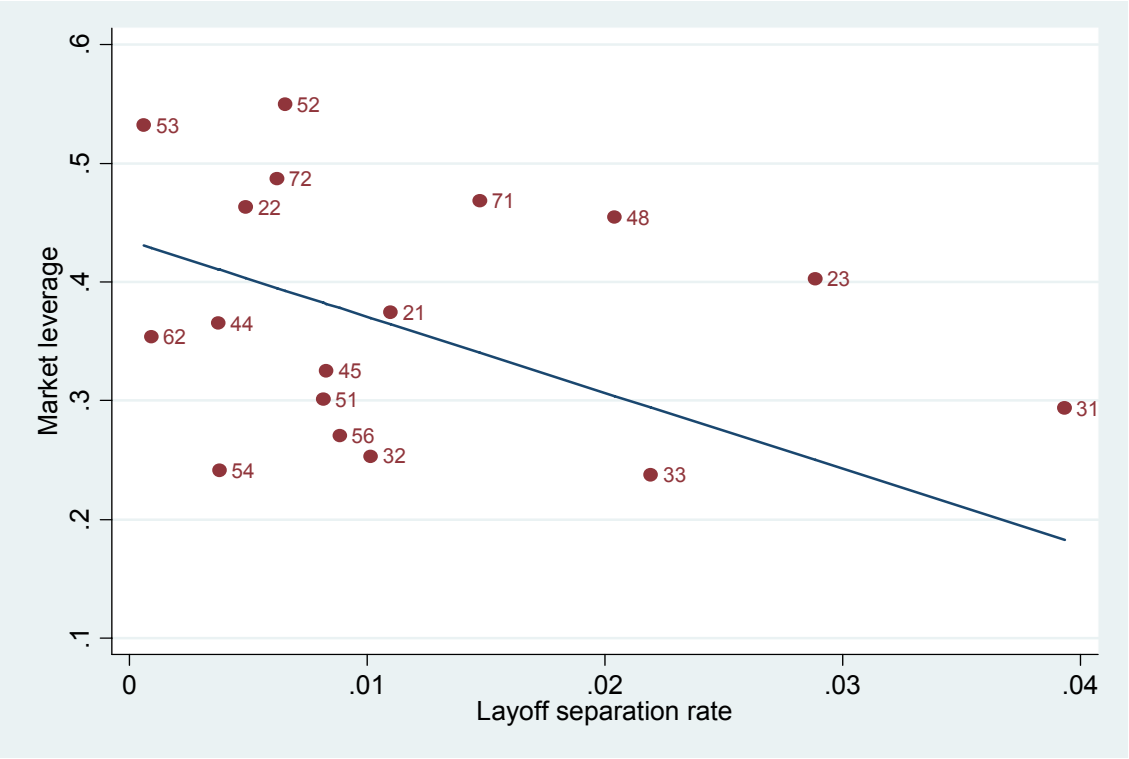

Figure 1. Cross-industry correlation between the layoff separation rate and market leverage, 2008. The figure plots average market leverage in 2008 against the long-run average layoff separation rate at the 2-digit NAICS level. Market leverage is total debt divided by the market value of the firm, from Compustat. The layoff separation rate is the ratio of workers affected by extended mass layoffs to total industry employment, based on data from the U.S. Bureau of Labor Statistics's Mass Layoff Statistics and the U.S. Bureau of Economic Analysis. The regression line shown is weighted based on the underlying number of firm observations. A 1 percentage point increase in the layoff separation rate is associated with 6.4 percentage point decrease in market leverage.

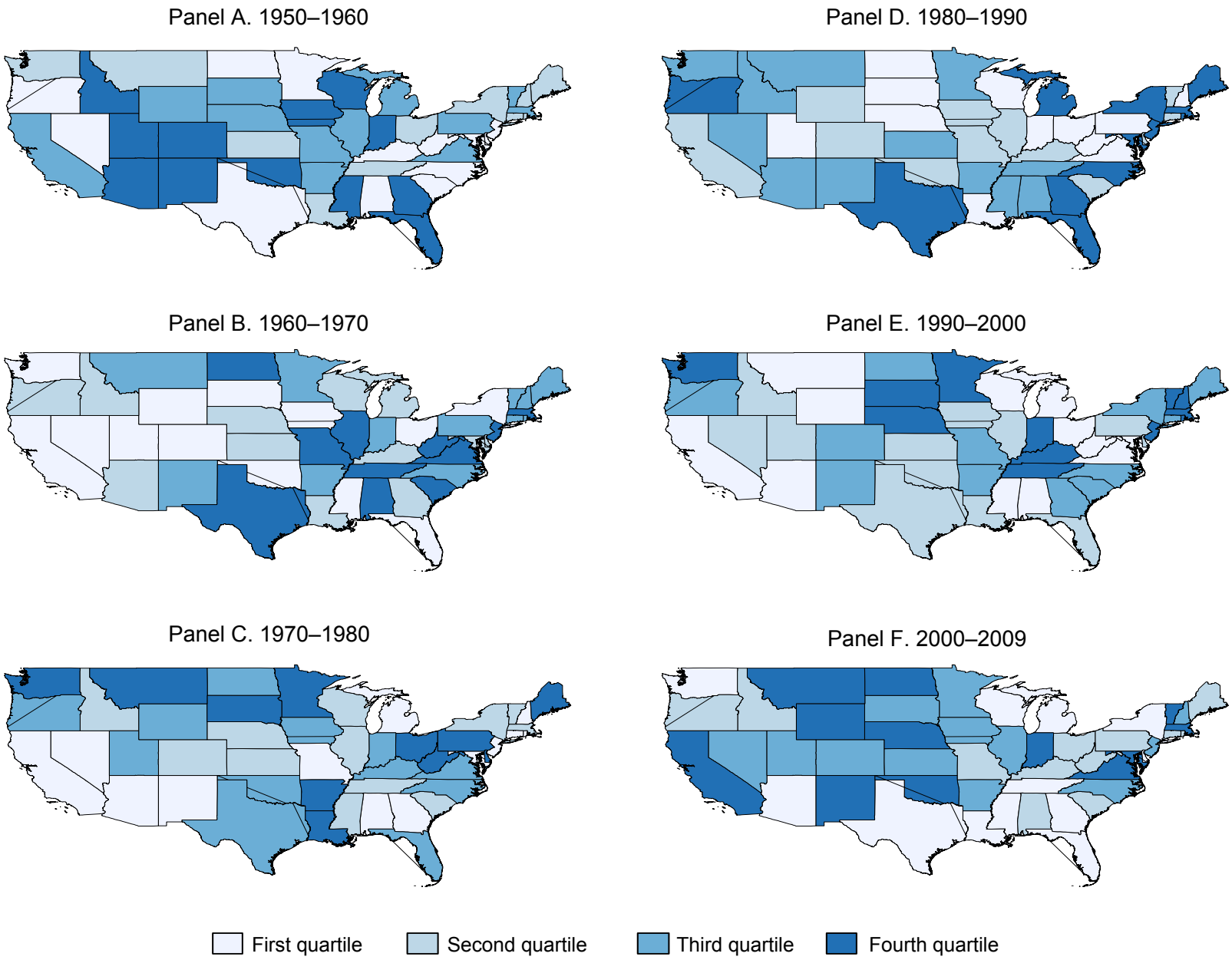

Figure 2. Relative increases in state maximum unemployment insurance benefits by decade, 1950–2009. The figure displays the quartile of a state's increase in maximum total benefits, relative to other states in each decade from 1950 to 2009. Larger increases in benefits are shown in darker shades. Maximum total benefits is the product of the statutory maximum weekly UI benefit and the maximum duration, based on information from annual issues of the U.S. Department of Labor's Significant Provisions of State UI Laws.

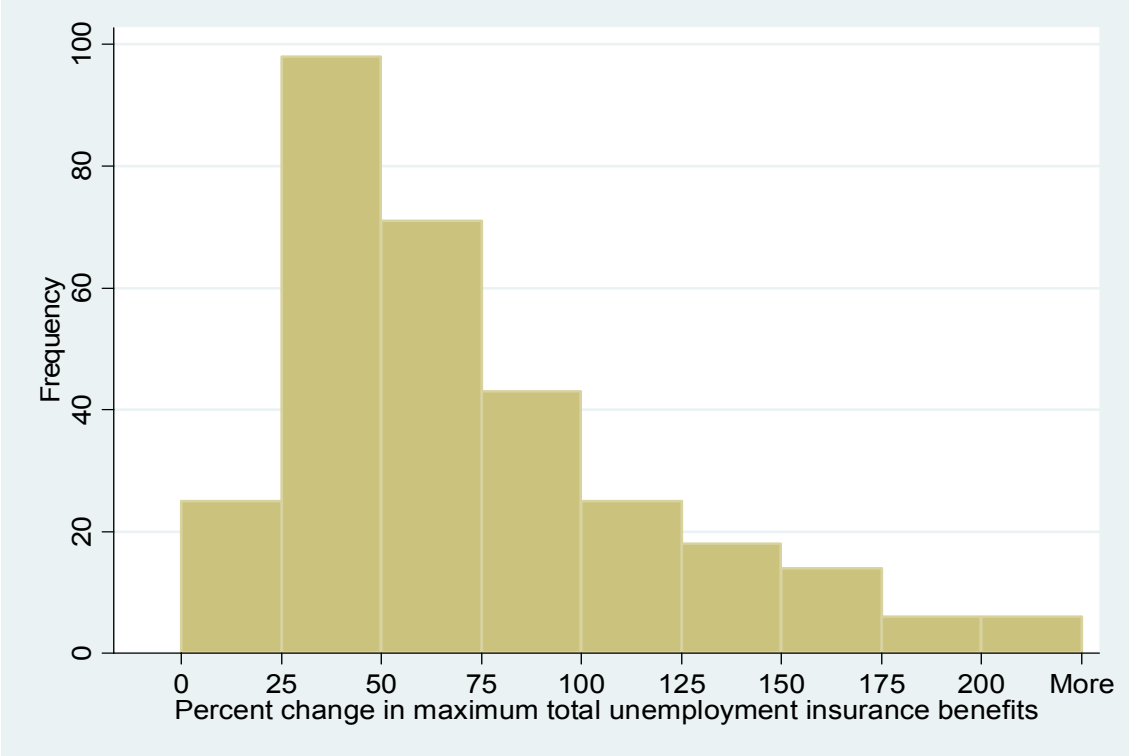

Figure 3. Distribution of state increases in max unemployment insurance benefits over each decade, 1950–2009. The figure plots the distribution of state increases in maximum total benefits over each decade from 1950 to 2009. In total, there are 306 state-decade observations, including the District of Columbia. Maximum total benefits is the product of the statutory maximum weekly UI benefit and the maximum duration, based on information from annual issues of the U.S. Department of Labor's Significant Provisions of State UI Laws.

Figure 4. Average market leverage and log max unemployment insurance benefits by state, 1950–2008. The figure plots average annual state residuals from regressions market leverage and log maximum total benefits on year fixed effects from 1950 to 2008. Results for each of the 6 largest US states are reported. Market leverage is total debt divided by the market value of the firm, from Compustat. Log max total benefits is the natural log of the product of the statutory maximum weekly UI benefit and the maximum duration, based on information from annual issues of the U.S. Department of Labor's Significant Provisions of State UI Laws.

Table 1. Summary statistics

The sample consists of 144,327 firm-year observations from 1950 through 2008. The unemployment insurance (UI) benefit criteria are from annual issues of the U.S. Department of Labor's Significant Provisions of State UI Laws, the financial data are from Compustat, the state unemployment rates are calculated from the Current Population Survey (available with complete state indicators starting in 1977), and the state GDP growth rates are from the U.S. Bureau of Economic Analysis. The sample includes all firms (excluding financials and utilities) with nonmissing observations for the variables shown below. The leverage ratio is debt divided by the market value of assets. Log interest coverage is the natural log of 1 plus the ratio of operating earnings before depreciation to interest expense, where the variable is recoded to zero for observations with negative earnings. Compustat variables are winsorized at 1% tails.

	Mean	Standard deviation	25th percentile	Median	75th percentile
		A. Dependent variables			
Total debt / Assets	0.292	0.254	0.072	0.230	0.460
Log interest coverage	1.875	1.449	0.839	1.805	2.653
		B. Unemployment insurance variables			
Log max total benefit	8.554	0.629	8.171	8.679	8.972
Log max weekly benefit	5.283	0.625	4.905	5.412	5.704
Log max duration	3.271	0.048	3.258	3.258	3.258
		C. Control variables			
Proportion of fixed assets	0.312	0.219	0.141	0.266	0.438
Log sales	4.423	2.284	2.991	4.440	5.966
Return on assets	-0.003	0.397	0.015	0.086	0.141
Z-score	0.877	5.205	0.948	2.058	2.848
Market to book ratio	2.333	4.455	0.773	1.478	2.777
Unemployment rate	6.383	1.943	5.019	6.174	7.472
GDP growth	6.768	3.439	4.510	6.417	8.734

Table 2. Unemployment Insurance Laws and Total State Benefit Payments

The table summarizes the results from state-panel regressions of log state unemployment insurance (UI) compensation on variables representing the generosity of state UI benefit criteria and a set of controls. Controls in all regressions include state and year fixed effects. Where shown, controls also include the state unemployment rate and the state GDP growth rate. Standard errors, clustered at the state level, are reported in parentheses. ** and *** denote statistical significance at the 5%, and 1% levels, respectively.

	Log state unemployment insurance compensation					
	(1)	(2)	(3)	(4)	(5)	(6)
Log max total benefit	0.891***			0.896***		
	(0.128)			(0.107)		
Log max weekly benefit		1.009***			1.009***	
		(0.131)			(0.107)	
Log max duration			0.484**			0.645**
			(0.232)			(0.251)
Unemployment rate				0.064***	0.064***	0.068***
				(0.007)	(0.008)	(0.008)
GDP growth				-0.022***	-0.022***	-0.027***
				-0.005	-0.005	-0.006
Observations	2,040	2,040	2,040	1,632	1,632	1,632
R-squared	0.92	0.92	0.91	0.93	0.93	0.91
Fixed effects:						
State	X	X	X	X	X	X
Year	X	X	X	X	X	X

Table 3. Unemployment Insurance Laws and Firms' Capital Structures

The table summarizes the results from firm-panel regressions of total debt divided by the market value of the firm (divided by book value in column 5) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Controls in all regressions include firm and year fixed effects. Where shown, controls also include financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets) and state economic indicators (state unemployment rate and the state GDP growth rate). Where indicated, industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Total debt / Assets				
	(1)	(2)	(3)	(4)	(5)
Log max total benefit	0.041**	0.032**	0.030*	0.040**	0.017*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.009)
Proportion of fixed assets		0.223***	0.224***	0.232***	0.218***
		-(0.011)	-(0.011)	-(0.012)	-(0.014)
Log sales		0.031***	0.035***	0.033***	0.030***
		(0.002)	(0.002)	(0.002)	(0.002)
Return on assets		-0.063***	-0.053***	-0.047***	-0.050***
		(0.009)	(0.008)	(0.007)	(0.005)
Z-score		-0.010***	-0.009***	-0.009***	-0.025***
		-(0.001)	(0.000)	-(0.001)	-(0.001)
Market to book ratio		-0.006***	-0.006***	-0.005***	-0.004***
		0.000	0.000	0.000	0.000
Unemployment rate			-0.002**	-0.002**	-0.002**
			(0.001)	(0.001)	(0.001)
GDP growth			-0.005***	-0.005***	-0.001
			(0.001)	(0.001)	0.000
Observations	144,327	144,327	119,942	98,885	98,885
R-squared	0.60	0.64	0.65	0.64	0.66
Exclude dispersed industries				X	X
Book value					X
Fixed effects:					
Firm	X	X	X	X	X
Year	X	X	X	X	X

Table 4. Unemployment Insurance Laws and Firms' Interest Coverage

The table summarizes the results from firm-panel regressions of log interest coverage on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Controls in all regressions include firm and year fixed effects. Where shown, controls also include financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets) and state economic indicators (state unemployment rate and the state GDP growth rate). Where indicated, industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *** denotes statistical significance at the 1% level.

	Log interest coverage			
	(1)	(2)	(3)	(4)
Log max total benefit	-0.154***	-0.128***	-0.149***	-0.181***
	(0.057)	(0.047)	(0.047)	(0.058)
Proportion of fixed assets		-0.826***	-0.843***	-0.887***
		(0.073)	(0.085)	(0.095)
Log sales		0.113***	0.124***	0.138***
		(0.009)	(0.010)	(0.010)
Return on assets		1.126***	1.035***	0.999***
		(0.055)	(0.047)	(0.042)
Z-score		0.026***	0.023***	0.021***
		(0.002)	(0.002)	(0.002)
Market to book ratio		0.012***	0.010***	0.009***
		(0.001)	(0.001)	(0.001)
Unemployment rate			0.015***	0.016***
			(0.004)	(0.005)
GDP growth			0.014***	0.013***
			(0.002)	(0.002)
Observations	144,327	144,327	119,942	98,885
R-squared	0.57	0.62	0.63	0.63
Exclude dispersed industries				X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 5. Unemployment Insurance Laws and Firms' Capital Structures

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Each column corresponds to different sample restrictions based on the geographic breakdown of sales in the firms' industry, specifically the percent of the value of product shipments in the firm's 3-digit NAICS industry sent to destinations in a different U.S. state, based on the 2007 Commodity Flow Survey. Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). Industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Full sample (1)	Sales data not missing (2)	Interstate sales > 70% (3)	Interstate sales > 75% (4)	Interstate sales > 80% (5)	Interstate sales > 85% (6)
			Panel A. Total debt / Assets			
Log max total benefit	0.040**	0.037*	0.041*	0.042**	0.042**	0.054***
	(0.016)	(0.020)	(0.021)	(0.021)	(0.020)	(0.018)
Observations	98,885	68,846	66,065	64,756	57,723	34,577
R-squared	0.64	0.63	0.63	0.63	0.63	0.62
			Panel B. Total debt / Assets			
Log max total benefit	-0.181***	-0.136**	-0.160***	-0.164***	-0.177***	-0.304***
	(0.058)	(0.057)	(0.058)	(0.058)	(0.065)	(0.086)
Observations	98,885	68,846	66,065	64,756	57,723	34,577
R-squared	0.63	0.62	0.62	0.62	0.62	0.60
Financial controls	X	X	X	X	X	X
Fixed effects:						
Firm	X	X	X	X	X	X
Year	X	X	X	X	X	X

Table 6. Unemployment Insurance Laws and Firms' Operating Performance

The table summarizes the results from firm-panel regressions of return on assets on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Controls in all regressions include firm and year fixed effects. Where shown, controls also include financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets) and state economic indicators (state unemployment rate and the state GDP growth rate). Where indicated, industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. None of the reported estimates are statistically significant at the 10% level.

	Return on Assets			
	(1)	(2)	(3)	(4)
Log max total benefit	0.002	0.015	0.032	0.038
	(0.022)	(0.025)	(0.036)	(0.042)
Observations	144,327	144,327	119,942	98,885
R-squared	0.66	0.70	0.70	0.71
Financial controls		X	X	X
Economic indicators			X	X
Exclude dispersed industries				X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 7. Falsification Test: Unemployment Insurance Laws in Bordering States

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance (UI) system, the median log maximum total potential benefit available under the UI systems in bordering states, and a set of controls. Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). Industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. ** and *** denote statistical significance at the 5% and 1% levels, respectively.

	Total debt / Assets			Log interest coverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Log max total benefit	0.040**	0.040**		-0.181***	-0.182***	
	(0.016)	(0.015)		(0.058)	(0.056)	
Log max total benefit,		0.020	0.024		-0.015	-0.032
bordering states median		(0.023)	(0.024)		(0.111)	(0.118)
Observations	98,885	98,754	98,754	98,885	98,754	98,754
R-squared	0.64	0.64	0.64	0.63	0.63	0.63
Financial controls	X	X	X	X	X	X
Economic indicators	X	X	X	X	X	X
Fixed effects:						
Firm	X	X	X	X	X	X
Year	X	X	X	X	X	X

Table 8. Unemployment Insurance Laws and Firms' Capital Structures -- Additional UI Measures

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on variables representing the generosity of states' unemployment insurance system (the log maximum weekly benefit and the log maximum duration), and a set of controls. Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). Industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Total debt / Assets		Log interest coverage	
	(1)	(2)	(3)	(4)
Log max weekly benefit	0.042**		-0.181***	
	(0.017)		(0.064)	
Log max duration		0.047		-0.328*
		(0.076)		(0.174)
Observations	98,885	98,885	98,885	98,885
R-squared	0.64	0.64	0.63	0.63
Financial controls	X	X	X	X
Economic indicators	X	X	X	X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 9. Unemployment Insurance Laws and Firms' Capital Structures -- Heterogeneity in Worker Unemployment Costs

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Panel A restricts the sample to industries with greater expected worker unemployment costs (above median layoff separation rate or labor intensity), while Panel B restricts the sample to industries with lower expected worker unemployment costs (below median for each variable). The layoff separation rate is the ratio of workers affected by extended mass layoffs to total industry employment, based on data from the U.S. Bureau of Labor Statistics's Mass Layoff Statistics and the U.S. Bureau of Economic Analysis. Labor intensity is the ratio of labor and pension expense to sales, from Compustat. For both variables, industries are defined at the 3-digit NAICS level. Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Industries with greater expected worker unemployment costs

	High layoff separation rates		More labor intensive	
	(1)	(2)	(3)	(4)
	Total debt / Assets	Log interest coverage	Total debt / Assets	Log interest coverage
Log max total benefit	0.041**	-0.218***	0.037**	-0.200**
	(0.020)	(0.076)	(0.017)	(0.074)
Observations	52,103	52,103	57,613	57,613
R-squared	0.63	0.59	0.62	0.62

Panel B. Industries with lower expected worker unemployment costs

	Low layoff separation rates		Less labor intensive	
	(5)	(6)	(7)	(8)
	Total debt / Assets	Log interest coverage	Total debt / Assets	Log interest coverage
Log max total benefit	0.017	-0.042	0.018	-0.124
	(0.022)	(0.066)	(0.021)	(0.089)
Observations	53,873	53,873	60,566	60,566
R-squared	0.64	0.65	0.64	0.63
Financial controls	X	X	X	X
Economic indicators	X	X	X	X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 10. Unemployment Insurance Laws and Firms' Capital Structures -- Cross-industry Heterogeneity in Importance of Unemployment Insurance

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Panel A restricts the sample to industries with greater UI payments and more low wage workers (above median proportion of workers to collect UI benefits, or proportion of workers earning less than $40,000 per year), while Panel B restricts the sample to industries with lower UI payments and fewer low wage workers (below median for each variable). The proportion of workers collecting unemployment insurance payments is from the Current Population Survey, where industries are defined at the 2-digit SIC level. The proportion of low wage workers is from the 2000 U.S. Population Census, where industries are defined at the 3-digit NAICS level. Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Industries with greater UI payments and low wage workers

	Many low wage workers		High UI payment rates	
	(1)	(2)	(3)	(4)
	Total debt / Assets	Log interest coverage	Total debt / Assets	Log interest coverage
Log max total benefit	0.042**	-0.181*	0.041**	-0.162*
	(0.017)	(0.090)	(0.020)	(0.082)
Observations	46,163	46,163	57,767	57,767
R-squared	0.66	0.64	0.63	0.61

Panel B. Industries with lower UI payments and low wage workers

	Fewer low wage workers		Low UI payment rates	
	(5)	(6)	(7)	(8)
	Total debt / Assets	Log interest coverage	Total debt / Assets	Log interest coverage
Log max total benefit	0.029	-0.122*	0.017	-0.097
	(0.020)	(0.069)	(0.017)	(0.072)
Observations	63,340	63,340	59,683	59,683
R-squared	0.62	0.61	0.66	0.64
Financial controls	X	X	X	X
Economic indicators	X	X	X	X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 11. Unemployment Insurance Laws and Firms' Capital Structures -- Cross-firm Heterogeneity

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Panel A restricts the sample to firms facing greater financial constraints (zero dividends or below median operating cash flows), while Panel B restricts the sample to firms facing fewer financial constraints (positive dividends or above median operating cash flows). Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). Industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firms facing greater financial constraints

	Zero dividends		Low cash flows (below median)	
	(1) Total debt / Assets	(2) Log interest coverage	(3) Total debt / Assets	(4) Log interest coverage
Log max total benefit	0.050**	-0.289***	0.040*	-0.219**
	(0.023)	(0.092)	(0.022)	(0.081)
Observations	67,621	67,621	48,882	48,882
R-squared	0.65	0.60	0.67	0.57

Panel B. Firms facing fewer financial constraints

	Positive dividends		High cash flows (above median)	
	(5) Total debt / Assets	(6) Log interest coverage	(7) Total debt / Assets	(8) Log interest coverage
Log max total benefit	0.016	0.041	0.023	0.023
	(0.011)	(0.061)	(0.015)	(0.111)
Observations	31,180	31,180	48,876	48,876
R-squared	0.77	0.74	0.72	0.71
Financial controls	X	X	X	X
Economic indicators	X	X	X	X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 12. Connection with Union Bargaining

The table summarizes the results from firm-panel regressions of firms' financial leverage (total debt divided by the market value of the firm or log interest coverage) on the log maximum total potential benefit available under the state's unemployment insurance system, and a set of controls. Columns 1 and 2 restrict the sample to industries where at least 25 percent of the workforce is covered by collective bargaining, while columns 3 and 4 restrict the sample to industries where fewer workers are covered. Data on union coverage is from Hirsch and Macpherson (2003), based on a sample of employed wage and salary workers, ages 16 and over, from the Current Population Survey Outgoing Rotation Group Earnings Files for 1983, and are matched to SIC industry classifications using U.S. Bureau of Census (1989). Controls in all regressions include firm and year fixed effects, financial controls (the proportion of fixed assets, the market-to-book ratio, log sales, modified Altman's z-score, and return on assets), and state economic indicators (state unemployment rate and the state GDP growth rate). Industries are excluded where a large percentage of the workforce is likely to be geographically dispersed, namely retail, wholesale, and transport. Standard errors, clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	High union (coverage ≥ 25%)		Low union (coverage < 25%)	
	Total debt / Assets	Log interest coverage	Total debt / Assets	Log interest coverage
	(1)	(2)	(3)	(4)
Log max total benefit	0.034	-0.115	0.043**	-0.227***
	(0.027)	(0.098)	(0.017)	(0.081)
Observations	35,491	35,491	59,523	59,523
R-squared	0.62	0.60	0.64	0.63
Financial controls	X	X	X	X
Economic indicators	X	X	X	X
Exclude dispersed industries	X	X	X	X
Fixed effects:				
Firm	X	X	X	X
Year	X	X	X	X

Table 13. Estimates of Compensation for Unemployment Risk by Credit Rating

The table presents estimates of the *ex ante* wage costs of firm leverage decisions. Panel A contains statistics describing employment changes in various windows (measured in years) around default for firms in the Altman NYU Salomon Center Corporate Bond Default Master Database (1977 to 2008). Industry (2-digit SIC) employment changes around default (excluding the defaulting firm) are also reported. Panel B presents estimates of wage premium, ω , as a percent of the market value of assets, A, required to compensate workers for unemployment risk across various credit ratings, based on the following formula:

$$\frac{\omega}{A} = \frac{p\upsilon\Pi \, L/A}{r_D + p}$$

where p is the probability of default, υ is the probability of unemployment conditional on default, Π is the per-unit required wage premium, L is labor expense, and r_D is the expected return on debt. The first column excludes employment changes for bankrupt firms in estimating p. The second and third columns assume a 50% reduction in employment for bankrupt firms for which employment data is unavailable. The second (third) column presents average compensating wage premiums assuming mean (no) UI wage replacement. The fourth and fifth columns present risk-adjusted *ex post* costs of financial distress and the tax benefits of debt for each credit rating as reported by Almeida and Philippon (2007, Table VI).

Panel A. Employment Changes Around Default (percent of employment)

				95% confidence interval	
Period (Years)	Observations	Mean	Standard Error	Min	Max
I. Defaulting firms					
[-1,+1]	283	-0.27	0.02	-0.30	-0.23
[-1,0]	362	-0.16	0.01	-0.19	-0.14
[0,+1]	286	-0.13	0.01	-0.16	-0.10
II. Rest of industry					
[-1,+1]	283	0.03	0.01	0.01	0.04
[-1,0]	362	0.00	0.00	-0.01	0.01
[0,+1]	286	0.02	0.00	0.01	0.03

Panel B. Costs and Benefits of Leverage (percent of firm value)

	Wage Premium			Almeida and Philippon (2007)	
	Excluding	Including bankruptcies		Costs of financial	Tax benefits
Credit rating	bankruptcies	With UI	Without UI	distress	of debt
AAA	0.01	0.01	0.02	0.32	0.47
AA	0.04	0.05	0.13	1.84	2.51
A	0.05	0.06	0.16	3.84	4.40
BBB	0.53	0.57	1.54	4.53	5.18
BB	1.03	1.12	3.01	6.81	7.22
B	1.46	1.59	4.28	9.54	8.95

Appendix Table A1. Layoff separation rates by 3-digit NAICS industry

This table lists layoff separation rates for three-digit NAICS industries. The layoff separation rate is the ratio of workers affected by extended mass layoffs to total industry employment, based on data from the U.S. Bureau of Labor Statistics's (BLS) Mass Layoff Statistics and the U.S. Bureau of Economic Analysis. Extended mass layoffs are defined by the BLS as when at least 50 initial claims are filed against an establishment during a consecutive 5-week period and at least 50 workers have been separated from their jobs for more than 30 days.

Industry	NAICS	Layoff separation rate (percent)
Agriculture and forestry		
Forestry and logging	113	0.8
Agriculture and forestry support activities	115	18.4
Mining, quarrying, and oil and gas extraction		
Oil and gas extraction	211	0.3
Mining, except oil and gas	212	2.8
Support activities for mining	213	1.3
Utilities	221	0.5
Construction		
Construction of buildings	236	1.2
Heavy and civil engineering construction	237	5.7
Specialty trade contractors	238	0.6
Manufacturing		
Food manufacturing	311	4.4
Beverage and tobacco product manufacturing	312	2.1
Textile mills	313	3.7
Textile product mills	314	1.7
Apparel manufacturing	315	4.5
Leather and allied product manufacturing	316	4.4
Wood product manufacturing	321	1.9
Paper manufacturing	322	1.4
Printing and related support activities	323	0.8
Petroleum and coal products manufacturing	324	2.6
Chemical manufacturing	325	0.8
Plastics and rubber products manufacturing	326	1.3
Nonmetallic mineral product manufacturing	327	2.4
Primary metal manufacturing	331	3.0
Fabricated metal product manufacturing	332	0.9
Machinery manufacturing	333	1.6
Computer and electronic product manufacturing	334	2.3
Electrical equipment and appliance manufacturing	335	2.6
Transportation equipment	336	4.1
Furniture and related product manufacturing	337	1.6
Miscellaneous manufacturing	339	1.1
Retail trade		
Motor vehicle and parts dealers	441	0.1
Furniture and home furnishings stores	442	0.4
Electronics and appliance stores	443	0.7
Building material and garden supply stores	444	0.5
Food and beverage stores	445	0.7
Health and personal care stores	446	0.2
Gasoline stations	447	0.1
Clothing and clothing accessories stores	448	0.4
Sporting goods, hobby, book and music stores	451	0.3
General merchandise stores	452	1.4
Miscellaneous store retailers	453	0.1
Nonstore retailers	454	1.0

Appendix Table A1. Layoff separation rates by 3-digit NAICS industry (cont.)

Industry	NAICS	Layoff separation rate (percent)
Transportation and warehousing		
Air transportation	481	2.2
Water transportation	483	3.5
Truck transportation	484	0.4
Transit and ground passenger transportation	485	5.9
Pipeline transportation	486	2.7
Scenic and sightseeing transportation	487	2.1
Support activities for transportation	488	0.5
Couriers and messengers	492	0.7
Warehousing and storage	493	0.4
Information		
Publishing industries, except Internet	511	0.5
Motion picture and sound recording industries	512	3.6
Broadcasting, except Internet	515	0.5
Telecommunications	517	0.9
Data processing, hosting and related services	518	0.7
Other information services	519	1.1
Finance and insurance		
Credit intermediation and related activities	522	0.8
Securities, commodity contracts, investments	523	0.2
Insurance carriers and related activities	524	0.3
Funds, trusts, and other financial vehicles	525	0.3
Real estate and rental and leasing		
Real estate	531	0.0
Rental and leasing services	532	0.2
Professional, scientific, and technical services	541	0.4
Management of companies and enterprises	551	0.2
Administrative and waste services		
Administrative and support services	561	1.0
Waste management and remediation services	562	0.4
Educational services	611	0.1
Health Care and Social Assistance		
Ambulatory health care services	621	0.1
Hospitals	622	0.2
Nursing and residential care facilities	623	0.1
Social assistance	624	0.7
Arts, entertainment, and recreation		
Performing arts and spectator sports	711	0.8
Museums, historical sites, zoos, and parks	712	0.5
Amusement, gambling, and recreation	713	1.8
Accommodation and food services		
Accommodation	721	1.2
Food services and drinking places	722	0.4
Other services, except public administration		
Repair and maintenance	811	0.1
Personal and laundry services	812	0.1
Membership associations and organizations	813	0.2