Bankruptcy and the Cost of Organized Labor: Evidence from Union Electrions*

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Abstract

Arguments that worker unionization leads to changes in productivity, employment, or business survival find little support in the literature. While unionization may have limited impact in good states, unionized workers are entitled to special treatment in bankruptcy court. This shift in bargaining power can be detrimental to other corporate stakeholders in default states, with senior, unsecured creditors standing to lose the most. We gather data on union elections covering several decades and employ a regression discontinuity design to identify the effect of worker unionization on bondholders' wealth. Closely-won union elections lead to significant losses to bond values but do not lead to poorer firm performance or higher default risk. Critically, unionization is associated with longer proceedings in bankruptcy court, with more bankruptcy emergences and subsequent refilings, and with higher fees and expenses paid to lawyers and financial experts in court. All of these costs diminish corporate asset values, aggravating bondholders' losses. The value effect of unionization is weaker in states where unions have been undermined by right-to-work laws.

Key words: Unionization, Bond Values, Regression Discontinuity Design, Bankruptcy Costs.

JEL classification: J51, G33, G32.

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> The purpose of Chapter 11 is to prevent a debtor from going into liquidation with an attendant loss of jobs and possible misuse of economic resources.
>
> — *Supreme Court, N.L.R.B. v. Bildisco & Bildisco (1984)*

1 Introduction

Despite their declining prominence, labor unions still shape human capital participation in corporate activity. Over eight million private-sector workers in the U.S. today are represented by unions, and of the largest 100 industrial firms, 33 have a unionized labor force, with most of their unions formed in the last 20 years. Studies find that unionized workers receive more generous contracts and observe less pay inequality due to collective bargaining (Parsley (1980) and Western and Rosenfeld (2011)). Yet, it is hard to assess the ultimate effects of organized labor on firms and investors. An earlier literature looks at how organized labor affects corporate equity values. While some studies find a negative impact of organized labor on share values (Ruback and Zimerman (1984) and Lee and Mas (2012)), others find little or no wealth impact stemming from contract negotiations with organized labor (Liberty and Zimmerman (1986)). Abowd (1990) shows that workers capture shareholder wealth as a result from collective wage bargaining, yet there is an overall gains for both workers and shareholders.

Unionization is commonly thought of as a means to increase workers' bargaining power in negotiating contracts governing benefits such as wages, health care, and pension funding. Arguably, however, these pecuniary benefits are less important than concerns such as career development and job security. Those non-contractual interests are most endangered when firms default on their obligations, since courts are unable to explicitly assess and protect individuals' human capital investment. The U.S. Bankruptcy Code, for example, is designed to only formally safeguard workers' accumulated wages and benefits for work already performed.[1] To protect their members' interests in bankruptcy, unions become active parties in legal proceedings under Chapter 11. Not surprisingly, their overriding goal in those proceedings has been

[1] The Chapter 11 Bankruptcy Code (U.S. Code § 507 (a)(4)) only gives automatic "superior priority" for wages and benefits earned in the 180 days before bankruptcy.

that of job preservation (see Haggard (1983) and Stone (1988)).

Unions are able to protect members' interests in several ways during bankruptcy and this paper shows that worker unionization has negative value implications for other corporate stakeholders. As recognized "unsecured corporate creditors," unions are eligible to gain seats in creditors' committees.[2] Section 1102(a) of the Bankruptcy Code charges the United States Trustee with the duty of organizing a committee that includes the largest unsecured creditors.[3] The committee has powers to (1) investigate the debtor for fraud or incompetence, (2) participate in the formulation of reorganization plans, (3) request the replacement of managers, and (4) ask the court to dismiss the case or convert it into Chapter 7 liquidation. Debtors are legally obliged to disclose all information requested by the creditors' committee and pay — from estate assets — for all of the committee's expenses. Workers in non-unionized firms, in contrast, are not eligible for a seat on creditors' committees. Instead, they are treated as individuals by the courts, only entitled to limited statutory priorities.[4]

Beyond receiving debtor-like recognition under Chapter 11, unions resort to several additional tactics to empower workers in bankruptcy. They organize strikes, boycotts, or public denouncements. As firms face financial difficulties, managers are more likely to work with unions to avoid disruptions that invite greater creditor control or liquidation (see Atanassov and Kim (2009)). When convenient, unions use their leverage in court so that bankruptcy proceedings allow for disruption of absolute priority rules (APR), whereby unsecured creditors' claims lose seniority.[5] Unions can also make bankruptcies last longer, using the courts to force parties into repeated, costly negotiations over workers' demands. In securing continued

[2]Unions' claims against companies include (1) withheld union dues, (2) unpaid contributions to union pension and welfare plans, (3) unpaid wages and accrued benefits to union workers, and (4) damages following from the rejection of collective bargaining agreements (see Haggard and Pulliam (1987)). Firms in financial distress often accumulate debts on all those accounts.

[3]Dawson (2014) reports that a union was a member of the court-appointed unsecured creditors' committee in over one third of the bankruptcy cases in which the debtor was unionized.

[4]Employee benefit and wages priority privileges are currently capped at only $10,000 per worker.

[5]In the Chrysler bankruptcy case, United Auto Workers (UAW) was instrumental in having the reorganized entity ("new Chrysler") assume $4.5 billion of employee benefits from "old Chrysler." The company distributed 55% of its equity to satisfy $10 billion in obligations to labor unions. Most other creditors, by comparison, recovered less than 30 cents per dollar from asset sales, despite having more senior claims (Adler (2010)).

employment for their workers, unions can also facilitate inefficient reorganizations in lieu of liquidation. This is an important issue since firms that emerge from reorganization often re-enter bankruptcy, as unions resist asset sales and worker layoffs. Even in cases where firm ownership is transferred, the successor is legally bound to negotiate with the predecessor's labor union.

We study the effect of unionization on unsecured corporate creditors by examining the price reaction of publicly-traded bonds to labor union elections. We do so using election data from the National Labor Relations Board (NLRB). Union elections in the U.S. are conducted through secret ballot voting, sometimes with little advance notice. Once a union wins over 50% of the workers' votes, it attains legal recognition and its members can exercise collective bargaining over compensation, benefits, and disputes with management. These rights are governed and protected by the National Labor Relations Act (NLRA) and a successful union election can discretely increase the bargaining power of workers in a firm.

Our analysis combines the NLRB union vote data with information on publicly-traded bonds from TRACE, Mergent FISD, and the University of Houston Database. Publicly-traded bond prices represent a unique value metric with which to gauge the effects of unionization on the expected costs of corporate default. Unlike other creditors (e.g., banks and syndicated lenders), it is very difficult for investors of diffusely-held bonds to renegotiate with borrowers. Bond investors, instead, dispose of their securities in the market in response to innovations to the value of their claims. Given the concave structure of bond payoffs (capped at issue face values in non-bankruptcy states), bond prices reflect investors' expected payments in bankruptcy states. Innovations that increase expected bankruptcy costs lead to declines in the secondary market price of corporate bonds. As holders of unsecured, senior claims, bondholders' interests are particularly sensitive to any deviations from an orderly bankruptcy process.

Naturally, both the occurrence and the results of union elections are related to firm-specific conditions, making it hard to identify the causal impact of unionization on bond prices. The average union-win firm might differ from the average union-loss counterpart on several dimensions (both observable and unobservable). To establish causality in our tests, we resort to a regression discontinuity design (RDD) that uses local variations in the vote share of workplace elections that lead to discrete changes in union legal status. In short, our tests contrast bond price reactions to closely-won union elections with bond price reactions to closely-lost union elections. Close winners gain representation status while close losers do not, yet average firm characteristics and workers' support for unions are ex-ante similar across the two groups of firms. Given the nature of secret ballot elections, it is unlikely for individuals or firms to precisely anticipate or manipulate the outcome of union elections. Under these regularity conditions (which we verify in the data), differences in bond price reactions to close union election outcomes can be plausibly attributed to the causal effect of unionization.

Our results show that unionization negatively affects the wealth of senior, unsecured corporate creditors. It does so in an economically significant manner. A simple event study shows that closely-won union elections are associated with a negative 60 (180)-basis-point average cumulative abnormal return (CAR) over the 3-month (12-month) window following election events, while closely-lost elections are associated with a statistically insignificant negative 10 (60)-basis-point CAR over the same window. Results from RDD analyses show even larger effects. Closely-won union elections lead to a 200 (500) basis points greater decline in bond CARs than closely-lost elections during the 3-month (12-month) post-election window.[6]

We also investigate the mechanisms through which unionization reduces bond values. From a pricing perspective, the decline in bond values could be associated with increases in (1) default probabilities or (2) in-court bankruptcy costs (or both). We first examine whether unionization increases default risk by tracking firms' business performance following unionization. Contrasting the performance of close union winners and losers, we find no evidence that close union winners perform worse or become more likely to go bankrupt than close losers for several years after the vote. At the same time, bond CARs of close union winners show noticeable declines even when their remaining time to maturity is relatively short. Our results imply that the im-

[6] The horizons we consider follow prior literature on the effects of unionization (e.g., DiNardo and Lee (2004) and Lee and Mas (2012)) and event studies on bond returns (e.g., Warga and Welch (1993), Eberhart and Siddique (2002), and Ellul et al. (2011)).

pact of unionization on bond prices is unlikely to be caused by increases in default probability.

We next examine the effects of unionization on in-court bankruptcy costs. We use information from the UCLA-LoPucki bankruptcy database to compute court cost measures, including the duration of bankruptcy proceedings, the fees paid to legal and financial professionals, and creditors' committee expenses. We find that bankrupt firms with unionized workers experience more prolonged bankruptcy proceedings and are also more likely to go through inefficient reorganizations, as evidenced by a higher likelihood of emerging from bankruptcy and refiling for bankruptcy thereafter. Unionized firms are also more likely to reorganize under debtor-in-possession (DIP) financing.[7] We also find that firms with labor unions incur significantly higher expenses and fees in bankruptcy court, including fees paid to attorneys and creditors' committees. Notably, these costs increase with the number of seats assigned to unions in unsecured creditors' committees. Taken together, our results are consistent with the notion that unionization significantly increases firms' bankruptcy costs, with those costs being ultimately imposed onto other financial stakeholders of the firm.

We exploit firm heterogeneity to verify that unionization affects bond values through costs incurred in bankruptcy court. We do so comparing subsamples of financially-distressed and financially-healthy firms. One would expect the bond prices of distressed firms to react more negatively to unionization, as these firms are closer to realizing increased in-court bankruptcy costs associated with unionization. We consider several measures of financial distress in our analysis, including Altman's Z-score, Ohlson's O-score, Merton's distance to default, as well as Moody's credit ratings. These distress measures are similarly distributed across firms where union elections are closely won and lost. Yet, consistently across all measures, RDD results show that unionization has a much greater impact on the bond values of distressed firms.

Finally, we examine the argument that the value impact of unions can be ascribed to increases in the bargaining power of the workers they represent. To do so, we experiment with settings where unions experience varying degrees of power in collective bargaining. Specifically,

[7] These financing arrangements often force pre-existing senior creditors into more junior claimant categories; yet they allow firms to continue operating and workers to keep their employment.

we use the adoption of right-to-work (RTW) laws across different jurisdictions in the U.S. RTW laws allow non-union members to enjoy the benefits of unionized bargaining without having to join a union or pay union dues. These laws weaken union powers, as they constrain unions' financial resources and reduce their organizing activity, ultimately impairing their effectiveness (see Ellwood and Fine (1987) and Holmes (1998)). We partition our sample according to whether or not union elections are held in states with RTW laws and find that the effect of unionization on bond values is far stronger in states without those laws. Indeed, for RTW-law states, unionization has negligible effects on bond values.

It is difficult to assess economic connections between unionized labor and other stakeholders in the firm. Studies such as Faleye et al. (2006), Chen et al. (2012), and Bradley et al. (2013) argue that workers and creditors share a common interest in reducing firm risk in good states, since both parties hold fixed claims on firm values in those states. Accordingly, Faleye et al. show that firms with strong labor representation invest less in long-term assets, taking fewer risks. Chen et al. report regressions showing that bonds issued by firms in more unionized industries are more highly valued by investors because those firms are less likely to be the targets of acquisitions. Bradley et al. argue that unions stifle risky innovation by firms, measured by declines in patents and citation counts following unionization. These papers do not study conflicts between workers and creditors when dividing assets and sharing residual wealth in bankruptcy court. We contribute to the literature by characterizing this dynamic, showing that unionized firms incur higher costs in bankruptcy, reducing the value of other creditors' claims.

Our paper also adds to a growing line of research on how human capital and organized labor influence firm financing. Berk et al. (2010) and Agrawal and Matsa (2013), for example, argue that managers choose lower financial leverage to reduce workers' exposure to unemployment risk. Our paper contributes to this literature by showing that unions are ultimately costly to holders of unsecured debt claims, a result that helps explain the documented negative association between debt ratios and unionization. The analysis furthers the understanding of the impact of worker organization on corporate investors' wealth, an important facet of firm–labor relations.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 presents our main results. Section 4 provides evidence regarding the channels through which unionization affects bond value. Section 5 provides several robustness checks as well as an assessment of the deadweight costs associated with worker unionization. Section 6 concludes.

2 Data Description and Sample Selection

We piece together a number of databases to study the effect of unionization on bond values and bankruptcy costs. This section describes our data collection process, sampling, and variable construction methods.

2.1 Union Election Data

The NLRB provides detailed data on the results of elections to certify a representative union for a collective bargaining unit for the 1977–2010 period.[8] We gather information related to the time and location of each union election in the United States, the number of participating and eligible voters, the number of votes "for" and "against" unionization, and the company in which the election took place. Starting from the universe of elections recorded in the NLRB database, we follow prior literature in considering the set of elections with more than 50 voters. We then follow the algorithm used in Lee and Mas (2012) for matching company names in the NLRB to their identifier in the Center for Research in Security Prices (CRSP) database. We inspect every match manually and exclude incorrect matches. Our base union election sample contains 5,714 elections.

[8]The 1977–1999 period data are used in Holmes (2006) and are available from Thomas Holmes's website (`http://www.econ.umn.edu/~holmes/data/geo_spill/index.html`). The 2000–2010 data are posted by the NLRB (`http://www.data.gov/`).

2.2 Bond Data

We collect information on publicly-traded corporate bonds from multiple data sources. Bond information for the 1977–1997 period is taken from the University of Houston Fixed Income Database (formerly Lehman Brothers Database). The University of Houston Database provides month-end bid prices for each bond issue, as well as issue-level characteristics such as accrued interest, yield to maturity, and credit ratings (see Warga (1998) and Collin-Dufresne et al. (2001)). For information after 1997, we use transaction-level data from the Mergent Fixed Income Securities Database (FISD) covering the 1997–2004 period and from Trade Reporting and Compliance Engine (TRACE) for the 2005–2010 period. Both providers offer comprehensive coverage of the bond market. We eliminate all canceled, corrected, and commission trades, following standard procedure in the literature (Bessembinder et al. (2006, 2009)). We also follow existing studies in limiting our sample to U.S. dollar-denominated, fixed-coupon corporate debt issues that are senior, not puttable, and unsecured. Senior, unsecured bonds account for around 95% of all corporate bonds issued.[9]

2.3 Bond Return Computation

We compute cumulative abnormal returns (CARs) of corporate bonds over several time windows to gauge creditors' reactions to union elections. We use monthly frequencies in calculating bond returns since NLRB election dates are sometimes only reported with monthly precision. Using monthly data also helps alleviate concerns about the impact of market illiquidity on bond prices, as many bonds are infrequently traded. Following Bessembinder et al. (2009), we compute trade size-weighted bond prices for each trading day and use the price on the last trading day of the month as the month-end price. We then calculate the observed

[9]Unsecured means that the bond is not backed by assets, not based on secured lease obligation, nor a private placement exempt from registration under SEC Rule 144a.

return (OR) for bond b in month t as:

$$OR_{b,t} = \frac{((P_{b,t} - P_{b,t-1}) + AI_{b,t})}{P_{b,t-1}}, \tag{1}$$

where P_t is the bond price at the end of month t, AI_t is the accrued interest that month, and P_{t-1} is the bond price at the end of month $t-1$.

We calculate abnormal bond returns in three steps. First, we find a benchmark portfolio for each bond based on its risk. Specifically, we classify all senior, unsecured bonds into three-by-three portfolios according to their credit ratings and time-to-maturity.[10] We then calculate the value-weighted average return for each portfolio using the returns of every bond in that portfolio. For a given bond b, we find a portfolio with the closest credit rating and time-to-maturity as its benchmark portfolio.

Next, we calculate the abnormal return of bond b using its benchmark portfolio return as the bond's expected return (ER). The abnormal return (AR) for bond b is thus defined as the difference between the observed bond return (OR) and expected return:

$$AR_{b,t} = OR_{b,t} - ER_{b,t}. \tag{2}$$

The firm-level abnormal bond return is computed using the weighted average abnormal returns of all bonds issued by the firm, weighting each bond with its market value.[11] Formally, the abnormal bond return AR for firm k at time t is calculated as follows:

$$AR_{k,t} = \sum_{b=1}^{J} w_{b,t} AR_{b,t}, \tag{3}$$

[10]Bessembinder et al. (2009) show that default risk (proxied by credit ratings) and time-to-maturity are the two primary risk factors driving bond returns. Bonds are classified into 9 benchmark portfolios according to whether their credit rating is high grade (Aaa+ to Aa3), medium grade (A1 to Baa3), or speculative grade (Ba1 and below), and whether the remaining time to maturity is less than 10 years, between 10 and 20 years, or more than 20 years.

[11]In later robustness checks, we also use the CARs of individual bonds (as opposed to those of firm-portfolio bonds) to estimate reactions to union elections.

where J is the number of bonds outstanding for firm k; w is the market value weight of bond b scaled by the total bond market value of firm k. Finally, we compute the cumulative abnormal return (CAR) following union election i for firm k from month $T_{i,1}$ to month $T_{i,2}$ as:

$$CAR(k, T_{i,1}, T_{i,2}) = \sum_{t=T_{i,1}}^{T_{i,2}} AR_{k,t}. \tag{4}$$

To be included in the sample, firms are required to have available monthly bond prices from one month prior to the union election to 12 months after the election. This allows us to examine time horizons similar to previous work on the effects of unionization (DiNardo and Lee (2004) and Lee and Mas (2012)) and event studies for bond returns (Warga and Welch (1993), Eberhart and Siddique (2002), and Ellul et al. (2011)). After matching bond CARs to the union election data, we are able to study a total of 721 election events.

2.4 Other Covariates

We extract firm fundamental information from Compustat and equity data from CRSP. We construct several measures of firm risk, including Altman's Z-score (*Z-score*), Ohlson's O-score (*O-score*), and Merton's distance to default (*Distance-Default).* We construct additional measures that describe firm characteristics: return on assets (ROA), asset size (*Size*), book-to-market ratio (*B/M*), liability-to-asset ratio (*Liability Ratio*), cash-to-asset ratio (*Cash*), and property, plant, and equipment-to-asset ratio (*Tangibility*). We also construct a bond liquidity measure, *Bond Liquidity*, following Batta et al. (2015). *Bond Liquidity* is defined as the ratio of bond price uncertainty to trading volume. Higher values of this measure indicate lower trading liquidity. Detailed definitions of these variables are in Appendix A. We winsorize all variables at the 1^{st} and 99^{th} percentiles.

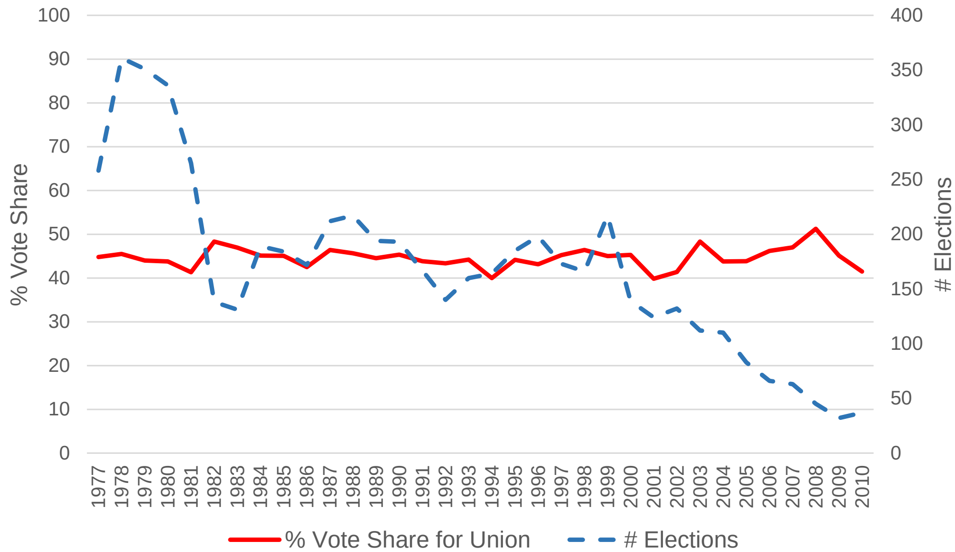


Figure I. Occurrence and results of union elections
This figure describes the time series variation in the occurrence and results of union elections in our sample period. The solid line represents the median percentage votes in support of a union (% Vote Share for Union) in the elections in a given year; the dashed line represents the total number of elections (# Elections) held.

2.5 Summary Statistics and Univariate Analysis

2.5.1 Union Elections

There is a well-documented decline in the unionization movement in the U.S. (see, e.g., Vedder and Gallaway (2002) and DiNardo and Lee (2004)). Our data sample spans 33 years, and Figure I shows that it captures a declining trend in establishment-level union elections. In the 2000s, in particular, the number of elections dropped sharply. Having a rich times series variation as our forcing variable is important for both statistical and economic inferences.

The patterns present in our sample seem consistent with claims that union activity has declined due to factors such as changes in the political climate and public policy, managerial opposition to unions, development of labor-saving technologies, and increased competition from international trade (DiNardo and Lee (2004)). Despite the decline in union elections, key statistics of election results remain constant over time. For example, the average vote share in support of union is close to 45% over the entire time horizon covered by our sample. Although not displayed, the percentage of successful union elections has also remained constant over time, hovering around 25%.

Table I reports summary statistics for firm and bond characteristics. These statistics are based on election-year data. Overall, our sample firms are large and profitable, with an average book value of total assets of about $20 billion and an average return on assets of 9%. The firms are also financially healthy and liquid, with an average Z-score of 3.6 and cash ratio of 4.3%. Firms in our sample typically have multiple bonds outstanding (average of 4), mostly with investment-grade credit ratings according to Moody's.

TABLE I ABOUT HERE

2.5.2 Bond Returns

An election event is defined as the month in which a union election vote takes place.[12] Observing the process through which unionization unfolds, we examine bond returns accumulated from the month prior to the vote to every 3 months up to one year following the event; i.e., $CAR(-1,3)$, $CAR(-1,6)$, $CAR(-1,9)$, and $CAR(-1,12)$.[13] Column (1) of Table II shows the abnormal bond returns following all union elections in our sample. On average, union-election bond CARs have a relatively small magnitude, ranging from –20 basis points during the 3-month post-election window to –100 basis points during the 12-month post-election window. Column (2) shows abnormal bond returns following all union winning elections, while column (3) shows the average bond CAR following all union losing elections. Notably, changes in bond values are not significantly different across those two groups.

TABLE II ABOUT HERE

As we focus on comparisons between closely-won and closely-lost union elections, differ-

[12]We use the union election date instead of the case closure date by the NLRB as the former date is more widely available for all election events and it is rare that the NLRB later overrules union election outcomes. Regardless of this choice, the NLRB closing date is around 10 days after the election in most cases, and using NLRB closing date does not affect our results.

[13]Results are similar if we start the event window from the election month; i.e., $CAR(0,3), ..., CAR(0,12)$.

ences between bond CARs widen, becoming both economically and statistically significant. To illustrate this, we arbitrarily define "close union losers" as those elections in which the vote share for unionization is between 35% and 50% (inclusive), and "close union winners" as those in which the vote share for unionization is between 50% (exclusive) and 65%. Column (4) of Table II shows that the average $CAR(-1,3)$ ($CAR(-1,12)$) of close union winners is -60 (-180) basis points, and Column (5) indicates that the average $CAR(-1,3)$ ($CAR(-1,12)$) of close union losers is only -10 (-60) basis points. Although coarse, these univariate comparisons already point to the negative relation between unionization and unsecured creditors' wealth that we identify below. To put our numbers in perspective, papers looking at corporate events that directly affect bondholders, such as leveraged buyouts (Warga and Welch (1993)) or fire sales driven by downgrades (Ellul et al. (2011)), find CARs of the order of 700 to 870 basis points over periods ranging from 4 to 5 months.

3 The Impact of Unionization on Bond Prices

3.1 Test Strategy

There can be several ways for a union to gain legal representation for workers in a business establishment. The most common path is through the following process. Union proponents must first file a petition supported by at least 30% of workers in the bargaining unit to obtain permission from the NLRB to conduct an election. The NLRB checks the petition's vote support and investigates employers' claims regarding the legitimacy of the petition. The NLRB then schedules the election. The time lag between an initial petition and the vote is usually around seven weeks. Once the election is conducted, a union is formed if over 50% of eligible workers vote in favor. Within seven days following the election, parties can file objections to the NLRB regarding election procedures. If the Board rules the election invalid, it will carry out a rerun (this rarely happens). If valid, the union is certified to represent the bargaining unit, and the firm is legally obligated to negotiate with the union in good faith.

We examine the impact of unionization on corporate bonds using a regression discontinuity design (RDD). The RDD approach gauges effects from a "treatment" by identifying a cutoff above or below which a treatment is assigned. The underlying assumption is that for subjects in the vicinity of the cutoff, the treatment assignment is plausibly random. In our setting, union representation status (the treatment) is determined by whether the vote share for union exceeds 50%. Due to the secret-ballot election mechanism required by law, there is a substantial level of ex-ante uncertainty about election outcomes. For close elections, it is unlikely that voters and other agents exactly anticipate the election result. The nature of the secret ballot mechanism also makes it difficult for agents to manipulate the vote share around the cutoff. As such, close winners and close losers in union elections are likely to be ex-ante similar. By calculating the differential bond return reactions from close union winners and losers, one should be able to infer the causal effect of workers' union status on bondholders' wealth.

3.2 Methodology

A simple RDD implementation consists of estimating two separate regressions on each side of the relevant assignment cutoff. One can use those two regression intercepts to compute the change in the outcome variable of interest at the cutoff. Formally, one estimates a polynomial regression model of order p on each side (*left* and *right*) of the cutoff c as follows:

$$Y = \alpha_l + (X - c) \times \beta_{l,1} + (X - c)^2 \times \beta_{l,2} + ... + (X - c)^p \times \beta_{l,p} + \epsilon, \; where \; X \leq c, \tag{5}$$

and

$$Y = \alpha_r + (X - c) \times \beta_{r,1} + (X - c)^2 \times \beta_{r,2} + ... + (X - c)^p \times \beta_{r,p} + \epsilon, \; where \; X > c. \tag{6}$$

In our setting, c is 50% (the cutoff for a union win). Y is bond CAR, X is the union vote share in the election, and ϵ is an error term. Combining the two equations above, we can estimate the following pooled regression:

$$Y = \alpha_l + D \times \tau + \sum_{n=1}^{p} (X - 0.5)^n \times \beta_{l,n} + \sum_{n=1}^{p} (X - 0.5)^n \times D \times (\beta_{r,n} - \beta_{l,n}) + \epsilon, \tag{7}$$

where D is an indicator for union victory that equals 1 if the vote share surpasses 50% and the union wins, and equals 0 if the union loses. The term τ equals $\alpha_r - \alpha_l$, capturing the jump in Y as the vote share just passes 50%. In other words, τ provides an estimate of the causal effect of unionization on corporate bonds' CARs.

Because the polynomial regression approach uses all available data in the estimation, it can achieve greater precision. The tradeoff, however, is that it imposes a particular functional form onto the relation between bond values and vote shares over a wide range of data, including data far away from the cutoff. Critically, strong functional form assumptions admit biases. Thus, we also consider a local linear regression approach, which is a non-parametric estimation using data within a small window h around the assignment cutoff. This approach reduces the potential for biases arising from global functional form assumptions at the cost of reducing statistical power due to the limit imposed on the sample size. Balancing the issues of bias and precision, we use both methods for estimation to ensure the reliability of our inferences.

Our local linear regressions can be represented similarly to the polynomial regressions discussed above, where one conveniently estimates the following model:

$$Y = \alpha_l + D \times \tau + (X - 0.5) \times \beta_l + D \times (X - 0.5) \times (\beta_r - \beta_l) + \epsilon, \tag{8}$$

where $0.5 - h \leq X \leq 0.5 + h$, and τ captures the causal effect of unionization on bond CARs.[14] In our local linear regression tests, we estimate models using both rectangular and triangular kernels. Each kernel method has advantages. Imbens and Lemieux (2008) and Lee and Lemieux (2010) recommend using rectangular kernels because they achieve higher efficiency. Fan and

[14] The local linear regression is estimated by solving the following kernel-weighted least square problem on each side of the cutoff: $min_{\alpha,\beta} \sum_i (Y_i - \alpha - \beta(X_i - c))^2 K(\frac{X_i - c}{h})$, where K is a kernel and h is the bandwidth.

Gijbels (1996) and Cheng et al. (1997) show that the triangular kernel is boundary-optimal, which is a desirable feature for sharp RDD applications.

3.3 Validity

We examine two necessary conditions to test the validity of our RDD approach: (1) continuity of the distribution of the forcing variable (union vote share) around the assignment cutoff and (2) continuity of other covariates around the cutoff. These two conditions help verify whether union voting serves as a locally randomized assignment.

We first examine whether the distribution of vote share is continuous around the 50% mark. If workers or firms could systematically manipulate vote shares around the 50% cutoff, we should expect to see markedly different vote share densities just above or just below that point. One could also be concerned that workers only call for a vote when they anticipate a union win (even if marginal). In that case, we could see an upward jump in the union vote share distribution density after the 50% mark. To formally test the continuity of vote distribution, we follow the methodology proposed by McCrary (2008). It consists of a local linear regression combined with a Wald test to detect jumps in the marginal density of the forcing variable around the treatment assignment cutoff.[15] If there is a jump in the density of vote shares at the 50% threshold, the treatment is likely to be unsuitable for RDD estimation.

Figure II plots the distribution of vote share for union. The dots represent the average observed distribution density for each bin for union vote share. The solid line represents the fitted distribution density function from local linear regressions (90% confidence intervals are also shown). The graph displays continuity in the vote share distribution around the 50% cutoff, with a large overlap between the confidence intervals of density function on both sides of the cutoff. Consistent with the visual evidence, the Wald test shows that the distribution density

[15]Formally, McCrary (2008) shows that the log difference between the density on the left and right sides of the cutoff $ln\hat{f}^r - ln\hat{f}^l$ follows an asymptotic normal distribution. The density $\hat{f}(p)$ at each point p is estimated as ϕ_1, where $\{\phi_1, \phi_2\}$ minimize the average distance to the observed density through a kernal smoothing function: $L(\phi_1, \phi_2, p) = \sum_{j=1}^{J}\{Y_j - \phi_1 - \phi_2(X_j - p)\}^2 K((X_j - p)/h)\{1(X_j > c)1(p \geq c) + 1(X_j < c)1(p < c)\}$, where $K(\cdot)$ is a triangle kernel function; X_j is the midpoint of bin j; and Y_j is the observed density of bin j.

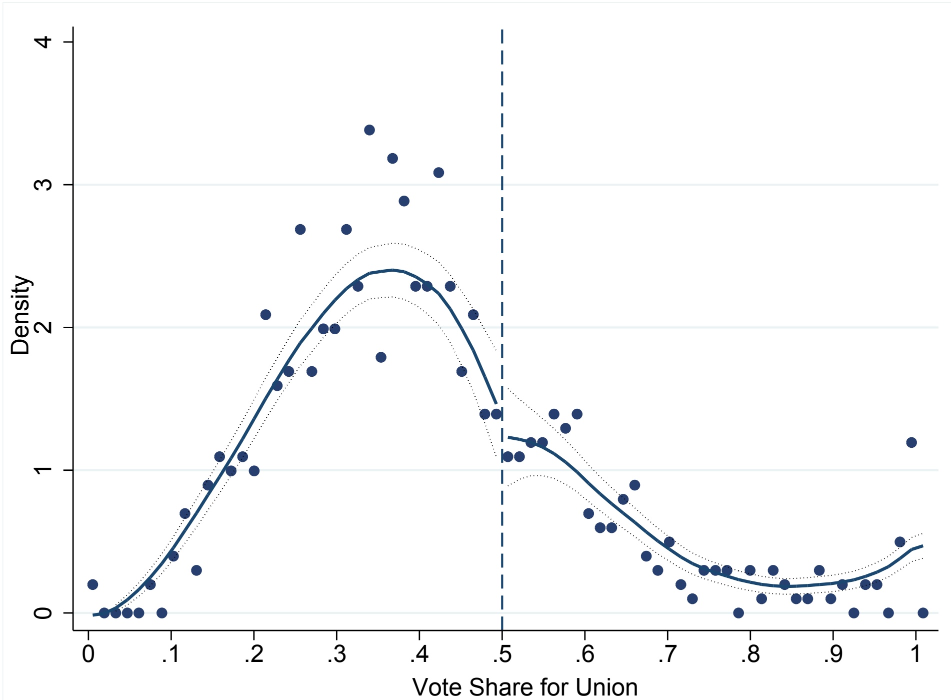


Figure II. Density distribution of the vote share for union
This figure shows the density distribution of vote shares for union following McCrary (2008). The horizontal axis represents the percentage of votes in favor of unionization and the vertical axis represents the associated distribution density. The dots correspond to the observed density. The solid lines show the local linear density estimate of the vote share for union (90% confidence intervals are displayed).

of vote shares on each side of the cutoff has a log difference of –0.09, with a standard error of 0.26. This estimate implies that in our sample of 721 elections, we can expect 15 closely-lost elections with vote share between 48.4% and 50%, and 14 close wins with vote share between 50% and 51.6%.[16] This difference is economically small and statistically insignificant.

We next examine whether predetermined firm-level covariates are continuous around the 50% vote share cutoff. If there is an abrupt change in observable covariates around the cutoff, one cannot safely attribute the difference in bond values around the cutoff to unionization, as it might result from the changes in those covariates. Importantly, discontinuity of firm characteristics around the 50% cutoff may indicate that firms on the left side of the cutoff are systematically different from those on the right side of the cutoff, and should not be used as controls.

We test the assumption of continuity in firm-level covariates using local linear regressions

[16] The bin size is 1.6%. Within the interval of (48.4%, 51.6%] around the cutoff, there is a 2.1% (= 15/721) probability that an election is a close loss, and a probability of 1.9% that it is a close win. The reported estimate of –0.09 represents the change in these probabilities 2.1% × (1 − 0.09) = 1.9%.

under the RDD framework around the 50% vote share cutoff. We focus on firm characteristics that are relevant to bond valuation, including firm fundamental information given by *ROA*, *Size*, *B/M*, *Liability Ratio*, *Cash*, and *Tangibility*. We also consider measures of credit risk such as *Z-score*, *O-score*, and *Distance-Default*. Finally, we also account for the liquidity of the treated bonds, *Bond Liquidity*. Table III shows the estimation results for these firm-level covariates using rectangular kernel and Imbens and Kalyanaraman's (2012) optimal bandwidths.[17]

TABLE III ABOUT HERE

The estimates in Table III do not point to any measurable changes in covariate values around the union election cutoff. We do not find evidence that close winners and close losers in union elections are different in relevant observable characteristics.

3.4 Graphical Analysis

We first use graphical analysis to identify the relation between vote shares for union and bond value changes following union elections. We divide the vote share into bins, calculating the conditional mean of the bond CAR corresponding to each bin. We then fit bond CARs on each side of the cutoff as separate quadratic functions of vote shares. We plot the average bond CAR against the midpoint of each bin. Figure III graphs the relation between bond $CAR(-1,3)$ and vote share for union. The solid lines depict bond CARs as fitted functions of vote shares; the dotted lines show 90% confidence intervals for those functions.

Figure III shows a distinct drop in bond CARs from the left side to the right side of the 50% cutoff, with non-overlapping confidence intervals. Bond CARs for close union winners decline over 180 basis points during the 3-month window following the election, while close losers' CARs are nearly 0 during the same event window.

[17] The results are robust to using triangular kernel or varying bandwidths. We obtain similar results using the polynomial regression approach. Those results are omitted for brevity but are readily available from the authors.

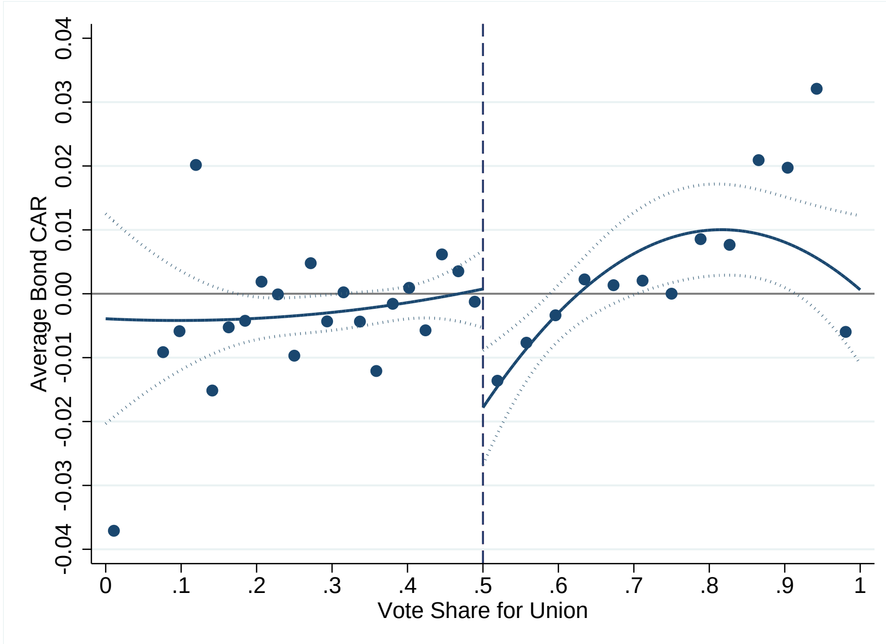


Figure III. Bond CARs following election
This figure shows the bond CARs over 3 months following elections against the vote share for union. The horizontal axis represents the vote share for union, and the vertical axis represents the bond CAR. The dots are CAR conditional means for each bin for union vote share. The solid lines represent the fitted quadratic polynomial function, estimated separately for union loss and union victory cases (below and above the 50% vote share). The dotted lines represent the 90% confidence intervals of the polynomial estimation.

3.5 Estimation Results

3.5.1 Polynomial Regressions

Table IV shows the results from polynomial regressions. For every return window, we report results in stages. We first regress bond CARs on a union victory dummy (*Union Victory*), which equals one if the union wins the election, and zero otherwise. We then add to the specification the vote share for the union (*Vote Share for Union*), thus controlling for a linear relation between bond values and the level of support for union. Finally, we allow for nonlinear functional relations by adding higher order terms of vote share. Specifically, we add up to 3^{rd}-order terms of vote share as well as the interaction between the union victory dummy and these higher-order terms, allowing for different polynomial relations for victory and losing elections.[18] In all regressions, we control for year-fixed effects to account for time-specific

[18] Our inferences are insensitive to the choices of the order of the polynomial function.

economic conditions that can affect both election outcomes and corporate bond returns. We also allow bondholders to have different rates of reactions to election outcomes for firms that host only one election and firms that conduct multiple elections in our sample period. To do so, we control for an indicator for multiple elections and its interactions with the 3^{rd}-order polynomial of election vote shares.[19]

Column (1) reports regression results for bond $CAR(-1, 3)$ on a dummy variable indicating whether the union wins the election. The coefficient on the union victory dummy is insignificantly different from zero, indicating that the average abnormal bond returns that follow union victories are not different from the returns following union losses. Column (2)'s results account for a linear effect of vote shares on bond returns. The coefficient on the union victory dummy gains in magnitude and significance. Column (3) reports results when we allow for nonlinear relations between bond returns and vote shares. The union victory dummy attracts an economically and statistically significant coefficient. The estimate indicates that, following union elections, the bond prices of near-winner firms decrease 240 basis points *more* than the bond prices of near-losers.

Table IV About Here

Columns (4) through (12) repeat the analyses in columns (1) through (3), examining the bond abnormal returns accumulated over longer event windows. Columns (6) and (9) show that unionization is associated with a 230 (460)-basis-point decline in bond prices over the 6 (9) months following a union's victory. Column (12) shows that, over the 12-month post-election window, the bond prices for near-win elections drop 560 basis points more than those associated with near-loss elections.

Importantly, the union-led declines in bond values that we identify are statistically and economically significant. The estimates imply that our sample bond investors lose, on average, $7 million over merely 90 days following union elections. The magnitude of those losses increases

[19]Coefficients of these additional interaction terms are omitted to cut clutter.

with the increase of the event window, reaching $16 million one year after the election.[20]

3.5.2 Local Linear Regressions

We employ local linear regressions to complement and verify the results returned from polynomial models. We use both rectangular and triangular kernels for estimation. We also consider several data bandwidths in our tests. In particular, we follow Imbens and Kalyanaraman (2012) and use the optimal bandwidth that minimizes the estimation errors over the entire data range. For robustness, we also report results based on 75% and 125% of their optimal bandwidth.[21]

Table V shows the results from local linear estimations using several different combinations of data bandwidths and kernel methods. Panel A (Panel B) shows the results from rectangular (triangular) kernel estimations. The test yields statistically and economically similar results across all specifications. The estimates suggest that unionization leads to significant declines in bond values over all event windows. Bondholders of close union winners suffer, on average, a 210-basis-points larger decline in bond values over the 3 months following elections than the bondholders of close losers. The effect is magnified as we increase the event window. Over the 12-month post-election window, bondholders of close union winners observe their bonds drop by 470–500 basis points more than bondholders of close losers. The magnitudes of these estimates are economically similar to those from polynomial regressions.

TABLE V ABOUT HERE

[20]Given that our sample firms have, on average, $288 million in bonds outstanding, one can estimate that close winners incur a $288 $\times$ 0.025 = $6.9 million greater loss in bond value during the 3-month window following union elections. Similarly, they are expected to observe a $16 million greater loss during the 12-month window (= $288 $\times$ 0.056).

[21]The choice of bandwidth involves the standard tradeoff between precision and bias. A wider bandwidth improves precision by using more observations but may admit biases as the function form may change over a larger interval. Using a narrower bandwidth yields less bias but reduces estimation precision.

3.5.3 Result Characterization

Our results point to significant economic effects stemming from unionization and it is important that we provide concrete characterization of their meaning. We do so describing in detail the impact of union elections on bond prices of firms in the transportation equipment industry (SIC 37) and in the electric, gas, and sanitary industry (SIC 49). Our sample has a total of 74 union elections taking place in the transportation industry. Nine of them represent close union victories. These close-win cases include the election of International Association of Machinists and Aerospace Workers to represent workers of Lockheed Martin Services Inc. The election took place in March 2009 in Ashburn, Virginia, where Lockheed Martin stations its "Automated Flight Services" unit. The union vote share was 56%.[22] Lockheed is a large defense contractor with products and services that vitally depend on automated flight capabilities. Close-win cases in transportation also include the election of United Auto Workers to represent the workers of Ford Motor Co. in August, 2004, in Allen Park, Michigan. This is where Ford's "Pilot Plant" is located. The plant is tasked with testing equipment and manufacturing vehicles before mass assembly, crucial to Ford's production process. The average bond CARs in SIC 37 are –50, –250, –308, and –520 basis points during the 3, 6, 9, and 12 months following closely-won elections, respectively.

Similarly, our sample has 58 elections taking place in SIC 49. Six of them are close union wins. These observations include International Brotherhood of Teamsters' election to represent workers of Waste Management Inc., which took place in Plymouth Massachusetts in September, 2004. Another example is the election of Teamsters for Republic Services in October 2009 in Anaheim, California. Each of these locations run the core business of their respective parent companies (waste and recycling for large geographical regions). The average bond CARs following these closely-won union elections were –211, –230, –313, and –402 basis points over the 3-, 6-, 9-, and 12-month windows, respectively.

[22] The 3-, 6-, 9-, and 12-month bond CARs for the Lockheed Martin election are –403, –843, –980, and –987 basis points, respectively.

The results of this section charaterize the impact on unionization on bond prices. The value effects we identify are statistically significant and economically meaningful, with effects persisting for several months after the union election. Unionization bears detrimental, lasting effects to unsecured creditors' wealth.

4 Mechanisms

While we have shown that unionization affects bond values, we have not shown whether this effect comes from the changes in bankruptcy likelihood or bankruptcy costs (or both). To gauge the effect of unionization on bankruptcy likelihood, we track the evolution of firm performance and financial health for several years after union elections take place, comparing close winners and close losers over time. To gauge the effect of unionization on bankruptcy costs, we gather information on bankruptcy proceedings and examine whether unionized firms experience longer, costlier bankruptcies.

4.1 Unionization and Bankruptcy Likelihood

For every firm in which an election takes place, we compute performance measures such as return on assets, book-to-market ratio, firm size, liability ratio, cash, tangibility, Z-score, O-score, and distance to default. For benchmarking, we subtract industry medians from each of these variables (3-digit SIC categorization). We then track the evolution in these industry-adjusted measures for the five years following the election year, comparing the difference of these measures to their own level in the year prior to the election. Finally, we use local linear regressions to test whether the changes in business performance measures differs for close union election winners and losers.

Table VI reports RDD estimates associated with close union victories on each of the industry-adjusted metrics we consider. The coefficient for union victory is rarely significant, indicating that close union winners and losers experience similar post-election performance.

If anything, close union winners show slightly better profitability and lower financial distress than close union losers following elections.

<u>Table VI About Here</u>

The lack of performance deterioration for the union-winning firms within five years following the election could indicate that the effect of unionization may only materialize in the longer term (more than five years). If this is the case, bonds that mature within five years following the election should not be affected by unionization. We investigate this possibility by examining whether bonds with less than five years to maturity at the election year experience any difference in returns across close winners and close losers. Table VII repeats the RDD analyses of Table V for the subsample of bonds with less than five years to maturity; these bonds are associated with 416 election events. Even for this subsample, we find that close union winners experience steeper declines in bond prices. In other words, shorter-term bond values decline in the aftermath of unionization even though there is no evidence that unionization will affect the odds the firm will go bankrupt in the short term. The value estimates are statistically significant, yet sensibly smaller in magnitude compared to those from the full sample analyses.

<u>Table VII About Here</u>

The results from Table VII rule out the argument that unionization only affects corporate bond prices in the long term (more than five years after the union election). At the same time, the results from Table VI suggest that unionization has no measurable influence over a firm's probability of default in the foreseeable future. A natural inference from these results is that the decline in bond value following elections is likely caused by the costs associated with bankruptcy, conditional on that event. We study this argument in turn.

4.2 Unionization and Bankruptcy Costs

We gather information on Chapter 11 bankruptcy cases from the UCLA-LoPucki Bankruptcy Research Database. The LoPucki database contains detailed records of petitions filed in U.S. bankruptcy courts, allowing us to contrast the judicial court processes experienced by unionized and non-unionized firms. We examine in-court costs incurred during bankruptcy from several margins. For this purpose, we obtain two datasets from the LoPucki library. The first contains information about Chapter 11 procedures, duration, and outcomes. It also reports whether the workers of the bankrupt firm were unionized before bankruptcy. We collect data from 1980 through 2010, for a total of 546 bankruptcy cases. The second dataset contains in-depth information about fees and expenses paid in court. This smaller dataset covers over one hundred of the largest bankruptcy cases in the country and provides information regarding the fees paid to various professionals involved in the bankruptcy cases considered. The dataset also reveals whether the firm was unionized prior to entering bankruptcy.

We combine these data libraries to study and contrast differences in bankruptcy costs and procedures for unionized vis-à-vis non-unionized firms. The LoPucki libraries lack information about union election dates and vote shares. Given the characteristics of these data, we resort to nonparametric and probabilistic approaches.

4.2.1 Bankruptcy Duration, Refinancing, Emergence, and Refiling

First, we examine whether unionization is associated with more prolonged, convoluted bankruptcy proceedings. LoPucki and Doherty (2011) show that the duration of bankruptcy cases is one of the most important determinants of fees and expenses incurred during litigation in the U.S. To study whether unions prolong the bankruptcy process, we compute the log of the number of days between the Chapter 11 filing date and the legal ending date of the case (*Duration*).[23] We contrast *Duration* across unionized and non-unionized firms using a

[23] The end of a Chapter 11 case can be the confirmation of a reorganization plan by the judge, the conversion to Chapter 7 liquidation, or dismissal by the court, whichever is applicable.

matching estimator. Specifically, we match each unionized firm with four non-unionized firms that file for bankruptcy in the same year, according to their pre-bankruptcy characteristics such as firm size, liability ratios, cash, and asset tangibility, as well as the performance before bankruptcy (ROA). The treatment assignment of interest is given by *Union*, a dummy variable that equals one if the company has unionized workers prior to bankruptcy and zero otherwise. Column (1) of Table VIII shows the results. Unionized firms experience a significant longer period in bankruptcy court; around 27% (or 143 days) longer than for non-unionized firms with similar characteristics that filed for bankruptcy in the same year.

Table VIII About Here

Next, we examine whether unionization is associated with a higher likelihood of the firm obtaining debtor-in-possession (DIP) financing during the bankruptcy process. DIP financing refers to the loans extended to firms under Chapter 11 protection. These loans have priority over all other debt issued by a company prior to bankruptcy, side-stepping absolute priority rules (see Dahiya et al. (2003) and Chatterjee et al. (2004)). Labor unions are likely to be in favor of DIP financing as it enables firms to continue operating during bankruptcy, and even emerge from bankruptcy. DIP-financed firms often face very high debt levels when they emerge, and pre-existing bondholders are wary of DIP financing since, in the emerged entity, DIP financiers receive a higher seniority.[24]

To examine the relation between unionization and DIP financing, we define an indicator variable *DIP* that equals one if the firm receives DIP financing in bankruptcy and zero otherwise. We use a logistic estimator to regress *DIP* on *Union*. The model includes the same set of covariates used in our matching estimation as well as year-fixed effects. Column (2) of Table VIII reports the results from this test. The estimated marginal effect suggests that, compared to non-unionized counterparts, unionized firms are 19% more likely to obtain DIP

[24]During Brookstone's bankruptcy, bondholders vehemently argued that DIP financing undercut the value of their bonds. See "Brookstone in Deal with Vendors as Bondholders Clash," *Wall Street Journal*, April 25, 2014.

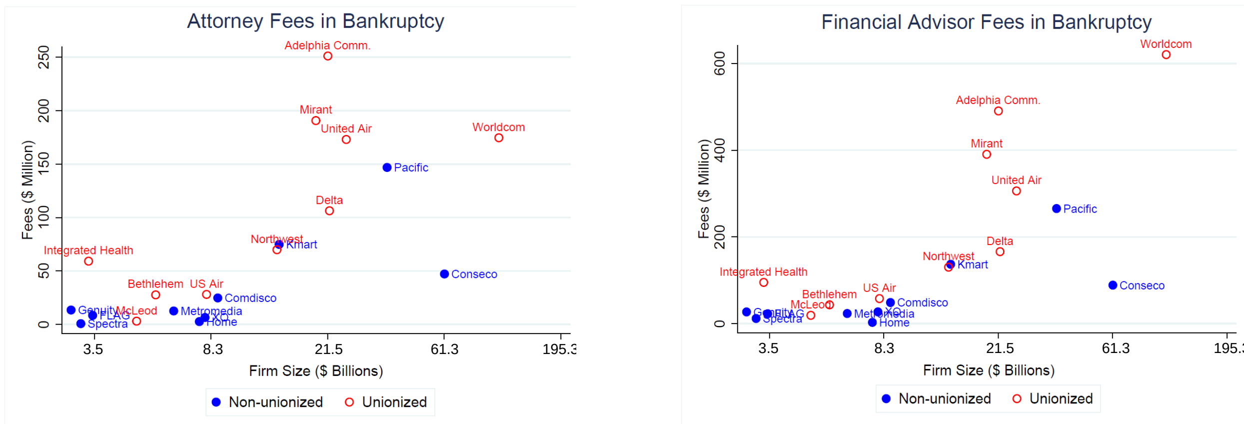
financing during bankruptcy. This result is both statistically and economically significant, indicating that firms with unionized labor are more likely to pursue refinancing maneuvers that reduce bondholders' senior claims over corporate assets in bankruptcy court.

Finally, we examine whether unionization is associated with a higher likelihood of the firm emerging from bankruptcy and refiling for bankruptcy again. A total of 390 firms in our sample emerge from bankruptcy, 73 of which refile afterward (on average, some five years from the first filing). If unionization leads to inefficient reorganization processes, we may observe more occurrences of firms emerging from Chapter 11, yet falling back into bankruptcy afterward. To test this conjecture, we construct an indicator for a firm emerging from Chapter 11 bankruptcy (*Emergence*) and an indicator for the firm refiling for bankruptcy after emergence (*Refiling*). We repeat the analysis for DIP financing, regressing the indicators *Emergence* and *Refiling* on the unionization dummy *Union* in a logistic model. Columns (3) and (4) of Table VIII report the results. The marginal effects indicate that unionized firms are 14% more likely to emerge from Chapter 11 than non-unionized firms. After emergence, however, unionized firms are 6% more likely to refile for bankruptcy.

4.2.2 Bankruptcy Fees and Expenses

The LoPucki database provides detailed information on court fees and expenses related to 102 of the largest bankruptcy cases in the U.S. between 1998 and 2007. To provide an intuitive cost comparison between unionized and non-unionized bankruptcies, we rank firms by total assets and identify the 10 largest unionized and the 10 largest non-unionized firms in the database. We then plot the fees and expenses of these 20 firms paid to attorneys and financial advisors during bankruptcy. Figure IV displays the relevant expenses, with the red hollow dots indicating unionized firms and the blue solid dots indicating non-unionized firms. The figure suggests that unionized firms pay much higher fees to (both) attorneys and financial advisors during bankruptcy relative to non-unionized firms of comparable sizes.

Formally, we test how unions affect the costs incurred during bankruptcy across the follow-



(a) (b)

Figure IV. Fees and expenses in bankruptcy for unionized and non-unionized firms
This figure shows the fees and expenses paid in bankruptcy by the 10 largest unionized firms (Integrated Health Services, McLeodUSA, Bethlehem Steel Corp., US Airways, Northwest Airlines, Mirant Corp., Adelphia Communications, Delta Air Lines, United Airlines, Worldcom) and 10 largest non-unionized firms (Genuity, SpectraSite Holdings, FLAG Telecom Holdings, Metromedia Fiber Network, Home Holdings, XO Communications, Comdisco, Kmart, Pacific Gas & Electric, Conseco) in our sample. The red hollow dots indicate firms that are unionized, while the blue solid dots indicate firms that are not. Panel (a) shows the fees and expenses paid to attorneys during bankruptcy. Panel (b) shows the fees and expenses paid to financial advisors during bankruptcy. Firms' size before bankruptcy (measured by $ln(Total\ Assets)$) is shown on the horizontal axis.

ing dimensions: (1) total fees and expenses paid in court, as an indication of overall bankruptcy costs, (2) the number of professional firms hired during the bankruptcy process, (3) fees paid to all attorneys, and (4) fees paid to creditors committees' attorneys. We do so by matching each unionized firm in bankruptcy court with four non-unionized firms according to pre-bankruptcy firm characteristics, including *ROA*, *Size*, *Liability Ratio*, *Cash*, and *Tangibility*. We require treated and control matches to file for bankruptcy in the same year. With the matched sample, we compare the log amount of bankruptcy court costs between the unionized and non-unionized firms. The results shown in Table IX.

The results from our matching procedure point to a consistent pattern across all dimensions of in-court bankruptcy costs. Unionized firms pay, on average, $16 million (53%) more overall expenses and hire 4 (27%) more professionals during the bankruptcy process. These firms are also likely to pay $26 million (68%) more to attorneys than non-unionized firms. When unions sit on the creditors' committee, firms pay $3 million (54%) more to the attorneys hired by the creditors' committee. Simply put, bankruptcy seems far more costly for unionized firms than for comparable non-unionized firms.

Table IX About Here

Taken together, the analyses in this section show that unionization does not lead to deterioration in firm performance or an increase in default risk. Notably, however, unionization is associated with prolonged bankruptcy processes, repeated bankruptcy filings, and significantly higher costs incurred in bankruptcy court, all of which adversely impact unsecured creditors' claims. Our results suggest that unionization is likely to affect bond value by increasing bankruptcy costs rather than by increasing the likelihood of bankruptcy.

4.3 Heterogeneity

4.3.1 Firm Characteristics

We exploit cross-sectional variation in firm characteristics to verify the argument that unionization affects bondholders through bankruptcy costs. Bond values reflect the product of default likelihood and bankruptcy costs. If unionization reduces bond values by increasing bankruptcy costs, this impact should be stronger when firms are more likely to go bankrupt in the first place. In other words, as the threat of bankruptcy looms, bondholders should become increasingly concerned about the cost impact of unionization.

To examine this conjecture, we partition our sample into financially-distressed and financially-healthy firms, conducting RDD analyses on bond CARs for each subsample. We expect the marginal impact of unionization on bond values to be stronger for distressed firms than for healthy firms. We use several measures of financial distress to conduct this comparison. First, we partition the sample according to Altman's Z-score, identifying a subsample of distressed (healthy) firms whose Z-scores are below 1.8 (above 3). Using Ohlson's O-score, we assign firms with O-scores above (below) 0.5 to the distressed (healthy) subsample. Based on Merton's distance to default, we assign firms in the bottom (top) quintile of our *Distance-Default* proxy to the distressed (healthy) subsample. Finally, we partition the sample firms according to credit ratings provided by Moody's and classify as distressed (healthy) those firms with speculative grade (investment grade) credit ratings.

Table X reports union near-win RDD estimates for financially-distressed and financially-healthy firms. Across virtually all measures of distress, unionization has a large and highly-significant impact on the bonds of distressed firms, but only a small, insignificant impact on the bonds of healthy firms. Results in Panel A show that close union winners with low Z-scores lose 780 basis points over the course of 3 months following the union election. In contrast, close winners with high Z-scores only lose 80 basis points, which is insignificantly different from zero. Similarly, close winners with speculative ratings suffer a drop of 620 (1,520) basis points in bond values over 3 (12) months following the election, while close winners with investment ratings observe only a 110 (180)-basis-point drop.

Table X About Here

The estimates in Table X generate economically sensible magnitude for union-induced bankruptcy costs. The results support the argument that the effect of unionization largely stems from increased bankruptcy costs, and suggest that unionization has a far stronger effect on bondholders' wealth when the firm is facing a high risk of default.

4.3.2 Union Characteristics

An important argument underlying our story is that unionization increases the collective bargaining power of workers, ultimately affecting bondholders. To examine this claim, we explore regional variation in the power of the union movement. In particular, we take advantage of state-level right-to-work (RTW) laws that alter unions' bargaining position. RTW laws allow employees who are not union members to enjoy the benefits of unions without paying dues. This induces a "free-rider" problem, which labor advocates claim would distract union efforts from collective bargaining and weaken unions' bargaining position both in and out of bankruptcy.[25] Research shows that RTW laws reduce unions' resources, limiting their powers (see, e.g., Ellwood and Fine (1987), Holmes (1998), and Matsa (2010)).[26] We conjecture that in RTW-law states, unionization is likely to increase labor's bargaining power to a lesser extent than in states without RTW laws. We exploit this wrinkle to test if unionization has differential effects on bond prices according to whether the state in which the firm is incorporated has passed a RTW law.

We partition our sample of union elections into two subsamples. One consists of 266 elections taking place in states that have RTW laws in place when a union vote occurs. The other comprises 455 elections in states that have not passed such laws. Despite the size difference, the two subsamples have similar rates of union victory and similar vote share distributions (insignificantly different according to Kolmogorov-Smirnov distribution tests). We also find that the continuity conditions necessary to conduct our RDD tests hold across both RTW and non-RTW law states.

Table XI shows the RDD results. In states with no RTW laws, unionization has a large and significant impact on bond values. Relative to near losers, bond prices of near winners drop 220 (670) basis points over the 3 (12)-month window following union elections. In states with RTW laws, in contrast, the impact of unionization on bond values is small and insignificantly different from zero.

TABLE XI ABOUT HERE

The estimates in Table XI imply that the impact of unionization on corporate bond values arises from the increased collective-bargaining power. To wit, the negative impact of unioniza-

[25] Ross Eisenbrey, vice president of Economic Policy Institute, argues that RTW laws make unions financially strapped, and end up "chasing after people to get their dues instead of researching, meeting with the employer, or organizing other units, doing all the things that the union would need to do to build strength." *Thinking Progress*, March 9, 2015. Also, see "Unions in Detroit See Clout Shrivel" *Wall Street Journal*, July 13, 2013.

[26] Eren and Ozbeklik (2011) report that union membership declined by nearly 15% after Oklahoma adopted RTW laws in 2001.

tion on unsecured creditors' wealth in bankruptcy is weakened in states where the legislature has passed laws that undermine the power of unions.

5 Discussion

Although our main RDD specification and results are robust across various extensions and consistent with proposed mechanisms, questions could remain regarding our baseline test. In this section, we verify the robustness of our findings using different sample compositions, investigate the timing of bondholders' response to election outcomes, and assess the economic magnitudes of their reactions.

5.1 Robustness

We first examine the robustness of our baseline RDD findings to potential concerns regarding sample composition. We delete all elections that are held within a 2-month period of a previous election, because when two elections are hosted close together, the effect of one election may be double counted for both. Next, we restrict our sample to only industrial firms. Specifically, we study a subsample of firms in the manufacturing sector or transportation, communications, and electric and gas services (1-digit SICs 2, 3, or 4). These can be seen as more comparable and are the sectors in which unions have a more significant presence. Finally, we perform tests for individual bond CARs, where for each firm we simply pick the largest bond instead of using firm-level bond portfolios.

Table XII shows the results from these robustness tests. For ease of comparison, column (1) redisplays our baseline estimates. Column (2) shows results for the subsample of "distant elections;" i.e., elections that are held at least two months apart. The estimates indicate that our findings are not driven by double counting the effects from sequential elections held closely together. Column (3) shows results from a subsample of industrial firms. In this subsample, bondholders react negatively to closely-won union elections, with magnitudes similar to those in the main sample. Column (4) shows results for individual bonds. We continue to find a negative, significant reaction from bondholders to union victory elections, although the coefficients have a slightly lower magnitude and significance.[27]

Table XII About Here

In all, results from our robustness analyses show that our baseline findings remain robust across various sample configurations. Our inferences are not driven by repeated elections, particular industry sectors, or attributable to the methods used to compute bond returns.

5.2 Bond Liquidity and Speed of Adjustment

Table V shows a gradual drift in bond CARs over a 12-month horizon following union elections, suggesting that bondholders are slow to respond to election outcomes — corporate bonds seem "overpriced" during the event window. Such a pattern is also observed by Lee and Mas (2012), who show that equity holders of recently unionized firms take over one year to respond to union elections. They find that this slow reaction is not driven by the lack of information transparency, but is likely due to the high risk that is inherent to arbitrage trading. Similar inefficiencies can prevent prices from immediately reflecting union elections in the corporate bond market. The high degree of illiquidity in bond trading, in particular, intensifies the under-reaction to corporate events (see Bao et al. (2011), Helwege et al. (2014), and Batta et al. (2015)).

To assess the role of trading liquidity in delaying bondholders' reactions to union election outcomes, we quantify the liquidity of our sample bonds following Batta et al. (2015) and conduct separate RDD tests for liquid and illiquid bonds. Given that trading volume is not available in the University of Houston database, we can only measure bond liquidity for observations after 1997. We partition our sample in half based on whether a firm's bonds are above

[27]The fact that we use individual bonds as opposed to portfolios should lead to noisier estimates.

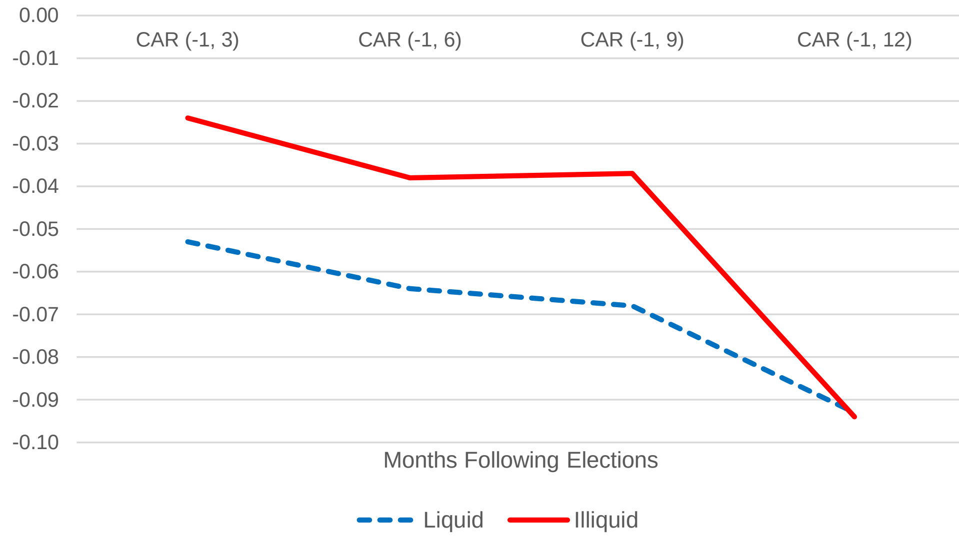


Figure V. Liquidity and speed of adjustment
This figure shows results from separately local linear regressions for the subsamples of liquid and illiquid bonds. We measure bond liquidity as the ratio of price uncertainty to trading volume (Batta et al. (2015)). The red line shows the results for the subsample of illiquid bonds, while the blue line shows the results for the subsample of liquid bonds.

or below the median of our bond liquidity measure. We conduct local linear regressions (as in Table V) for each bond liquidity subsample over various time horizons.

Figure V depicts the subsample results across time. The red line shows results for illiquid bonds, while the blue dash line shows results for liquid ones. Bondholders in both subsamples devalue their claims by around 9.5% over the 12-month post-election window, yet the prices of liquid bonds show more than half of this devaluation (5.3%) in the first 3 months. In comparison, the prices of illiquid bonds experience a much greater delay, reflecting only around a quarter of the devaluation (2.4%) in the first 3 months. Put differently, the investors in illiquid bonds experience a drift of around 7% during the 3-month to 9-month window while those of liquid bonds only experience 4%. Bond illiquidity accounts for nearly half of bondholders' under-reaction to news about unions, with the rest likely due to market inefficiency and risks associated with arbitrage strategies.

5.3 Equity Prices

If unionization affects a firm's bankruptcy probability, equity prices should respond reflecting the higher risk inherent to shareholders' claims. On the other hand, if unions diminish the liquidation value of a firm upon bankruptcy, residual claimants such as equity investors stand to lose little. In that case, one may not observe significant equity price changes following unionization. To evaluate how equity investors respond to union election outcomes, we calculate a market-adjusted equity CAR for each firm around its election date. We assess equity CARs from the day prior to the election to 30 days after the election (*CAR* (–1, 30)). We further calculate equity CARs in a longer horizon corresponding to our baseline bond CAR tests, from 30 days prior to a union election to 90 days following the election (*CAR* (–30, 90)).

Figure VI compares these equity CARs for close union winners and losers. The left panel shows the results for equity *CAR* (–1, 30) and the right panel shows the results for *CAR* (–30, 90). The patterns in Figure VI show no significant differences in investors' response to union election outcomes around the 50% vote share cutoff. The pattern that unionization triggers no response in equity prices is consistent with the notion that bankruptcy costs, as opposed to the bankruptcy likelihood, underlies the channel through which union formation affect bond prices.

5.4 Assessing Value Transfers

We end our analysis with an assessment of the economic magnitudes implied in bondholders' reactions. We have shown that worker unionization brings losses to unsecured creditors. We have also shown that some of those losses are attributable to costs arising from in-court bankruptcy proceedings. It is important that we put those costs (total bond losses and court costs) into perspective, fleshing out magnitudes and assessing the consequences they bring to workers and creditors. Notably, the bankruptcy process allows — even if only temporarily — for workers to continue receiving wages and enjoying benefits. Continuation of employment can be seen as a wealth transfer amongst corporate insiders. This welfare effect stands in contrast

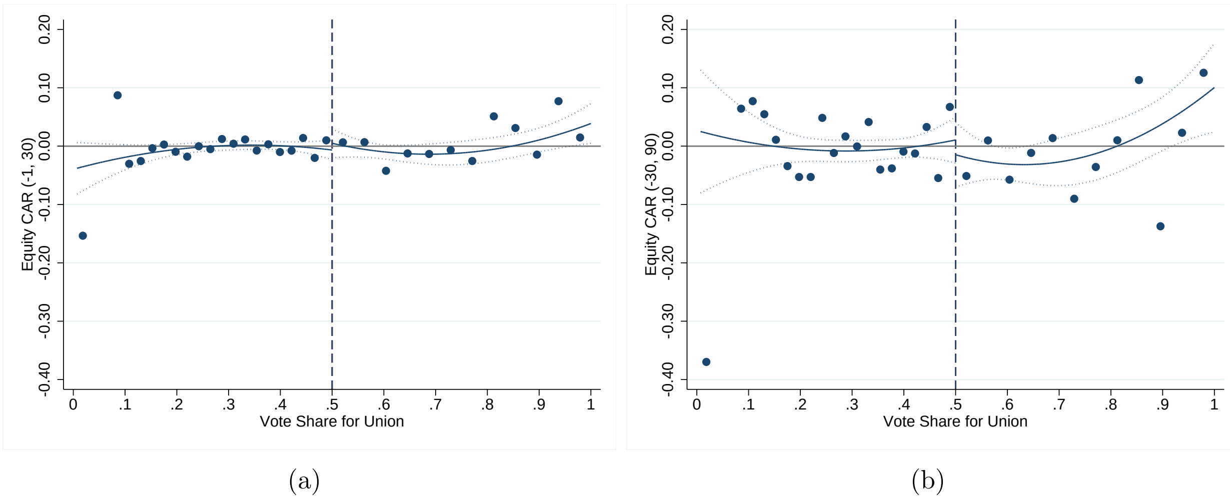


Figure VI. Equity CARs following union elections
This figure compares equity investors' responses to close union winners and close union losers using local linear regressions. The left panel shows the results for equity CAR (–1, 30), and the right panel shows the results for CAR (–30, 90). Vote share for union is shown on the horizontal axis.

to transfers from firm insiders to outside parties, such as attorneys, financial advisors, and other professionals involved in court litigation. While it is difficult to measure these wealth effects, our setting allows us to perform a back-of-the-envelope calculation that helps tease out some of the magnitudes involved.

We start by calculating the total value loss to bondholders induced by unionization. From our estimates, a close union winner experiences a 470-basis-point decline in bond values over the 12-month period following the union election (cf. Table V). Given that the average firm in our sample has $1,087 million in bonds outstanding, this estimate translates to an average of $51 million total value loss for bondholders.

Next, we estimate bondholders' losses that arise from the increases in court costs attributable to unionization. Estimates of direct bankruptcy costs range from as low as 2.8% (cf. Weiss (1990)) to 6% (Altman (1984)) of firms' total asset values. We choose a conservative figure of 2.8%. The estimations in Table IX suggest that unionization is associated with 53% higher bankruptcy costs. Accordingly, we take that unionization is associated with a higher bankruptcy cost equivalent to 1.5% of a firm's total asset value (= 53% × 2.8%). The average firm in our sample has a total asset value of $21.5 billion; thus, we estimate that bankruptcy is likely to cost \$294 million more for unionized firms (= 1.5% × \$21.5 billion).

The last element we need to consider is the probability that firms default. We estimate default probabilities according to firms' credit ratings, and we employ two measures of default. We first use historical default probabilities from Moody's (cf. Canter et al. (2007)), which are simple statistics of past observed default events. We also use risk-neutral default probabilities estimated by Almeida and Philippon (2007), who account for investors' risk preferences, implying default probabilities that are higher than historical occurrences.[28] Given that our sample firms have an average credit rating of A3, they have a historical default probability of 1.6% and a risk-neutral default probability of 12%.

With these default probability statistics, we estimate an expected explicit bankruptcy cost of around \$4.8 million for our sample firms under the historical default probability (= 1.6% × \$294 million), a negligible portion of the \$51 million total bondholder loss. Under the risk-neutral default probability, however, we expect bankruptcy costs to be \$36 million (= 12% × \$294 million), which accounts for a large proportion of the total losses.

The estimates above point to two possible channels through which bondholders' wealth is dissipated in bankruptcy. Modern asset pricing theory suggests that risk-neutrality underlies the calculation of bond prices (Duffie and Singleton (1999) and Elton et al. (2001)). If bond investors price their claims using risk-neutral probabilities, then our results imply that over 70% of observed losses to bond values stem from expected court costs (wealth that is in great part transferred to professionals involved in the litigation process). If one relies on historical default probabilities, on the other hand, then a plausible conclusion is that bondholder losses are more likely to be partially captured by unionized workers (Abowd (1989)).

[28]Risk-neutral measures take into account investors' disutility when defaults happen in low consumption states. It correctly prices an Arrow-Debreu security that pays off \$1 in different states of the world. As corporations are more likely to default in bad economic times, defaultable bond prices will be more heavily discounted compared to their actual historical default rates (Almeida and Philippon (2007)). In other words, risk-neutral default probabilities are higher than historical probabilities so that the securities are priced fairly.

6 Concluding Remarks

Using a comprehensive sample of union elections spanning four decades, we study the effects of unionization on bond values using a regression discontinuity design. We find that union victories lead to significant declines in bond prices. As we investigate channels through which unionized labor affects bond values, we find that unionization causes significant increases in bankruptcy costs, yet no changes in the probability of bankruptcy. Our estimates suggest that unionized firms generally spend 50% more in direct bankruptcy costs than non-unionized firms. The impacts of unionization on bond values are stronger for financially distressed firms and those in states with Right-to-Work laws.

Our paper sheds new light on how organized labor interacts with financial stakeholders of the firm, unsecured creditors in particular. We show that unions can make bankruptcy more costly, prolonged, and convoluted through the way unionized workers' rights are assigned under Chapter 11 proceedings. Our study shows that the rights of unions in court are recognized by creditors, who in turn price it into firms' funding costs. The analysis provides insights for researchers and policymakers in better understanding how firm–labor relations shape corporate access to credit.

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Appendix A Variable Definitions

Vote Share for Union: The ratio of the number of employees in the unit voting for the union to the number of employees in the unit eligible to vote. Data source: NLRB

Union Victory: A dummy variable that equals one if the union gains more than half of the votes and obtain the legal representation status, and zero otherwise. Data source: NLRB

ROA: Earnings before interest and tax (EBIT)/total assets. Data source: Compustat

Size: ln(Total assets). Data source: Compustat

B/M: The ratio of the book value of equity to the market value of equity. Data source: Compustat and CRSP

Liability Ratio: Total liability/total assets. Data source: Compustat

Cash: The ratio of cash and short-term investments to total assets. Data source: Compustat

Tangibility: The ratio of property, plant, and equipment to total assets. Data source: Compustat

Z-score: 3.3 × EBIT/total assets + 1.0 × sales/total assets + 1.4 × retained earnings/total assets + 1.2 × working capital/total assets. Data source: Compustat

O-score: − 1.32 − 0.407 × size + 6.03 × liability ratio − 1.43 × working capital/total assets+ 0.0757 × current liabilities/current assets − 1.72 X − 2.37 × net income/total assets − 1.83 × funds from operations/total liabilities + 0.285 Y − 0.521 × (net income(t) − net income($t-1$))/(|net income(t)| + |net income($t-1$)|), where X is an indicator for total liabilities being larger than total assets, and Y is an indicator for net losses in the past two years. Data source: Compustat

Distance-Default: A measure of distance to default, as in Bharath and Shumway (2008). *Distance-Default*=$\frac{ln(V/F)+(\mu-0.5\sigma_V^2)T}{\sigma_V\sqrt{T}}$. Data source: Compustata and CRSP

Bond Liquidity: The monthly normalized standard deviation of the bond price (normalized by the monthly average price) divided by the monthly trading volume (in millions $). If a firm has multiple bonds outstanding, bond liquidity is the average liquidity across all bonds outstanding. Data source: TRACE and FISD

Duration: The log of the number of days from the day on which the bankruptcy case was filed to the day on which the judge signed the order confirming a plan of reorganization or to the day on which the Chapter 11 case was converted to Chapter 7 or dismissed, whichever is applicable. Data source: UCLA-LoPucki Bankruptcy Research Database

Total Fees and Expenses Paid in Court: The log amount of fees and expenses awarded by the court in the bankruptcy case. Data source: UCLA-LoPucki Bankruptcy Research Database

Number of Legal and Financial Professionals Hired: The log number of professional firms filing fee applications in the bankruptcy case. Data source: UCLA-LoPucki Bankruptcy Research Database

Fees Paid to Attorneys: The log amount of fees and expenses awarded to attorneys of the bankruptcy case by the court. Data source: UCLA-LoPucki Bankruptcy Research Database

Fees Paid to Creditor Committee's Attorneys: The log amount of fees and expenses paid to the creditor committee's lead attorney. Data source: UCLA-LoPucki Bankruptcy Research Database

Table I
Summary statistics
This table provides summary statistics of the variables of interest in our sample, including election information, firm characteristics, and bond statistics. *Election Year* is the year in which the election was held. *ROA*, *Size*, *Liability Ratio*, *Cash*, *Tangibility*, *B/M*, *Z-score*, *O-score*, and *Distance-Default* are based on the information collected during the year of the election. *# Bonds per Firm*, *Bond Maturity*, and *Bond Rating* are based on the information during the month of the election. *# Bonds per Firm* is the average number of bonds outstanding for a firm. *Bond Maturity* measures the time to maturity for a bond. *Bond Rating* is the Moody's credit rating on the bonds. When a firm has multiple bonds, we use a simple average to measure a firm's *Bond Maturity* and *Bond Rating*. The sample period is from 1977 to 2010.

	N	Mean	Std. Dev.	Median	5 Pct.	95 Pct.
Election Year	721	1990.030	9.447	1989	1978	2007
# Valid Votes	721	232.877	633.143	118	55	756
Vote Share for Union	721	0.414	0.187	0.384	0.165	0.800
ROA	698	0.090	0.045	0.085	0.025	0.166
Size	703	8.829	1.207	8.862	6.761	10.609
B/M	673	0.726	0.871	0.670	0.193	1.669
Liability Ratio	703	0.662	0.179	0.633	0.457	0.871
Cash	703	0.043	0.045	0.028	0.003	0.132
Tangibility	703	0.407	0.221	0.383	0.068	0.759
Z-score	577	3.586	2.434	3.126	1.371	6.999
O-score	703	–0.921	1.453	–0.988	–2.826	1.205
Distance-Default	671	7.005	3.965	6.529	2.035	14.572
# Bonds per Firm	721	4.08	3.59	3	1	46
Bond Maturity (years remaining)	721	13.21	7.07	12.615	0.71	34.66
Bond Rating (Aaa+=1, Aaa=2,...,C=22)	721	8.21	3.77	8	2	19.67

Table II
Bond CARs following union elections, event study
This table reports average bond CARs following union elections. $CAR\,(T_1, T_2)$ denotes the cumulative abnormal return from month T_1 to month T_2 relative to the union election month. Column (1) summarizes the average bond CAR for all elections in our sample. Column (2) shows average bond CARs following union victory elections, in which unions receive more than 50% of the votes. Column (3) shows average bond CARs following union loss elections, when unions receive 50% or less of the vote. Column (4) shows average CARs following close wins, when the vote share for unionization is between 50% (exclusive) and 65%. Column (5) shows average bond CARs following close losses, when the vote share for unionization is between 35% and 50% (inclusive).

	(1)	(2)	(3)	(4)	(5)
	All Elections	Union Victory	Union Defeat	Close Win	Close Loss
CAR (-1, 3)	–0.002**	–0.002	–0.002*	–0.006**	–0.001
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)
CAR (-1, 6)	–0.004***	–0.004	–0.004***	–0.009**	–0.005**
	(0.001)	(0.003)	(0.001)	(0.004)	(0.002)
CAR (-1, 9)	–0.006***	–0.009**	–0.005***	–0.013**	–0.003
	(0.002)	(0.004)	(0.002)	(0.005)	(0.003)
CAR (-1, 12)	–0.010***	–0.013***	–0.009***	–0.018***	–0.006**
	(0.002)	(0.004)	(0.002)	(0.007)	(0.003)
Observations	721	180	541	107	245

Table III
Continuity of firm characteristics

This table reports the results from local linear regressions for firm characteristics in the election year. *Union Victory* is a dummy variable that equals one if a union receives more than 50% of votes and zero otherwise. Only the coefficients of *Union Victory* are reported. We use the rectangular kernel and the optimal bandwidth defined in Imbens and Kalyanaraman (2012). Standard errors are clustered by firm.

	Union Victory Coefficient	Std. Err.	*Z*-statistics	*P*-value
ROA	–0.001	0.012	–0.080	0.936
Size	0.233	0.335	0.700	0.486
B/M	-0.334	0.291	–1.150	0.252
Liability Ratio	0.016	0.039	0.400	0.686
Cash	0.008	0.009	0.880	0.377
Tangibility	–0.057	0.054	–1.050	0.294
Z-score	–0.527	0.531	–0.990	0.321
O-score	0.052	0.260	0.200	0.841
Distance-Default	–1.229	1.064	–1.150	0.248
Bond Liquidity	0.006	0.01	0.662	0.508

Table IV

Polynomial regression results for bond CARs

This table reports the results from polynomial regression analyses for bond CARs following union elections. *Union Victory* is a dummy variable that equals 1 if the union wins the election and equals 0 if not. *Vote Share for Union* is the percentage share of votes in support of unionization in the election. *Multiple Elections* is a dummy variable that equals 1 if the firm conducts more than one elections during our sample period. The interaction terms of *Multiple Elections* with the polynomial terms of *Vote Share for Union* are also controlled for, but their coefficients are suppressed. Standard errors are clustered by firm.

	CAR (–1, 3)			*CAR* (–1, 6)			*CAR* (–1, 9)			*CAR* (–1, 12)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Union Victory	–0.000	–0.007*	–0.024***	0.000	–0.003	–0.023*	–0.003	–0.012*	–0.046**	–0.003	–0.016**	–0.056**
	(0.003)	(0.004)	(0.009)	(0.003)	(0.005)	(0.013)	(0.004)	(0.006)	(0.018)	(0.005)	(0.007)	(0.022)
Vote Share for Union		0.018*	0.004		0.011	–0.114		0.027**	–0.079		0.038***	–0.041
		(0.010)	(0.162)		(0.011)	(0.170)		(0.012)	(0.233)		(0.015)	(0.253)
(Vote Share for Union)^2			–1.156			–1.526			–1.908			–2.001
			(1.351)			(1.553)			(2.106)			(2.348)
(Vote Share for Union)^3			–6.616			–6.049			–7.926			–8.686
			(4.617)			(5.352)			(7.025)			(7.930)
Union Victory× *Vote Share for Union*			0.435			0.770*			1.135*			1.284*
			(0.314)			(0.394)			(0.588)			(0.704)
Union Victory× *(Vote Share for Union)*^{2}			–1.992**			–2.745**			–4.952***			–5.887***
			(0.944)			(1.228)			(1.668)			(2.086)
Union Victory× *(Vote Share for Union)*^{3}			15.920			15.780			22.539			25.008
			(9.823)			(11.499)			(15.047)			(17.359)
Multiple Elections			–0.008			–0.012**			–0.016***			–0.016**
			(0.005)			(0.005)			(0.006)			(0.007)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	721	721	721	721	721	721	721	721	721	721	721	721
R-squared	0.129	0.134	0.160	0.161	0.163	0.186	0.167	0.172	0.199	0.153	0.161	0.192

*** p-value<0.01, ** p-value<0.05, * p-value<0.10

Table V

Local linear regression results for bond CARs

This table reports the results from local linear regression analysis for bond CARs following the NLRB election month. $CAR\,(T_1, T_2)$ denotes the cumulative abnormal return from month T_1 to month T_2 relative to the union election month. We report the coefficient on *Union Victory* for each dependent variable and specification. Panel A presents results based on estimations with rectangular kernels, and Panel B presents results based on estimations with triangular kernels. Standard errors are clustered by firm.

Panel A: Coefficients of Union Victory (Rectangular Kernel)

	CAR (–1, 3)	*CAR* (–1, 6)	*CAR* (–1, 9)	*CAR* (–1, 12)
Optimal Bandwidth	–0.021***	–0.022*	–0.040**	–0.047**
	(0.007)	(0.012)	(0.017)	(0.021)
Observations	366	321	264	296
75% Optimal Bandwidth	–0.021**	–0.023	–0.050**	–0.061**
	(0.009)	(0.014)	(0.021)	(0.025)
Observations	277	239	196	225
125% Optimal Bandwidth	–0.018***	–0.021**	–0.036**	–0.043**
	(0.006)	(0.009)	(0.015)	(0.017)
Observations	460	402	335	370

Panel B: Coefficients of Union Victory (Triangular Kernel)

	CAR (–1, 3)	*CAR* (–1, 6)	*CAR* (–1, 9)	*CAR* (–1, 12)
Optimal Bandwidth	–0.020***	–0.021*	–0.041**	–0.050**
	(0.007)	(0.012)	(0.018)	(0.021)
Observations	468	405	340	379
75% Optimal Bandwidth	–0.022**	–0.020	–0.043**	–0.055**
	(0.009)	(0.014)	(0.021)	(0.025)
Observations	352	298	254	279
125% Optimal Bandwidth	–0.018***	–0.020*	–0.038***	–0.044**
	(0.006)	(0.010)	(0.015)	(0.018)
Observations	554	491	429	468

Table VI

Performance changes 5 years following election

This table provides the results of the changes in industry-adjusted performance using local linear regressions. The dependent variables are the changes in firm characteristics related to performance or risk, relative to the year prior to the election. Only the coefficients of *Union Victory* (standard errors) are reported. We use the optimal bandwidth defined in Imbens and Kalyanaraman (2012) and the rectangle kernel for estimation.

Year	*ROA*	*Size*	*B/M*	*Liability Ratio*	*Cash*	*Tangibility*	*Z-score*	*O-score*	*Distance-Default*
1	0.002	0.119	-0.114	-0.006	0.018*	-0.027*	1.425**	-0.126	0.968
	(0.008)	(0.282)	(0.072)	(0.033)	(0.011)	(0.016)	(0.653)	(0.262)	(0.944)
2	-0.001	0.150	-0.250	-0.014	0.006	-0.011	1.398	-0.149	0.541
	(0.011)	(0.499)	(0.174)	(0.025)	(0.011)	(0.013)	(0.878)	(0.233)	(0.767)
3	0.022*	0.825*	-0.052	-0.041	0.021	0.017	0.155	-0.731**	1.562
	(0.011)	(0.465)	(0.180)	(0.039)	(0.014)	(0.026)	(0.930)	(0.347)	(1.340)
4	0.041***	0.715	-0.568	-0.021	0.030**	0.003	-1.290	-0.877*	1.301
	(0.016)	(0.467)	(0.548)	(0.042)	(0.013)	(0.020)	(2.373)	(0.461)	(0.813)
5	0.034*	0.391	-0.576	-0.027	0.019	0.008	0.783	-0.768	2.009
	(0.018)	(0.501)	(0.410)	(0.050)	(0.014)	(0.025)	(0.800)	(0.483)	(1.367)

Table VII
Bond CARs for issues maturing within 5 years
This table reports the test results from local linear regressions on the impact of unionizations on bonds matured within 5 years after the election year. Only the coefficients of *Union Victory* (standard errors) are reported. The dependent variable is bond CAR.

Panel A: Coefficients of Union Victory (Rectangular Kernel)				
	CAR (–1, 3)	*CAR* (–1, 6)	*CAR* (–1, 9)	*CAR* (–1, 12)
Optimal Bandwidth	–0.012*	–0.037**	–0.041**	–0.026*
	(0.007)	(0.014)	(0.016)	(0.015)
Observations	293	193	191	266
75% Optimal Bandwidth	–0.017**	–0.039**	–0.048***	–0.038**
	(0.007)	(0.016)	(0.019)	(0.020)
Observations	234	139	135	198
125% Optimal Bandwidth	–0.011*	–0.034***	–0.034***	–0.029*
	(0.007)	(0.012)	(0.013)	(0.015)
Observations	341	237	230	308

Panel B: Coefficients of Union Victory (Triangular Kernel)				
	CAR (–1, 3)	*CAR* (–1, 6)	*CAR* (–1, 9)	*CAR* (–1, 12)
Optimal Bandwidth	–0.014*	–0.036***	–0.042***	–0.033**
	(0.007)	(0.014)	(0.016)	(0.017)
Observations	348	239	234	313
75% Optimal Bandwidth	–0.016**	–0.038**	–0.048***	–0.039**
	(0.008)	(0.016)	(0.018)	(0.019)
Observations	280	187	177	254
125% Optimal Bandwidth	–0.012*	–0.034***	–0.037***	–0.028*
	(0.007)	(0.013)	(0.013)	(0.015)
Observations	389	285	279	361

Table VIII
The impact of unionization on the bankruptcy process
This table analyzes the impact of unionization on bankruptcy procedures. *Duration* is defined as the log of the number of days from the bankruptcy filing date to the conclusion of a Chapter 11 bankruptcy case. *DIP* is a dummy variable that equals one if a firm obtains debtor-in-possession financing during bankruptcy and zero otherwise. *Emergence* is a dummy variable that equals one if the company emerged from bankruptcy and zero otherwise. *Refiling* is a dummy variable that equals one if the emerging company refiled bankruptcy and zero otherwise. *Union* is a dummy variable that equals one if the bankruptcy firm had unionized workers before bankruptcy. Column (1) presents the result from a matching estimator, in which we match each unionized firm with four non-unionized firms that file bankruptcy in the same year, with similar characteristics including *ROA*, *Size*, *Liability Ratio*, *Cash*, and *Tangibility*. Columns (2) through (4) present results from logistic regressions that control for the same set of firm characteristics and year-fixed effects. In each column, the coefficient (heteroscedasticity-robust standard errors) on *Union* is reported.

	(1)	(2)	(3)	(4)
Dep. Var.	*Duration*	*DIP*	*Emergence*	*Refiling*
Union	0.272***	1.098***	0.753***	0.602**
	(0.099)	(0.373)	(0.241)	(0.301)
Observations	512	228	492	487

*** p-value<0.01, ** p-value<0.05, * p-value<0.10

Table IX

The impact of unionization on bankruptcy costs

This table compares the fees and expenses during bankruptcy incurred by unionized and matched non-unionized firms. We compare bankruptcy fees across the following dimensions: (1) *Total Fees and Expenses Paid in Court*, measured as the log amount of total fees and expenses incurred in the bankruptcy court; (2) *Number of Legal and Financial Professionals Hired*, the log number of legal and financial professionals, (3) *Fees Paid to Attorneys*, the log amount of fees and expenses awarded to attorneys, indicating the legal costs among the expenses; and (4) *Fees Paid to Creditor Committee's Attorneys*, the log amount of fees and expenses awarded to the creditor committee's lead attorney, indicating the costs related to the creditor committee's lead attorney. We compare these dimensions of bankrutpcy costs by matching a unionized firm with four non-unionized firms that file for bankruptcy in the same year, with similar characteristics including *ROA*, *Size*, *Liability Ratio*, *Cash*, and *Tangibility*.

	(1) *Total Fees and Expenses Paid in Court*	(2) *Number of Legal and Financial Professionals Hired*	(3) *Fees Paid to Attorneys*	(4) *Fees Paid to Creditor Committee's Attorneys*
Union	0.534**	0.269*	0.676**	0.539*
	(0.213)	(0.137)	(0.268)	(0.308)
Observations	68	67	68	61

*** p-value<0.01, ** p-value<0.05, * p-value<0.10

Table X

Firm heterogeneity

This table provides RDD results from local linear regressions on the impact of unionization on bond returns for firms with different default risks. Only the coefficients of *Union Victory* are reported. We examine healthy and distressed firms based on their Z-scores (above 3 or below 1.8), Distance-Default (top and bottom quintile), and O-scores (below or above 0.5) in the election year as well as their credit ratings (investment or speculative grade) in the election month. The dependent variable is bond CAR. We use the optimal bandwidth defined in Imbens and Kalyanaraman (2012) for estimation. All standard errors are clustered by firm.

Panel A: Coefficients of Union Victory (Rectangular Kernel)

	Distressed				Healthy			
	Z-score	*O-score*	*Distance-Default*	*Rating*	*Z-score*	*O-score*	*Distance-Default*	*Rating*
CAR (–1, 3)	–0.078***	–0.035*	–0.020	–0.062***	–0.008	–0.013*	–0.033*	–0.011*
CAR (–1, 6)	–0.094*	–0.139***	–0.008	–0.082**	–0.010	–0.003	0.011	–0.004
CAR (–1, 9)	–0.130*	–0.204***	–0.059*	–0.121***	–0.023	–0.010	–0.029	–0.010
CAR (–1, 12)	–0.150***	–0.239**	–0.075*	–0.152**	–0.028	–0.015*	–0.017	–0.018*

Panel B: Coefficients of Union Victory (Triangular Kernel)

	Distressed				Healthy			
	Z-score	*O-score*	*Distance-Default*	*Rating*	*Z-score*	*O-score*	*Distance-Default*	*Rating*
CAR (–1, 3)	–0.075***	–0.048**	–0.012	–0.058**	–0.011	–0.011	–0.037**	–0.009
CAR (–1, 6)	–0.088*	–0.135***	–0.011	–0.075**	–0.013	–0.003	0.002	–0.002
CAR (–1, 9)	–0.119*	–0.201***	–0.051	–0.118**	–0.023	–0.011	–0.031	–0.013
CAR (–1, 12)	–0.141***	–0.236**	–0.073*	–0.148**	–0.026	–0.016	–0.011	–0.017

Table XI
The role of Right-to-Work (RTW) laws

This table provides results from local linear regressions for subsamples based on whether the union election takes place in states with or without RTW laws. We examine the impact of unionization on bond returns for each subsample and report the coefficients of *Union Victory* for all event horizons and both subsamples. The dependent variable is bond CAR. We use optimal bandwidth defined in Imbens and Kalyanaraman (2012) for estimation. Standard errors are clustered by firm.

Panel A: Coefficients of Union Victory (Rectangular Kernel)

	RTW (not passed)		RTW (passed)	
	Unionization Coef.	Std. Err.	Unionization Coef.	Std. Err.
CAR (–1, 3)	–0.022**	(0.009)	–0.025*	(0.013)
CAR (–1, 6)	–0.030*	(0.015)	–0.005	(0.020)
CAR (–1, 9)	–0.054**	(0.022)	–0.017	(0.018)
CAR (–1, 12)	–0.067**	(0.028)	–0.018	(0.022)

Panel B: Coefficients of Union Victory (Triangular Kernel)

	RTW (not passed)		RTW (passed)	
	Unionization Coef.	Std. Err.	Unionization Coef.	Std. Err.
CAR (–1, 3)	–0.021**	(0.009)	–0.019	(0.012)
CAR (–1, 6)	–0.029*	(0.015)	–0.005	(0.021)
CAR (–1, 9)	–0.055**	(0.022)	–0.013	(0.018)
CAR (–1, 12)	–0.068**	(0.029)	–0.014	(0.022)

Table XII
Robustness results for local linear analyses
This table reports the results from alternative specifications of local linear regression analyses for bond CARs following the NLRB election month. $CAR(T_1, T_2)$ denotes the cumulative abnormal return from month T_1 to month T_2 relative to the union election month. We report the RDD coefficient on *Union Victory* for each dependent variable and specification. Column (1) shows the benchmark local linear regression results with our sample. Column (2) shows the results on a subsample of elections that are not held within 2 months of a previous election. Column (3) shows the results for firms in manufacturing, and transportation and communications industries (1-digit SIC being 2, 3, or 4). Column (4) shows the results for a sample of CARs for a firm's largest bond in market value instead of firm-level weighted average. All regressions use rectangular kernels and Imbens and Kalyanaraman (2012) optimal bandwidths. Standard errors are clustered by firm.

	(1) Benchmark	(2) Distant Elections	(3) Industrial Firms	(4) Individual Bonds
CAR (–1, 3)	–0.021***	–0.018**	–0.021***	–0.013*
	(0.007)	(0.007)	(0.008)	(0.007)
CAR (–1, 6)	–0.022*	–0.024*	–0.024*	–0.010
	(0.012)	(0.013)	(0.013)	(0.014)
CAR (–1, 9)	–0.040**	–0.042**	–0.032**	–0.024*
	(0.017)	(0.019)	(0.015)	(0.014)
CAR (–1, 12)	–0.047**	–0.057**	–0.035**	–0.035*
	(0.021)	(0.024)	(0.016)	(0.021)
Observations	721	637	541	674