The Market for Corporate Control and the Cost of Debt

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Abstract

How do bondholders view the existence of an open market for corporate control? Between 1985 and 1991, 30 states in the U.S. enacted business combination (BC) laws, raising the cost of corporate takeovers. Relying on these exogenous events, we estimate the influence of the market for corporate control on the cost of debt. We identify different channels through which an open market for corporate control can benefit or harm bondholders: a reduction in managerial slack or the "quiet life," resulting in higher profitability and firm value; a coinsurance effect, in which firms become less risky after being acquired; and an increasing leverage effect, in which bondholder wealth is expropriated through leverage-increasing takeovers. Consistent with the first two mechanisms, we find that the cost of debt rose after the passage of the BC laws; moreover, it rose sharply for firms in non-competitive industries, and for firms rated speculative-grade. In contrast, there is virtually no effect for firms in competitive industries, or firms rated investment-grade.

1 Introduction

The market for corporate control, often referred to as the takeover market, can be an effective governance mechanism to discipline managers and reduce agency costs within a firm (e.g., Jensen and Ruback (1983) and Shleifer and Vishny (1997)). However, significant barriers, in the form of antitakeover provisions in a firm's charter and state-level antitakeover laws, can dampen the effectiveness of this important external mechanism of corporate governance. Recently, Gompers, Ishii, and Metrick (2003) show that firms with a greater number of antitakeover provisions in their charters are associated with lower equity returns, suggesting that a weaker market for corporate control could hurt shareholders. This raises an interesting question as to how bondholders—an important group of claimholders in the capital structure—view an open market for corporate control. We make several contributions to this literature. First, we use regulatory events, namely, the passage of second-generation antitakeover laws during 1985-1991 in different states, to identify the relation between the market for corporate control and the cost of debt. This approach avoids the endogeneity problem associated with firm-level governance metrics. Moreover, we recognize that the takeover market—even though it can reduce the moral hazard problem for managers—can often amplify the divergence between shareholder and bondholder interests. Therefore, we identify multiple mechanisms through which the threat of takeovers can influence the cost of debt, and we attempt to disentangle each of these effects from the data.

First, we consider the influence of the takeover market on managerial preferences, which can affect firm value and the welfare of both shareholders and bondholders. The market for corporate control can be viewed as a market in which managers compete for the privilege to manage a firm's resources (Fama (1980) and Jensen and Ruback (1983)). An active takeover market could raise managerial career concerns and reduce managerial slack. In particular, Bertrand and Mullainathan (2003) find that, after the passage of second-generation antitakeover laws, workers' wages rise, firm size and capital expenditures remain unchanged, while profitability and productivity decline. They argue that this is consistent with a quiet

life preference, in which managers, when shielded from takeovers, are reluctant to perform cognitively difficult tasks such as closing old plants, starting new ones, or bargaining with suppliers and labor unions. Giroud and Mueller (2008) argue that managerial slack cannot survive in a competitive market and that industry competition can mitigate and even eliminate the managerial preference for the quiet life. By examining the interaction between the passage of antitakeover laws and industry competition, they find that a weakened market for corporate control results in higher input costs, wages, and overhead costs, but only so in non-competitive industries. We therefore label this as the quiet life effect, in which an open market for corporate control reduces managerial slack, increases profitability and firm value, and yields a lower cost of debt; further, the magnitude of the effect is modulated by industry competitiveness.[1]

The effect of an open market for corporate control, however, goes beyond aligning the interests of management and a firm's claimholders. In actual takeovers, the financial risk of both the acquirer and the target often changes significantly. For instance, when two firms with imperfectly correlated cash flows combine, bondholders may benefit from a reduction in total risk. In support of this hypothesis, Billett, King, and Mauer (2004) find that target bondholders earn an average excess return of 1.09 percent around takeover announcements; they also find a much bigger effect (4.30 percent) when the target firm is rated speculative-grade. For acquirer bondholders, however, the wealth effects are much smaller. The implication for bondholders in general, not necessarily those whose firms are currently acquiring or being acquired, is that an open market for corporate control leads to a lower cost of debt; in addition, the effect would be more pronounced for firms with higher credit risk. Following Billett, King, and Mauer (2004), we loosely label this as the coinsurance effect.

[1]As an alternative to the quiet life preference, managers who enjoy the private benefit of control, but do not bear the full cost of their actions, may overinvest to "build empires." Li (2007) argues that through overinvestment, managers can increase the capital stock and the associated cash flows in order to avoid liquidation, benefitting bondholders. However, neither Bertrand and Mullainathan (2003) nor Giroud and Mueller (2008) find support for the empire-building models of managerial preference.

A more pessimistic view of takeovers, from a bondholder's perspective, is that hostile takeovers can exacerbate the expropriation of bondholder wealth. For example, management often responds to hostile takeovers by increasing leverage or paying out liquid assets; following a leveraged buyout, the amount of debt can also increase dramatically. Notably, Warga and Welch (1993) find that bondholders suffer average losses of six to seven percent around announcements of leveraged buyouts (see also Asquith and Wizman (1990)). If bondholder are generally concerned with the effect of leverage-increasing takeovers, an open market for corporate control would give rise to a higher cost of debt. In particular, the effect would be stronger for firms with lower leverage, as they are more likely to be targeted by leverage-increasing takeovers (Chava, Livdan, and Purnanandam (2008)). We label this as the increasing leverage effect.

Combining all of these considerations, it is apparent that the effect of takeover threat on the cost of debt can be quite complex. How bondholders assess and aggregate the various costs and benefits of an open market for corporate control remains unclear, and whether any of the hypothesized effects would dominate is ultimately an empirical question. Therefore, we conduct an empirical analysis of the relation between the market for corporate control and credit spreads. Following Karpoff and Malatesta (1989), Garvey and Hanka (1999), Bertrand and Mullainathan (2003), Cheng, Nagar, and Rajan (2004), Yun (2007), Giroud and Mueller (2008), and others, we treat the passage of state-level antitakeover laws as exogenous shocks to the market for corporate control. Specifically, we focus on the passage of business combination (BC) laws, which created hurdles for certain transactions between the target firm and corporate raiders, such as mergers and asset sales. According to Bertrand and Mullainathan (2003), business combination laws are the most stringent among the second-generation antitakeover laws. Because they significantly weaken corporate takeovers as a disciplinary device, changes in business combination laws present a unique opportunity for us to study the relation between the market for corporate control and the cost of debt.[2]

[2]We conduct a separate empirical analysis using other types of antitakeover state laws, such as control share acquisition laws and fair price laws. Our results show that they do not have a significant effect on the

We use the differences-in-differences approach to gauge the effect of the BC laws. Specifically, we compare the change in credit spread around the time a BC law was passed (say, year t) for firms affected by the law to the change in credit spread for firms unaffected by the law. Our sample consists of 3,996 firm years of observations from 1976 to 1995, and includes firms incorporated in 26 states that passed a BC law and 13 states which did not pass a BC law. Because these laws were enacted in different years for different states, our control group is not limited to firms incorporated in states in which no BC law was passed; rather, it also includes firms incorporated in states in which a BC law was passed either before or after year t. This ensures that there are no systematic differences between the treatment and control groups. Nevertheless, we include several well-documented determinants of credit spreads as control variables, such as credit rating, firm size, leverage, cash flow volatility, profitability, and sales growth. We also compute average credit spreads in a given year across all firms (excluding the firm in question) in a given industry or state of location, and use them to control for changes in industry-wide or state-level economic conditions that might be concurrent with the passage of the BC laws. As pointed out by Giroud and Mueller (2008), this is made possible by a general lack of congruence between a firm's industry, state of incorporation, and state of location.

Our findings are briefly documented as follows: First, we find that the passage of BC laws causes the credit spread to rise by an average of 28 basis points. This is both statistically and economically significant, given a sample median credit spread of 89 basis points. To see how much the quiet life effect plays a role in our finding, we follow Giroud and Mueller (2008) to interact the BC law dummy with the level of industry competition, as proxied by the Herfindahl index. Extrapolating to a perfectly competitive industry, we find that the effect of the BC laws on credit spreads is essentially zero. However, for a one-standard-deviation increase in the Herfindahl index, the effect of the BC laws on credit spreads increases by 22 basis points. This finding is consistent with Giroud and Mueller's main result that market

cost of debt. These results are available upon request.

competition helps to eliminate managerial slack. To shed light on the coinsurance effect, we interact the BC law dummy with an indicator of whether the firm has an investment-grade or speculative-grade credit rating. For investment-grade firms, we find no evidence of a significant increase in credit spreads after the law-change. In contrast, we find a highly significant increase in credit spreads of over 134 basis points among speculative-grade firms, which suggests that speculative-grade bondholders were expecting a significant loss of coinsurance benefits after the BC laws took effect. This result is consistent with Billett, King, and Mauer (2004)'s findings based on actual takeovers. Lastly, we interact the BC law dummy with an indicator of whether the firm's leverage is below the sample median. The hypothesis is that the increasing leverage effect mostly afflicts firms with low leverage, rendering a negative coefficient for the this interaction term. However, we find this coefficient to be positive and significant; moreover, it becomes insignificant in a regression that also includes the interaction between the BC law dummy and the level of industry competition. While this is inconsistent with the increasing leverage effect, it fits well with the story that higher leverage could serve as a governance device; managers have less room to accumulate free cash flow and enjoy the quiet life (Jensen (1986) and Zwiebel (1996)). Our finding also suggests that market competition plays a more effective role than leverage in curbing managerial slack.

Our paper belongs to a group of recent studies that examine the effect of the market for corporate control on bondholder wealth, which have produced generally mixed results. For example, Billett, King, and Mauer (2004) find that actual takeovers benefit target bondholders, especially when the target is rated below investment-grade. Similarly, Bradley, Chen, Dallas, and Snyderwine (2007) show that credit spreads are positively related to the presence of firm-level antitakeover provisions, and that this relation is significantly stronger for firms with less than investment-grade ratings. In contrast, Klock, Mansi, and Maxwell (2005), Cremers, Nair, and Wei (2007), and Chava, Livdan, and Purnanandam (2008) find that the threat of takeovers is harmful to bondholders. All of these studies, with the exception

of Billett, King, and Mauer (2004), rely on cross-sectional variations in the G-index or its variants to infer the relation between the market for corporate control and credit spreads. Because of the endogenous nature of firm-level antitakeover provisions, it is possible that the G-index happens to be correlated with a missing risk factor that influences credit spreads. For instance, Li (2007) suggests that firms with more antitakeover provisions are usually larger and older—such firms might have lower information asymmetry, which results in a lower cost of debt. Duarte, Young, and Yu (2007) find that in the presence of information risk variables, the association between the G-index and credit spreads becomes insignificant. There is also the possibility of reverse causality—changes in firm performance (hence the cost of debt) often foreshadow changes in firm-level corporate governance. In contrast, our methodology exploits a one-time change in the market for corporate control mandated by regulatory authorities, which can be safely regarded as an exogenous event.[3]

Several papers have examined the effect of state-level antitakeover laws on credit spreads. For example, Mansi, Maxwell, and Wald (2006) find that state antitakeover laws do not have a significant effect on credit spreads after controlling for state-level payout restrictions. Francis, Hasan, John, and Weisman (2006) find that bond yields are higher in takeover friendly states such as Delaware, and lower in takeover unfriendly states, such as Massachussetts, Ohio, and Pennsylvania. Different from these studies, our inference of the relation between the market for corporate control and the cost of debt is based on the variation in credit spreads around changes in state business combination laws. At the same time, our empirical methodology allows time-invariant heterogeneities (such as state-level payout restrictions and the state of incorporation) to affect the credit spread by including firm fixed effects.

Our paper also contributes to the literature by articulating and then using empirical tests to differentiate multiple mechanisms in which the takeover market can affect the cost

[3]Romano (1987) offers anecdotal evidence that the passage of state antitakeover laws was often the result of political lobbying on behalf of a single firm. Bertrand and Mullainathan (2003) and Giroud and Mueller (2008) test and reject the idea that the BC law changes were the result of broad-based lobbying by a coalition of firms incorporated in the same state. Giroud and Mueller (2008) also argue that removing the small number of firms directly responsible for the passing of the BC laws has no effect on their results.

of debt. Our results suggest that, depending on the environment a firm faces (e.g., industry competition) and the characteristics of the firm (e.g., credit rating and leverage), bondholders in different firms can respond differently to changes in the market for corporate control. It is important to note that, in this paper, we are concerned with the expected effect of the takeover market on the cost of debt for a firm in the general population (i.e., the *ex ante* wealth effect). This should be distinguished from the bondholder wealth effect in actual takeovers (i.e., the *ex post* wealth effect). For example, it is well known that bondholders can suffer substantial losses in leveraged buyouts. Yet the ex ante bondholder wealth loss due to leveraged buyouts also depends on the probability of being targeted by a leveraged buyout.[4] Our results indicate that the ex ante bondholder wealth effect of the takeover market is dominated by the quiet life and coinsurance mechanisms.

The rest of this paper is organized as follows: Section 2 describes the data used in our analysis and explains our methodology. Section 3 presents our empirical results. Section 4 contains additional analyses attesting to the robustness of our findings. We conclude with Section 5.

2 Data and Methodology

2.1 Variables

We combine two major data sources to construct the sample used in our empirical analysis. First, we take corporate bond pricing from the University of Houston's Fixed Income Database.[5] We measure the cost of debt, our dependent variable, as the credit spread, or the difference in yields between a corporate bond and a Treasury bond of the same maturity.

[4]Researchers have found that hostile deals are much less frequent than friendly ones. For example, Schwert (2000) show that hostile bids never represented more than 30 percent of all deals. Andrade, Mitchell, and Stafford (2001) show that no more than four percent of all deals during 1990-1998 were hostile at some stage. Becht, Bolton, and Röell (2003) show that only one to five percent of all deals during 1989-1999 were initially rejected by the target board.

[5]This database has been used in numerous studies in the fixed income literature. For more detailed descriptions, see Duffee (1998, 1999), Helwege and Turner (1999), Collin-Dufresne, Goldstein, and Martin (2001), Elton, Gruber, Agrawal, and Mann (2001), Billett, King, and Mauer (2004), Klock, Mansi, and Maxwell (2005), and Cremers, Nair, and Wei (2007).

Following Cremers, Nair, and Wei (2007), we obtain one-year, three-year, five-year, seven-year, 10-year, and 30-year constant maturity Treasury yields from the Federal Reserve's H-15 Release, which we interpolate into a piecewise linear term structure. To control for the dependence of the credit spread on bond characteristics, we obtain the age, duration, convexity, and S&P's credit rating for each bond from the Fixed Income Database.[6] Because we perform our analysis at the firm level, we use a value-weighted approach to aggregate the credit spread and other bond-level characteristics into firm-level measures. Specifically, we divide the amount outstanding of each bond by the sum of the amount outstanding across all available bonds for the same firm, and use this ratio as the weight in the calculation of firm-level measures.[7]

As motivated by structural credit risk models and subsequently validated by empirical research, a significant part of the variation in credit spreads can be explained by changes in firm characteristics.[8] Following this literature, we obtain the following variables from the Compustat annual file: 1) Firm size, defined as the logarithm of total assets; 2) Firm leverage, defined as long-term debt plus debt in current liabilities, divided by total assets; 3) Firm risk, defined as the standard deviation of annual cash flows from operations (income before extraordinary items plus depreciation and amortization, normalized by total assets) for the past five years; 4) Profitability, defined as earnings before interests, taxes, depreciation, and amortization, normalized by total assets; 5) Sales growth, defined as the percentage change in sales over the past year. These additional control variables are important for several reasons. First, there may be differences between the treatment and control groups in our differences-in-differences estimation that are unrelated to the passage of the BC laws. Including the

[6]We convert the credit rating into a numerical scale as follows: 1-AAA+, 2-AAA, 3-AA+, 4-AA, 5-AA-, 6-A+, 7-A, 8-A-, 9-BBB+, 10-BBB, 11-BBB-, 12-BB+, 13-BB, 14-BB-, 15-B+, 16-B, 17-B-, 18-CCC+, 19-CCC, 20-CCC-, 21-CC, 22-C, and 23-D.

[7]Among our robustness checks, we apply an alternative equally-weighted scheme, and perform a separate analysis using bond-level data; we find that our main conclusions remain intact. Similarly, we exclude bonds with embedded call or put options from our analysis, but our main results stand even if we include these bonds and control for their option features separately in our regressions. For details, see Section 4.

[8]See Collin-Dufresne, Goldstein, and Martin (2001), Campbell and Taksler (2003), Ericsson, Jacobs, and Oviedo-Helfenberger (2005), and Avramov, Jostova, and Philipov (2007), among others.

firm characteristics allows us to control for these differences. Second, it has been shown that changes in state-level antitakeover or payout laws can cause firm characteristics, such as leverage and profitability, to change (Garvey and Hanka (1999), Wald and Long (2007), and Giroud and Mueller (2008)). The inclusion of these controls allows us to estimate the incremental effect of the BC law-change on the cost of debt beyond its measurable impact on the firm characteristics.[9]

Besides the bond-level and firm-level control variables included in a typical study of credit spreads, we require two additional pieces of information about a firm—its state of location and state of incorporation. The state of location—taken to be the state in which the firm is headquartered—allows us to control for changes in state-level economic conditions that might affect its cost of debt. The state of incorporation, on the other hand, determines which state's business combination law is in effect for the firm. A frequently encountered problem is that Compustat only reports the state of incorporation for the most recent year, which may be different from where the firm was incorporated historically. However, many researchers have argued that changes in the state of incorporation occur only infrequently. For example, Bertrand and Mullainathan (2003) randomly select 200 firms from their sample and find that only three firms changed their state of incorporation; moreover, these changes predated their sample period. Cheng, Nagar, and Rajan (2004) find that none of their Fortune 500 companies re-incorporated during a seven-year sample period. Using historical data on state of incorporation from Compact Disclosure, Yun (2007) shows that about one percent of his sample firms changed their state of incorporation during a 14-year sample period. These researchers conclude that changes in the state of incorporation have a minimal impact on their results.

Our analysis also uses the Herfindahl index, defined as the sum of squared market share at the industry level, as a proxy for the level of industry competition. In a perfectly compet-

[9]If we were able to control for every determinant of the credit spread, then changes in BC laws should not have a direct effect on the cost of debt. In reality, however, it is not possible to measure the quiet life, coinsurance, and increasing leverage effects adequately using observable firm characteristics. In this case, it would not be surprising for the BC law-change to have an effect on the credit spread.

itive industry with atomistic firms, the Herfindahl index is equal to zero; in a monopolistic industry, the Herfindahl index is equal to one. Giroud and Mueller (2008) argue that industry classification based on three-digit SIC codes represents a compromise between too coarse a partition, in which unrelated industries may be grouped together, and too fine a partition, which might generate misclassification. We follow their approach. Our subsequent analysis also allows for market share based on either sales or total assets.

2.2 Summary Statistics

Following Bertrand and Mullainathan (2003) and Giroud and Mueller (2008), we choose a sample period of 1976-1995.[10] After winsorizing all variables at the one percent level, our final sample consists of 3,996 firm year observations on 713 firms. Table 1 summarizes the state of incorporation and the state of location for these firms. We take the state and year in which a BC law was passed from Bertrand and Mullainathan (2003). According to the original Bertrand and Mullainathan data, 30 states passed BC laws from 1985 to 1991. However, due to the additional requirement of having bond pricing data, we have to delete four of these states, in which none of our sample firms is incorporated or located. As a result, our 713 sample firms consist of 66 firms incorporated in 13 states that did not pass a BC law, and 647 firms incorporated in 26 states that did. While there are many more firms in states that passed a BC law, our control group includes not only firms incorporated in states that never passed a BC law, but also those incorporated in states that passed a BC law before or after year t. Because the BC law was passed in different states in different years, this ensures that our treatment and control groups are in fact quite balanced. For example, if we were considering the effect of the passage of the BC law in Delaware, our control group would have also included firms incorporated in Arizona, Connecticut, Illinois, Indiana, and so on—states in which a BC law was passed, but either before or after 1989.

The requirement of bond data availability reduces the size of our sample compared to

[10] As in Cremers, Nair, and Wei (2007), our bond pricing coverage stops in 1997. When we extend our sample period to 1976-1997, we find very similar results.

that of Giroud and Mueller (2008). However, this has not visibly altered the distribution of the firms' state of incorporation. For example, Table 1 shows that about 50 percent of the sample firms are incorporated in Delaware, 38 percent of the firms are incorporated in their state of location, with the rest of the firms incorporated elsewhere.[11] These numbers are almost identical to those based on the larger sample in Giroud and Mueller (2008).

Tables 2 summarizes the variables used in our analysis. The median firm in our sample is quite large—with total assets in excess of $3 billion. It has a weighted S&P's credit rating of A, and a weighted credit spread of 89 basis points. The median firm also has a leverage ratio of 32 percent, a cash flow volatility of one percent, and profitability of 12 percent. The median value of the Herfindahl index, based on sales, is 0.07. All of the variables exhibit substantial variations in our sample.

Table 3 presents the correlation matrix for our variables. As expected, the credit spread is positively related to firm leverage, firm risk, and credit rating; it is negatively related to firm size (total assets), profitability, and sales growth. The correlation between the credit spread and the Herfindahl index is positive, indicating that firms in more competitive industries (lower Herfindahl index) have a lower cost of debt. Somewhat disconcerting, however, is that the credit spread is negatively related to the weighted debt age. Typically, the liquidity of a bond decreases with its age—the older the bond, the higher is the required yield (Sarig and Warga (1989)). Further investigation reveals that this negative relation is due to the low spreads of very old bonds. This is reasonable, given that very old bonds by definition have issuers that have survived for a long period of time, whose financial situation must have improved in the process.[12] Later on in our analysis, when we condition on age being less than 10 years, we find the predicted positive correlation between the credit spread and age. Beyond 10 years, however, this relation is reversed.

[11] Because of the predominance of firms incorporated in Delaware, it is possible that the effect of BC law-changes on the cost of debt is mainly a "Delaware effect." We show that this is not the case in our robustness results in Section 4.

[12] Some evidence of duration-dependent rating transition behavior can be found in Lando and Skødeberg (2002). Table 2 shows that the weighted age has a sample mean and standard deviation much larger than the median, indicating that some bonds in our sample are potentially very old.

2.3 Empirical Methodology

Our inference of the effect of the BC law-change relies on a dummy variable called BC. Following the standard differences-in-differences approach, BC takes the value of one if a firm is incorporated in a state that has passed a BC law by year t. To infer the effect of the BC law-change on firms' cost of debt, we embed BC into a credit spread regression, controlling for firm characteristics, which also include bond-level characteristics that we convert into firm-level measures using our value-weighted procedure outlined in the previous section.

The basic regression specification is the following:

$$y_{ijklt} = \alpha_i + \beta_t + \gamma BC_{kt} + \theta' X_{ijklt} + \delta_1 \overline{y}_{jt}^{(i)} + \delta_2 \overline{y}_{lt}^{(i)} + \epsilon_{ijklt}, \tag{1}$$

where i, j, k, l, and t represent firm, industry, state of incorporation, state of location, and year, respectively. Among the included variables, y denotes the credit spread, α firm fixed effects, β year fixed effects, X firm-level control variables, and ϵ the independently and identically distributed disturbances. We also include $\overline{y}_{jt}^{(i)}$, the average credit spread in year t across all firms in industry j, excluding firm i, as a control of industry shocks concurrent with the BC law-change. Similar, $\overline{y}_{lt}^{(i)}$ denotes the average credit spread in year t across all firms located in state l, excluding firm i; it helps to differentiate the effect of local shocks from the effect of the BC law-change on the credit spread. As pointed out by Giroud and Mueller (2008), we can do this so long as there is a lack of congruence between a firm's industry, state of incorporation, and state of location. We have verified that this is indeed the case for our sample. For example, Table 1 shows that only 38 percent of the sample firms are incorporated in their state of location.

Bertrand, Duflo, and Mullainathan (2004) argue that a combination of a highly serially-correlated dependent variable and the lack of variation in the BC dummy makes serial correlation a serious concern for the estimation of equation (1). In our case, credit spreads are known to be highly persistent. Therefore, following their suggestions, we adjust our

standard errors by clustering the observations at the state of incorporation level. This accounts for arbitrary correlation across firms incorporated in the same state, as well as serial correlation within the same firm (see also Petersen (2007)).

In order to gauge the relative importance of the quiet life, coinsurance, and increasing leverage effects in the data, we can take advantage of predictions of how the BC law effect might differ across firms with different characteristics. For example, according to Giroud and Mueller (2008), the quiet life effect can be mitigated by the level of industry competition. Therefore, we can augment equation (1) with the interaction between the Herfindahl index and the BC dummy:

$$y_{ijklt} = \alpha_i + \beta_t + (\gamma_0 + \gamma_1 \text{Herfindahl}_{jt})\, BC_{kt} + \theta' X_{ijklt} + \delta_1 \overline{y}_{jt}^{(i)} + \delta_2 \overline{y}_{lt}^{(i)} + \epsilon_{ijklt}, \qquad (2)$$

This approach can be generalized to other firm characteristics; in effect, it allows us to further condition the BC law effect on these firm characteristics. Giroud and Mueller (2008) call this the "differences-in-differences-in-differences" approach.

3 Empirical Results

3.1 Baseline Regression

We begin with the regression specification in equation (1), which provides an estimate of the effect of the BC law-change on the credit spread of a representative firm in our sample. In Column (1) of Table 4, we include only the BC dummy and the fixed effects, while leaving out the firm-level control variables; this allows more observations to be used for the estimation. We find that the BC dummy has a statistically significant coefficient of 0.27, implying an increase in credit spread of 27 basis points around the time when a BC law was passed. Altogether, the BC dummy and the fixed effects generate an adjusted R^2 of 0.68.

In Column (2), we introduce into the regression a battery of control variables as documented in the previous section. We lose about 20 percent of the observations, but at the same time, the adjusted R^2 rises to 0.77, suggesting that the control variables are helping

to explain the variation of the credit spread. Indeed, most of the control variables have highly significant coefficients. Most importantly, however, the size and t-statistic of the BC coefficient have barely changed compared to the values in Column (1). This suggests that the effect of the BC law-change on the credit spread is above and beyond its impact on the firm characteristics. The size of the coefficient—28 basis points—represents an economically significant impact relative to the median credit spread of 89 basis points in our sample. It indicates that for the average firm in our sample, bondholders view the passage of the BC laws as wealth-reducing because it causes the credit spread to widen.

Among our control variables, most of the estimated coefficients are consistent with the correlation analysis in Table 3. For example, the coefficients are positive for S&P's credit rating, firm risk, and leverage. They are negative for the logarithm of total assets, profitability, and sales growth. Not surprisingly, the credit spread loads positively on the state-year and industry-year average credit spreads; this simply means that the credit spread of an individual firm is correlated with the credit spreads of its industry and local peers. We do not hold any strong prior about the relation between credit spreads and the weighted duration and convexity, other than the fact that they were constructed from bond-level characteristics that should help explain credit spreads. While our coefficients on duration and convexity are consistent with those in Klock, Mansi, and Maxwell (2005), Table 3 shows that duration and convexity are highly correlated, thus the estimated coefficients may not be reliable.

Motivated by the correlation analysis, we consider a potentially nonlinear effect of bond age on the credit spread. Specifically, we separate the weighted bond age into three bins: zero to one year, one to ten years, and beyond ten years. The middle group acts as our baseline, while we include dummy variables for each of the other two groups. We find that firms with a weighted bond age less than one year have lower credit spreads than the baseline group, while firms with a weighted bond age greater than ten years also have lower credit spreads. This represents a hump-shaped, or nonlinear, relation between the credit spread and the weighted bond age. The first half of this relation is consistent with bond age being a

measure of illiquidity (Sarig and Warga (1989)). The second half of this relation is consistent with a survivorship argument (Brown, Goetzmann, Ibbotson, and Ross (1992))—bonds with an old age are by definition issued by firms that have survived for a long period of time. The mere fact of survival is indication that the firm's financial health has improved in the past, giving rise to a lower credit spread. The literature on credit ratings also suggests that rating migration is a path-dependent phenomenon, which depends very much on the amount of time spent in a given rating category (Lando and Skødeberg (2002)).

We also examine the potentially dynamic effect of BC law-changes. In other words, we are interested in the effect of BC laws on credit spreads during the year of their passage, one year after their passage, and during subsequent years. We replace the BC dummy with three dummy variables: Before^0 is defined as one if a firm is incorporated in a state that passed a BC law that year, After^1 is defined as one if a firm is incorporated in a state that passed a BC law one year ago, and After^2 is defined as one if a firm is incorporated in a state that passed a BC law at least two years ago. In Column (3) of Table 4, we find that the coefficient for Before^0 is not significant, while the coefficients for After^1 and After^2 are both positive and significant. Specifically, credit spreads are 29 basis points higher one year after the passage of BC laws, and 24 basis points higher two years or more after the passage of BC laws. These results are similar to those of Bertrand and Mullainathan (2003), who find a significant but weak effect of BC laws on wages during the year of their passage and more significant effects in subsequent years.

3.2 Quiet Life Effect

We continue our analysis by considering one of the proposed explanations of the BC law effect. As documented by Bertrand and Mullainathan (2003) and Giroud and Mueller (2008), the passage of the BC laws caused input costs, wages, and overhead costs to increase, while capital expenditures were unaffected. This is consistent with a managerial preference for the quiet life, in which managers prefer doing nothing to the hassle of investing in new plants and

bargaining with suppliers and employees. A consequence of the quiet life preference is lower profitability and productivity, which both sets of authors confirm. A further implication is that the lower managerial effort results in a lower firm value, which would increase the cost of debt. Therefore, the quiet life effect is certainly consistent with our baseline results. More importantly, Giroud and Mueller (2008) find that the revealed quiet life preference becomes weaker in competitive industries. In fact, they show that it vanishes when extrapolating to a perfectly competitive industry with a Herfindahl index of zero. This provides an interesting way for us to further test for the quiet life effect on the cost of debt—the hypothesis being that the BC coefficient depends on the level of industry competition; moreover, the effect disappears in the limiting case of firms in a perfectly competitive industry.

In Table 5, we estimate equation (2) and its variants. In Columns (1) and (2), the Herfindahl index is based on sales; in Columns (3) and (4), it is based on total assets. Similarly, Columns (1) and (3) interact BC directly with the Herfindahl index, while Columns (2) and (4) interact BC with a dummy variable representing an above-median Herfindahl index. In all cases, we find that the BC effect becomes stronger for firms in non-competitive industries. More importantly, the coefficient on BC itself is never significant—this represents the BC effect when the level of competition is high (Columns (2) and (4)) or when the Herfindahl index is zero (Columns (1) and (3)).

To understand the magnitude of the effect, let us take Column (1) as an example: when the Herfindahl index is zero, the BC effect is only about eight basis points, which is not significant. With a one standard deviation increase in the Herfindahl index (0.13, according to Table 2), the BC effect increases by $1.729 \times 0.13 = 0.22$, or 22 basis points. Similarly, Column (2) shows that the BC effect is not significant for firms with a below-median Herfindahl index. For firms with an above-median Herfindahl index, however, the BC effect increases by 37 basis points, which is highly significant. The rest of Table 5 shows that much of what we know about the control variables remains unchanged. Also, despite the significant role of market competition in our analysis, the Herfindahl index itself is not significantly related

to the cost of debt. This is not surprising, however, given that market competition reduces managerial slack and profitability at the same time.

To summarize, while Giroud and Mueller (2008) find that competition mitigates the quiet life preference, we find that competition mitigates the effect of the BC law on the cost of debt. Intriguingly, when the level of competition becomes intense, the BC law-change ceases to have any impact on profitability or the cost of debt. These two sets of results therefore reinforce each other in supporting the Alchian-Friedman-Stigler notion that competition helps to eliminate managerial slack.[13] The difference is that, whereas Giroud and Mueller's results are based on corporate outcomes of managerial actions, our results are based on investors' interpretation of these actions as reflected in bond pricing.

3.3 Coinsurance Effect

Billett, King, and Mauer (2004) study the effect of announcement of mergers and acquisitions on bondholder wealth. They find a fairly intuitive set of results: For bonds of the target firm, their value increases substantially when the credit risk of the target, as measured by credit rating, stock return volatility, leverage, and size, is below that of the acquirer. Most notable is the finding that for target firms rated below investment-grade (hence more likely to be acquired by a more creditworthy firm), their bonds have an excess return of 4.30 percent around the announcement. These findings point to a coinsurance effect, in which claims on the target firm's assets are being "propped up" by the more solid balance sheet of the acquiring firm. Since this effect seems quite prevalent among announced or completed deals, it could conceivably affect bond value even when a firm is not facing an imminent takeover. How bondholders judge the size of this effect depends on two things: the average change in bond value conditional on a takeover announcement, and the likelihood of being targeted for takeovers. Because the passages of the BC laws may have contributed to a reduction in takeover rates, it may well have a negative effect on bondholder wealth through a perceived

[13] See Alchian (1950), Friedman (1953), and Stigler (1958).

loss of coinsurance benefits.[14]

To detect the existence of the coinsurance effect, we conduct two tests in Table 6. First, we estimate equation (1) separately for firms rated investment-grade and speculative-grade. Second, we augment equation (1) with an interaction between the BC dummy and an indicator of whether the firm is rated below investment-grade. The hypothesis is that the coinsurance effect is more pronounced for firms with a lower credit rating.

First, focusing on the split-sample results, we find that the BC dummy does not have any significant effect on credit spreads among investment-grade firms. The BC coefficient is approximately 13 basis points, but its t-statistic is only 1.62. In contrast, among speculative-grade firms, the BC coefficient is more than 134 basis points and significant at the five-percent level. Relative to a median credit spread of 314 basis points for speculative-grade firms, this is economically significant as well. Second, when we perform the full sample regression with the interaction term, the results are similar. For investment-grade firms, the BC effect is represented by the coefficient on BC alone, and it is significant only at the margin. For speculative-grade firms, the BC effect is $14.4 + 114.3 = 128.7$ basis points, and it is highly significant. Therefore, although speculative-grade firms are a minority of our sample, they play an important role in the relation between the market for corporate control and the cost of debt.

While our preceding analysis shows that the quiet life effect and the coinsurance effect exist separately in our data, a question remains as to whether they are independent effects that can coexist. Equivalently, we can ask whether there are significant interactions between these two effects. For example, is industry competition more effective at curbing managerial slack when firms are closer to financial distress? Table 2 shows that the Herfindahl index and credit rating are not highly correlated at all. This suggests that the two effects may very well be independent of each other.

[14]Comment and Schwert (1995) find no evidence that antitakeover laws have deterred takeovers. Schwert (2000) extends Comment and Schwert (1995)'s sample period and shows that takeover rates indeed declined as a result of poison pills and state antitakeover laws (see Footnote 1 on page 2609 of Schwert (2000)).

Table 7 sheds light on the interaction between the quiet life and coinsurance effects. Columns (1)-(3) use the sales-based Herfindahl index to measure industry competition. In Column (1), we include the BC dummy and two interaction terms together—BC dummy interacting with the Herfindahl index and BC dummy interacting with a speculative-grade dummy. The results show that the coefficient on the BC dummy is insignificant—the estimated coefficient is -0.036 with a t-statistic of -0.43—suggesting that the BC effect is largely absent for investment-grade firms in a highly competitive industry. In contrast, both interaction terms remain significant when jointly included in the regression, and the coefficients on BC × Herfindahl Index and BC × Speculative-grade are 1.588 and 1.125, respectively. In fact, their coefficients are remarkably similar to earlier results in Tables 5 and 6, when the interaction terms were included separately. These results suggest that the quiet life and coinsurance effects do not cannibalize each other. In Column (2), we explicitly test for potential interaction between the two effects by including BC × Herfindahl Index × Speculative-grade. The estimated coefficient is not significant, again suggesting that the two effects do not interact.

Column (3) provides a more detailed investigation of the interaction between the two effects. We condition the passage of the BC laws on four mutually exclusive scenarios: BC × Low Competition × Speculative-grade, BC × High Competition × Speculative-grade, BC × Low Competition × Investment-grade, and BC × High Competition × Investment-grade. Consistent with earlier results, the coefficient on BC × High Competition × Investment-grade is insignificant, suggesting that the BC effect is absent among investment-grade firms in competitive industries. At the other end of the scale, the BC laws appear to have the biggest impact on speculative-grade firms in non-competitive industries, with an estimated coefficient of 1.516 for BC × Low Competition × Speculative-grade. This is to be expected, given that BC × Low Competition × Speculative-grade captures both the quiet life effect and the coinsurance effect. Meanwhile, the other two interaction terms, BC × High Competition × Speculative-grade and BC × Low Competition × Investment-grade, remain significant

with coefficients of 1.068 and 0.324, respectively.

To test if industry competition has a different effect on how investment-grade and speculative-grade firms react to the passage of the BC laws, we test the following null hypothesis:

$$\mathrm{H}_0 : \gamma_{\text{BC}\times\text{Low Comp}\times\text{Spec}} - \gamma_{\text{BC}\times\text{High Comp}\times\text{Spec}} = \gamma_{\text{BC}\times\text{Low Comp}\times\text{Inv}} - \gamma_{\text{BC}\times\text{High Comp}\times\text{Inv}},$$

where the γ's denote the coefficients for the four interaction terms. The p-value of the F-test is equal to 0.8; hence we cannot reject the null hypothesis. This result indicates that industry competition does not affect investment-grade and speculative-grade firms differently. Columns (4)-(6) use the asset-based Herfindahl index and yield similar conclusions. Our results thus confirm that the quiet life effect and the coinsurance effect are largely independent of each other.

3.4 Increasing Leverage Effect

So far, we have identified an unconditionally positive relation between the BC law-change and the cost of debt (Table 4). Further conditional analyses have found evidence for the quiet life and coinsurance effects, both of which predict a higher cost of debt after the passage of the BC laws (Tables 5-7). Collectively, our analyses suggest that these two independent effects dominate how bondholders view the wealth implication of the BC laws. The increasing leverage effect, however, predicts a decrease in the cost of debt after the passage of the BC laws. The intuition is that if the BC laws effectively stunted hostile takeovers, bondholders would no longer have to worry about the increase in leverage either before or after a hostile bid. Although bondholders often suffer significant losses in hostile takeovers such as leveraged buyouts (Asquith and Wizman (1990) and Warga and Welch (1993)), hostile takeovers are rare (Schwert (2000), Andrade, Mitchell, and Stafford (2001), and Becht, Bolton, and Röell (2003)). This seems to work against the increasing leverage effect as a major concern for bondholders not facing an immediate threat of takeover. On the other hand, the conditional analysis, which we performed in the earlier sections, is a powerful tool that allows us to identify an effect even if it is not the dominant force. Following a line

of reasoning in Chava, Livdan, and Purnanandam (2008), we interact the BC dummy with firm leverage—the hypothesis being that firms with low leverage are the prime targets for leverage-increasing takeovers. Therefore, bondholders of such firms are especially concerned about the increasing leverage effect. This suggests that the cost of debt for low-leverage firms would not rise as much as other firms after the passage of the BC laws.

Following our earlier approach, not only do we examine the increasing leverage effect on its own, but we also consider the possibility that it might interact with the other two effects. While neither the Herfindahl index nor credit rating is highly correlated with leverage, leverage is one of the key covariates used by regulators and rating agencies to evaluate credit risk. This suggests that we need to be especially careful about the robustness of the coinsurance effect, which we estimated primarily based on the differential responses of credit spreads to the BC law by firms with different credit ratings. For example, we have attributed the absence of the BC effect among investment-grade firms to the coinsurance hypothesis. Because investment-grade firms typically have low leverage, this could instead be the result of the increasing leverage effect offsetting whatever is causing the cost of debt to increase after the passage of the BC laws.

These possibilities are considered in Table 8. In Column (1), we allow an interaction between BC and leverage, which does not yield a significant estimate. Following Chava, Livdan, and Purnanandam (2008), we include an interaction between BC and a low leverage dummy in Column (2), defined as one if the firm's leverage is below the sample median. We find a positive and significant coefficient of 0.119 for BC $\times$ Low Leverage, which is inconsistent with the increasing leverage effect. In Column (3), we jointly consider the increasing leverage effect and the coinsurance effect. The coefficient of BC $\times$ Speculative-grade is 1.154 and highly significant. It also appears to be indistinguishable from a coefficient of 1.143, estimated in Table 6 without including BC $\times$ Low Leverage. In Column (4), we jointly estimate the increasing leverage effect and the quiet life effect. The coefficient of BC $\times$ Herfindahl Index is a highly significant 1.673, which does not appear to be different

from an estimate of 1.729 in Table 5 without including BC × Low Leverage. In these joint specifications, BC × Low Leverage has a positive coefficient, which is significant unless the regression also includes BC × Low Competition.

How do we interpret these results? First, they demonstrate the robustness of our findings on the quiet life and coinsurance effects; the coefficients on BC × Speculative-grade and BC × Herfindahl Index do not vary much across the different specifications. Second, they suggest that instead of being a proxy for the increasing leverage effect, BC × Low Leverage is actually capturing some aspect of the quiet life effect. To better understand this interpretation, we note that Jensen (1986) and Zwiebel (1996) have argued that the use of leverage commits managers against accumulating free cash flow. As a result, there is less room for managers to enjoy the "quiet life." This argument suggests that the passage of the BC laws would have a more positive effect on the cost of debt for low leverage firms, because such firms are likely to end up with more managerial slack being shielded by the BC laws. This line of reasoning also suggests that high leverage and high industry competition are, in fact, substitute mechanisms in curbing managerial slack. They are not equally effective, however; our results under Column (4) show that market competition is the more effective of the two.

To summarize, we have attempted to disentangle three different effects of the BC law-change on the cost of debt. Two of the three, the quiet life effect and the coinsurance effect, predict an increase in the cost of debt after the passage of the BC laws, while the third, the increasing leverage effect, predicts the opposite. We identify a positive and significant overall response in the cost of debt to the passage of the BC laws. In addition, we find empirical support for the quiet life and coinsurance effects, while the increasing leverage effect does not appear to fit the data.

4 Robustness

In this section, we consider the robustness of our results under alternative econometric specifications, variable definitions, and sample constructions.

4.1 Institutional Blockholding

Cremers, Nair, and Wei (2007, CNW hereafter) find an interesting association between institutional blockholding and credit spreads that depends on the number of firm-level antitakeover provisions. They show that blockholding is associated with lower credit spreads only when the firm is prevented from takeovers; when the firm is open to takeovers, blockholding is instead associated with higher credit spreads. Their interpretation of these results is that blockholding increases bondholders' concern of leverage-increasing takeovers. While our preceding results do not support the increasing leverage effect, it remains an interesting question as to whether there are interactions between blockholding and the BC law effect.

We follow CNW to define Block as a dummy variable indicating the presence of an institutional shareholder, who owns at least five percent of a firm's outstanding shares. We also measure blockholding by Block Percentage, defined as the percentage holding of the largest institutional shareholder. Our results are reported in Table 9. In Columns (1) and (2), we use Block; in Columns (3) and (4), we use Block Percentage.

First, we do not find a significant interaction between BC and blockholding in any of our regressions. To understand the source of this difference from CNW, we note that our BC dummy represents a fairly limited amount of variation in the number of antitakeover provisions—one, to be exact. In contrast, CNW exploit variations in firm-level antitakeover provisions that are much larger.

Second, our estimated coefficient for Block/Block Percentage is positive and significant, while CNW estimate a negative and significant coefficient. Nevertheless, these are mutually consistent findings. To see this, we note that in CNW, the Block coefficient represents the effect of blockholding on credit spreads for a firm that has an ATI of zero.[15] This is a firm that has many antitakeover provisions and is essentially closed to takeovers. In contrast, the Block coefficient in our Table 9 represents the effect of blockholding on credit spreads for a

[15]The ATI index used by Cremers, Nair, and Wei (2007) is on a scale of zero to four, with higher values representing firms most vulnerable to takeovers.

firm incorporated in states that have not yet passed a BC law. This is an average firm that might be fairly open to takeovers. If we use the estimates from Table 3, Column 4, of CNW, and take ATI to be equal to three, we find that the Block coefficient for such firms would be:

$$-0.18 + 3 \times 0.08 = 0.06.$$

This is not very different from our Block coefficient of 0.076 (Table 9, Column 1).

It is important that even though blockholding appears to be a significant determinant of credit spreads, the main coefficients of interest (interactions between BC and competition and credit rating) remain robust according to Table 9.

4.2 Simultaneous Determination of Credit Ratings and Credit Spreads

In all of our regression specifications, we have included credit rating as a control variable. In practice, however, credit ratings are likely to be simultaneously determined with bond pricing. Following Chen, Lesmond, and Wei (2007), we estimate a simultaneous equations specification in Table 10 using fixed effects two-stage least squares regressions. Our instrumental variable for credit rating is last year's credit rating. While the lagged rating is correlated with the current rating, the current credit spread should not affect the lagged rating. Our instrumental variables for credit spread are duration, convexity, and a dummy variable indicating whether the age of the bond is less than one year. Duration and convexity are correlated with credit spreads due to term structure effects, and the age dummy is correlated with credit spreads because it is a measure of bond liquidity. Credit ratings, however, are more likely to be correlated with firm balance sheet information than these bond-specific attributes. To address the endogeneity of leverage, we replace current leverage with leverage in the previous year.

Column (1) of Table 10 shows that the current rating is mostly explained by the lagged rating; most of the firm-specific control variables have little explanatory power. Moreover,

credit rating is not significantly related to the BC dummy; this shows that rating agencies did not take into account the passage of BC laws when assigning a credit rating. Column (2) presents the regression equation for credit spreads. The estimates are similar to those in Table 4. In particular, the estimated unconditional BC effect of 30 basis points is close to the earlier estimate of 28 basis points. In Column (3), we add the interaction terms for the quiet life and coinsurance effects to the credit spread equation. Again, we find the estimates to be close to earlier results in which credit rating is treated as an exogenous variable.

4.3 Herfindahl Index

The Herfindahl index plays an important role in our test of the quiet life effect on the cost of debt. We already include Herfindahl indexes based on sales or total assets, along with Herfindahl dummies, in our main analysis. Here, we consider one more test involving the Herfindahl index. Specifically, we follow Giroud and Mueller (2008) to delete the top 2.5 percent of the Herfindahl index observations. This procedure helps to eliminate "outliers," often caused by industries with a single firm. In these cases, the Herfindahl index is equal to one by construction, yet the industry can often be quite far from a monopolistic one. The ideal solution would be to merge the industry in question with other, similar, industries. However, eliminating the top 2.5 percent of the Herfindahl index observations is a simpler solution to the problem.

The results of the rest of our robustness exercises are presented in Table 11. Because of our earlier findings showing the dominant role of the coinsurance and quiet life effects, we include both BC $\times$ Speculative-grade and BC $\times$ Herfindahl Index throughout these robustness exercises. Therefore, our benchmark comparison is against Column (1) of Table 7, which we reproduce here as Column (1) in Table 11. In Column (2), we delete the top 2.5 percent of the Herfindahl index observations. We find no significant change in the coefficients for either the major interactions or the firm-level controls. Therefore, our results do not appear to be driven by outliers in the Herfindahl index.

4.4 Aggregation of Bond Characteristics

Previously, we used the amount outstanding of each bond as weight in aggregating bond-level characteristics into firm-level measures. Here, we address the robustness of our results to alternative methods of aggregation. The most obvious alternative to the value-weighted method is to treat each bond equally, irrespective of its amount outstanding. We call this the equally-weighted method. After re-computing the credit spread, credit rating, debt duration, convexity, and age, we re-estimate the benchmark specification and present the results in Column (3). The estimated coefficients appear to be insensitive to changes in the weighting method.

4.5 Delaware-Incorporated Firms

Our summary statistics (Table 1) show that over 50 percent of the sample firms are incorporated in the state of Delaware. This raises a serious concern as to how much our main results depend on the presence of Delaware-incorporated firms in our sample. Following the standard practice in this literature, we eliminate all Delaware-incorporated firms from our sample and repeat the benchmark regression. The results are presented in Column (4). While we lose about 45 percent of the observations, and some of the firm-level controls are no longer significant, possibly because of the shrinkage in sample size, the coefficients on BC $\times$ Speculative-grade and BC $\times$ Herfindahl Index remain remarkably similar to those in the benchmark regression. This suggests that our main results are not driven by a "Delaware effect."

4.6 Selective Debt Issuance

Antitakeover laws can affect firms' decision to use debt. For example, Garvey and Hanka (1999) find a reduction in leverage following the passage of antitakeover state laws. In comparison, we find that the cost of debt increased following the passage of BC laws. To the extent that this increase in the cost of debt caused some firms to stop issuing debt, our

empirical results serve as an alternative explanation of Garvey and Hanka's findings. This type of selective debt issuance, should it exist, also strengthens our results—if firms with a higher cost of debt actually issued debt, our estimates of the BC effect would have been even more positive. To mitigate the concern with selective debt issuance, we repeat the benchmark estimation using bonds that were in existence both before and after the passage of BC laws. We report our estimation results in Column (5). Despite having only about 36 percent of the original sample size, we find that most of the estimates remain qualitatively similar to the benchmark estimates in Column (1).

4.7 Bond Covenants

Bradley and Roberts (2004) show that the cost of debt is related to the presence of covenants. To control for the covenant effect, we follow Qi and Wald (2006) to obtain information on bond covenants from Mergent FISD. In Column (6), we include the total number of covenants in our benchmark regression. This firm-level variable is constructed by adding one point if a protective covenant is included in any of the firm's outstanding bond issues. Because all bonds in our original sample do not have available covenant information, our sample size is dramatically reduced to 1,320 firm year observations. Nevertheless, neither the reduction in sample size nor the inclusion of this control variable affects our main results in a qualitative manner. We also do not find a significant relation between credit spreads and the total number of bond covenants.[16]

4.8 Bond-Level Regressions

The primary reason for aggregating bond-level characteristics into firm-level measures is because the credit spreads of bonds issued by the same firm are likely to be very closely correlated. Yet, adjusting the standard errors for clustering at the firm level could be an

[16]In results not included here, we check whether credit spreads are separately related to the number of event risk, payout, and financing covenants. We do not find any significant relation. Mansi, Maxwell, and Wald (2006) find a weakly positive (i.e., significant at the ten percent level) relation between credit spreads and the number of financing covenants, although they do not control for unobserved firm heterogeneities.

effective way to address the cross-correlation between different bonds issued by the same firm. This also allows us to make use of bond-level variations in the data in a more efficient way, as opposed to disregarding them altogether. To draw better comparisons with our other results, we actually adjust the standard errors for clustering at the state of incorporation level. As mentioned earlier, this accounts for serial correlation as well as cross-sectional correlation among firms incorporated in the same state.

In Column (7), we repeat the benchmark regression at the bond-level. The firm-level characteristics are defined exactly as before, and the bond-level characteristics are used without aggregation. One other difference is that in the firm-level regressions, the state-year and industry-year controls are defined as state- and industry-wide average credit spreads excluding the single observation of the firm in question. Here, they are defined as averages excluding all bond-level observations associated with the firm in question. Excluding the single bond in question would be problematic, because the averages would have involved credit spreads of other bonds issued by the same firm, which would be highly correlated with the dependent variable. At the bond-level, our sample consists of 13,361 bond year observations. Despite this significant change in sample size, our results remain qualitatively similar to those from the benchmark regression. For example, the coefficient of the coinsurance effect is 0.922, which is close to the benchmark estimate of 1.125. The coefficient of the quiet life effect is 1.588, which happens to be the same as the benchmark estimate. As before, the coefficient of BC itself is not significant. Therefore, the coinsurance effect remains robust, and so does the conclusion that market competition eliminates the effect of managerial slack on the cost of debt. With respect to the control variables, many of the coefficients remain similar to their benchmark values, and all of them have the expected sign.

In our previous analysis, we have excluded all callable and putable bonds because these embedded option features can also affect the cost of debt. For example, callable bonds would have to offer investors higher yields because the issuer has the option to redeem the debt before maturity. Similarly, a putable bond can offer investors less yields because, in

this case, bondholders have the option to force early redemption. However, Duffee (1998) finds that there were relatively few noncallable bonds prior to the mid-1980s, and only by the mid-1990s did noncallable bonds become the majority in the Fixed Income Database. Therefore, including callable and putable bonds allows us to have a more balanced sample before and after the BC law-change. In Column (8), we include all callable and putable bonds in a bond-level regression, while adding dummy variables (Callable and Putable) to control for the influence of the option features on the credit spread. This further increases our sample size to 50,334 bond year observations. Our results show that the coefficients of the Callable and Putable dummies have the anticipated sign, with the former being positive and the latter negative. Many of the coefficients for the control variables change significantly from their benchmark regression values, yet all of them are still consistent with the expected relation with the credit spread. More importantly, the coefficients of interest, BC, BC $\times$ Speculative-grade, and BC $\times$ Herfindahl Index, did not change qualitatively, leaving our main conclusions intact.

5 Conclusion

The threat of takeovers has often been considered as an effective corporate governance mechanism that mitigates the managerial agency problem. Recent empirical research has found that better governance, in the sense of an open market for corporate control, helps to reduce the managerial preference for the quiet life (Bertrand and Mullainathan (2003)) and increase equity value (Gompers, Ishii, and Metrick (2003)). However, our understanding of how bondholders view this governance mechanism remains unclear. On one hand, a reduction in managerial slack can increase firm value, benefitting bondholders. On the other hand, firm risk often changes during takeovers, which can have a significant impact on bondholder wealth in either direction (Billett, King, and Mauer (2004) and Warga and Welch (1993)). The goal of our paper is to provide an empirical analysis of this issue, paying particular attention to the competing concerns highlighted in the literature.

We use the passage of state-level business combination laws during 1985-1991 as an exogenous shock to the market for corporate control, and study its impact on individual firms' cost of debt, computed as the credit spread between comparable corporate and Treasury bonds. Using a differences-in-differences estimation approach, we find that the passage of the BC laws causes the credit spread to increase by an average of 28 basis points. Confirming Giroud and Mueller (2008)'s result that competition eliminates managerial slack, we find no evidence of rising credit spreads in competitive industries, while the effect increases by 22 basis points for a one-standard-deviation increase in the Herfindahl index. We also present evidence of a coinsurance effect, in which bondholders benefit from a reduction in firm risk after being taken over. Consistent with Billett, King, and Mauer (2004)'s result based on actual takeovers, we find that the passage of the BC laws causes speculative-grade credit spreads to widen by over 134 basis points, while having no significant impact on investment-grade credit spreads. Lastly, our evidence is inconsistent with a bondholder concern for the damaging effect of leverage-increasing takeovers. Specifically, firms with lower leverage have a *larger* increase in credit spread after the passage of the BC laws. While the absence of a negative incremental effect may be attributed to the rarity of LBO-style takeovers, our evidence is consistent with low leverage proxying for an abundance of managerial slack (Jensen (1986)).

Generalizing from the passage of the BC laws, our results suggest that, similar to shareholders, bondholders overall view a weakening of the market for corporate control negatively—in the sense that this has the effect of increasing the cost of debt and reducing bondholder wealth. A more precise quantification of the effect, however, must be conditioned on a firm's economic environment and its own characteristics. Our analysis shows that industry competitiveness, along with a firm's credit rating and leverage, are important conditioning variables.

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Table 1. States of Incorporation and Location of Sample Firms

This table provides the distributions of states of incorporation and location of sample firms. State of Incorporation indicates the state in which a firm is incorporated. State of Location indicates the state in which a firm's headquarter is located. BC year indicates the year in which a business combination (BC) law was passed, which is taken from Bertrand and Mullainathan (2003). The sample period is from 1976 to 1995.

State Name	BC year	State of Incorporation	State of Location	Number (Percentage) of Firms Incorporated In		
		Number of Firms	Number of Firms	State of Locations	Delaware	Other States
Alabama		3	8	3	5	0
Arizona	1987	4	11	4	4	3
Arkansas		0	3	0	3	0
California		11	51	10	34	7
Colorado		5	14	5	7	2
Connecticut	1989	7	36	6	22	8
Delaware	1988	369	11	9	0	2
District of Columbia		4	4	1	3	0
Florida		9	17	8	5	4
Georgia	1988	14	18	13	5	0
Illinois	1989	10	53	9	40	4
Indiana	1986	12	16	11	5	0
Iowa		3	5	2	2	1
Kansas	1989	3	0	0	0	0
Kentucky	1987	3	3	2	1	0
Louisiana		0	2	0	1	1
Maine	1988	2	0	0	0	0
Maryland	1989	23	14	9	3	2
Massachusetts	1989	16	26	15	11	0
Michigan	1989	15	29	15	14	0
Minnesota	1987	2	9	2	7	0
Missouri	1986	8	16	5	7	4
Nebraska	1988	0	3	0	2	1
Nevada	1991	7	4	1	2	1
New Hampshire		0	2	0	2	0
New Jersey	1986	25	34	15	13	6
New York	1985	32	72	19	43	10
North Carolina		8	13	7	3	3
Ohio	1990	31	48	28	12	8
Oklahoma	1991	2	3	2	1	0
Oregon		6	8	6	2	0
Pennsylvania	1989	23	40	18	18	4
South Carolina	1988	2	5	2	3	0
Tennessee	1988	4	7	4	2	1
Texas		14	82	12	64	6
Utah		3	5	2	3	0
Virginia	1988	18	23	11	8	4
Washington	1987	4	4	4	0	0
Wisconsin	1987	11	14	10	3	1
Total		713	713	270 (37.87%)	360 (50.49%)	83 (11.64%)

Table 2. Summary Statistics

This table presents summary statistics for the variables used in this study. Spread is the weighted average of the yield spreads of a firm's all outstanding publicly-traded bonds, where the yield spread is the difference between the bond's yield to maturity and a linearly interpolated Treasury yield of identical maturity. Credit Rating is the weighted average of S&P's credit ratings for a firm's all outstanding bonds. Duration is the weighted average of the durations of a firm's all outstanding bonds. Convexity is the weighted average of the convexities of a firm's all outstanding bonds. Age is the weighted average of the ages of a firm's all outstanding bonds, where the age of a bond is the number of years between the observation date and its issuing date. The weight is the amount outstanding for each bond divided by the total amount outstanding for all bonds of a firm. Assets is the total assets of a firm. Firm Risk is the standard deviation of annual cash flows from operations normalized by total assets for the past 5 years. Profitability is EBITDA normalized by total assets. Leverage is equal to (long term debt + debt in current liabilities)/total assets. Sales Growth is equal to $(sales_t - sales_{t-1})/sales_{t-1}$. Sales-based Herfindahl Index is the sum of squared market shares over all firms in an industry, where a firm's market share is the firm's sales as a proportion of total sales in the industry. Assets-based Herfindahl Index is the sum of squared market shares of all firms in an industry, where a firm's market share is the firm's total assets as a proportion of total assets in the industry. Information on corporate bonds is from the University of Houston's Fixed Income Database. Information on firm characteristics is obtained from Compustat. The sample period is from 1976 to 1995.

	N	Mean	S.D.	25th	Median	75th
Spread	4,951	1.22	1.46	0.54	0.89	1.41
Credit Rating	4,951	8.32	4.48	5.21	7.00	10.00
Duration (years)	4,951	6.0	2.15	3.52	5.04	6.49
Convexity (years)	4,951	0.41	0.36	0.16	0.33	0.54
Age (years)	4,951	8.62	10.01	1.39	3.13	16.94
Assets ($ million)	4,825	10,571	23,481	1,211	3,177	9,175
Firm Risk	4,139	0.02	0.02	0.006	0.01	0.03
Leverage	4,764	0.35	0.20	0.21	0.32	0.43
Profitability	4,635	0.12	0.06	0.08	0.12	0.16
Sales Growth	4,750	0.08	0.15	0.00	0.07	0.15
Sales-based Herfindahl Index	4,951	0.12	0.13	0.03	0.07	0.16
Assets-based Herfindahl Index	4,951	0.12	0.14	0.03	0.08	0.15

Table 3. Correlation Matrix

This table presents correlations among the variables used in this study. The definitions of the variables are described in Table 2.

	Spread	Credit Rating	Duration (years)	Convexity (years)	Age (years)	Assets ($million)	Firm Risk	Leverage	Profitability	Sales Growth	Sales-based Herfindahl Index	Asset-based Herfindahl Index
Spread	1											
Credit Rating	0.612	1										
Duration (years)	-0.078	-0.025	1									
Convexity (years)	-0.061	-0.047	0.936	1								
Age (years)	-0.226	-0.102	-0.235	-0.238	1							
Assets ($million)	-0.055	-0.153	0.034	0.086	-0.176	1						
Firm Risk	0.350	0.364	0.023	0.035	-0.225	-0.039	1					
Leverage	0.283	0.160	-0.188	-0.167	-0.110	0.138	-0.075	1				
Profitability	-0.217	-0.247	0.044	0.057	-0.013	-0.156	0.040	-0.180	1			
Sales Growth	-0.126	-0.090	0.074	0.055	-0.023	0.034	-0.116	0.048	0.113	1		
Sales-based Herfindahl Index	0.124	0.081	0.105	0.136	-0.294	0.072	0.182	0.019	0.074	-0.017	1	
Assets-based Herfindahl Index	0.110	0.079	0.120	0.154	-0.296	0.079	0.181	-0.170	0.083	-0.014	0.953	1

Table 4. Effect of BC Laws on the Cost of Debt: Baseline Results

This table presents regression results on the impact of BC laws on the cost of debt. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year and industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. $Before^0$ is equal to one if a firm is incorporated in a state that passed a BC law that year. $After^1$ is equal to one if a firm is incorporated in a state that passed a BC law one year ago. $After^2$ is equal to one if a firm is incorporated in a state that passed a BC law at least two years ago. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
BC	0.270**	0.281***	
	(2.51)	(2.93)	
$Before^0$			-0.038
			(-0.46)
$After^1$			0.289***
			(2.98)
$After^2$			0.238**
			(2.07)
Credit Rating		0.141***	0.140***
		(8.94)	(8.94)
Duration (years)		-0.102***	-0.101***
		(-4.63)	(-4.67)
Convexity (years)		0.474***	0.483***
		(4.58)	(4.60)
Age ≤ 1		-0.127**	-0.128**
		(-2.44)	(-2.48)
Age > 10		-0.584***	-0.583***
		(-4.88)	(-4.90)
Ln(Assets)		-0.218***	-0.221***
		(-2.76)	(-2.87)
Firm Risk		5.568**	5.585**
		(2.10)	(2.11)
Leverage		2.065***	2.068***
		(4.40)	(4.39)
Profitability		-0.776	-0.785
		(-1.18)	(-1.19)
Sales Growth		-0.447**	-0.444**
		(-2.48)	(-2.47)
State-year		0.106*	0.105*
		(1.93)	(1.93)
Industry-year		0.178***	0.177***
		(7.70)	(7.79)
Firm Fixed Effect	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes
Observations	4,951	3,996	3,996
Adj-R Squared	0.68	0.77	0.77

Table 5. Effect of BC Laws on the Cost of Debt: Quiet Life Effect

This table presents results on the interaction between industry competition and the BC law effect. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Low Competition is a dummy variable equal to one if a firm is in an industry whose Herfindahl index is above the sample median and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. Columns (1) and (2) use sales-based Herfindahl index; Columns (3) and (4) use assets-based Herfindahl index. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Sales-based Herfindahl Index		Assets-based Herfindahl Index	
	(1)	(2)	(3)	(4)
BC	0.082	0.099	0.102	0.131
	(0.79)	(1.14)	(1.00)	(1.12)
BC × Herfindahl Index	1.729***		1.445***	
	(5.17)		(6.09)	
BC × Low Competition		0.366***		0.301***
		(6.07)		(2.79)
Herfindahl Index	-0.091	0.709	-0.231	0.465
	(-0.19)	(1.60)	(-0.47)	(1.15)
Credit Rating	0.138***	0.139***	0.138***	0.139***
	(9.06)	(9.08)	(9.00)	(9.12)
Duration (years)	-0.101***	-0.098***	-0.102***	-0.099***
	(-4.91)	(-5.00)	(-5.07)	(-5.34)
Convexity (years)	0.435***	0.399***	0.441***	0.419***
	(4.23)	(4.10)	(4.33)	(4.48)
Age ≤ 1	-0.101**	-0.100**	-0.104**	-0.103**
	(-2.05)	(-2.28)	(-2.11)	(-2.55)
Age > 10	-0.637***	-0.646***	-0.634***	-0.634***
	(-5.49)	(-5.56)	(-5.52)	(-5.17)
Ln(Asset)	-0.259***	-0.273***	-0.256***	-0.271***
	(-3.31)	(-3.48)	(-3.24)	(-3.30)
Firm Risk	5.066**	5.342*	5.171**	5.346**
	(1.99)	(1.92)	(1.99)	(2.01)
Leverage	2.027***	2.003***	2.026***	1.991***
	(4.21)	(4.30)	(4.15)	(4.11)
Profitability	-0.783	-0.754	-0.763	-0.749
	(-1.18)	(-1.20)	(-1.15)	(-1.17)
Sales Growth	0.425**	-0.424**	-0.433**	-0.426**
	(-2.37)	(-2.40)	(-2.40)	(-2.41)
State-year	0.104*	0.106**	0.107*	0.108**
	(1.91)	(1.96)	(1.94)	(1.98)
Industry-year	0.177***	0.176***	0.178***	0.175***
	(7.03)	(6.84)	(7.20)	(6.67)
Firm Fixed Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observations	3,996	3,996	3,996	3,996
Adj-R Squared	0.77	0.77	0.77	0.77

Table 6. Effect of BC Laws on the Cost of Debt: Coinsurance Effect

This table presents regression results on the interaction between credit rating and the BC law effect. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to one and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. Columns (1) and (2) test the impact of BC laws on investment-grade and speculative-grade firms separately. Column (3) uses the full sample and adds an interaction term between BC and Speculative-grade. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Split Sample		Full Sample
	Investment grade	Speculative grade	
	(1)	(2)	(3)
BC	0.129	1.339**	0.144*
	(1.62)	(2.47)	(1.86)
BC × Speculative-grade			1.143***
			(15.77)
Credit rating	0.125***	0.089***	0.118***
	(8.51)	(7.44)	(7.27)
Duration (years)	-0.126***	0.648**	-0.104***
	(-6.84)	(2.26)	(-4.22)
Convexity (years)	0.721***	-6.148***	0.563***
	(6.63)	(-3.40)	(5.07)
Age ≤ 1	-0.033	-0.639***	-0.128**
	(-1.38)	(-3.95)	(-2.39)
Age > 10	-0.466***	-1.315***	-0.615***
	(-5.90)	(-5.66)	(-4.96)
Ln(Asset)	-0.014	-0.061	-0.164**
	(-0.23)	(-0.35)	(-2.02)
Firm Risk	3.092***	5.787**	4.721**
	(3.39)	(2.07)	(2.06)
Leverage	0.355**	4.789***	2.006***
	(2.45)	(8.77)	(3.96)
Profitability	-1.172***	0.630	-0.756
	(-2.83)	(0.34)	(-1.11)
Sales Growth	-0.300***	-0.246	-0.417**
	(-3.31)	(-0.76)	(-2.30)
State-year	0.084*	0.293	0.111**
	(1.72)	(1.17)	(2.04)
Industry-year	0.150***	0.055	0.173***
	(5.82)	(0.73)	(9.27)
Firm Fixed Effect	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes
Observations	3,467	529	3,996
Adj R-Squared	0.70	0.76	0.78

Table 7. Effect of BC Laws on the Cost of Debt: Quiet Life Effect vs. Coinsurance Effect

This table presents regression results on the interaction between the BC law effect and industry competition and credit rating. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Low Competition is a dummy variable equal to one if a firm is in an industry whose Herfindahl index is above the sample median and zero otherwise. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. Columns (1) to (3) use sales-based Herfindahl index; Columns (3) to (6) use assets-based Herfindahl index. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Sales-based Herfindahl Index			Assets-based Herfindahl Index		
	(1)	(2)	(3)	(4)	(5)	(6)
BC	-0.036	-0.023		-0.017	0.004	
	(-0.43)	(-0.27)		(-0.20)	(0.05)	
BC × Herfindahl Index	1.588***	1.441***		1.322***	1.097***	
	(6.24)	(4.47)		(6.31)	(4.48)	
BC × Speculative-grade	1.125***	0.987***		1.127***	0.865***	
	(13.02)	(5.61)		(13.48)	(4.28)	
BC × Herfindahl Index × Speculative-grade		1.084			1.893	
		(0.62)			(1.06)	
BC × Low Competition × Speculative-grade			1.516***			1.526***
			(6.45)			(11.65)
BC × High Competition × Speculative-grade			1.068***			0.924***
			(10.47)			(6.71)
BC × Low Competition × Investment-grade			0.324***			0.242***
			(3.90)			(3.53)
BC × High Competition × Investment-grade			-0.033			0.046
			(-0.41)			(0.44)
Herfindahl Index	-0.000	-0.008	0.730	-0.209	-0.132	0.460
	(-0.00)	(-0.02)	(1.60)	(-0.42)	(-0.30)	(1.14)
Credit Rating	0.117***	0.116***	0.117***	0.116***	0.116***	0.117***
	(7.27)	(7.17)	(7.24)	(7.19)	(7.15)	(7.24)
Duration (years)	-0.103***	-0.102***	-0.099***	-0.104***	-0.103***	-0.098***
	(-4.45)	(-4.30)	(-4.20)	(-4.58)	(-4.49)	(-4.80)
Convexity (years)	0.517***	0.516***	0.475***	0.522***	0.552***	0.503***
	(4.80)	(4.82)	(4.63)	(4.93)	(5.01)	(5.11)
Age ≤ 1	-0.104**	-0.105**	-0.102***	-0.107**	-0.108**	-0.113***
	(-2.04)	(-2.09)	(-2.26)	(-2.09)	(-2.09)	(-2.70)
Age > 10	-0.662***	-0.662***	-0.677***	-0.660***	-0.661***	-0.650***
	(-5.47)	(-5.51)	(-5.52)	(-5.51)	(-5.61)	(-5.15)
Ln(Asset)	-0.202**	-0.201**	-0.217**	-0.198**	-0.200**	-0.205**
	(-2.51)	(-2.51)	(-2.64)	(-2.44)	(-2.44)	(-2.41)
Firm Risk	4.280*	4.213*	4.484*	4.370*	4.258*	4.570**
	(1.92)	(1.88)	(1.83)	(1.93)	(1.89)	(1.99)
Leverage	1.973***	1.970***	1.947***	1.971***	1.978***	1.958***
	(3.82)	(3.88)	(3.82)	(3.77)	(3.81)	(3.85)
Profitability	-0.762	-0.760	-0.725	-0.745	-0.713	-0.691
	(-1.11)	(-1.12)	(-1.10)	(-1.09)	(-1.05)	(-1.05)
Sales Growth	-0.398**	-0.395**	-0.395**	-0.405**	-0.400**	-0.400**
	(-2.19)	(-2.13)	(2.07)	(-2.22)	(-2.15)	(-2.24)
State-year	0.109**	0.111**	0.110**	0.112**	0.114**	0.113**
	(2.01)	(2.07)	(2.07)	(2.04)	(2.12)	(2.08)
Industry-year	0.173***	0.172***	0.171***	0.174***	0.171***	0.171***
	(8.73)	(8.47)	(8.47)	(8.77)	(8.41)	(8.13)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,996	3,996	3,996	3,996	3,996	3,996
Adj-R Squared	0.78	0.78	0.78	0.78	0.78	0.78

Table 8. Effect of BC Laws on the Cost of Debt: Increasing Leverage Effect

This table presents regression results on the interaction between a firm's leverage level and the BC law effect. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Low leverage is a dummy variable equal to one if a firm's leverage level is below the sample median. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Herfindahl Index is the sales-based Herfindahl index. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
BC	0.225	0.232**	0.084	0.057
	(1.00)	(2.41)	(1.07)	(0.57)
BC × Leverage	0.141			
	(0.29)			
BC × Low Leverage Dummy		0.119**	0.146***	0.080
		(2.56)	(3.52)	(1.57)
BC × Speculative-grade			1.154***	
			(16.88)	
BC × Herfindahl Index				1.673***
				(4.99)
Herfindahl Index	0.803*	0.818*	0.840*	-0.053
	(1.74)	(1.79)	(1.78)	(-0.11)
Credit Rating	0.140***	0.140***	0.118***	0.139***
	(8.98)	(8.97)	(7.32)	(9.06)
Duration (years)	-0.104***	-0.101***	-0.103***	-0.099***
	(-4.27)	(-4.63)	(-4.28)	(-4.89)
Convexity (years)	0.492***	0.464***	0.539***	0.425***
	(4.04)	(4.25)	(4.83)	(4.01)
Age ≤ 1	-0.126**	-0.124**	-0.125**	-0.100**
	(-2.56)	(-2.45)	(-2.39)	(-2.01)
Age > 10	-0.584***	-0.576***	-0.607***	-0.633***
	(-4.62)	(-4.78)	(-4.85)	(-5.46)
Ln(Asset)	-0.217***	-0.202**	-0.144*	-0.250***
	(-2.73)	(-2.53)	(-1.78)	(-3.14)
Firm Risk	5.650**	5.644**	4.795**	5.095*
	(2.05)	(2.11)	(2.07)	(2.00)
Leverage	2.012***	2.185***	2.152***	2.103***
	(3.19)	(4.47)	(4.14)	(4.12)
Profitability	-0.789	-0.749	-0.724	-0.770
	(-1.18)	(-1.16)	(-1.08)	(-1.16)
Sales Growth	-0.436**	-0.456**	-0.429**	-0.434**
	(-2.62)	(-2.59)	(-2.42)	(-2.45)
State-year	0.103*	0.105*	0.109**	0.104*
	(1.92)	(1.87)	(1.97)	(1.90)
Industry-year	0.177***	0.177***	0.173***	0.177***
	(7.55)	(7.40)	(8.96)	(6.99)
Firm Fixed Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observations	3,996	3,996	3,996	3,996
Adj-R Squared	0.77	0.77	0.78	0.77

Table 9. Effect of BC Laws on the Cost of Debt: Institutional Blockholding

This table presents regression results on the interaction between a firm's institutional blockholding and the BC law effect. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Block is a dummy variable equal to one if a firm has an institutional shareholder who owns at least 5% of shares outstanding. Block Percentage is the percentage holding of the largest institutional shareholder. Herfindahl Index is the sales-based Herfindahl index. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
BC	0.068	-0.139*	0.128	-0.093
	(1.11)	(-1.81)	(1.65)	(-1.07)
Block	0.076***	0.130***		
	(2.43)	(3.16)		
BC × Block	0.020	-0.050		
	(0.31)	(-0.60)		
Block Percentage			0.017**	0.021***
			(2.60)	(2.81)
BC × Block Percentage			-0.009	-0.013
			(-0.95)	(-1.40)
BC × Herfindahl Index		0.755***		0.823***
		(3.42)		(3.53)
BC × Speculative-grade		1.084***		1.083***
		(11.80)		(11.56)
Herfindahl Index		-0.973		-1.146
		(-1.33)		(-1.45)
Credit Rating	0.111***	0.083***	0.112***	0.085***
	(7.92)	(7.23)	(7.99)	(7.20)
Duration (years)	-0.182***	-0.163***	-0.183***	-0.165***
	(-6.65)	(-6.20)	(-6.26)	(-5.90)
Convexity (years)	0.895***	0.837***	0.908***	0.857***
	(8.52)	(7.77)	(7.98)	(7.18)
Age ≤ 1	-0.083***	-0.088***	-0.085***	-0.089***
	(-3.86)	(-3.54)	(-3.92)	(-3.57)
Age > 10	-0.667***	-0.703***	-0.665***	-0.703***
	(-6.25)	(-7.41)	(-6.14)	(-7.44)
Ln(Asset)	-0.273***	-0.225***	-0.270***	-0.226***
	(-3.17)	(-2.92)	(-3.14)	(-2.83)
Firm Risk	4.458***	3.927***	4.345***	3.863***
	(2.98)	(3.14)	(3.00)	(3.23)
Leverage	1.664***	1.544**	1.685**	1.564**
	(2.96)	(2.41)	(2.80)	(2.31)
Profitability	-0.905	-0.982	-0.866	-0.952
	(-0.98)	(-1.09)	(-0.92)	(-1.03)
Sales Growth	-0.183	-0.132	-0.182	-0.127
	(-1.18)	(-0.98)	(-1.13)	(-0.92)
State-year	0.102**	0.106**	0.102**	0.107**
	(2.23)	(2.24)	(2.30)	(2.30)
Industry-year	0.081**	0.084***	0.085***	0.088***
	(2.67)	(3.76)	(2.81)	(3.92)
Firm Fixed Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observations	2,221	2,221	2,221	2,221
Adj-R Squared	0.79	0.80	0.79	0.80

Table 10. Simultaneous Equations Estimation: Credit Spread and Credit Rating

This table presents regression results on the impact of BC laws on the cost of debt when the credit spread and credit rating are modeled simultaneously. The model is estimated using fixed effects instrumental two-stage least squares regressions. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Herfindahl Index is the sales-based Herfindahl index. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. Lagged Leverage is a firm's leverage level in the previous year. Lagged Credit Rating is a firm's credit rating in the previous year. State-year is the average credit spread/credit rating in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread/credit rating in a firm's industry (excluding the firm itself) in that year. The definitions of the other variables are described in Table 2. The instrumental variable for credit rating is Lagged Credit Rating. The instrumental variable for credit spread is Duration, Convexity, and Age ≤ 1. Bootstrapped t-statistics with 100 replications are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Credit Rating	Credit Spread	Credit Spread
	(1)	(2)	(3)
BC	0.324	0.301***	-0.027
	(1.43)	(2.88)	(0.33)
Credit Spread	0.509		
	(0.78)		
Credit Rating		0.129***	0.103***
		(4.17)	(3.12)
BC × Herfindahl Index			1.786***
			(3.16)
BC × Speculative-grade			1.165***
			(4.23)
Herfindahl Index			-0.369
			(-0.40)
Duration (years)		-0.094**	-0.096**
		(-2.21)	(-2.24)
Convexity (years)		0.482*	0.491*
		(1.77)	(1.91)
Age ≤ 1		-0.088*	-0.077
		(-1.84)	(-1.56)
Age > 10	0.191	-0.591***	-0.684***
	(0.50)	(-4.20)	(-4.50)
Ln(Asset)	-0.372	-0.210	-0.205
	(-1.36)	(-1.31)	(-1.31)
Firm Risk	5.518	6.013*	4.331
	(0.90)	(1.84)	(1.63)
Lagged Leverage	1.261	2.213***	2.078***
	(0.84)	(3.90)	(3.07)
Profitability	-3.064*	-1.402	-1.371
	(-1.70)	(-1.56)	(-1.38)
Sales Growth	0.327	-0.580***	-0.513**
	(0.80)	(-3.04)	(-2.08)
Lagged Credit Rating	0.672***		
	(7.40)		
State-year	0.071	0.091	0.095*
	(0.91)	(1.51)	(1.66)
Industry-year	-0.059	0.178***	0.183***
	(-0.49)	(3.43)	(3.95)
Firm Fixed Effect	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes
Observations	3,495	3,495	3,495
Adjusted R-Square	0.89	0.46	0.48

Table 11. Robustness Tests

This table presents robustness tests on the BC law effect. Column (1) is the benchmark result taken from Table 7. Column (2) drops firm year observations in the top 2.5 percent of the Herfindahl index. Column (3) calculates a firm's cost of debt as the equally-weighted credit spread of all bonds issued by the firm. Column (4) excludes firms incorporated in Delaware. Column (5) includes only bonds existing both before and after the passage of BC laws. Column (6) controls for the number of debt covenants in the regression. Column (7) presents bond-level regression results. Column (8) presents bond-level regression results with the inclusion of callable and putable bonds. BC is a dummy variable equal to one if a state has passed a BC law by that year and zero otherwise. Herfindahl Index is the sales-based Herfindahl index. Speculative-grade is a dummy variable equal to one if a firm's weighted average credit rating is below BBB- and zero otherwise. Age ≤ 1 is a dummy variable equal to one if a firm's weighted average bond age is less than or equal to 1 and zero otherwise. Age > 10 is a dummy variable equal to one if a firm's weighted average bond age is greater than 10 and zero otherwise. Number of Covenants is the total number of event risk, payout, and financing covenants. Callable is a dummy variable equal to one if the bond is callable. Putable is a dummy variable equal to one if the bond is putable. State-year is the average credit spread in a firm's state of location (excluding the firm itself) in that year. Industry-year is the average credit spread in a firm's industry (excluding the firm itself) in that year. The definitions of the other variables are described in Table 2. Heteroskedasticity-robust t-statistics adjusted for clustering within states of incorporation are in parentheses. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Benchmark Result (From Column (1) of Table 7)	Excluding Observations In the Top 2.5% Herfindahl Index	Equally-Weighted	Excluding Delaware Firms	Including Only Bonds Existing Both Before and After BC laws	Control for Covenants	Bond-Level Regression	Bond-Level Regression (Including Callable and Putable Bonds)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BC	-0.036	-0.093	-0.033	-0.107	-0.000	-0.024	0.020	0.075
	(-0.43)	(-1.27)	(-0.43)	(-1.07)	(-0.00)	(-0.13)	(0.22)	(0.48)
BC × Herfindahl Index	1.588***	2.188***	1.497***	1.873***	1.113**	2.037**	1.588***	1.717***
	(6.24)	(6.06)	(6.51)	(3.07)	(2.38)	(2.40)	(3.91)	(6.95)
BC × Speculative-grade	1.125***	1.066***	1.137***	0.929***	1.583***	0.434***	0.922***	0.337**
	(13.02)	(12.30)	(14.42)	(4.69)	(9.35)	(6.92)	(5.47)	(2.05)
Herfindahl Index	-0.000	-0.135	0.035	0.398	0.576	1.095	-0.152	-0.812*
	(-0.00)	(-0.23)	(0.07)	(0.31)	(0.59)	(0.92)	(-0.19)	(-1.95)
Credit Rating	0.117***	0.118***	0.115***	0.131***	0.183***	0.152***	0.122***	0.074***
	(7.27)	(7.43)	(6.67)	(4.04)	(3.69)	(4.91)	(3.63)	(2.97)
Duration (year)	-0.103***	-0.105***	-0.099***	-0.133***	-0.027	0.058	-0.084***	-0.028
	(-4.45)	(-4.48)	(-4.29)	(-2.77)	(0.85)	(0.85)	(-3.08)	(-1.05)
Convexity (year)	0.517***	0.511***	0.496***	0.593**	-1.007*	-0.127	0.606***	0.091
	(4.80)	(4.51)	(4.56)	(2.48)	(-1.89)	(-0.35)	(4.09)	(0.80)
Age ≤ 1	-0.104**	-0.095*	-0.094**	-0.169**	0.114*	-0.233***	-0.074	-0.203***
	(-2.04)	(-1.82)	(-2.57)	(-2.10)	(1.80)	(-4.51)	(-1.48)	(-4.60)
Age > 10	-0.662***	-0.680***	-0.623***	-0.800***	-0.858***	-0.662***	-0.611***	-0.626***
	(-5.47)	(-5.54)	(-7.31)	(-3.69)	(-3.47)	(-3.88)	(-7.37)	(-17.47)
Ln(Asset)	-0.202**	-0.202**	-0.214**	-0.173	-0.448***	-0.250**	-0.281*	0.020
	(-2.51)	(-2.45)	(-2.60)	(-0.90)	(-2.89)	(-2.46)	(-1.92)	(0.15)
Firm Risk	4.280*	3.573*	4.177*	9.546***	2.771	0.264	9.284**	1.658
	(1.92)	(1.89)	(1.94)	(3.23)	(1.09)	(0.31)	(2.69)	(1.06)
Leverage	1.973***	1.904***	2.002***	0.945***	1.090	1.090	1.995***	1.558***
	(3.82)	(3.64)	(3.96)	(3.23)	(1.51)	(1.51)	(3.20)	(2.91)
Profitability	-0.762	-0.748	-1.097	-1.264	-2.547***	-0.082	-2.643***	-2.142***
	(-1.11)	(-1.08)	(-1.61)	(-0.83)	(-4.85)	(-0.10)	(-3.68)	(-4.19)
Sales Growth	-0.398**	-0.413**	-0.376**	-0.516	-0.372	-0.100	-0.133	-0.711**
	(-2.19)	(-2.20)	(-2.01)	(-1.21)	(-1.58)	(-0.81)	(-0.73)	(-2.41)
Number of Covenants						-0.018		
						(-1.03)		
State-year	0.109**	0.115**	0.099*	0.118	0.141	-0.072	0.024	0.102
	(2.01)	(2.12)	(1.88)	(1.55)	(1.17)	(-1.55)	(0.25)	(1.51)
Industry-year	0.173***	0.159***	0.170***	0.128***	0.162***	0.158***	0.158***	0.384***
	(8.73)	(8.77)	(8.72)	(2.77)	(3.64)	(5.70)	(3.72)	(2.79)
Callable								0.413***
								(7.50)
Putable								-0.384***
								(-2.79)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,996	3,913	3,996	2,195	1,428	1,320	13,361	50,334
Adj-R Squared	0.78	0.78	0.78	0.75	0.90	0.90	0.65	0.62