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Empty Creditors and Strong Shareholders: The Real Effects of Credit Risk Trading*

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Abstract

Credit derivatives allow creditors to transfer debt cash flow rights to other market participants while retaining control rights. Theory predicts that this transfer can create empty creditors that do not fully internalize liquidation costs and liquidate borrowers excessively often. This empty creditor problem is concentrated in firms whose creditors would face powerful shareholders in distressed debt renegotiations. Consistent with this prediction, we show that (1) creditors buy more CDS protection when facing strong shareholders, and that (2) CDS trading reduces the distance-to-default, investment, and value of firms with powerful shareholders.

Keywords: debt decoupling, empty creditors, credit default swaps, shareholder bargaining power, real effects

JEL Classification: G32, G33, G34

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1 Introduction

Debt ownership typically combines contingent control and cash flow rights. Yet, credit risk trading allows creditors to insure against borrower default and, at the same time, to retain the right to push a delinquent firm into bankruptcy.[1] Bolton and Oehmke (2011) predict that this separation of rights can create "empty creditors" that do not fully internalize liquidation cost and potentially force a firm into bankruptcy even though private debt renegotiation would be more efficient. Empirical evidence from the market for credit default swaps (CDSs) suggests that credit risk trading is indeed associated with higher default risk (Subrahmanyam, Tang, and Wang, 2014) to which firms respond with a build-up of precautionary cash buffers (Subrahmanyam, Tang, and Wang, 2016).

This paper provides empirical evidence that credit risk trading in the CDS market has adverse effects on the investment activity and firm value of borrowers that are most affected by the empty creditor problem.[2] More precisely, the magnitude of these real effects depends on the distribution of bargaining power among claimholders. Firms whose creditors would face strong shareholders in distressed debt negotiations attract more CDS protection and experience a larger increase in default risk once CDS trading starts. Compared to other firms, they reduce investment and lose value. These effects are economically large and robust to different identification strategies.

Under Chapter 11 of the U.S. Bankruptcy Code, delinquent firms are allowed to renegotiate outstanding debt with their creditors on mutually acceptable terms. Renego-

[1] This separation of rights is also called debt unbundling or decoupling (Hu and Black, 2008). Credit risk trading can take place, for example, through credit risk derivatives, securitization, or short-long positions in multiple classes of debt written on the same firm. Feldhütter, Hotchkiss, and Karakaş (2016) show that market participants do not only value cash flow rights but also debt control rights, in particular around credit events.

[2] We focus on the CDS market as one of the most popular venues for credit risk trading. The CDS market grew to over USD 58 trillion in notional amount at its peak in 2007 (see http://www.bis.org/statistics/derstats.htm). Since the financial crisis, the use of CDSs by banks has been expanding due to the introduction of Basel III (Subrahmanyam, Tang, and Wang, 2016).

tiation outcomes largely depend on bargaining.[3] Theoretical research on the real effects of CDSs shows that CDS protection fundamentally changes debt negotiations because it gives creditors a valuable outside option and makes their threat to let the firm default more credible (e.g., Bolton and Oehmke, 2011; Danis and Gamba, Forthcoming). Building on this literature, we hypothesize that this outside option is more valuable to creditors that would have to bargain with powerful shareholders.

Creditors choose the optimal amount of CDS protection balancing the following trade-off. On the one hand, CDS protection improves the creditors' bargaining position and increases their expected payoff in debt negotiations.[4] On the other hand, CDS protection increases the probability that debt renegotiations fail and the firm is pushed into inefficient liquidation.[5] The optimal amount of CDS protection that balances this trade-off depends on the ex-ante distribution of bargaining power absent CDSs. Our theory shows that creditors in firms with strong shareholders benefit more from improving their bargaining position and, therefore, buy more CDS protection. Consequently, firms with powerful shareholders experience an increase in default risk once CDS trading starts, which reduces firm value and induces underinvestment.

We study these predictions empirically in a quarterly sample of 5,843 U.S. firms over 2001-14 using a number of different measures of relative creditor/shareholder bargaining power. In the main specification, we focus on equity ownership in the hands of institutional investors (Alanis, Chava, and Kumar, 2015). The underlying assumption is that these relatively sophisticated shareholders drive a harder bargain and, ceteris paribus,

[3]Existing studies illustrate that the bargaining positions of a firm's claimholders affect the incidence of renegotiations, debt recovery rates, deviations from absolute priority, as well as credit spreads (e.g., Gilson, John, and Lang, 1990; Asquith, Gertner, and Scharfstein, 1994; Franks and Torous, 1994; Betker, 1995; Davydenko and Strebulaev, 2007; Chen and Strebulaev, 2016). Fan and Sundaresan (2000) explore the role of bargaining power in debt renegotiation theoretically.

[4]If CDS are fairly priced, the insurance payment in default itself does not incentivize creditors to buy CDSs. The sole benefit of CDS stems from strengthening creditors' bargaining power in renegotiations.

[5]The increase in default risk increases the expected liquidation cost and, therefore, lowers the value of debt ex ante. The expected CDS payment in default does not compensate the creditor for the increase in default risk provided that it is fairly priced.

can extract higher concessions in debt renegotiation than dispersed retail investors.[6] In our first test, we show that more CDS protection is written on firms with powerful shareholders (equivalently, with weak creditors). A 1% increase of institutional ownership, our proxy for shareholder bargaining power, increases the ratio of CDS net protection over total debt by 0.32%. This is consistent with weaker creditors buying more CDS insurance to improve their outside option in debt renegotiation with strong institutional investors.

As more CDS protection is written on firms with powerful shareholders, we test whether these same firms also experience stronger real effects of CDS trading. First, we study how the distance-to-default of firms with high versus low institutional ownership responds to the initiation of CDS trading. Consistent with our theory, CDS trading reduces the distance-to-default of firms in the top quartile of the institutional ownership distribution by 0.475, a decrease by 7.9% relative to the sample median. In the presence of bankruptcy costs, such a large increase in credit risk can potentially destroy firm value. Using Tobin's q as a measure of firm value, we show that CDS trading reduces the value of firms with strong shareholders by 0.128 compared to other firms, a decrease by 8.8% relative to the median.[7] Finally, we study the effect of CDSs on investment and show that the top 25% of firms with the strongest shareholders reduce capital expenditure by 0.003 compared to other firms (7% relative to the sample median) once a CDS starts to trade on firms' debt. These results highlight that shareholder bargaining power strongly affects the severity of the empty creditor problem as well as the ensuing effects on firm value and investment.[8]

Our analysis must deal with two identification challenges. First, our proxy for share-

[6] We validate our different bargaining power proxies in Appendix B. For example, we show that bargaining outcomes in Chapter 11 and after covenant violations are indeed more favorable to institutional sophisticated shareholders.

[7] When we replace Tobin's q by the return on assets as an asset-side measure of firm value, we get qualitatively similar results.

[8] While our findings are derived from the CDS market, they possibly extend to other forms of credit risk trading.

holder strength is potentially endogenous. We address this concern by using lagged and beginning-of-period values of institutional ownership throughout the analysis. In addition, we estimate all regressions with firm fixed effects that control for time-invariant heterogeneity. Identification then only comes from changes in institutional ownership. In addition, we consider the possibility that ownership changes are endogenous and use the inclusion and exclusion of firms in the S&P500 as an instrument (Aghion, Reenen, and Zingales, 2013). Estimates from all these different specifications suggest that creditors buy more CDS protection if they face powerful shareholders in debt renegotiations.

Endogeneity of CDS trading poses a second identification challenge. We run a battery of tests to address this concern. First, we follow Ashcraft and Santos (2009), Saretto and Tookes (2013), Subrahmanyam, Tang, and Wang (2014), and others and exploit differences in the timing of CDS trading initiation across firms. At the same time, we include firm fixed effects to control for time-invariant firm heterogeneity. While this regression specification is standard in the literature, it relies on the assumption that the timing of CDS introduction is exogenous. We refine this identification strategy by adding industry-time fixed effects that control for unobservable industry-specific time variation.

Yet, the possibility that time variation at the firm level could confound the timing of CDS introduction requires further efforts. We follow Danis (2016), Gündüz, Ongena, Tümer-Alkan, and Yu (2015), and others and conduct an event study in a narrow window around the CDS Big Bang of 2009.[9] This regulatory event was an exogenous shock that made it easier for creditors to buy CDS protection and, thus, to become "empty."[10] Importantly, the Big Bang was a market-wide event immune to a possible self-selection of firms into treatment. We find that firms with outstanding CDSs and powerful share-

[9] Gündüz, Ongena, Tümer-Alkan, and Yu (2015) study the implementation of this trading protocol in Germany.

[10] This regulatory event improved the availability and liquidity of CDSs through contract harmonization. It also eliminated debt restructuring as an eligible credit event that would trigger CDS payments thereby reducing the incentives of empty creditors to renegotiate debt further.

holders become riskier, decrease investment, and lose value during the first six calendar quarters after the shock.

The CDS Big Bang took place at a time of extraordinary economic turmoil. Therefore, we conduct a second event study exploiting an amendment to the net capital rule by the SEC which occurred already in 2004. This amendment exempted the broker-dealers of Merrill Lynch, Goldman Sachs, Bear Sterns, Lehman Brothers, and Morgan Stanley from the net capital rule which determined their minimum capital requirements. After the exemption, they could instead follow the Basel standards which allowed them to reduce capital requirements for credit risk exposures with CDS protection. We hypothesize that this possibility incentivized these institutions to buy more CDS protection. Indeed, we find that their borrowers are more likely to have a CDS than firms borrowing from other creditors and that their borrowers tend to have more liquid CDSs after the event. We then show that this regulatory shock to the demand for CDS protection decreases the distance-to-default, firm value, and investment only of borrowers with affected creditors and especially if those borrowers have powerful shareholders.

Finally, we study whether our results are robust to alternative measures of bargaining power. First, we compute the fraction of equity owned by the five largest institutions as a measure of ownership concentration. We argue that ownership concentration is likely to reduce coordination problems between shareholders, thereby strengthening their bargaining position in debt renegotiation. Second, we follow Fich, Harford, and Tran (2015) and identify shareholders that have invested an important part of their portfolio wealth in the firm. Having more skin in the game, these investors are likely to be tougher in debt renegotiation. Third, we compute the ratio of bank debt to total assets. We expect that shareholder bargaining power is lower in the presence of informed relationship-lenders like banks, who know the situation of a distressed firm better than distant bondholders. Our results are robust to the use of these different measures of bargaining power.

Our paper contributes to the literature on the effects of CDSs on firms. Previous studies have examined the role of CDSs in shaping shareholder-creditor relationships in distressed firms. For example, Danis (2016) shows that creditors of CDS firms are less likely to vote in favor of distressed exchange offers, whereas Bedendo, Cathcart, and El-Jahel (2016) do not find any evidence that distressed CDS firms are more likely to file for bankruptcy. Subrahmanyam, Tang, and Wang (2014) do not restrict their analysis to distressed firms. They show that firms tend to become riskier after the introduction of CDSs. The mixed evidence for different samples and identification strategies reported in these papers might be due to the fact that CDS trading has heterogeneous effects for different firms. We address this problem by starting with a comprehensive data set of 5,843 US firms and then explicitly allowing for variation in shareholders' bargaining power as an important determinant of the empty creditor problem.

A number of papers examine the consequences of CDS trading for firms' access to debt markets. For example, Ashcraft and Santos (2009), Kim (2016), and Narayanan and Uzmanoglu (2015) test whether CDS trading affects the cost of debt and find mixed evidence. Saretto and Tookes (2013) show that CDS availability may improve access to debt markets by increasing the maturity and quantity of debt rather than by reducing credit spreads.

Several theoretical studies analyze the real effects of CDSs in a general equilibrium framework delivering a rich set of predictions (Darst and Refayet, 2014; Fostel and Geanakoplos, 2016; Danis and Gamba, Forthcoming). Campello and Matta (2012) show theoretically that CDSs can generate risk-shifting incentives. Kitwiwattanachai and Lee (2014) and Uzmanoglu (2015) provide consistent empirical evidence. To the best of our knowledge, we are the first to show that the effects of CDS trading on firm value and investment strongly depend on the distribution of bargaining power among a firm's claimholders. While CDS may well have positive welfare effects, too (for example,

through an efficient allocation of credit risk in the market), it seems that CDS trading can have adverse effects at least on the firms most prone to an empty creditor problem.[11]

The paper proceeds as follows. Section 2 presents a short stylized model conveying the intuition why the empty creditor problem is affected by the distribution of bargaining power between creditors and shareholders. Section 3 describes the data. Section 4 discusses our empirical results. Section 5 concludes. Additional results are collected in the Appendix.

2 Hypotheses development

Renegotiating with empty creditors. Under Chapter 11 of the U.S. Bankruptcy Code, delinquent firms are allowed to renegotiate outstanding debt with their creditors on mutually acceptable terms. By preserving firm operations and avoiding liquidation costs, distressed renegotiations can be valuable to both debtors and creditors. Yet, renegotiation outcomes largely depend on bargaining. As a result, bargaining positions of a firm's claimholders are key factors affecting the incidence of renegotiations as well as credit spreads (see, e.g., Davydenko and Strebulaev, 2007).

Claimholders' bargaining positions, in turn, depend on the allocation of cash flow and control rights. While cash flow and control rights have traditionally been bundled together, credit risk trading has led to a separation of control rights from cash flow rights. By promising a payment to creditors when the firm is delinquent, CDSs provide creditors with an outside option to distressed renegotiations, which strengthens their bargaining positions. In the following, we sketch out a stylized model illustrating that this outside option is more valuable to creditors of firms with more powerful shareholders.

[11] Augustin, Subrahmanyam, Tang, and Wang (2014) and Augustin, Subrahmanyam, Tang, and Wang (2016) survey the literature on CDSs and provide further references.

A simple model. In our two-dates model ($t = 0, 1$), agents are risk neutral and have rational expectations. The risk-free rate is zero. We consider a firm that has an investment opportunity and no assets in place. Investment costs $I > 0$ at $t = 0$ and promises a cash flow z at $t = 1$, which is uniformly distributed over the support $[0, Z]$, with $Z > I$.

The firm can finance the investment cost with a combination of debt and equity, as in Myers (1977).[12] Debt matures at time $t = 1$, when it requires the contractual repayment F. We assume that debt is risky, so $0 < F < Z$. If the firm fails to meet the contractual payment F at time $t = 1$, creditors can force the firm into default. Default is inefficient as a fraction $\alpha \in [0, 1]$ of cash flows is lost as a frictional cost. To avoid this cost, creditors and shareholders can renegotiate the debt contract on mutually acceptable terms. The renegotiation surplus is split via Nash bargaining, as in Fan and Sundaresan (2000). The ex-ante relative bargaining powers are denoted by $\eta \in (0, 1)$ for shareholders and $1 - \eta$ for creditors.

We assume that CDSs written on the firm's debt are available so that creditors can buy credit protection. CDSs provide creditors with the promise of a net payment π if a credit event occurs at $t = 1$.[13] A credit event is verified if the firm misses the contractual payment F and creditors and shareholders fail to renegotiate the debt contract. Following the literature, we assume that creditors pay the fair premium $p(\pi)$ at $t = 0$.

Insights. The model is solved backwards. We denote by z_1 the cash flow realization at $t = 1$. If z_1 is equal or bigger than F, the firm is able to meet its contractual payment. If z_1 falls below F, the firm is delinquent. In this case, two outcomes are possible: Either creditors force the firm into bankruptcy and collect π from the protection seller, or they agree to renegotiate the debt contract.

[12] As in Myers (1977), there are no taxes or agency costs of free cash flows, so the face value of debt is exogenous. Yet, the leverage ratio is endogenous, because so are the market values of debt and equity.

[13] We follow CDS market practice and assume that creditors retain the liquidation value of assets and receive the net CDS payment (π) (see also Campello and Matta, 2012).

In renegotiation, the optimal sharing rule θ^* solves

$$\theta^* = \arg\max_{\theta} \left[\theta z_1\right]^{\eta} \left[(1-\theta)z_1 - (\pi + (1-\alpha)z_1)\right]^{1-\eta}.$$

The first term represents the incremental value of debt renegotiation as opposed to firm liquidation to shareholders. The second term represents the incremental value to creditors if they do not force the firm into default (thus collecting the CDS payment π) but renegotiate the debt instead. It is worth noting that a higher CDS net payment π reduces the incremental value of debt renegotiation to creditors. Solving this maximization problem gives[14]

$$\theta^* = \eta \frac{\alpha z_1 - \pi}{z_1} = \eta \left(\alpha - \frac{\pi}{z_1}\right) \tag{1}$$

for shareholders ($1-\theta^*$ for creditors), which implies that π decreases (increases) the surplus share to shareholders (creditors). Because θ^* needs to be nonnegative, renegotiation occurs *if* $z_1 > \pi/\alpha$, i.e., if the realized cash flow is sufficiently large. Otherwise, creditors force the firm into default and collect the CDS payment. The greater π is, the larger the liquidation interval $[0, \pi/\alpha]$ and the smaller the renegotiation interval $[\pi/\alpha, F]$.

The optimal level of credit protection π^* is chosen by creditors at $t = 0$ to maximize their expected payoff at $t = 1$ by solving

$$\max_{\pi} \left\{ \int_0^{\frac{\pi}{\alpha}} (1-\alpha)\frac{z}{Z}dz + \int_{\frac{\pi}{\alpha}}^{F} \left[1 - \eta\left(\alpha - \frac{\pi}{z}\right)\right] \frac{z}{Z}dz + \int_F^Z \frac{F}{Z}dz \right\}. \tag{2}$$

The first term is the creditors' net payoff if they force the firm into default.[15] The second term is the creditors' payoff in renegotiation. The last term is the payoff when the firm is solvent. This objective function illustrates that creditors face a tradeoff when choosing the level of credit protection π. A larger π increases the creditors' surplus from

[14] If $z_1 = 0$, there is nothing to renegotiate on, and creditors always trigger CDS payment.

[15] The fair price of CDS insurance offsets the expected payment by the protection seller at $t = 1$.

renegotiation. However, a larger π decreases the renegotiation interval and expands the liquidation interval. It is worth noting that because CDSs are fairly priced and investors have rational expectations, the benefit accruing to creditors from CDS protection does not stem from the payment in default, but rather from the enhanced bargaining positions in renegotiation.

Solving this problem delivers the optimal π^*

$$\pi^* = \frac{\alpha \eta F}{1+\eta}, \tag{3}$$

which is monotonically increasing (and concave) in η. Creditors grant themselves a larger outside option π^*, i.e. a more valuable alternative to distressed bargaining, in the presence of more powerful shareholders. The probability of liquidation associated with (3) is given by:

$$P\left[\text{default}|\pi = \pi^*\right] = \int_0^{\frac{\pi^*}{\alpha}} \frac{dz}{Z} = \frac{F}{Z}\frac{\eta}{1+\eta}, \tag{4}$$

which is monotonically increasing in η.

By affecting the likelihood of renegotiation versus liquidation, higher CDS insurance affects firm value, which is given by

$$E\left[\text{firm}|\pi = \pi^*\right] = \int_0^{\frac{\pi^*}{\alpha}} (1-\alpha)\frac{z}{Z}dz + \int_{\frac{\pi^*}{\alpha}}^{Z} \frac{z}{Z}dz \;=\; \frac{Z}{2} - \frac{F^2}{2Z}\frac{\eta^2\alpha}{(1+\eta)^2}. \tag{5}$$

Simple calculations illustrate that firm value decreases with η. When facing stronger shareholders, creditors purchase more credit protection ex ante. This leads to an increase in the probability of liquidation and to a higher incidence of liquidation costs on firm value. In the absence of CDS ($\pi = 0$), conversely, creditors are always better off renegotiating instead of pushing the firm in liquidation, so liquidation costs do not affect firm value,

which is equal to $\int_0^Z \frac{z}{Z} dz = Z/2$.[16]

Shareholders are willing to invest at $t = 0$ only if firm value exceeds the cost of investment:

$$E\left[\text{firm}|\pi = \pi^*\right] \geq I. \tag{6}$$

From (5), the left-hand side of this inequality is decreasing in η. The right-hand side is constant. Thus, there is a critical level of shareholder bargaining power η^* for which (6) holds as an equality. If $\eta > \eta^*$, the firm will not invest at $t = 0$ because the project has a negative net present value.

In conclusion, CDS protection reduces creditors' incentives to renegotiate the outstanding debt and to avoid default. In the presence of liquidation cost, this implies adverse effects of CDS trading on firm value and investment. Large shareholder bargaining power exacerbates this empty creditor problem because it ex-ante increases the creditors' optimal level of CDS protection. We summarize our testable hypotheses below.

Hypothesis 1:

The level of CDS protection written on firm debt increases in shareholder bargaining power.

Hypothesis 2:

After CDSs are written on firm debt, (a) default risk of firms with powerful shareholders increases relative to other firms; (b) firm value and investment of firms with powerful shareholders decrease relative to other firms.

[16] See Appendix A.

3 Data

3.1 Data sources

We use quarterly accounting data and daily stock return data for a sample of U.S. public firms from the CRSP-Compustat merged database over the period from 2001 through 2014, excluding financial institutions and utilities. We restrict the analysis to this period, because our CDS data start in 2001. We include firm-years with non-missing sales, total assets, common shares outstanding, share price, and calendar date. We exclude firms with zero financial debt and firms with market or book leverage outside of the unit interval. In addition, we require firms to report total assets and property, plant and equipment (PPE) in excess of $10 million and of $1 million in 2010 dollars, respectively.

We match this dataset with CDS pricing data from Markit (starting in January 2001) and CDS volume data from the Depository Trust & Clearing Corporation DTCC (starting in the fourth quarter of 2008). We retrieve institutional holdings data from the Thomson 13f filings database and debt structure data from Capital IQ (starting in 2002).

To identify firms' relationships with financial institutions, we rely on loan data from the Loan Pricing Corporation's Dealscan database, and non-convertible debt issuance data from the Thomson Financial's SDC Platinum Global New Issues (SDC) database.[17]

Finally, to obtain information on firms entering Chapter 11 bankruptcy, we rely on the UCLA-LoPucki Bankruptcy Research Database (BRD).

3.2 Variable construction

To test our predictions, we construct the following variables.

[17] We match Dealscan data with Compustat data using the link file made available by Michael Roberts (Chava and Roberts, 2008).

CDS trading activity. Following Ashcraft and Santos (2009), Saretto and Tookes (2013), Subrahmanyam, Tang, and Wang (2014), and others, we start by checking whether a given firm is traded in the CDS market. The binary variable *CDS traded* equals one for firms that have an outstanding CDS in at least one quarter over the sample period and zero for firms that are never traded in the CDS market. The binary variable *CDS trading* captures the timing of CDS introduction. It equals one only in firm-quarters in which a CDS is traded on the firm and zero before the onset of CDS trading. In a second step we analyze the amount and liquidity of CDS trading at the firm-quarter level. DTCC data reports the notional value of CDS protection written on a given firm. In line with Campello and Matta (2016), we measure the amount of CDS protection written on a firm name as the ratio of outstanding CDS net (gross) notional amount to total firm debt at quarter end. Finally, we capture the liquidity of a firm's CDS contract using the negative of the illiquidity measure proposed by Junge and Trolle (2015).[18]

Bargaining power proxies. We use several measures of shareholder bargaining power. In our baseline analysis, we focus on institutional ownership (relative to common shares outstanding). Institutional investors tend to be more sophisticated than retail investors and are, therefore, likely to have more bargaining power in renegotiation (see, e.g., Alanis, Chava, and Kumar, 2015). Second, we look at ownership concentration among the top five institutional investors. More concentrated ownership is likely to reduce potential coordination problems among investors thereby increasing their bargaining power. Third, we hypothesize that an institutional investor will be more active and tougher in debt renegotiation if he has more skin in the bargaining outcome. We check for each investor-firm relationship whether the firm represents a significant position in the investor's portfolio. Following Fich, Harford, and Tran (2015), we identify shareholders whose "holding value

[18]This illiquidity measure is given by the quarterly average of absolute 5-year CDS spread changes divided by the number of quotes available on a given contract.

in the target firm is in the top 10% of their portfolio."[19] Then we count the number of these *monitoring shareholders* per firm. Fourth, we use the ratio of bank debt to total assets as a proxy for *creditor* bargaining power. Due to their monitoring function in relationship lending, banks are presumably better informed about debtors than distant bondholders. The presence of high bank debt should, therefore, limit the relative bargaining position of shareholders (Betker, 1995).

We validate these measures of bargaining power against data on shareholders' and creditors' ex post behavior in default. We look both at Chapter 11 bankruptcies and at technical defaults following loan covenant violations. First, starting with Chapter 11 filings, we check whether firms with powerful shareholders are more likely to form equity committees in bankruptcy. Equity committees are considered a primary determinant of shareholders' ability to negotiate deviations from the absolute priority rule (LoPucki and Whitford, 1990; Bharath, Panchapagesan, and Werner, 2010).[20] Indeed, we find that shareholders of firms with higher institutional ownership, higher institutional ownership concentration, and a higher number of monitoring shareholders are more likely to form equity committees in bankruptcy (see Appendix Table B.1).

Second, we analyze covenant violations, which, from a contractual perspective, entail a transfer of control rights from shareholders to creditors. Chava and Roberts (2008) show that creditors push managers to reduce investment following covenant violations. Their ability to do so is probably lower in the presence of powerful shareholders who influence managers' investment choices themselves. Consistent with this hypothesis, we find that investment decreases less after covenant violations if our proxies indicate the presence of powerful shareholders (see Appendix Figure B.1).

[19] Other studies have looked at the Herfindahl Hirschman Index (HHI) as a measure of general portfolio concentration (e.g., Geng, Hau, and Lai, 2015). The approach by Fich, Harford, and Tran (2015) has the additional advantage to capture the importance of the individual firm to the investor.

[20] Ideally, we would like to study the correlation between our bargaining power measures and deviations from absolute priority. Unfortunately, only thirty observations have data on distributions to shareholders.

Overall, outcomes both in Chapter 11 bankruptcies as well as after covenant violations seem to be more favorable to shareholders in cases in which our shareholder bargaining power measures are high. We provide more details on these tests in Appendix B.

Dependent variables. Our main measure of default risk is the naïve distance-to-default by Bharath and Shumway (2008). Such a measure hinges on the functional form by Merton (1974) but does not require to solve the model numerically. Bharath and Shumway (2008) provide evidence that it predicts default better than the actual Merton (1974) distance-to-default. As a supplementary proxy for default risk, we use the Altman's Z-score as modified by MacKie-Mason (1990). A low Z-score indicates high default risk. Our main measure of firm value is Tobin's q. Additionally, we use the return on assets (ROA) as an asset-side measure of firm value. Finally, we use the ratio of capital expenditures to PPE and PPE growth to measure investment.

We winsorize variables at the 1st and 99th percentile to reduce the influence of outliers. All dollar amounts are expressed in 2010 dollars. Detailed definitions of the variables are given in Appendix C.1.

3.3 Summary statistics

Panel A of Table 1 reports summary statistics for the 5,843 firms in our final sample. The binary variable *CDS traded* equals one for 23% of the firm-quarter observations, i.e., 742 firms are referenced in a CDS contract at least once between 2001 and 2014. The variable *CDS trading* equals one for 18% of the firm-quarters. Conditional on CDS trading, we report *CDS gross (net) protection*. As DTCC reports outstanding notional amounts of CDS protection only for the top 1,000 reference firms and only from the fourth quarter of 2008 onwards, CDS volume data is available only for 5,593 firm-quarters. In this sub-sample, average *CDS gross protection* equals 4.4. After netting, CDS protection over

total firm debt decreases to, on average, 0.325.

Average institutional ownership equals 0.53. For roughly 25% of the observations institutional investors hold more than 80% of firm equity which suggests that ownership of these firms is sophisticated and associated with high bargaining power. Average ownership concentration among the top five investors equals 0.25 and exceeds 0.34 in the top quartile of the distribution. The average number of monitoring shareholders equals zero for more than half of the observations. Yet, firms in the top quartile of the distribution have at least one shareholder with significant skin in the firm. Average bank debt over total assets equals 0.11, which is considerable given that average book leverage equals only 0.25.

Panel B of Table 1 reports summary statistics for firms with institutional ownership in the lower three quartiles of the distribution. Column 2 reports variable means for firm-quarters without an outstanding CDS contract ($CDS\ trading = 0$) whereas column 4 reports variable means for firm-quarters with CDS trading. Columns 5 and 6 of Panel B show that, conditional on low institutional ownership, CDS firms have a significantly higher average distance-to-default, Z-score, and ROA than non-CDS firms. Panel C shows the corresponding variable means in the sample of firms with institutional ownership in the top quartile of the distribution. For these firms with presumably high shareholder bargaining power, CDS trading appears to be associated with a lower distance-to-default and lower Tobin's q, investment, and PPE growth.

The two-sample t-tests reported in Panels B and C provide suggestive evidence that CDS trading has adverse effects on firms with high shareholder bargaining power compared to other firms. While this is consistent with our theoretical predictions, these results are possibly confounded by a potential self-selection of firms into CDS trading. We will address this problem in Section 4.2.1.

4 Results

4.1 CDS protection

In debt renegotiation, creditors of firms with high shareholder bargaining power receive a relatively smaller fraction of the continuation value of the firm.[21] Hypothesis 1 predicts that creditors who must negotiate with powerful shareholders try to improve their bargaining position by buying more credit insurance. Figure 1 is consistent with this hypothesis. The positive slope of the fitted line suggests that the ratio of CDS net notional amount to total debt increases in shareholder bargaining power measured by institutional ownership. Next, we will verify this observation in a formal regression framework:

$$CDS\ net\ protection_{i,t} = \beta_1 \cdot Inst.\ own._{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}, \quad (7)$$

where the subscripts i and t indicate firm and calendar quarter, respectively. $CDS\ net\ protection_{i,t}$ is the ratio of CDS net notional amount to total debt of firm i at the end of quarter t. $Inst.\ own._{i,t}$ denotes institutional ownership and measures shareholder bargaining power. We control for Tobin's q, internal cash flow, firm size, and an indicator variable for the investment grade rating status.[22] We include firm fixed effects υ_i to absorb time-invariant firm heterogeneity. Furthermore, we include calendar quarter fixed effects ν_t and fiscal quarter fixed effects $FQ_{i,t}$ where the latter are included to control for seasonal patterns. Standard errors are clustered at the firm-level.

Table 2 examines the relation between CDS protection bought and shareholder bargaining power. As our measure of CDS protection relies on CDS volume data, we restrict the analysis to the subsample of firms with data available in DTCC. The sample period starts in the fourth quarter of 2008. In column 1, we estimate equation (7) without the

[21] See Footnote 3 for empirical evidence.

[22] We do not include an indicator for the presence of a rating in this case, because all the firms with available CDS volume data in our sample are rated.

control variables to ensure that our results are not driven by "bad controls", i.e., control variables that are potentially outcome variable themselves and may induce selection bias (Angrist and Pischke, 2009). The coefficient estimate $\hat{\beta}_1$ of institutional ownership equals 0.149 and is statistically significant at the 5% level consistent with Hypothesis 1. When we include the control variables in column 2, the regression coefficient drops only slightly to 0.133 and remains significant. In column 3, we lag institutional ownership by one quarter to address concerns that reverse causality might drive our results. The change in the regression coefficient is negligible.

The elasticity of CDS protection to an increase of institutional ownership is economically large. In column 2, a 1% increase in institutional ownership is associated with a 0.32% increase in CDS protection (at the sample mean of the regressors). These findings suggest that especially the creditors of firms with powerful shareholders buy more CDS protection to improve their outside option in debt renegotiation.

Ownership structure is potentially endogenous to the amount of CDS protection written on the firm. While we control for time-invariant firm heterogeneity in Table 2 and address concerns about reverse causality by lagging institutional ownership, we recognize that changes in institutional ownership might still be correlated with changes in omitted variables. Therefore, we follow Aghion, Reenen, and Zingales (2013) and exploit changes in S&P 500 membership as an instrument for changes in ownership structure and, thus, in shareholder bargaining power.

S&P 500 membership satisfies the relevance condition as an instrument for institutional ownership. First, index constituents are likely to attract investment funds that are subject to fiduciary duty laws and performance benchmarks that favor investment in S&P 500 firms (Aghion, Reenen, and Zingales, 2013). Second, institutional investors that officially track the S&P 500 have no choice but to invest in its constituents. It is worth pointing out that, contrary to common perception, index funds are not bound to

be weak shareholders. While these funds do not actively manage their portfolio composition, their incentives to take part in firm governance through vote and voice are arguably high because they cannot simply disinvest and exit (Edmans and Holderness, 2016).[23]

Figure 2 shows the effects of index inclusion on institutional ownership in the DTCC subsample (top) and in the full sample (bottom). The DTCC subsample comprises 290 firms, of which 207 are members of the S&P 500 at some point between 2008 and 2014. Our sample contains 9 inclusion events and 21 exclusion events. As expected, institutional ownership increases (decreases) around index inclusions (exclusions) even though it partially rebounds four quarters after index exclusion, in line with evidence shown in Chan, Kot, and Tang (2013).

Table 3 presents the instrumental variable estimation. We instrument institutional ownership using the indicator variable *S&P 500*, which is equal to one if a firm is a member of the S&P 500 index in a given quarter. Column 1 reports the first-stage estimates. Consistent with Figure 2, *S&P 500* has a positive coefficient. The Angrist-Pischke F-statistics is close to 10 suggesting that the relevance condition is satisfied.

Column 2 shows the second stage using CDS protection as dependent variable. In line with Hypothesis 1, instrumented institutional ownership exhibits a positive and statistically significant (at the 10% level) coefficient in column 2. A valid concern would be that S&P 500 membership is positively correlated with the amount of CDS protection because it does not satisfy the exclusion restriction as an instrument. Yet, two arguments speak against this. First, one would probably expect S&P 500 constituents to exhibit lower credit risk and to have more stable growth prospects than other firms, in which case hedging incentives should be lower and CDS protection should be negatively corre-

[23]The empirical evidence on the effects of passive stock ownership on governance is mixed. Appel, Gormley, and Keim (2016) provide empirical evidence that passive mutual funds remove takeover defenses, appoint *more* independent directors, push for more equal voting rights, and improve firms' long-term performance. By contrast, Schmidt and Fahlenbrach (2017) show how passive ownership leads to an increase in CEO power, *fewer* appointments of independent directors, and negative announcement returns to the appointments of directors.

lated with index membership. Secondly and more importantly, S&P states explicitly that index inclusions (exclusions) are not related to changes in firm performance or growth prospects but to how well a given company represents its industry (Aghion, Reenen, and Zingales, 2013). Nevertheless, we show that our result is robust to controlling for the stock return (column 3) or for the industry-adjusted stock return (column 4) over the past year.

4.2 Real effects of CDS trading

We now turn to the main objective of our analysis and study the real effects of CDS trading. In Section 4.2.1, we will estimate the unconditional effects on the average firm. In Section 4.2.2, we will test whether CDS trading has stronger effects on firms with strong shareholders or, equivalently, with weak creditors.

4.2.1 Unconditional effects

The main challenge of this analysis is to identify a causal link between CDS trading and default risk, firm value, and investment. In a first attempt, we follow Ashcraft and Santos (2009) and many others and exploit differences in the timing of CDS introduction. We define the binary variable *CDS trading* that equals one after the inception of CDS trading for the firm, and zero before. The baseline regression is specified as follows:

$$y_{i,t} = \beta_1 \cdot CDS\ trading_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}. \tag{8}$$

As in equation (7), unobservable time-invariant differences between CDS and non-CDS firms are absorbed by firm fixed effects υ_i and we also control for time fixed effects ν_t and fiscal quarter fixed effects $FQ_{i,t}$. The coefficient β_1 of the variable $CDS\ trading_{i,t}$ tells us whether the dependent variable $y_{i,t}$ changes after the CDS of the firm starts to trade. Hence, identification is based on the assumption that the timing of the onset of

CDS trading is exogenous.

In Panel A of Table 4 we estimate equation (8) for various measures of default risk, firm value, and investment. In columns 1 and 2 of Table 4 we use the distance-to-default and the Z-score to measure the risk of firm default. For both variables high values indicate lower default risk. In columns 3 and 4 we use Tobin's q and the return on assets ROA to measure firm value. In columns 5 and 6 we use investment (capital expenditures over lagged PPE) and PPE growth as dependent variables. Consistent with Bennett, Güntay, and Unal (2015) and Bhagat, Bolton, and Lu (2015), we control for book leverage, asset tangibility, and firm size in the default risk and firm value regressions.[24] In investment regressions, we control for lagged Tobin's q and internal cash flow as is standard in the literature. To capture CDS availability we also control for the credit ratings of firms and firm reliance on the commercial paper market. Following Ashcraft and Santos (2009), we exclude firms that are already trading in the first quarter of the regression sample because it is not clear when the CDSs of those firms actually began trading.[25]

Except for column 2, the regression coefficient of $CDS\ trading_{i,t}$ is negative in all specifications of Table 4, suggesting that CDS trading activity makes firms riskier and decreases firm value and investment activity. However, these effects are not statistically significant. The picture changes slightly when we control for industry specific time variation in Panel B of Table 4. After including Fama-French 48 industry times year-quarter fixed effects, we find that the negative marginal effects of CDS trading on Tobin's q and PPE growth become statistically significant. Yet, the unconditional effects of CDS trading on the other dependent variables remain insignificant. In the following sections, we will refine the analysis and check whether the real effects of CDS trading are stronger for

[24]In the firm value (default risk) regressions we also control for stock volatility (lagged Tobin's q). As stock volatility can be seen as a measure of credit risk itself, we do not include it as a control variable in the default risk regressions. Similarly, we do not include lagged Tobin's q in firm value regressions. However, in unreported tests, we find that our results about firm value are robust to including lagged Tobin's q among control variables.

[25]In unreported tests, we find that our results are robust to the inclusion of these firms.

firms with high shareholder bargaining power.

4.2.2 Shareholder bargaining power

We have established in Section 4.1 that creditors of firms with powerful shareholders have a higher propensity to hedge against firm default. For sufficiently high levels of CDS protection these "empty creditors" may be unwilling to renegotiate and force firms into inefficient liquidation. According to Hypothesis 2, CDS trading has, therefore, particularly adverse effects on firms with high shareholder bargaining power. We test this hypothesis by adjusting equation (8) in the following way:

$$y_{i,t} = \beta_1 \cdot CDS\ trading_{i,t} \times Inst.\ own._{i,t} + \beta_2 \cdot Inst.\ own._{i,t} + \beta_3 \cdot CDS\ trading_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t} \tag{9}$$

The regression coefficient β_1 of the interaction term $CDS\ trading_{i,t} \times Inst.\ own._{i,t}$ measures the treatment effect of CDS trading on firms that have high institutional ownership and presumably high shareholder bargaining power.[26] Robustness of our results to the use of our alternative measures of shareholder bargaining power are shown in Section 4.4.

Panel A of Table 5 reports the coefficient estimates of equation (9) for the dependent variables distance-to-default, firm value measured by Tobin's q, and firm investment. The same control variables as in Table 4 are included but not reported for brevity.[27] In column 1 the distance-to-default is used as dependent variable. The coefficient estimate of -1.546 for the interaction effect $CDS\ trading_{i,t} \times Inst.\ own._{i,t}$ is negative and statistically significant. Compared to other firms, firms with high institutional ownership and thus high shareholder bargaining power become riskier after CDS contracts on their debt start to

[26] As $Inst.\ own._{i,t}$ is non-negative and interacted with another non-negative variable ($CDS\ trading_{i,t}$), we demean institutional ownership to avoid potential multicollinearity problems. All results are robust if we do not demean institutional ownership.

[27] Specifications without controls can be found in Appendix Table D.2.

trade. In column 2 we replace the continuous variable *Inst. own.*$_{i,t}$ with a dummy variable that equals one if institutional ownership is in the top-quartile of the distribution and zero otherwise. The coefficient of the interaction $CDS\ trading_{i,t} \times$ *Inst. own. Top25%*$_{i,t}$ is interpreted as the treatment effect on the top 25% firms with the highest shareholder bargaining power. After the onset of CDS trading, their distance-to-default drops by an additional 0.475 compared to firms with low shareholder power. This treatment effect corresponds to a reduction of -7.9% relative to the median distance-to-default (=6.032) and is economically large. It suggests that CDS firms with powerful shareholders indeed suffer from a strong empty creditor problem. Interestingly, the coefficient of the CDS trading dummy alone is undistinguishable from zero in column 2. It seems that the distance-to-default of firms with institutional ownership in the lower three quartiles, i.e. of firms with weak shareholders, is not adversely affected by CDS trading. In fact, once we control for industry-time fixed effects in Panel B of Table 5, the CDS effect on these firms becomes even positive and marginally significant in column 2.

Columns 3 and 4 of Table 5 report regression estimates for Tobin's q as dependent variable. The coefficients of the interaction terms $CDS\ trading_{i,t} \times$ *Inst. own.*$_{i,t}$ in column 3 and $CDS\ trading_{i,t} \times$ *Inst. own. Top25%*$_{i,t}$ in column 4 are both negative and highly significant. The effect of CDS trading on the Tobin's q of treated firms with institutional ownership in the top-quartile is 0.128 lower compared to firms with low institutional ownership. This corresponds to a large drop of -8.8% relative to median Tobin's q (=1.449). In columns 5 and 6 investment is used as dependent variable. Again the treatment effect of CDS trading on firms with high shareholder bargaining power is negative and highly significant. Firms with institutional ownership in the top-quartile of the distribution cut capital expenditures over lagged PPE by 0.003 compared to other firms and compared to the time when no CDSs were traded on their debt. The treatment effect is again economically large and corresponds to a decrease of -7% relative to median

investment (=0.043). By contrast, CDS trading does not seem to affect firm value and investment activity of firms with weak shareholders. The coefficient of the trading dummy alone is never statistically significant in columns 4 and 6. All these results are robust to controlling for industry-time fixed effects in Panel B of Table 5 and to the use of ROA as an asset-side measure of firm value and of PPE growth as an alternative investment proxy (see Appendix Table D.1).

The different effects of CDS trading on firms with powerful and weak shareholders are also illustrated in Figure 3. The horizontal axes show year-quarters in event time. CDS trading starts at time zero. The vertical axes show the (median) distance-to-default, firm value measured by Tobin's q, and investment of treated firms with high shareholder bargaining power (solid lines) and of control firms with low shareholder bargaining power (dashed lines). Before CDS introduction at time zero, the solid lines of the treatment group co-move with the dashed lines of the control group. After the start of CDS trading, the solid and dashed lines diverge. Firms with high shareholder bargaining power seem to become riskier, lose firm value, and reduce investment relative to other firms.

Overall the evidence suggests that CDS trading has statistically and economically large adverse effects on default risk, firm value, and investment. The fact that these real effects are concentrated in the sample of firms with high shareholder bargaining power is consistent with the hypothesis that CDS trading creates an empty creditor problem.

4.3 Endogeneity in CDS Trading

Identification in the previous section relies on the assumption that differences in the timing of CDS introduction across firms are exogenous, at least once we control for firm and industry-time fixed effects. However, endogeneity problems could still arise due to firm-specific time variation in omitted variables (e.g., negative shocks to a firm's growth prospects). The following two tests in this section address this concern.

4.3.1 The 2009 CDS Big Bang: A quasi-natural experiment

We begin with a quasi-natural experiment and exploit the implementation of the CDS Big Bang Protocol on April 4, 2009, which was an exogenous market-wide shock and exacerbated the empty creditor problem for two reasons. First, the Big Bang Protocol made it easier for creditors to trade credit risk and to become empty. Through a number of convention changes and efforts to harmonize CDS contracts it improved liquidity and reduced uncertainty about the occurrence and execution of credit events.[28] The first two columns of Table 6 show the estimation results of an event study regression in the twelve calendar quarters around the CDS Big Bang. Indeed, we observe a statistically significant increase in CDS liquidity.[29] Second, the Big Bang removed debt restructuring as an eligible credit event for North American CDS. Before the CDS Big Bang, single-name CDSs with a "Modified Restructuring (MR)" clause would pay buyers of CDS protection also after a debt restructuring. After the CDS Big Bang, all CDSs had "No restructuring (XR)" clauses, which confine CDS protection to firm default (Danis, 2016; Subrahmanyam, Tang, and Wang, 2014). Hence, the CDS Big Bang reduced the incentives of empty creditors to restructure debt further.

We exploit this implementation of the CDS Big Bang in a differences-in-differences estimation. We define treated firms as those that had CDSs traded on their debt as of 2008Q3, namely two quarters before the introduction of the CDS Big Bang, and that have high institutional ownership. We argue that the creditors of these firms became tougher in renegotiation after the CDS Big Bang. To establish a sounder causal link, we restrict the sample to the six calendar quarters before and the six quarters after the event (2007Q4 through 2010Q3).

[28] Among others, the contract and convention changes included auction hardwiring following credit events, the formation of official committees that would determine credit events, and the harmonization of contractual features that would allow trade compression. See Markit (2009).

[29] We proxy for CDS liquidity with a price impact measure in the spirit of Junge and Trolle (2015).

Table 7 reports the results from the quasi-natural experiment for distance-to-default, Tobin's q as a measure of firm value, and investment. The same control variables as in Table 4 are included in the estimation but not reported for brevity. The coefficient of the triple interaction *Post 2009Q1* $\times$ *CDS trading 2008Q3* $\times$ *Inst. own.* measures the treatment effect.[30] Column 1 shows a negative and highly significant coefficient estimate of -4.682 for the triple interaction. The CDS Big Bang triggered a drop in the distance-to-default of treated firms with trading CDS contracts and high institutional ownership. This result is also robust to the use of lagged or beginning-of-period values of institutional ownership in columns 2 and 3.[31] We then turn to the effects of the empty creditor problem on Tobin's q and investment in columns 4 to 9. Again, firms with high shareholder bargaining power, as proxied by institutional ownership, appear to experience an adverse treatment effect. Overall, the evidence from this event study is consistent with Hypothesis 2 that CDS trading creates an empty creditor problem in firms with high shareholder bargaining power.

4.3.2 The 2004 net capital rule exemption: Instrumental variable estimation

In the previous section we relied on the 2009 CDS Big Bang as a quasi-natural experiment. In this section we exploit another regulatory event which took place several years before the financial crisis, i.e. in a fundamentally different economic environment than the CDS Big Bang. On August 20, 2004 the SEC exempted a group of broker-dealers from the net capital rule, which had been effective since 1975. The regulatory event allowed the exempted broker-dealers to use their own internal risk models to calculate haircuts and capital levels for securities holdings.

The 2004 net capital rule exemption has three interesting aspects. First, the ex-

[30] The stand-alone indicators for *Post 2009Q1* and *CDS trading 2008Q3* are absorbed by time and firm fixed effects.

[31] The beginning-of-period values of institutional ownership are measured in the quarter when a firm enters the complete sample for the first time (i.e., 2001Q1 for most firms).

emption allowed the recognition of credit risk transfers (CRTs) that would result in lower regulatory capital requirements: "the deductions for [derivatives-related] credit risk would recognize appropriate offsets as a result of hedging strategies for CRT instruments (Bank for International Settlements, 2004)."[32] Among the CRTs recognized for regulatory capital requirements were CDSs.[33] We argue that this increased the incentives of creditors to buy CDS protection and thereby exacerbated the empty creditor problem.

Second, the exemption only applied to broker-dealers that were part of so-called consolidated supervised entities (CSEs), back then Bear Sterns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley. Broker-dealers that were not part of CSEs "would not get relief for using credit derivatives as hedges for credit risk (Bank for International Settlements, 2004)." We conjecture that especially firms with public debt or loans that were underwritten or extended by a CSE were affected by the 2004 net capital rule exemption.[34]

Third, even though the net capital rule exemption became effective on August 20, 2014,[35] it did not allow exempted broker-dealers to use internal models and to recognize CDSs for regulatory purposes immediately. Instead, the internal models of CSE-affiliated broker-dealers were authorized at different dates throughout 2005.[36] Treatment of firms with relationships to different CSEs is thus staggered across time.

We use Dealscan and SDC data to identify firms that borrow from treated creditors, i.e. from institutions that are affected by the regulatory event and likely to increase the

[32]The exemption extended the approach for market risk and credit risk derivatives under the Basel Accord to investment banks, thus recognizing a wide range of CRTs.

[33]Another recognized CRT was securitization. Nadault and Sherlund (2013) argue that the exemption possibly contributed to the dramatic increase in securitization activity by investment banks between 2003 and 2005. Milcheva (2013) provides evidence of cross-border regulatory arbitrage through securitization related to the 2004 exemption.

[34]Note that the CSE holding companies themselves had never been subject to the net capital rule. Nevertheless, their capital requirements were reduced thanks to the net capital rule exemption of their affiliated broker-dealers (Levine, 2010).

[35]See Federal Register, Volume 69, Number 118, p. 34428.

[36]Merrill Lynch (January 2005), Goldman Sachs (May 2005), Bear Sterns, Lehman Brothers, and Morgan Stanley (December 2005).

use of CDS contracts. More specifically, we define the dummy variable *CSE relationship* equal to one in a given firm-quarter (i) if the firm has had public debt underwritten or loans extended by a CSE in the previous five years, and (ii) if the CSE has already been authorized to use its internal risk models and hence to recognize CDSs for regulatory purposes.[37] The first condition (i) exploits heterogeneity in firm-bank relationships whereas the second condition (ii) exploits differences in the timing of the regulatory shock to firm-bank relationships.[38] Ideally, we would like to check whether the amount of CDS hedging increases for treated firm-creditor relationships. As this data is not available, we test whether the CDS of a firm becomes more liquid after the regulator has authorized at least one of its creditors to recognize CDS. Columns 3 and 4 of Table 6 show that this is indeed the case.

In a next step, we use the recognition of CDSs for regulatory purposes to instrument CDS trading. In columns 1 and 2 of Table 8 we report the first stages for *CDS trading* and the interaction *CDS trading* × *Inst. own.*[39] We control for the same set of controls and fixed effects as in previous regressions. The instruments are *CSE relationship* and the interaction *CSE relationship* × *Inst. own.* The model is, hence, exactly identified. As expected, the instruments have statistically significant positive coefficient estimates suggesting that incentives to trade CDS protection are higher if the bank of the firm can recognize the CDS for regulatory purposes.[40] The Angrist-Pischke F-statistic of excluded instruments exceeds the conventional threshold of 10, reducing concerns about

[37] We match subsidiaries reported as lead lenders and underwriters in Dealscan and SDC to their ultimate parent company. To identify the correct ultimate parent company, we keep track of the mergers and acquisitions involving the subsidiary. The relationships of target institutions are assumed to be inherited by acquiring institutions after mergers.

[38] According to Atanasov and Black (2016), such a shock-based instrument is more likely to satisfy the exclusion restriction than instruments that only exploits cross-sectional variation.

[39] We report the first-stage estimates for distance-to-default, but our results remain qualitatively unchanged for the other measures of default risk and firm value.

[40] *CSE relationship* is strongly related to *CDS trading* whereas its correlation with *CDS trading* × *Inst. own.* is economically small. By contrast, *CSE relationship* × *Inst. own.* is strongly related to *CDS trading* × *Inst. own.* but not to *CDS trading*. Hence, the instruments allow us to separately identify the endogenous variables (see, e.g., Butler, Fauver, and Mortal, 2009).

weak instruments.

Columns 3, 4, and 5 of Table 8 show the second stages for the dependent variables distance-to-default, Tobin's q, and investment. The coefficients of the (instrumented) interaction term *CDS trading* $\times$ *Inst. own.* are always negative and highly significant. Columns 6, 7, and 8 show the second stages of specifications that use lagged values of institutional ownership. The coefficient estimates of the (instrumented) interaction term decrease in absolute terms but remain statistically significant for the dependent variables distance-to-default and investment. Overall, our instrumental variable estimation suggests that CDS trading has an adverse *causal* effect on the default risk, value, and investment activity of firms with high shareholder bargaining power.[41]

4.4 Further robustness tests

We begin by establishing the robustness of our results to alternative measures of bargaining power. In columns 1, 4, and 7 of Table 9 we replace the variable *Inst. ownership* by equity ownership of the top five institutional investors. We hypothesize that higher ownership concentration among the top five investors reduces coordination problems between shareholders and that this strengthens their bargaining power in debt renegotiation. We find that the treatment effect of CDS trading as measured by the coefficient of the interaction term *CDS trading* $\times$ *Inst. own. (top 5 inv.)* is negative and highly significant for the dependent variables distance-to-default, Tobin's q, and investment.

In columns 2, 5, and 8 of Table 9 we interact the dummy variable *CDS trading* with the number of monitoring shareholders whose holding value in the firm is in the top 10% of their portfolio (Fich, Harford, and Tran, 2015). We hypothesize that these investors

[41] Our results are robust to including two commercial banks whose broker-dealers were also authorized to use internal models (Citigroup in August 2006 and JP Morgan Chase in December 2007). We ignore both commercial banks in our baseline estimation because they were regulated under the Basel Accord and had already been allowed to recognize CDSs for capital requirements before 2004. Our results are also robust to restricting the analysis to firms that have loans and bond issues reported in Dealscan and SDC over the past-five years.

have strong incentives to influence firm policies and are more active in negotiations with creditors as they have significant skin in the game. Indeed, we find that CDS trading has a significant negative treatment effect on firm value (Tobin's q) and investment for firms with a higher number of monitoring shareholders. For the distance-to-default we find a negative but insignificant coefficient of *CDS trading* $\times$ *No. of monitoring shareholders*.

In columns 3, 6, and 9 of Table 9 we use the ratio of bank debt to total assets as a proxy for the bargaining power of *creditors*. Under the assumption that bank creditors are better informed about the situation of a distressed firm than distant bondholders, firms with more bank debt should have higher *creditor* bargaining power. For these firms we predict *weaker* real effects of CDS trading. Indeed, regression coefficients of the interaction *CDS trading* $\times$ *Bank debt* are positive and significant in all columns.

Next, we establish the robustness of our baseline results to the use of different regression samples (see Appendix Table D.3). First, we drop all firms that never have an outstanding CDS traded on their names between 2001 and 2014. Again we find that CDS trading has a significant negative treatment effect on firm value and investment for firms with high shareholder bargaining power. In another test, we restrict the sample to firm-quarter observations for which the dummy *CDS trading* equals one. Consistent with Hypothesis 2, we find that firms with very liquid CDS contracts and high shareholder bargaining power are significantly riskier and invest less than firms with illiquid CDS contracts and low shareholder bargaining power.

Saretto and Tookes (2013) show that CDS trading is associated with higher firm leverage. We test whether the effect of CDS trading on leverage is different for firms that are most susceptible to the empty creditor problem, i.e., for firms with strong shareholders. Panel A of Appendix Table D.4 shows that this is not the case. The interaction effect estimated in columns 2 and 4 is not significant. This result does not change if we follow Saretto and Tookes (2013) and restrict our sample to S&P 500 firms in Panel B. Yet, we

can confirm the baseline result in Saretto and Tookes (2013). Columns 1 and 3 of Table D.4 show a significant positive effect of CDS trading on leverage for the average firm.

5 Conclusion

When creditors buy CDS protection, they transfer credit risk and cash flow rights to protection sellers but, at the same time, retain control rights. Such debt unbundling can give rise to empty creditors, who are less willing to renegotiate and may push the firm into bankruptcy even if the continuation of the firm would be efficient.

We provide empirical evidence that creditors buy more CDS protection in the presence of powerful shareholders to strengthen their bargaining position in debt renegotiations. Firms with powerful shareholders are, hence, most susceptible to the empty creditor problem and suffer large adverse effects from CDS trading. Compared to other firms, firms with powerful shareholders have higher default risk, lose market value, and invest less after the start of CDS trading. Our findings remain unchanged in a battery of robustness checks that address the potential endogeneity of CDS trading.

Our results highlight the potentially harmful consequences of CDS trading and extend to other credit transfer techniques such as debt securitization, long-short positions in multiple classes of debt written on the same firm, and other credit risk derivatives besides CDSs.

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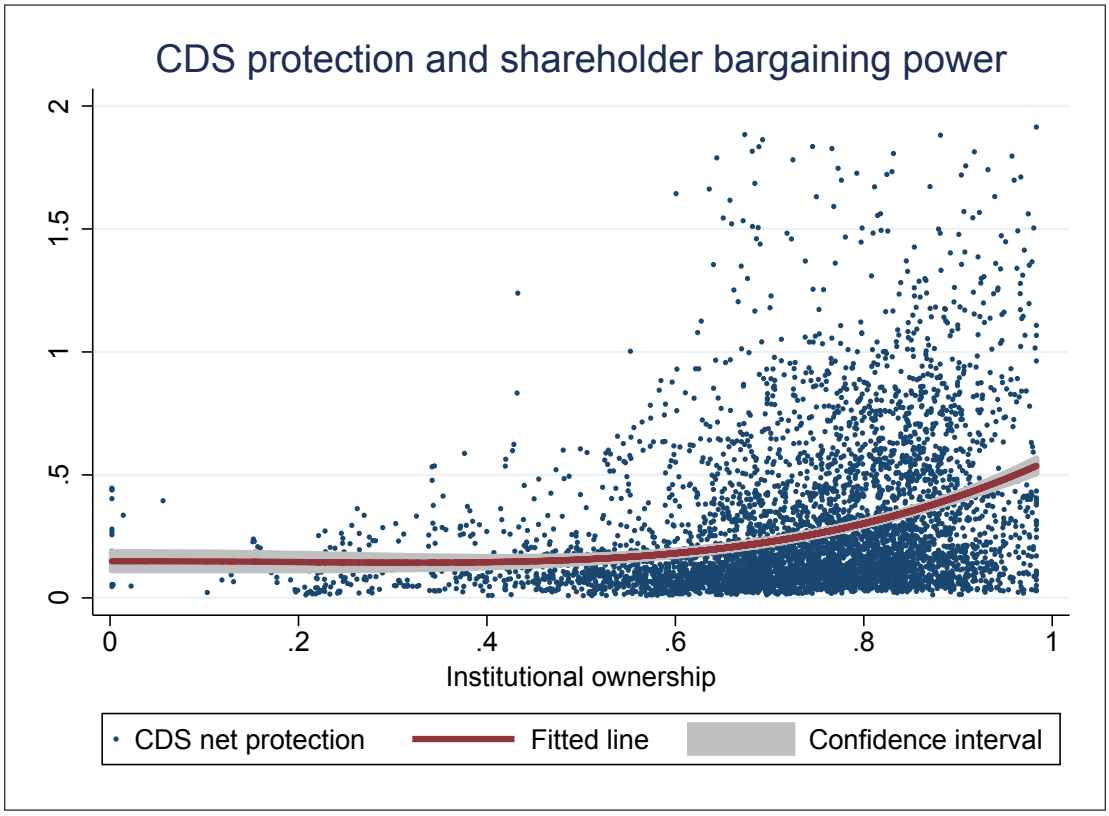

Figure 1: The figure shows the amount of CDS protection traded on firm debt for firms with different shareholder bargaining power. Shareholder bargaining power is proxied by institutional ownership (horizontal axis). The vertical axis shows the ratio of CDS net notional amount to total firm debt. The fitted line is estimated using a fractional polynomial of institutional ownership. The sample contains firm-quarter observations for the period 2008Q4-2014Q4. Outliers with CDS protection to debt above a value of two are omitted. The confidence interval is drawn for the 5% level.

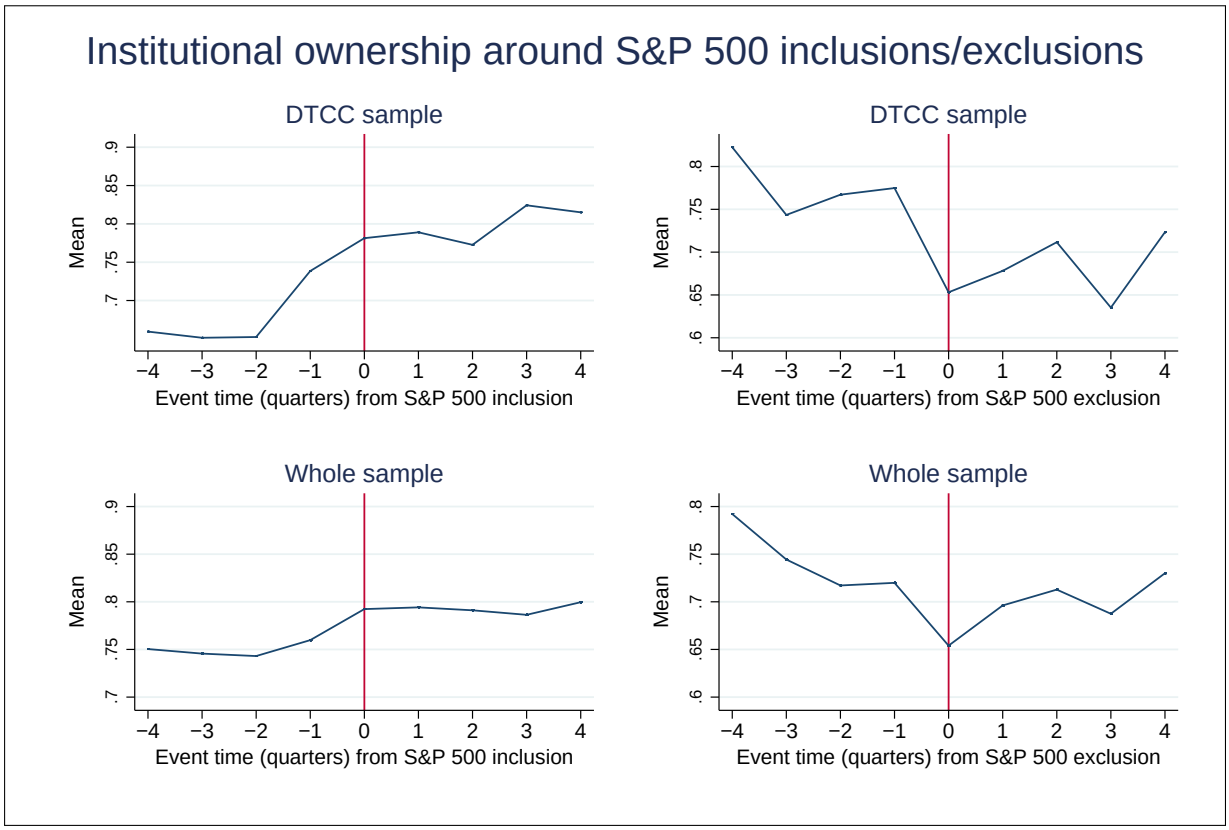

Figure 2: The figure shows the dynamics of ownership structure around changes in S&P 500 membership. The horizontal axes show year-quarters in event-time. At time zero a firm is included (left graphs) or excluded (right graphs) from the S&P 500 index. The vertical axes show the sample mean of institutional ownership. The sample contains only DTCC firm-quarter observations in the top two graphs but all available observations in the bottom two graphs. The sample period is 2001Q1-2014Q4.

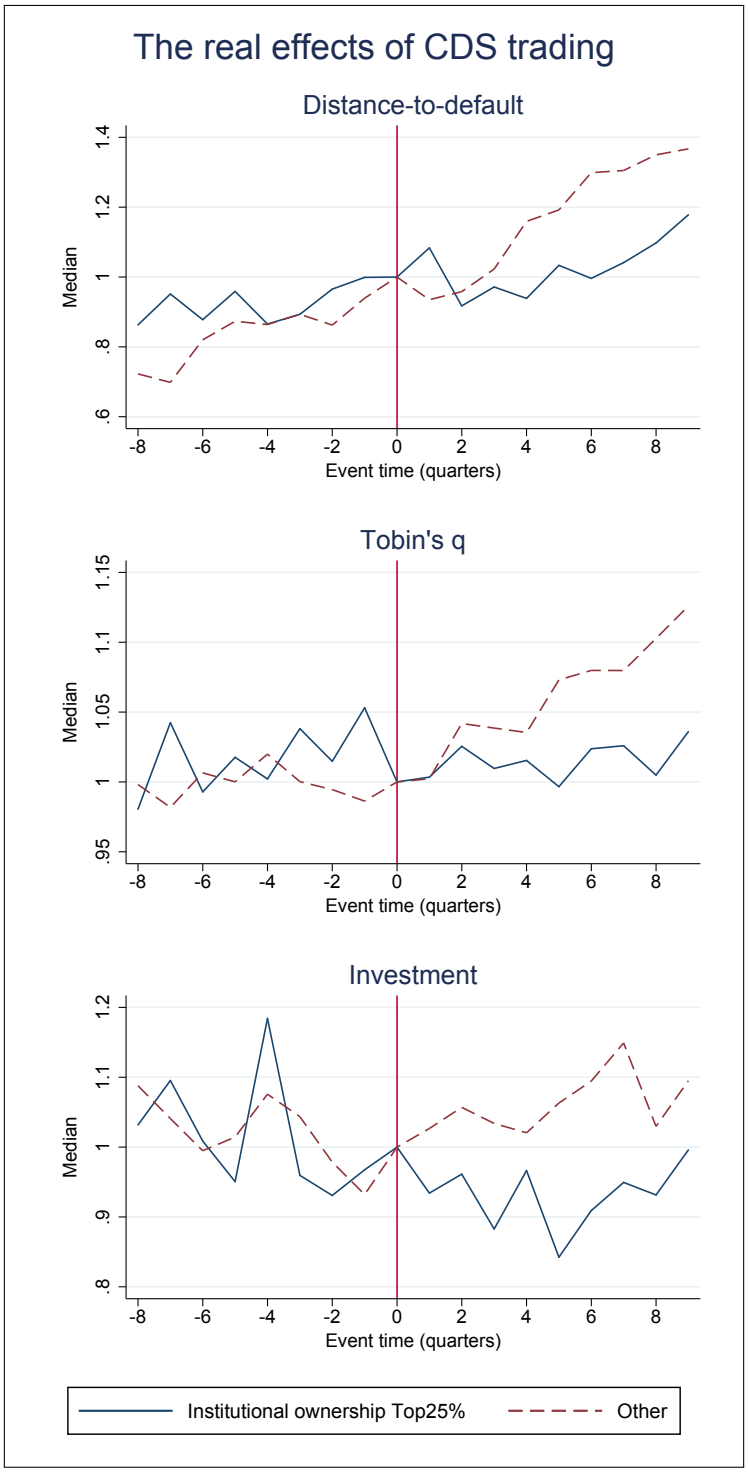

Figure 3: The figure shows the real effects of CDS trading on firms with high and low shareholder bargaining power. The horizontal axes show year-quarters in event-time. At time zero a CDS contract is written on the debt of firms for the first time. The vertical axes show the sample medians of the distance-to-default, Tobin's q, and investment. They are standardized by their respective values at the time of CDS introduction. The solid lines represent the treated firms with shareholder bargaining power (as measured by institutional ownership) in the top quartile of the distribution. The dashed lines represent the control firms with shareholder bargaining power in the lower three quarters of the distribution. The sample contains firm-quarter observations for the period 2001Q1-2014Q4.

Table 1: Summary statistics

This table reports summary statistics of the main variables employed in the paper. The sample includes 5,843 U.S. firms for the period 2001Q1-2014Q4, excluding financial institutions and utilities. Data on CDSs are from DTCC and Markit. We obtain accounting and stock market data from the CRSP-Compustat merged database, institutional holdings data from Thomson 13f filings, debt structure data from Capital IQ, loan data from Dealscan, and bond issuance data from SDC. Panel A shows the descriptive statistics of the variables in the full sample. Panel B reports variable means only for firms with shareholder bargaining power (as proxied by institutional ownership) in the lower three quartiles of the distribution. Panel C shows variable means for firms with high shareholder bargaining power in the top quartile of the distribution. The samples in Panels B and C are split into sub-samples conditional on firms' CDS trading status. Column 5 in Panels B and C shows the differences in means between firms with and without CDSs. Column 6 reports the standardized test statistic for a two-sample t-test. All dollar amounts are in millions of 2010 dollars. Refer to Appendix Table C.1 for variable definitions.

Panel A: Full sample	Obs. (1)	Mean (2)	Std. Dev. (3)	P25 (4)	Median (5)	P75 (6)
CDS trading activity:						
CDS traded	132827	0.226	0.419	0.000	0.000	0.000
CDS trading	132827	0.182	0.386	0.000	0.000	0.000
CDS gross protection	5593	4.364	9.709	0.988	2.043	5.018
CDS net protection	5593	0.325	0.691	0.085	0.164	0.375
CDS liquidity	18562	-1.316	3.102	-1.000	-0.333	-0.087
5-year CDS spread (%)	17890	2.233	5.053	0.464	0.972	2.426
Bargaining power proxies:						
Institutional ownership	124834	0.532	0.297	0.268	0.586	0.794
Institutional ownership (top 5 investors)	130757	0.252	0.128	0.166	0.254	0.335
Number of monitoring shareholders	131083	0.894	2.310	0.000	0.000	1.000
Bank debt	46067	0.106	0.147	0.000	0.040	0.161
Dependent variables:						
Distance-to-default	123368	7.320	7.177	2.838	6.032	10.129
Z-score	127021	0.062	2.210	-0.059	0.645	1.165
Tobin's q	132827	1.811	1.163	1.105	1.449	2.076
ROA	132808	-0.007	0.058	-0.009	0.008	0.019
Investment	130555	0.063	0.067	0.023	0.043	0.078
PPE growth	131184	0.007	0.099	-0.029	-0.005	0.028
Control variables:						
Cash flow	125717	0.001	0.687	0.013	0.071	0.179
Investment grade	132827	0.141	0.348	0.000	0.000	0.000
Rated	132827	0.338	0.473	0.000	0.000	1.000
Stock volatility	132827	0.547	0.360	0.311	0.455	0.656
Book leverage	132827	0.252	0.198	0.089	0.222	0.369
Tangibility	132827	0.280	0.233	0.097	0.204	0.403
Size	132827	6.283	1.908	4.834	6.251	7.595
Commercial paper issuer	132827	0.083	0.275	0.000	0.000	0.000
S&P 500 constituent	132827	0.182	0.386	0.000	0.000	0.000

(Continued)

Table 1: – Continued

Panel B: Firms with low shareholder bargaining power

	Non-CDS firms		CDS firms			
	Obs. (1)	Mean (2)	Obs. (3)	Mean (4)	Difference (5)	t-stat (6)
Dependent variables:						
Distance-to-default	73018	6.325	10258	9.589	-3.265	-46.33
Z-score	77002	-0.324	9922	0.707	-1.032	-39.01
Tobin's q	80297	1.793	10912	1.798	-0.005	-0.38
ROA	80285	-0.017	10910	0.012	-0.029	-44.23
Investment	78533	0.065	10838	0.045	0.020	27.69
PPE growth	79029	0.005	10851	0.003	0.001	1.24
Control variables:						
Cash flow	75255	-0.086	10502	0.123	-0.209	-27.26
Investment grade	80297	0.031	10912	0.624	-0.594	-249.67
Rated	80297	0.154	10912	0.950	-0.796	-224.73
Stock volatility	80297	0.635	10912	0.372	0.263	68.29
Book leverage	80297	0.236	10912	0.318	-0.082	-40.05
Tangibility	80297	0.279	10912	0.326	-0.046	-19.43
Size	80297	5.347	10912	8.912	-3.565	-238.39
Commercial paper issuer	80297	0.013	10912	0.434	-0.421	-203.91
S&P 500 constituent	80297	0.050	10912	0.669	-0.619	-231.77

Panel C: Firms with high shareholder bargaining power

	Non-CDS firms		CDS firms			
	Obs. (1)	Mean (2)	Obs. (3)	Mean (4)	Difference (5)	t-stat (6)
Dependent variables:						
Distance-to-default	21010	9.160	8692	7.968	1.192	11.24
Z-score	21022	0.684	8349	0.691	-0.007	-0.48
Tobin's q	21575	1.962	8828	1.618	0.344	25.73
ROA	21571	0.008	8828	0.010	-0.002	-5.56
Investment	21421	0.070	8785	0.050	0.020	28.46
PPE growth	21477	0.017	8796	0.005	0.012	11.67
Control variables:						
Cash flow	20830	0.141	8523	0.132	0.009	1.24
Investment grade	21575	0.073	8828	0.506	-0.433	-98.57
Rated	21575	0.349	8828	0.943	-0.594	-111.79
Stock volatility	21575	0.435	8828	0.376	0.059	20.39
Book leverage	21575	0.234	8828	0.316	-0.082	-36.11
Tangibility	21575	0.253	8828	0.302	-0.049	-17.01
Size	21575	6.854	8828	8.563	-1.708	-143.93
Commercial paper issuer	21575	0.013	8828	0.243	-0.230	-73.05
S&P 500 constituent	21575	0.145	8828	0.627	-0.482	-96.53

Table 2: Shareholder bargaining power and net notional amount of CDS protection
Shown are estimates from panel regressions that use the ratio of CDS net notional amount to total firm debt at quarter-end as dependent variable. In columns 1 and 2 institutional ownership is used to proxy for shareholder bargaining power. In column 3 institutional ownership is lagged by one quarter. All specifications include calendar quarter, fiscal quarter, and firm fixed effects. The sample contains firm-quarter observations for the period 2008Q4-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	CDS net protection		
	(1)	(2)	(3)
Inst. ownership	0.149**	0.133**	
	(2.33)	(2.01)	
Inst. own. (lagged)			0.129**
			(2.07)
Tobin's q (lagged)		-0.085**	-0.087***
		(-2.52)	(-2.63)
Cash flow		0.011	0.016
		(0.81)	(1.17)
Size		-0.308***	-0.307***
		(-6.72)	(-6.73)
Investment grade		0.044	0.046
		(1.12)	(1.19)
Firm F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes
Observations	5449	5351	5312
R^2	0.05	0.37	0.37

Table 3: S&P 500 membership: Instrumental variable estimation
Shown are instrumental variable estimates from two-stage least squares panel regressions that use the ratio of CDS net notional amount to total firm debt at quarter-end as dependent variable. Institutional ownership is used to proxy for shareholder bargaining power. Institutional ownership is instrumented with *S&P 500* which equals one in a given firm-quarter if the firm is a member of the S&P 500 index and zero otherwise. Column 1 reports first-stage estimates for the model in column 2. Columns 2 through 4 report second-stage estimates. In column 3, the stock return over the past twelve months is included as a control variable. In column 4, the excess stock return relative to the firm's industry as well as the equally weighted industry stock return itself are included as control variables. All specifications include the same firm controls as in Table 2, as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2008Q4-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	1st stage: Inst. own.	2nd stage: CDS net protection		
	(1)	(2)	(3)	(4)
S&P 500	0.112***			
	(3.01)			
Inst. own. (predicted)		1.167*	1.674*	1.558*
		(1.68)	(1.91)	(1.81)
Return			-0.024	
			(-1.33)	
Excess return w.r.t. industry				-0.025
				(-1.44)
Industry return				-0.016
				(-0.50)
Tobin's q (lagged)	-0.006	-0.084***	-0.080**	-0.080**
	(-0.74)	(-2.60)	(-2.34)	(-2.28)
Cash flow	-0.002	0.012	0.015	0.016
	(-0.29)	(0.89)	(1.00)	(0.99)
Size	-0.037**	-0.297***	-0.300***	-0.301***
	(-2.25)	(-6.40)	(-6.11)	(-6.14)
Investment grade	-0.004	0.039	0.034	0.037
	(-0.35)	(0.93)	(0.77)	(0.82)
Firm F.E.	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes
Observations	5344	5344	5286	5179
F-stat A-P test of excl. instr.	9.05			

Table 4: The real effects of CDS trading

Shown are estimates from panel regressions that regress measures of default risk, firm value, and investment on the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt. Columns 1 and 2 analyze the risk of firm default as measured by the distance-to-default and the Z-score, respectively. Columns 3 and 4 analyze firm value as measured by Tobin's q and return on assets, respectively. Columns 5 and 6 analyze investment (capital expenditures scaled by lagged PPE) and the log-change in PPE. All specifications include firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. Specifications shown in Panel B additionally control for industry (Fama-French 48 industry groups) times calendar quarter fixed effects. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Baseline specification

	Distance-to-default	Z-score	Tobin's q	ROA	Investment	PPE growth
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading	-0.177	0.097**	-0.054	-0.001	-0.001	-0.004*
	(-1.14)	(2.13)	(-1.49)	(-0.52)	(-0.55)	(-1.90)
Book leverage	-14.305***	-2.329***	-0.360***	-0.047***		
	(-46.53)	(-22.83)	(-5.81)	(-18.16)		
Tangibility	-2.231***	-1.262***	-0.669***	-0.056***		
	(-5.10)	(-7.70)	(-5.86)	(-13.02)		
Size	0.295***	1.190***	-0.353***	0.009***		
	(3.68)	(23.85)	(-16.88)	(10.14)		
Rated	-0.438**	-0.289***	0.005	-0.005***		
	(-2.50)	(-6.16)	(0.17)	(-4.75)		
Investment grade	0.764***	-0.185***	0.140***	0.001		
	(3.75)	(-3.36)	(2.94)	(0.92)		
Comm. paper issuer	0.248	-0.191***	-0.144**	-0.003**		
	(0.86)	(-3.06)	(-2.09)	(-2.17)		
Tobin's q (lagged)	1.243***	0.055***			0.015***	0.022***
	(24.53)	(3.86)			(25.99)	(29.32)
Stock volatility			-0.144***	-0.022***		
			(-7.83)	(-20.86)		
Cash flow					0.000	0.003***
					(0.00)	(2.89)
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	No	No	No	No	No	No
Observations	119816	122331	129472	129454	121965	122450
R^2	0.34	0.13	0.03	0.09	0.09	0.04

Panel B: Controlling for industry-time fixed effects

	Distance-to-default	Z-score	Tobin's q	ROA	Investment	PPE growth
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading	0.050	0.039	-0.082**	-0.000	-0.002	-0.004**
	(0.33)	(0.86)	(-2.33)	(-0.45)	(-0.99)	(-1.98)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	119240	121740	128876	128858	121398	121880
R^2	0.57	0.89	0.70	0.59	0.39	0.22

Table 5: Shareholder bargaining power and the real effects of CDS trading
Shown are estimates from panel regressions that use measures of default risk, firm value, and investment as dependent variables. Columns 1 and 2 analyze the risk of firm default as measured by the distance-to-default. Columns 3 and 4 analyze firm value as measured by Tobin's q. Columns 5 and 6 analyze investment (capital expenditures scaled by lagged PPE). In columns 1, 3, and 5, the dependent variables are regressed on institutional ownership *Inst. ownership* as a proxy of shareholder bargaining power, the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own.* × *CDS trading*. In columns 2, 4, and 6, the continuous variable *Inst. own.* is replaced by the dummy variable *Inst. own. Top25%*, which equals one if institutional ownership is in the top 25% quartile of the regression sample. All specifications include the same firm controls as in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. Specifications shown in Panel B additionally control for industry (Fama-French 48 industry groups) times calendar quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Baseline specification

	Distance-to-default		Tobin's q		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. ownership	-1.546***		-0.776***		-0.013***	
	(-3.20)		(-8.42)		(-3.26)	
Inst. ownership	1.413***		0.933***		0.026***	
	(4.98)		(16.66)		(9.58)	
CDS trading × Inst. own. Top25%		-0.475***		-0.128***		-0.003**
		(-3.07)		(-4.75)		(-2.23)
Inst. own. Top25%		0.180*		0.149***		0.004***
		(1.79)		(8.51)		(3.86)
CDS trading	0.269	0.088	0.138***	-0.001	0.003**	0.001
	(1.34)	(0.49)	(3.34)	(-0.02)	(2.00)	(0.68)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	No	No	No	No	No	No
Observations	112766	112766	121612	121612	114582	114582
R^2	0.34	0.34	0.05	0.04	0.08	0.09

Panel B: Controlling for industry-time fixed effects

	Distance-to-default		Tobin's q		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. own.	-1.440***		-0.815***		-0.014***	
	(-2.98)		(-9.14)		(-3.31)	
Inst. own.	1.415***		0.929***		0.027***	
	(5.13)		(16.76)		(9.97)	
CDS trading × Inst. own. Top25%		-0.471***		-0.142***		-0.003**
		(-3.05)		(-5.42)		(-2.43)
Inst. own. Top25%		0.198**		0.151***		0.004***
		(2.03)		(8.78)		(4.44)
CDS trading	0.481**	0.322*	0.120***	-0.020	0.003	0.000
	(2.40)	(1.78)	(2.94)	(-0.51)	(1.61)	(0.26)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112284	112284	121111	121111	114110	114110
R^2	0.57	0.57	0.71	0.71	0.40	0.39

Table 6: CDS liquidity around the CDS Big Bang and the 2004 Net Capital Rule Exemption
In this table we study changes in CDS liquidity around the CDS Big Bang on April 4, 2009 (columns 1 and 2) and around the net capital rule exemption of CSE-affiliated broker-dealers throughout the year 2005 (columns 3 and 4). CDS liquidity is computed as the negative of the Junge and Trolle (2015) CDS illiquidity measure. In columns 1 and 2 CDS liquidity is regressed on the indicator variable *Post 2009Q1* that equals one for firm-quarters after the CDS Big Bang. In columns 3 and 4 CDS liquidity is regressed on the indicator variable *CSE relationship* that equals one in a given firm-quarter if (i) the firm has had public debt underwritten or loans extended by a CSE in the previous five years and (ii) the CSE has already obtained the authorization to use internal models. *CSE relationship* is based on all the lead lenders from Dealscan and underwriters of non-convertible debt from SDC that have had a relationship with a given firm in the previous five years. The sample periods are chosen to cover the respective events (CDS Big Bang on April 4, 2009 and 2005Q1 to 2005Q4 for the net capital rule exemption) plus an additional twelve calendar quarters surrounding the respective event windows. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	CDS Liquidity			
	CDS Big Bang		Net Capital Rule Exemption	
	(1)	(2)	(3)	(4)
Post 2009Q1	0.659**	0.905***		
	(2.27)	(2.62)		
CSE relationship			0.632***	0.639***
			(3.46)	(3.48)
Tobin's q (lagged)		1.607***		0.397***
		(4.22)		(4.71)
Cash flow		0.580**		0.302*
		(2.23)		(1.79)
Size		4.647***		0.194
		(3.00)		(1.18)
investment grade		-0.216		0.175*
		(-0.64)		(1.70)
Firm F.E.	Yes	Yes	Yes	Yes
Time F.E.	No	No	No	No
Observations	5695	5543	7357	6912
Sample period	2007Q4-2010Q3	2007Q4-2010Q3	2003Q3-2007Q2	2003Q3-2007Q2
R^2	0.00	0.00	0.01	0.06

Table 7: The CDS Big Bang: A quasi-natural experiment

Shown are estimates from panel regressions that exploit the introduction of the CDS Big Bang Protocol on April 4, 2009 as a quasi-natural experiment. The sample period covers twelve calendar quarters around the CDS Big Bang event. The dependent variables are regressed on institutional ownership as a proxy of shareholder bargaining power, the dummy variable *CDS trading 2008Q3*, which equals one if the firm has quoted CDS contracts on its debt as of 2008Q3, the indicator *Post 2009Q1* for the post-event period, and interactions between these three variables. In columns 1, 4, and 7, the variable *Inst. own.* is the demeaned institutional ownership variable used in previous tables. In columns 2, 5, and 8, institutional ownership is lagged by one quarter (*Inst. own. (lagged)*). In columns 3, 6, and 9, institutional ownership is computed as the beginning-of-period value measured in the first quarter a firm enters the sample (*Inst. own. (initial)*). The dependent variables are distance-to-default, Tobin's q, and investment (capital expenditures scaled by lagged PPE). All specifications include the same firm controls as in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	Distance-to-default			Tobin's q			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post 2009Q1 × CDS trading 2008Q3 × Inst. own.	-4.682***			-0.224**			-0.014**		
	(-6.86)			(-2.33)			(-2.14)		
CDS trading 2008Q3 × Inst. own.	1.131			-0.855***			-0.020**		
	(1.25)			(-6.58)			(-2.22)		
Post 2009Q1 × Inst. own.	2.543***			0.110**			0.006*		
	(7.40)			(2.46)			(1.67)		
Inst. own.	-0.034			0.783***			0.026***		
	(-0.07)			(7.44)			(3.50)		
Post 2009Q1 × CDS trading 2008Q3 × Inst. own. (lagged)		-4.813***			-0.204**			-0.012*	
		(-6.70)			(-2.10)			(-1.91)	
CDS trading 2008Q3 × Inst. own. (lagged)		3.873***			-0.236*			-0.017**	
		(4.69)			(-1.91)			(-2.07)	
Post 2009Q1 × Inst. own. (lagged)		2.627***			0.058			0.005	
		(7.26)			(1.29)			(1.29)	
Inst. own. (lagged)		-1.015*			0.278***			0.025***	
		(-1.84)			(3.00)			(3.66)	
Post 2009Q1 × CDS trading 2008Q3 × Inst. own. (initial)			-1.806***			-0.292***			-0.011*
			(-2.76)			(-3.33)			(-1.93)
Post 2009Q1 × Inst. own. (initial)			1.619***			0.105**			0.007*
			(3.66)			(2.35)			(1.90)
CDS trading 2008Q3 × Post 2009Q1	0.835***	0.994***	-0.008	-0.024	-0.009	-0.025	0.005***	0.004**	0.003**
	(4.02)	(4.73)	(-0.04)	(-0.86)	(-0.30)	(-1.30)	(2.86)	(2.40)	(2.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23719	22841	24943	25416	24225	26674	24533	23648	25755
R^2	0.42	0.42	0.43	0.02	0.02	0.02	0.07	0.08	0.09

Table 8: The 2004 net capital rule exemption: Instrumental variable estimation

Shown are instrumental variable estimates from two-stage least squares panel regressions. The IV relies on the SEC 2004 exemption of broker-dealers from the net capital rule. This regulatory change allowed broker-dealers to use their own internal models to assess risk and calculate adequate capital levels. It applied to broker-dealers that were part of so-called consolidated supervised entities (CSEs), i.e., the five major U.S. investment banks as of 2004: Bear Sterns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley. After the 2004 exemption, U.S. CSE-affiliated broker-dealers were allowed to reduce their capital requirements for derivatives-related credit risk through hedging with credit derivatives. The CDS availability indicator *Trading* and its interaction with institutional ownership are instrumented with *CSE relationship* and its interaction with institutional ownership. *CSE relationship* is an indicator variable equal to one in a given firm-quarter if (i) the firm has had public debt underwritten or loans extended by a CSE in the previous five years and (ii) the CSE has already obtained the authorization to use internal models. *CSE relationship* is based on all the lead lenders from Dealscan and underwriters of non-convertible debt from SDC that have had a relationship with a given firm in the previous five years. Columns 1 and 2 report first-stage estimates when the outcome variable in the second-stage is distance-to-default. Columns 3 through 8 report second-stage estimates. In columns 6 through 8, institutional ownership is lagged by one quarter (*Inst. own. (lagged)*). The dependent variables are distance-to-default, Tobin's q, and investment (capital expenditures scaled by lagged PPE). All specifications include the same firm controls as in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	1st stage		2nd stage			2nd stage: Lagged regressor		
	(1) CDS trading	(2) CDS trading × Inst. own.	(3) Dist.-to-def.	(4) Tobin's q	(5) Investment	(6) Dist.-to-def.	(7) Tobin's q	(8) Investment
CSE relationship	0.168***	-0.046***						
	(8.19)	(-5.33)						
CSE relationship × Inst. own.	0.073	0.445***						
	(1.32)	(12.59)						
Inst. own.	-0.055***	0.089***	1.863***	0.911***	0.031***			
	(-3.57)	(9.71)	(5.23)	(12.65)	(9.16)			
CDS trading (pred.) × Inst. own.			-5.758***	-0.679**	-0.039***			
			(-3.95)	(-2.09)	(-2.96)			
Inst. own. (lagged)						1.102***	0.589***	0.024***
						(3.22)	(8.07)	(7.46)
CDS trading (pred.) × Inst. own. (lagged)						-4.638***	-0.414	-0.026**
						(-3.12)	(-1.27)	(-2.00)
CDS trading (pred.)			0.257	-0.048	0.038***	-0.024	-0.265	0.032***
			(0.26)	(-0.20)	(4.35)	(-0.02)	(-1.03)	(3.46)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112443	112443	112443	121305	114285	106320	113192	108264
F-stat A-P test of excl. instr.	104.79	144.98						

Table 9: Alternative measures of shareholder bargaining power

Shown are estimates from panel regressions that use measures of default risk, firm value, and investment as dependent variables. Columns 1 through 3 analyze the risk of firm default as measured by the distance-to-default. Columns 4 through 6 analyze firm value as measured by Tobin's q. Columns 7 through 9 analyze investment (capital expenditures scaled by lagged PPE). In columns 1, 4, and 7, the dependent variables are regressed on equity ownership by the top five institutional investors as a measure of shareholder bargaining power, the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own. (top5 inv.)* × *CDS trading*. In columns 2, 5, and 8 *Inst. own. (top5 inv.)* is replaced by the *Number of monitoring shareholders*, defined as the number of institutional investors whose holding value in the target is in the top 10% of their portfolio. In columns 3, 6, and 9, *Inst. own. (top5 inv.)* is replaced by the ratio of bank debt over total assets as a measure of creditor bargaining power. All specifications include the same firm controls as in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	Distance-to-default			Tobin's q			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CDS trading × Inst. own. (top 5 inv.)	-3.705***			-0.386**			-0.020***		
	(-4.32)			(-2.50)			(-2.81)		
Inst. own. (top 5 inv.)	-0.426			-0.306***			0.011**		
	(-0.96)			(-3.59)			(2.31)		
CDS trading × No. of monitoring shareholders		-0.037			-0.138***			-0.001***	
		(-0.75)			(-15.30)			(-2.65)	
Number of monitoring shareholders		0.417***			0.198***			0.001***	
		(11.01)			(25.64)			(3.90)	
CDS trading × Bank debt			2.509***			0.262*			0.017**
			(2.58)			(1.68)			(2.15)
Bank debt			-1.583**			0.043			-0.022***
			(-2.47)			(0.36)			(-3.53)
CDS trading	0.880***	-0.278*	-0.653*	0.046	0.019	0.007	0.005**	0.002	-0.010***
	(2.82)	(-1.70)	(-1.73)	(0.79)	(0.50)	(0.07)	(2.13)	(1.04)	(-2.60)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118449	119183	40156	127428	127745	43786	120153	120424	42081
R^2	0.34	0.35	0.22	0.04	0.07	0.03	0.09	0.09	0.11

Appendix for

"Empty Creditors and Strong Shareholders: The Real Effects of Credit Risk Trading"

A Value of corporate securities in the model

By substituting $\pi = 0$ into equation (1), we recover the shareholders' surplus share in renegotiation in the absence of CDSs:

$$\theta_N^* = \eta\alpha. \tag{A.1}$$

Creditors then get $1 - \theta_N^* = 1 - \eta\alpha$ and strictly prefer renegotiation to liquidation for any $z_1 \in (0, F)$ if $1 - \theta_N^* > 1 - \alpha$ holds, which is the case for any $\eta < 1$.[42] Hence, in the absence of CDSs, the shareholders' surplus share θ_N^* is independent of z_1 and greater than θ^* (equivalently, the creditors' surplus share is smaller).

We next derive the value of corporate securities. We start from considering the case in which there are no CDSs written on the firm debt. Absent CDSs, the value of debt at time zero solves

$$E[\text{debt} \mid \pi = 0] = \int_0^F \frac{(1-\eta\alpha)z}{Z} dz + \int_F^Z \frac{F}{Z} dz = F - \frac{F^2}{2Z}(1+\eta\alpha). \tag{A.2}$$

The first integral is the payoff to creditors in renegotiation, whereas the second integral represents debt repayment. Likewise, the value of equity is given by:

$$E[\text{equity} \mid \pi = 0] = \int_0^F \frac{\eta\alpha z}{Z} dz + \int_F^Z \frac{z-F}{Z} dz = \frac{\eta\alpha F^2 + (Z-F)^2}{2Z}. \tag{A.3}$$

The first integral represents the payoff to shareholders in renegotiation, whereas the second integral is the residual payoff to shareholders after debt repayment.

In the absence of CDSs, liquidation costs do not affect firm value because creditors are always better off renegotiating than pushing the firm into liquidation. As a result, firm value is just the expected present value of cash flows at $t = 1$ and equal to $\frac{Z}{2}$, no matter how this is split between the firm's claimholders. Absent CDSs, shareholders' bargaining power thus has: (1) a positive effect on the value of equity, because it increases the shareholders' surplus share in renegotiation; (2) a negative effect on the value of debt, because it erodes the creditors' surplus share in renegotiation; (3) no effects on firm value.

Next, we derive the value of corporate securities when CDSs written on the firm's debt are available. Substituting (3) into (2) gives the value of debt associated with the

[42] In the limit case $z_1 = 0$, creditors are indifferent between default and renegotiation.

optimal level of credit protection

$$E[\text{debt} \mid \pi = \pi^*] = F - \frac{F^2}{2Z}\left(1 + \frac{\eta\alpha}{1+\eta}\right). \tag{A.4}$$

Comparing (A.4) with (A.2) shows that buying the level of CDS protection (3) is better than having no CDS protection if $\eta > 0$, i.e., whenever shareholders' bargaining power is positive. The value of equity is given by

$$\begin{aligned} E\left[\text{equity} \mid \pi = \pi^*\right] =& \int_{\frac{\pi^*}{\alpha}}^{F} \frac{\eta(\alpha z - \pi^*)}{Z} dz + \int_{F}^{Z} \frac{z - F}{Z} dz \\ =& \frac{F^2}{2Z}\frac{\alpha\eta}{(1+\eta)^2} + \frac{(Z-F)^2}{2Z}. \end{aligned} \tag{A.5}$$

The value of equity increases with η both in the absence and in the presence of CDSs. In the presence of CDSs, however, it increases at a lower rate, which implies that the difference $E\left[\text{equity} \mid \pi = 0\right] - E\left[\text{equity} \mid \pi = \pi^*\right]$ is positive and increasing in η. In turn, the value of debt decreases with η both in the presence and in the absence of CDS. Yet, it decreases at a lower rate in the presence of CDS, which implies that the difference $E\left[\text{debt} \mid \pi = 0\right] - E\left[\text{debt} \mid \pi = \pi^*\right]$ is negative and decreasing in η. The reason is the following. When CDSs are traded on the firm's debt: (1) An increase in η causes a direct increase (decrease) in the shareholders' (creditors') surplus share in renegotiation (this channel operates in the absence of CDSs too); (2) Yet, an increase in η also increases the optimal level of credit protection bought by creditors. The larger creditors' outside option explains the gap between $E\left[\text{debt} \mid \pi = 0\right]$ and $E\left[\text{debt} \mid \pi = \pi^*\right]$. At the same time, the ensuing increase in the probability of liquidation decreases the value of equity and drives the gap between $E\left[\text{equity} \mid \pi = 0\right]$ and $E\left[\text{equity} \mid \pi = \pi^*\right]$. Overall, and as explained in the main text, firm value decreases with η.

B Validation of the bargaining power measures

In this section, we validate the bargaining power proxies used in the paper, i.e., institutional ownership, ownership concentration among the largest five institutional investors, the number of monitoring shareholders, and the ratio of bank debt to total assets. We want to check whether shareholders that our proxies predict to be more powerful are indeed able to extract larger concessions from creditors in default. In other words, we are looking at the *ex post* outcomes of bargaining between shareholders and creditors in this appendix. By contrast, in the rest of the paper, we are interested whether shareholder bargaining power matters also outside default in the context of credit risk trading (ex ante perspective). We consider two situations in which we can observe the ex post outcomes of bargaining between shareholders and creditors: Chapter 11 bankruptcies and covenant violations.

B.1 Chapter 11 bankruptcies

We study the bankruptcies of large U.S. public firms recorded in the UCLA-LoPucki BRD database. After merging BRD with our sample, we have 211 Chapter 11 filings between 2001 and 2014. Ideally, we would like to look at the correlation between our bargaining power proxies and deviations from the absolute priority rule (APR). Stronger shareholders should be more likely to obtain APR deviations in their favor. However, the data on distributions to shareholders in bankruptcy in the available sample are sparse (about 30 observations), thus complicating inference.

To increase sample size, we look at the formation of equity committees during Chapter 11 bankruptcies. This approach is well suited to verify the validity of our shareholder power proxies because, "by forming a committee, shareholders gain the right to consult with management about the administration of the firm, to conduct investigations into the firm's financial condition, and to participate in the formulation of a plan of reorganization" (Betker, 1995, p. 165). Indeed, LoPucki and Whitford (1990) and Bharath, Panchapagesan, and Werner (2010) find that APR deviations in favor of shareholders are much more likely in the presence of an equity committee.

In Appendix Table B.1, we estimate linear probability models for the likelihood that shareholders form an equity committee. We find a positive and statistically significant correlation for all the shareholder bargaining power measures: Institutional ownership (Panel A), institutional ownership by the top five institutional investors in the firm (Panel B), and the number of monitoring shareholders (Panel C).[43] The results are robust to the inclusion of year fixed effects, industry fixed effects, and control variables.[44]

B.2 Covenant violations

A loan covenant violation constitutes a technical default and triggers a transfer of control rights from shareholders to creditors. Hence, corporate policies around covenant violations may be informative about the distribution of bargaining power between shareholders and creditors. Most prominently, Chava and Roberts (2008) find that creditors push firms to reduce investment following covenant violations. We hypothesize that creditors will find it harder to convince managers to cut investment if more powerful shareholders potentially lobby against cuts to investment. To test this idea, we merge our CRSP-Compustat data with the Dealscan database and create a sample with firm-quarter observations. We then focus on firms that are subject to current ratio covenants or net worth covenants following Chava and Roberts (2008). We code a firm-quarter as in "covenant violation", if the current ratio or net worth are below the corresponding covenant threshold.

Appendix Figure B.1 shows that the magnitude of the negative marginal effect of

[43] We carry out these tests only for shareholder bargaining power measures, because CIQ data on bank debt are available only for a few firms filing for Chapter 11.

[44] Given the paucity of observations, we use year rather than calendar quarter fixed effects, and SIC industry division rather than Fama-French 48 industry groups fixed effects. Control variables include Tobin's q, internal cash flow, and firm size measured on the last filing date before Chapter 11.

covenant violations on investment is (i) decreasing in the shareholder bargaining power proxies (institutional ownership, institutional ownership by the top five institutional investors in the firm, and the number of monitoring shareholders), and (ii) increasing in the creditor bargaining power proxy (ratio of bank debt to total assets).[45] In Appendix Figure B.2, we obtain similar results when restricting the analysis to a "discontinuity sample" that only comprises firm-quarters whose relative distance to the covenant threshold (in absolute value) is less than 0.4 (Chava and Roberts, 2008).

Overall, our analysis of bargaining outcomes in Chapter 11 bankruptcies and after covenant violations suggests that our bargaining power proxies do indeed capture shareholders' ability to extract concessions from creditors.

[45]Note that more than half of the firm-quarters in the sample have no monitoring shareholders, which explains the flat line to the left of the median in the bottom left graph of Appendix Figure B.1.

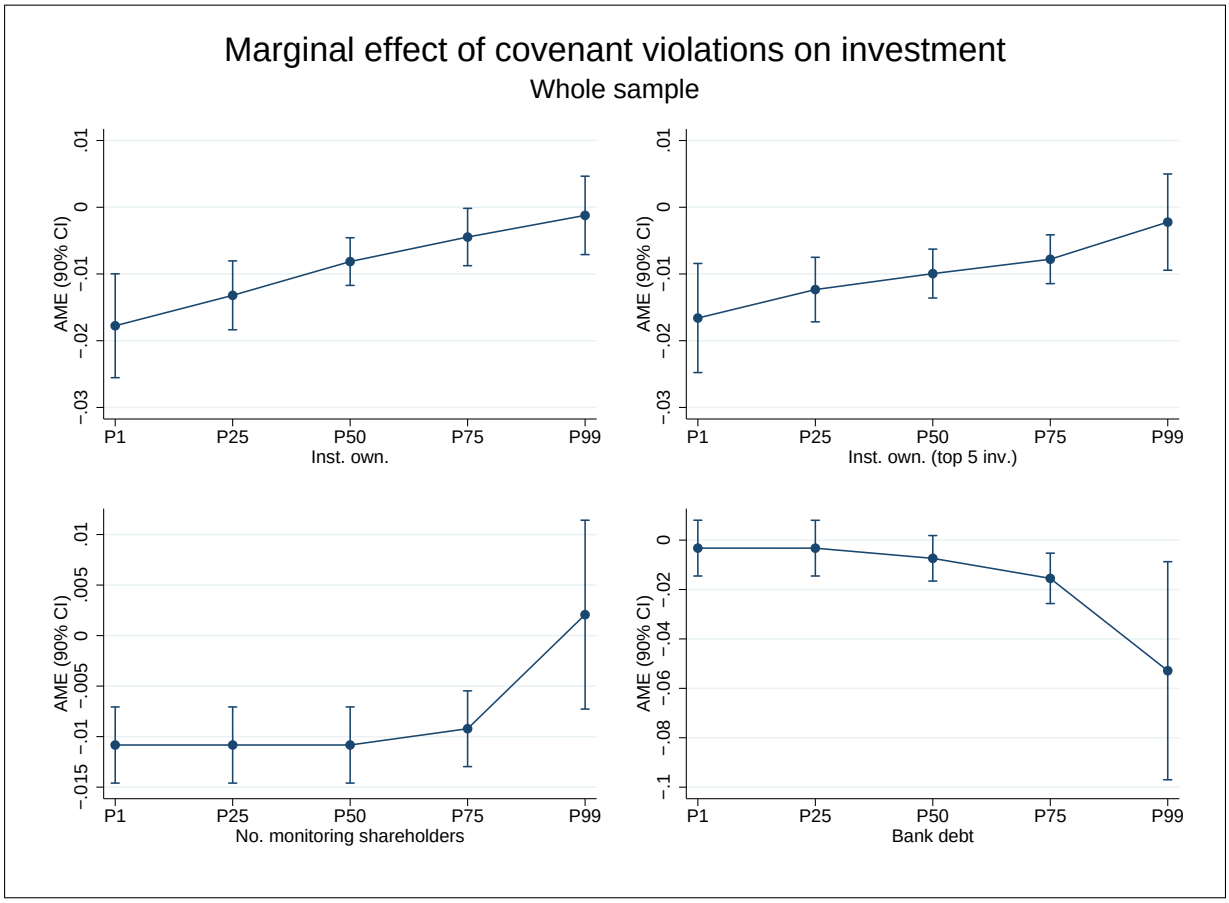

Figure B.1: The figure shows the marginal effect of covenant violations on corporate investment conditional on our four shareholder bargaining power measures institutional ownership (top left graph), institutional ownership by the top five institutional investors in the firm (top right graph), the number of monitoring shareholders (bottom left graph), and the ratio of bank debt to total assets(bottom right graph). The horizontal axes report different percentiles of each respective bargaining power measure. Marginal effects are computed from a panel regression of investment on a covenant violation indicator interacted with the bargaining power measure at hand. The regression specification includes control variables (Tobin's q, internal cash flow, firm size, and an indicator variable for the investment grade rating status), as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2012Q4. We only consider firms that are subject to loan covenants on the current ratio or net worth. The confidence interval is drawn for the 10% level.

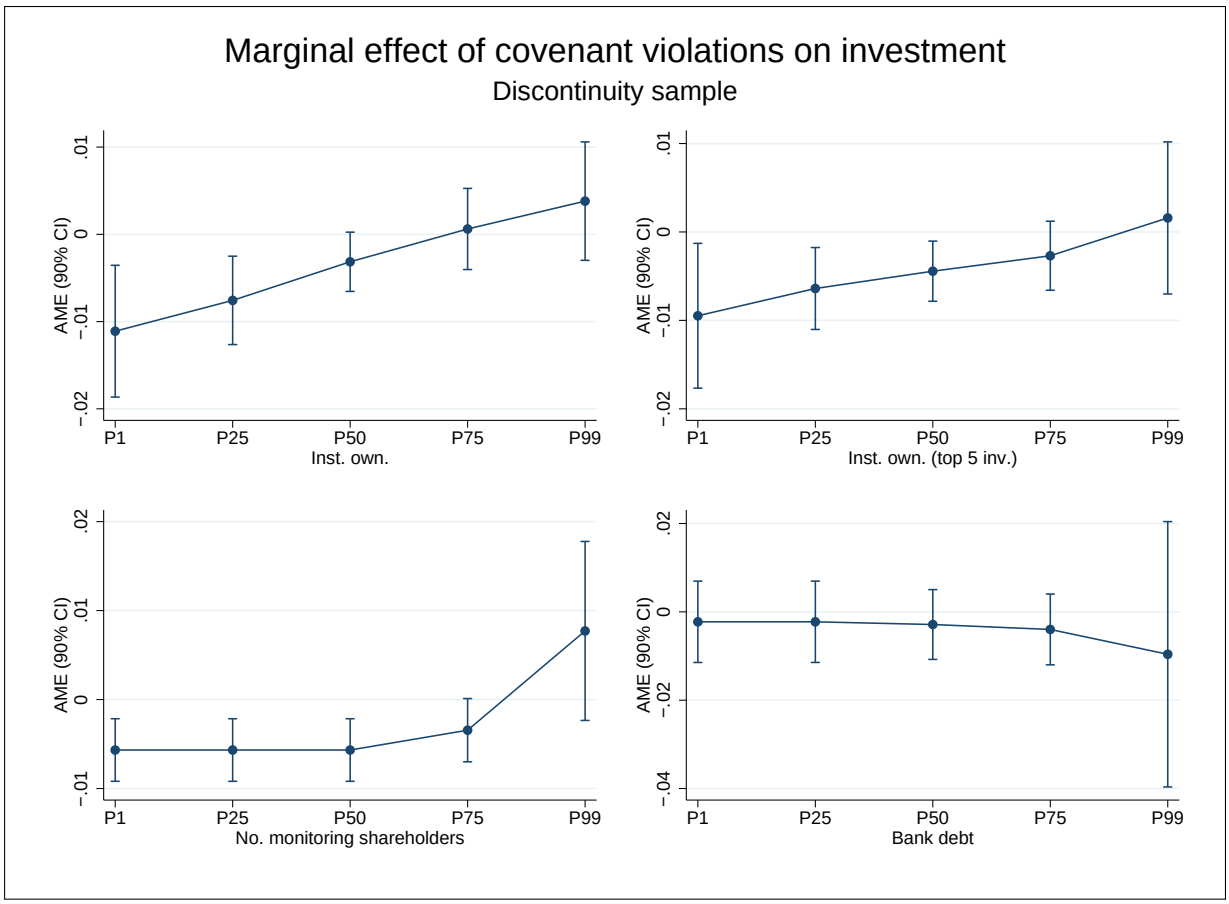

Figure B.2: The figure shows the marginal effect of covenant violations on corporate investment conditional on our four shareholder bargaining power measures institutional ownership (top left graph), institutional ownership by the top five institutional investors in the firm (top right graph), the number of monitoring shareholders (bottom left graph), and the ratio of bank debt to total assets(bottom right graph). The horizontal axes report different percentiles of each respective bargaining power measure. Marginal effects are computed from a panel regression of investment on a covenant violation indicator interacted with the bargaining power measure at hand. The regression specification includes control variables (Tobin's q, internal cash flow, firm size, and an indicator variable for the investment grade rating status), as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2012Q4. We only consider firms that are subject to loan covenants on the current ratio or net worth and whose relative distance from the corresponding covenant threshold (in absolute value) is less than 0.4. The confidence interval is drawn for the 10% level.

Table B.1: Shareholder bargaining power and equity committees
Shown are estimates from linear probability regressions that use an indicator variable equal to one if shareholders form an equity committee in Chapter 11 as dependent variable. The dependent variable is regressed on different measures of shareholder bargaining power: institutional ownership in Panel A, equity ownership by the top five institutional investors in Panel B, and the number of institutional investors whose holding value in the target is in the top 10% of their portfolio in Panel C. In column 1 i the shareholder bargaining power measure is the only explanatory variable. Column 2 adds year fixed effects. Column 3 adds SIC industry division fixed effects. Column 4 additionally controls for Tobin's q, internal cash flow, and firm size measured at the last filing date before the Chapter 11 filing. The sample contains observations for the period 2001-2014. The t-statistics (in parentheses) are calculated with robust standard errors clustered by SIC industry division. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Institutional ownership				
	Equity committee			
	(1)	(2)	(3)	(4)
Inst. own.	0.404***	0.477***	0.490***	0.463***
	(8.47)	(5.52)	(5.22)	(4.21)
Controls	No	No	No	Yes
Year F.E.	No	Yes	Yes	Yes
SIC division F.E.	No	No	Yes	Yes
Observations	199	199	199	196
R^2	0.09	0.14	0.14	0.14

Panel B: Institutional ownership (top 5 investors)				
	Equity committee			
	(1)	(2)	(3)	(4)
Inst. own. (top 5 inv.)	0.244***	0.296***	0.322***	0.303***
	(3.52)	(4.75)	(4.22)	(3.48)
Controls	No	No	No	Yes
Year F.E.	No	Yes	Yes	Yes
SIC division F.E.	No	No	Yes	Yes
Observations	206	206	206	203
R^2	0.01	0.05	0.05	0.06

Panel C: Number of monitoring shareholders				
	Equity committee			
	(1)	(2)	(3)	(4)
No. monitoring shareholders	0.146**	0.169***	0.186***	0.165**
	(2.97)	(4.15)	(4.44)	(3.23)
Controls	No	No	No	Yes
Year F.E.	No	Yes	Yes	Yes
SIC division F.E.	No	No	Yes	Yes
Observations	181	181	181	180
R^2	0.03	0.12	0.14	0.14

C Definition of variables

Table C.1: Definition of variables

Variable	Definition
CDS trading activity:	
CDS traded	Indicator variable equal to one if the firm has CDSs traded over the period 2001-2014 based on Markit data.
CDS trading	Indicator variable equal to one in the period after initiation of CDS trading based on Markit data.
CDS gross protection	Ratio of CDS gross notional amount from DTCC at quarter-end to total debt. Total debt is `dlttq+dlcq` in Compustat.
CDS net protection	Ratio of CDS net notional amount from DTCC at quarter-end to total debt. Total debt is `dlttq+dlcq` in Compustat.
CDS liquidity	CDS illiquidity measure from Markit computed following Junge and Trolle (2015) and multiplied by (-1). The illiquidity measure $ILLIQ_{i,t}$ is computed at quarterly frequency for each firm i with an available 5-year senior unsecured (*tier=snrfor*) CDS contract: $$ILLIQ_{i,t} = \frac{1}{n_{i,t}} \sum_{d=1}^{n_{i,t}} \frac{\lvert C_{i,d} - C_{i,d-1} \rvert}{Depth_{i,d}},$$ where $n_{i,t}$ is number of consecutive spread changes over the quarter t, $Depth_{i,d}$ is the number of quotes available on trading date d, and $\lvert C_{i,d} - C_{i,d-1} \rvert$ is the absolute spread change on trading date d.
5-year CDS spread	Average of daily five-year U.S. dollar denominated CDS spreads over the last quarter from Markit. We consider only CDS on unsecured debt (*tier=snrfor*).
Bargaining power proxies:	
Institutional ownership	Fraction of shares outstanding held by institutional investors from Thomson 13f. *Institutional ownership* is generally demeaned for default risk, firm value, and investment regressions.
Institutional ownership (top 5 investors)	Fraction of shares outstanding held by the top five institutional investors from Thomson 13f.
Number of monitoring shareholders	Number of institutions whose holding value in the target is in the top 10% of their portfolio (Fich, Harford, and Tran, 2015)
Bank debt	Ratio of bank debt relative to total assets, where bank debt is defined as the sum of term loans and revolving credit in Capital IQ.
Dependent variables:	
Distance-to-default	Naïve distance-to-default measure computed following Bharath and Shumway (2008).
Z-score	Altman's Z-score as modified by MacKie-Mason (1990). We define it as `−3.3 × (piq/atq) − (saleq/atq) − 1.4 × (req/atq) − 1.2×(actq−lctq)/atq)` in Compustat.
Tobin's q	Tobin's q defined as `(prccq×cshoq+atq−ceqq)/atq` in Compustat.
ROA	Return on assets defined as `ibq/atq` in Compustat.
Investment	Capital expenditures to PPE defined as `capxy/ppentq(t−1)` in Compustat. As `capxy` are reported on a year-to-date basis by Compustat, in the second, third, and fourth quarter we use the change relative to the previous quarter.
PPE growth	Log-change in PPE, defined as `ppentq` in Compustat.
Control variables:	
Cash flow	Internal cash flow defined as `(ibq+dpq)/ppentq(t−1)` in Compustat.
Investment grade	Indicator variable equal to one if a firm has investment grade rating (`splticrm` at least BBB) in Compustat.
Rated	Indicator variable equal to one a firm has a long-term issuer rating, `splticrm`, in Compustat.
Stock volatility	Annualized stock volatility based on CRSP daily returns over the last quarter.

(Continued)

Table C.1: – Continued

Book leverage	Book leverage defined as `(dlcq+dlttq)/atq` in Compustat.
Tangibility	PPE to total assets defined as `ppentq/atq` in Compustat.
Size	Natural logarithm of total assets defined as `atq` in Compustat.
Commercial paper issuer	Indicator variable equal to if the has issued commercial paper based on information in Capital IQ.
S&P 500	Indicator variable equal to one in a given firm-quarter if the firm is a S&P 500 member (based on Compustat).
Return	Stock return over the year from CRSP.
Industry return	Equally weighted industry return over the year based on Fama-French 48 industry classification.
Excess return w.r.t. industry	*Return* minus *Industry return*.
CSE relationship	Indicator variable equal to one in a given firm-quarter if (i) the firm has had public debt underwritten or loans extended by a CSE in the previous five years, and (ii) the CSE has already obtained the authorization to use internal models.
Equity committee	Indicator variable equal to one if shareholders form an equity committee in Chapter 11, based on information in BRD.

D Further results

Table D.1: Shareholder bargaining power and the effects of CDS trading on Z-score, ROA, and PPE growth Shown are estimates from panel regressions that use measures of default risk, firm value, and investment as dependent variables. Columns 1 and 2 analyze the risk of firm default as measured by the Z-score. Columns 3 and 4 analyze firm value as measured by return on assets *ROA*. Columns 5 and 6 analyze investment as measured by PPE growth. In columns 1, 3, and 5, the dependent variables are regressed on institutional ownership *Inst. own.* as a proxy of shareholder bargaining power, the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own.* × *CDS trading*. In columns 2, 4, and 6, the continuous variable *Inst. own.* is replaced by the dummy variable *Inst. own. Top25%*, which equals one if institutional ownership is in the top 25% quartile of the regression sample. All specifications include the same firm controls as in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. Specifications shown in Panel B additionally control for industry (Fama-French 48 industry groups) times calendar quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Baseline specification

	Z-score		ROA		PPE growth	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. own.	-0.245*		-0.007**		-0.016**	
	(-1.84)		(-2.09)		(-2.32)	
Inst. own.	0.304***		0.010***		0.047***	
	(3.58)		(4.86)		(11.93)	
CDS trading × Inst. own. Top25%		-0.034		-0.002*		-0.004**
		(-1.08)		(-1.86)		(-2.22)
Inst. own. Top25%		0.030		0.002***		0.008***
		(1.47)		(2.83)		(6.11)
CDS trading	0.168***	0.117**	0.001	0.000	0.002	-0.001
	(3.16)	(2.51)	(1.00)	(0.21)	(0.78)	(-0.39)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	No	No	No	No	No	No
Observations	114911	114911	121594	121594	115041	115041
R^2	0.13	0.13	0.09	0.09	0.04	0.04

Panel B: Controlling for industry-time fixed effects

	Z-score		ROA		PPE growth	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. own.	-0.145		-0.006*		-0.016**	
	(-1.11)		(-1.81)		(-2.21)	
Inst. own.	0.343***		0.010***		0.048***	
	(4.18)		(4.74)		(12.05)	
CDS trading × Inst. own. Top25%		-0.024		-0.002**		-0.004**
		(-0.75)		(-2.07)		(-2.23)
Inst. own. Top25%		0.037*		0.002***		0.008***
		(1.85)		(2.78)		(6.35)
CDS trading	0.087*	0.053	0.001	0.001	0.002	-0.001
	(1.66)	(1.12)	(0.93)	(0.42)	(0.59)	(-0.52)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114415	114415	121093	121093	114566	114566
R^2	0.89	0.89	0.59	0.59	0.23	0.22

Table D.2: Baseline regressions without control variables

Shown are estimates from panel regressions that use measures of default risk, firm value, and investment as dependent variables. Columns 1 and 2 analyze the risk of firm default as measured by the distance-to-default and the Z-score, respectively. Columns 3 and 4 analyze firm value as measured by Tobin's q and return on assets, respectively. Columns 5 and 6 analyze investment (capital expenditures scaled by lagged PPE) and the log-change in PPE. The dependent variables are regressed on institutional ownership *Inst. own.* as a proxy for shareholder bargaining power, the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own.* × *CDS trading*. There are no control variables besides firm, calendar quarter, and fiscal quarter fixed effects. Specifications shown in Panel B additionally control for industry (Fama-French 48 industry groups) times calendar quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Baseline specification

	Distance-to-default	Z-score	Tobin's q	ROA	Investment	PPE growth
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. own.	-2.448***	-0.934***	-0.541***	-0.014***	-0.024***	-0.034***
	(-4.47)	(-7.77)	(-6.04)	(-4.50)	(-5.95)	(-5.00)
CDS trading	0.202	0.459***	0.029	0.003**	0.005***	0.004
	(0.87)	(9.17)	(0.70)	(2.43)	(2.78)	(1.63)
Inst. own.	4.063***	1.725***	0.560***	0.029***	0.039***	0.066***
	(13.66)	(17.24)	(10.89)	(13.71)	(13.75)	(16.37)
Controls	No	No	No	No	No	No
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	No	No	No	No	No	No
Observations	112978	116295	121612	121594	119577	120153
R^2	0.17	0.09	0.03	0.08	0.01	0.01

Panel B: Controlling for industry-time fixed effects

	Distance-to-default	Z-score	Tobin's q	ROA	Investment	PPE growth
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. own.	-2.485***	-0.891***	-0.570***	-0.014***	-0.025***	-0.034***
	(-4.54)	(-7.33)	(-6.74)	(-4.59)	(-6.10)	(-4.83)
CDS trading	0.385*	0.398***	0.006	0.004***	0.004**	0.003
	(1.67)	(8.22)	(0.15)	(3.02)	(2.24)	(1.22)
Inst. own.	4.012***	1.726***	0.549***	0.029***	0.039***	0.066***
	(13.66)	(17.42)	(10.67)	(13.80)	(13.93)	(16.29)
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112495	115794	121111	121093	119085	119657
R^2	0.52	0.85	0.69	0.57	0.37	0.20

Table D.3: Regression samples restricted to traded and trading firms
Shown are estimates from panel regressions that use measures of default risk, firm value, and investment as dependent variables. Columns 1 and 2 analyze the risk of firm default as measured by the distance-to-default. Columns 3 and 4 analyze firm value as measured by Tobin's q. Columns 5 and 6 analyze investment as measured by capital expenditures scaled by lagged PPE. In columns 1, 3, and 5, the regression samples are restricted to firms that have a quoted CDS contract on its debt for at least one quarter in period 2001Q1-2014Q4 (firms are *CDS-traded*). The dependent variables in columns 1, 3, and 5 are regressed on institutional ownership *Inst. own.* as a proxy of shareholder bargaining power, the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own.* × *CDS trading*. In columns 2, 4, and 6, the regression samples only comprise observations with a quoted CDS contract in each firm-quarter (firms are *CDS-trading*). In these columns, the variable *CDS trading* is replaced by *CDS liqu. (pct)*, which equals the firm's percentile of the negative of the Junge and Trolle (2015) CDS illiquidity measure (averaged over a given quarter). All specifications include the same firm controls used in Table 4 as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

	Distance-to-default		Tobin's q		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS contract of sample firms	Traded	Trading	Traded	Trading	Traded	Trading
CDS trading × Inst. own.	0.652		-0.440***		-0.012**	
	(0.95)		(-3.39)		(-2.10)	
CDS trading	-0.716***		0.131***		-0.004**	
	(-3.33)		(2.84)		(-2.30)	
CDS liqu. (pct) × Inst. own.		-3.644***		0.097		-0.018*
		(-3.47)		(0.57)		(-1.80)
CDS liqu. (pct)		2.329***		0.095*		0.010***
		(6.81)		(1.70)		(3.15)
Inst. own.	-1.105	0.780	0.443***	-0.132	0.022***	0.006
	(-1.57)	(1.17)	(3.39)	(-1.41)	(3.53)	(1.31)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24023	19903	25338	20550	24219	19690
R^2	0.44	0.46	0.00	0.01	0.14	0.11

Table D.4: CDS trading and book leverage

Shown are estimates from panel regressions that use book leverage as dependent variables. Book leverage is regressed on the dummy variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, institutional ownership *Inst. own.* as a proxy for shareholder bargaining power, and the interaction *Inst. own.* × *CDS trading*. All specifications control for asset tangibility, firm size, whether the firm is rated, whether it has an investment grade rating, whether it has a commercial paper program, annualized equity volatility, lagged Tobin's q, and time and fiscal quarter fixed effects. Columns 1 and 2 control for industry fixed effects whereas columns 3 and 4 control for firm fixed effects. Panel A uses the full firm sample whereas Panel B restricts the sample to S&P500 constituents. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table C.1 for variable definitions.

Panel A: Full sample

	Book leverage			
	(1)	(2)	(3)	(4)
CDS trading × Inst. own.		0.005		-0.013
		(0.17)		(-0.65)
Inst. own.		-0.094***		-0.097***
		(-9.45)		(-9.65)
CDS trading	0.017**	0.004	0.006	0.005
	(2.05)	(0.35)	(0.92)	(0.72)
Controls	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	No	No
Firm F.E.	No	No	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes
Sample	Full	Full	Full	Full
Observations	127215	119635	127806	120131
R^2	0.27	0.29	0.21	0.23

Panel B: Only S&P 500 constituents

	Book leverage			
	(1)	(2)	(3)	(4)
CDS trading × Inst. own.		0.005		-0.029
		(0.08)		(-0.84)
Inst. own.		0.029		-0.025
		(0.71)		(-0.79)
CDS trading	0.039***	0.038**	0.022**	0.031***
	(3.37)	(2.15)	(2.31)	(2.84)
Controls	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	No	No
Firm F.E.	No	No	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes
Sample	S&P 500	S&P 500	S&P 500	S&P 500
Observations	20892	19910	20892	19910
R^2	0.34	0.36	0.14	0.14

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