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

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Abstract

Credit derivatives give creditors the possibility to transfer debt cash flow rights to other market participants while retaining control rights. We use the market for credit default swaps (CDSs) as a laboratory to show that the real effects of such debt unbundling crucially hinge on shareholder bargaining power. We find that creditors buy more CDS protection when facing strong shareholders to secure themselves a valuable outside option in distressed renegotiations. After the start of CDS trading, the distance-to-default, investment, and market value of firms with powerful shareholders drop by 7.9%, 7%, and 8.8% compared to other firms.

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1 Introduction

Bargaining is at the core of distressed renegotiations as framed by the U.S. Bankruptcy Code's Chapter 11. By preserving firm operations and avoiding liquidation costs, debt renegotiations can be valuable to both creditors and debtors. Yet, renegotiation outcomes depend crucially on the distribution of bargaining power among shareholders and debtholders. Existing studies illustrate that the bargaining positions of a firm's claimholders affect the incidence of renegotiations, debt recovery rates, as well as credit spreads (see, e.g., Davydenko and Strebulaev, 2007).

Claimholders' bargaining positions, and thus renegotiation outcomes, crucially hinge on the allocation of cash flow and control rights. In particular, the bargaining power of debtholders originates from their right to force a delinquent company into bankruptcy.[1] Traditionally, this control right is bundled together with cash flow rights in the form of future principal and interest payments, should the debtholders agree to modify the debt contracts and allow the survival and reorganization of the firm. However, recent years have seen an increase in credit risk trading which separates the debtholders' control rights from their cash flow rights.[2] This trend, also called "debt unbundling" or "debt decoupling" (Hu and Black, 2008), can give rise to so-called *empty creditors*, who lose interest in the efficient continuation of the debtor's operations. Consequently, credit risk trading affects the bargaining positions of claimholders and debt renegotiation outcomes.

Several studies exploit the market for credit default swaps (CDSs) as a laboratory to study how the separation of creditor control and cash flow rights affects, for example, default risk (Subrahmanyam, Tang, and Wang, 2014; Bedendo, Cathcart, and El-Jahel, 2016), cost of debt (Ashcraft and Santos, 2009), access to debt markets (Saretto and

[1]Similarly to equity control rights (Kalay, Pant, and Karakaş, 2014), debt control rights are highly valued by market participants (Feldhütter, Hotchkiss, and Karakaş, 2016).

[2]Credit risk trading can take place through credit risk derivatives, securitization, or short-long positions in multiple classes of debt written on the same firm.

Tookes, 2013), and cash holdings (Subrahmanyam, Tang, and Wang, 2016). We contribute to this literature in three ways. First, we build a stylized model that illustrates how the severity of the empty creditor problem hinges on the ex ante distribution of bargaining power. We predict that creditors buy more CDS protection when facing strong shareholders to secure themselves a valuable outside option in distressed renegotiations. Second, we test our predictions in a large panel of 5,770 US firms with quarterly data from 2001 to 2014 explicitly allowing for differential effects of CDS trading on firms with high and low shareholder bargaining power. Third, we close a gap in the literature and study the real effects of CDS trading on investment and firm value to evaluate the net benefits and welfare implications of CDS trading.

We employ four different measures of (relative) shareholder bargaining power. First, we follow Alanis, Chava, and Kumar (2015) and hypothesize that institutional investors are driving a harder bargain than retail investors. Consequently, CDS trading should have particularly adverse effects on firms with high institutional ownership. Second, we argue that ownership concentration is likely to reduce coordination problems between shareholders, thereby strengthening their bargaining position in debt renegotiation. Third, we hypothesize that more active investors, which have invested an important part of their portfolio wealth in the firm and have more skin in the game, are tougher in debt negotiation. Finally, 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. Using these different measures of bargaining power, we make the following observations.

1. The net notional amount of credit protection written on debt is significantly higher for firms with high shareholder bargaining power, as proxied by institutional ownership. An increase of institutional ownership by 1% increases the ratio of CDS net protection over firm debt by 0.32%. This is consistent with the hypothesis that

relatively powerless creditors buy more CDS insurance to create an outside option for debt renegotiation.

2. After the start of CDS trading on firm debt, the distance-to-default of firms with shareholder bargaining power in the top quartile of the distribution decreases by 0.475 relative to other firms. This treatment effect corresponds to a decrease by 7.9% relative to the median. This is consistent with the hypothesis that CDSs make debt restructurings harder for firms with high renegotiation frictions.
3. The Tobin's q of firms with high shareholder bargaining power is 0.128 lower compared to other firms and compared to the time when no CDSs were traded on their debt. This corresponds to a large decrease in firm value by 8.8% relative to the sample median. It points to an adverse effect of CDS trading on firms that are more likely to suffer from an empty creditor problem.
4. After the introduction of CDS trading, firms with high shareholder bargaining power cut capital expenditure over lagged property, plant and equipment (PPE) by 0.003 compared to other firms. This effect corresponds to a decrease of investment by 7% relative to the median.

These results highlight the central role of shareholder bargaining power in the empty creditor problem with its detrimental effects on firm value and investment. While our findings are derived from the CDS market, they possibly extend to other forms of debt unbundling.[3]

The main challenge of our analysis is the possibility that firms self-select into CDS trading. We run a battery of tests to address the potential endogeneity of CDS trading. First, we follow Ashcraft and Santos (2009), Saretto and Tookes (2013), Subrahmanyam,

[3]There are other ways besides hedging with CDSs in which investors can separate the control and cash flow rights of debt ownership. Debt unbundling can take place through positions in multiple classes of debt written on the same firm, debt securitization (e.g., collateralized debt obligations), or through hedging with other forms of credit derivatives. Other credit derivatives that allow debt unbundling include total return swaps or loan swaps, options to buy credit default or total return swaps, and credit spread options (Hu and Black, 2008).

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 unobserved time-invariant firm heterogeneity. Under the assumption that the timing of CDS introduction is exogenous, this baseline specification allows us to identify a causal effect of CDS trading on firm characteristics. In a second test, we exploit the CDS Big Bang in 2009 as a quasi-natural experiment. The Big Bang was an exogenous shock to renegotiation frictions induced by CDSs because (1) it increased the availability of CDSs through contract harmonization and (2) eliminated debt restructuring as an eligible credit event that would trigger CDS payments. Third, we devise a shock-based IV estimation, exploiting the SEC's 2004 change in the net capital rule for broker-dealers, which allowed the recognition of CDSs for regulatory purposes and exogenously increased CDS availability. Fourth, we use lagged and beginning-of-period values for institutional equity ownership to address potential endogeneity in our main proxy for shareholder bargaining power. Fifth, we restrict the sample to CDS-firms and exploit heterogeneity in CDS liquidity, which is arguably less prone to selection bias.

Our paper contributes to the literature on the firm-level effects of CDS. Previous studies examine the role of CDSs in shaping shareholder-creditor relationships. They focus on distress resolution and have found mixed evidence for the empty creditor problem. For example, Danis (2015) 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. We find that such an effect is strongest for firms whose shareholders have high bargaining power and are thus prone to 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) test whether CDS trading reduces 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, 2015; Danis and Gamba, 2015). Campello and Matta (2012) show theoretically that CDSs can generate risk-shifting incentives. Kitwiwattanachai and Lee (2014) provide consistent empirical evidence. Uzmanoglu (2015) shows that firm value decreases following the introduction of CDSs. To the best of our knowledge, we are the first to comprehensively evaluate how the effects of CDS trading on default risk, firm value, and investment depend on the bargaining power of shareholders and creditors, both theoretically and empirically.[4]

The remainder of the paper is organized as follows. Section 2 presents our theoretical framework and derives testable predictions. Section 3 describes the data and variable definitions. Section 4 discusses our empirical results and Section 5 concludes.

2 Theory and hypotheses

In our two-date model, agents are risk neutral, the risk-free rate is zero, and markets are complete. We consider a firm whose managers act in the shareholders' best interest. The firm has one investment opportunity (assets in place are normalized to zero). The cost of investment is $I > 0$, to be paid at time $t = 0$. If exercised, the investment opportunity pays off a cash flow z at time $t = 1$. The cash flow is risky in that z is a random variable uniformly distributed over the support $[0, Z]$, with $Z > I$.

The firm can finance the initial investment with a combination of debt and equity, as

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

in Myers (1977).[5] The proceeds of the debt issue are used to reduce the required initial equity investment (i.e., they are not held as cash). Debt matures at time $t = 1$, when it requires the contractual repayment F. Because of cash flow uncertainty, the firm may not be able to repay F at $t = 1$; i.e., debt is risky. We assume that $F < Z$, meaning that the firm can meet the contractual repayment if the $t = 1$ cash flow is sufficiently large.

If the firm fails to meet the payment F, creditors can force the firm into default. As an alternative, creditors and shareholders can renegotiate the debt contract at mutually acceptable terms. If renegotiation fails, a fraction $\alpha \in [0, 1]$ of cash flows is lost as a frictional cost. If renegotiation succeeds, the surplus is split between shareholders and creditors according to their bargaining power. Absent CDSs, we assume that the relative bargaining powers are exogenously given by η for shareholders and $1 - \eta$ for creditors.

A benchmark without CDSs. We start by assuming that there are no CDSs written on firm debt. In default, creditors receive $(1 - \alpha)z$ and shareholders receive nothing. In renegotiation, the optimal sharing rule θ_N^* solves

$$\theta_N^* = \arg\max[\theta z]^\eta [(1 - \theta)z - (1 - \alpha)z]^{1-\eta},$$

where the term θz (respectively, $(1-\theta)z-(1-\alpha)z$) is the incremental value to shareholders (creditors) from renegotiation as opposed to liquidation. Solving the maximization problem gives

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

for shareholders and $1 - \theta_N^* = 1 - \eta\alpha$ for creditors. Creditors strictly prefer renegotiation to liquidation for any realization of the cash flow shock z when $1 - \theta_N^* > 1 - \alpha$ and thus

[5] As in Myers (1977), there are no taxes or agency costs of free cash flows, and the debt-equity mix is exogenous. We abstract from these aspects because our focus is on the effects of debt decoupling on corporate policies and the role of shareholder bargaining power thereof.

$\eta < 1$. An increase in shareholders' bargaining power weakens creditors' preference for renegotiation over default. In the limit case with $\eta = 1$, creditors are indifferent between default and renegotiation.

Absent CDSs, the value of equity is given by the following expression

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

The first term represents the payoff to shareholders if the realized cash flow is low ($z < F$), which triggers renegotiation. The second term is the residual payoff to shareholders after debt repayment whenever $z \geq F$. Absent CDSs, shareholders' bargaining power has an unambiguous positive effect on the value of equity because it increases the shareholders' surplus share in renegotiation. Likewise, the value of debt at time zero solves

$$E[\text{debt}] = \int_0^F \frac{(1 - \eta \alpha) z}{Z} dz + \int_F^Z \frac{F}{Z} dz = F - \frac{F^2}{2Z}(1 + \eta \alpha) \tag{3}$$

Absent CDSs, shareholders' bargaining power has an unambiguous negative effect on the value of debt because it erodes the creditor's surplus share in renegotiation. The sum of equity and debt gives firm value at $t = 0$:

$$E[\text{firm}] = \frac{Z}{2}. \tag{4}$$

Firm value depends neither on shareholders' bargaining power η nor on default costs α as bargaining in debt renegotiation does not affect the total continuation value of the firm.

Shareholders are willing to invest at $t = 0$ if the following inequality holds:

$$E[\text{equity}] > I - E[\text{debt}].$$

The value of equity needs to exceed investment cost net of the proceeds of debt issuance. In other words, firm value in (4) needs to exceed investment cost I. When no CDSs are traded on corporate debt, the investment decision is thus unrelated to shareholders' bargaining power.

CDS credit protection. We next allow creditors to insure against non-payment of the contractual obligation F by purchasing CDSs. Following the literature, we assume that the CDS market is competitive and CDS contracts are fairly priced. CDSs provide creditors with the promise of a gross payment π (equivalently, net payment $\pi - (1-\alpha)z$) if a credit event occurs at $t = 1$, against a fair premium $p(\pi)$ that creditors (protection buyers) pay to the protection seller. A credit event is verified if the firm misses the contractual payment F and creditors and shareholders fail to renegotiate the debt contract to mutually acceptable terms. That is, if F goes unpaid, two outcomes are possible: Either creditors force the firm into bankruptcy and collect π, or creditors and shareholders renegotiate the debt contract.

CDS protection provides creditors with an outside option. When CDSs on the firm's debt are available, the optimal sharing rule θ^* solves

$$\theta^* = \arg\max[\theta z]^{\eta}[(1-\theta)z - \pi]^{1-\eta}.$$

The last term in this expression illustrates that CDS protection affects the incremental value to creditors from renegotiation. Solving this maximization problem gives

$$\theta^* = \eta \frac{z-\pi}{z} = \eta\left(1 - \frac{\pi}{z}\right) \tag{5}$$

for shareholders and $1 - \theta^* = 1 - \eta + \eta\frac{\pi}{z}$ for creditors. Thus, renegotiation occurs only if $z > \pi$, i.e. if the realized cash flow is sufficiently high. In other words, by providing creditors with an outside option, CDS protection makes creditors tougher in renegotiation. If $\pi < F$, three outcomes can arise depending on z: Default for $z \in [0, \pi)$, renegotiation for $z \in [\pi, F)$, contractual repayment for $z \in [F, Z]$. If $\pi = F$, renegotiation never occurs because the CDS payment in bankruptcy is more attractive than the renegotiation surplus. Bankruptcy occurs for $z \in [0, F)$, whereas contractual repayment happens for $[F, Z]$.[6]

We next allow creditors to choose their optimal level of credit protection. The fair price of CDS insurance (paid by creditors at $t = 0$) is equal to the expected payment $t = 1$ by the protection seller. Thus, the fair price and the expected CDS payment offset each other in creditors' expected payoff. The creditors' maximization problem is

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

Solving this problem delivers the optimal π^*

$$\pi^* = \frac{F\eta}{\alpha + \eta}, \tag{6}$$

which is monotonically increasing (and concave) in η. The value of debt associated with (6) is given by

$$E[\text{debt} \mid \pi = \pi^*] = F - \frac{F^2}{2Z}\left(1 + \frac{\eta\alpha}{\alpha + \eta}\right). \tag{7}$$

Were creditors to choose perfect coverage ($\pi = F$), their payoff would be given by

$$E[\text{debt} \mid \pi = F] = F - \frac{F^2}{2Z}(1 + \alpha). \tag{8}$$

Comparing (3) with (7) and (8) provides useful insights. From the creditors' perspective:

[6]The case $\pi > F$ never arises because it is suboptimal to pay the CDS premium for states of the world that do not trigger the CDS payment, which is the case for any $z \geq F$.

(i) Buying perfect coverage ($\pi = F$) is dominated by buying the value maximizing level of credit protection $\pi = \pi^*$ as well as buying no CDS protection at all. In fact, as the CDS premium is fairly set, (8) is smaller than (7) and (3). (ii) Buying the value maximizing π^* is better than having no CDSs if $\eta > 1 - \alpha$; that is, whenever shareholders' bargaining power is sufficiently large. In these cases, CDS protection increases the creditors' share of firm surplus in debt renegotiation.

The level of credit protection affects the likelihood of renegotiation and default. Default occurs if $z < \pi^*$, i.e. if the cash flow at $t = 1$ falls short of the level of credit protection. The probability of default can thus be calculated as follows:

$$P\left[\text{default}|\pi = \pi^*\right] = \int_0^{\pi^*} \frac{dz}{Z} = \frac{\pi^*}{Z} = \frac{F}{Z}\frac{\eta}{\alpha + \eta}, \tag{9}$$

which is monotonically increasing (and concave) in η. This means that the stronger shareholders are, the larger the level of credit protection bought by creditors, and the higher the probability of default.

Given the optimal level of credit protection, the value of equity is given by

$$\begin{aligned} E\left[\text{equity} \mid \pi = \pi^*\right] = & \int_{\pi^*}^{F} \frac{\eta(z - \pi^*)}{Z} dz + \int_F^Z \frac{z - F}{Z} dz \\ = & \frac{\eta F^2}{2Z}\frac{\alpha^2}{(\alpha + \eta)^2} + \frac{(Z - F)^2}{2Z}. \end{aligned} \tag{10}$$

This expression implies that when CDSs are traded on the firm's debt, shareholders' bargaining power η has two offsetting effects on the value of equity: (1) An increase in η increases the shareholders' surplus share in renegotiation. This effect increases the value of equity; (2) An increase in η increases creditors' optimal level of credit protection, the creditors' outside option, and so the probability of default. This effect decreases the value of equity. These two strengths compound at the firm level. Firm value is the sum of debt and equity and is given by:

$$E\left[\text{firm}|\pi = \pi^*\right] = \frac{Z}{2} - \frac{F^2}{2Z}\frac{\eta^2\alpha}{(\eta + \alpha)^2} \tag{11}$$

Comparing (11) with (4) illustrates that CDSs lead to a decrease in firm value. The decrease is more severe when shareholders' bargaining power is large (equation (11) is decreasing in η). Firm value is unaffected by CDS trading only if η is zero (and debtholders are willing to renegotiate for any z) or if the cost of default α is zero.

Finally, as in the case without CDSs, shareholders are willing to invest at $t = 0$ only if the value of equity exceeds investment cost net of the proceeds of debt issuance:

$$E[\text{equity} \mid \pi = \pi^*] > I - E[\text{debt} \mid \pi = \pi^*].$$

Equivalently, firm value in (11) needs to satisfy:

$$\frac{Z}{2} - \frac{F^2}{2Z}\frac{\eta^2\alpha}{(\eta + \alpha)^2} > I. \tag{12}$$

In this expression, the left-hand side is decreasing in η, whereas the right-hand side is constant. This implies that it is optimal to invest only if $\eta < \eta^*$, where we denote by η^* the critical bargaining power such that (12) holds as an equality. If shareholder bargaining power is too high and $\eta > \eta^*$, the firm does not invest because the project is negative NPV.[7]

In conclusion, the model delivers two testable hypotheses.

Hypothesis 1:

The level of CDS protection π^* written on firm debt increases in shareholder bargaining power η.

[7]If there is no η^* such that (12) holds as an equality, the project is negative NPV for all $\eta \in [0, 1]$.

Hypothesis 2:

CDS protection has adverse effects on default risk, firm value, and investment. The effects are larger for firms with high shareholder bargaining power η.

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 in excess of $10 million and of $1 million in 2010 dollars, respectively.

We match this dataset with CDS pricing data from Markit (from January 2001) and CDS volume data from the Depository Trust & Clearing Corporation (DTCC – from the fourth quarter of 2008). We retrieve institutional holdings data from the Thomson 13f filings database, debt structure data from Capital IQ (available from 2002), and board of directors data from the Investor Responsibility Research Center (IRRC) before 2007, and from Riskmetrics from 2007 onwards.[8]

Finally, to identify firms' relationships with financial institutions, we rely on loan data from the Loan Pricing Corporation's Dealscan (Dealscan) database, and non-convertible debt issues data from the Thomson Financial's SDC Platinum Global New Issues (SDC) database.[9]

[8]We follow the procedure proposed by Coles, Daniel, and Naveen (2014) to match IRRC and Riskmetrics data with CRSP/Compustat data.

[9]We match Dealscan data with Compustat data using the link file made available by Michael Roberts

3.2 Variable construction

We construct the following variables.

Default risk, firm value, and investment. 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 is a better predictor of default 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. As an additional measure, we use the ROA. Finally, we proxy for investment by using the ratio of capital expenditures to PPE. In robustness tests, we also use PPE growth.

Bargaining power. We use several measures of shareholder bargaining power. In our baseline analysis, we focus on institutional ownership (relative to common shares outstanding). The intuition is that institutional investors are more sophisticated than retail investors and, therefore, have more bargaining power in renegotiation (see, e.g., Alanis, Chava, and Kumar, 2015). Alternatively, 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. Furthermore, we hypothesize that more active investors are likely to be tougher in debt negotiation. We use the fraction of firm equity held by institutional investors that each have allocated more than 2% of their portfolio wealth to the firm in question. As these investors have more skin in the game, they should have higher incentives to drive a hard bargain in debt renegotiation. Finally, we use the ratio of bank debt to total assets as a proxy for *creditor* bargaining power. Due to their monitoring function in relationship

(Chava and Roberts, 2008).

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.

CDS protection and liquidity. DTCC data on firm-level CDSs on the top 1,000 reference entities by notional value are available starting in 2008Q4. In line with Campello and Matta (2013), 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. We also compute a measure of CDS liquidity based on price impact (Junge and Trolle, 2015).

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 Table A.1.

3.3 Summary statistics

Panel A of Table 1 reports summary statistics for the 5,770 firms in our final sample. Panel B reports summary statistics for firm-quarter observations with and without CDS contracts trading separately. The 640 CDS firms in the sample are larger, more levered, exhibit lower default risk, and invest less than non-CDS firms.[10] These differences point to a potential self-selection of firms into CDS trading. We will address this problem in Section 4.2.

[10] 325 of the 640 CDS firms are in the S&P 500 index.

4 Results

4.1 CDS protection

In debt renegotiation, creditors of firms with high shareholder bargaining power receive only a relatively small fraction of the continuation value of the firm. 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:

$$CDS\ net\ protection_{i,t} = \beta_1 \cdot Inst.\ own._{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}, \quad (13)$$

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.[11] 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 (13) without the

[11] 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 in line 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 ownerhsip 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.

4.2 Real effects of CDS trading

The goal of our analysis is to identify real effects of CDS. The main challenge is potential endogeneity and that firms self-select into CDS trading. We follow four different identification strategies to establish a causal link between CDSs and default risk, firm value, and investment. First, we follow Ashcraft and Santos (2009) and exploit differences in the timing of the onset of CDS trading across firms. Second, we exploit the CDS Big Bang Protocol in April 2009 as a quasi-natural experiment (see, e.g., Danis, 2015; Uzmanoglu, 2015). Third, we devise a shock-based IV estimation, exploiting the SEC's 2004 change in the net capital rule for broker dealers as a source of exogenous variation in CDS availability. Fourth, we restrict the sample to CDS firms and analyze variation in CDS liquidity, which is arguably less affected by firm selection bias.

In the baseline specification, we exploit differences in the timing of CDS introduction and define the binary variable *CDS trading* that equals one after the inception of CDS trading for the firm, and zero before that. We estimate the baseline specification:

$$y_{i,t} = \beta_1 \cdot CDS\ trading_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}. \tag{14}$$

As in equation (13), 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 Table 3 we estimate equation (14) for various measures of default risk, firm value, and investment. In columns 1 and 2 of Table 3 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 expenditure 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.[12] 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

[12]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.

because it is not clear when the CDSs of those firms actually began trading.[13]

Except for column 2, the regression coefficient of $\textit{CDS trading}_{i,t}$ is negative in all specifications of Table 3, suggesting that CDS trading activity decreases distance-to-default, firm value, and investment activity. However, these effects are not statistically significant. In our large sample of 5,770 US firms, the unconditional real effects of CDS trading appear to be very weak over the years 2001 to 2014. In the following sections we will refine the analysis and check whether the real effects of CDS trading are stronger for firms with high shareholder bargaining power.

4.3 Shareholder bargaining power

We have established above 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.

Figure 2 provides first evidence for Hypothesis 2. 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).[14] High shareholder bargaining power is proxied by institutional ownership in the top quartile of the distribution.

Both the parallel trend assumption before the start of CDS trading as well as the negative treatment effect thereafter are verified in Figure 2. Before time zero, the solid lines of the treatment group follow the dashed lines of the control group.[15] After the

[13]In unreported tests, we find that our results are robust to the inclusion of these firms.
[14]Distance-to-default, Tobin's q, and investment are divided by their respective values at time zero.
[15]The blue lines are more volatile which is due to the smaller sample size of the treatment group.

start of CDS trading, the solid and dashed lines diverge. Firms with high shareholder bargaining power become riskier, lose firm value, and reduce investment compared to other firms in the control group. While this visual analysis provides first evidence for Hypothesis 2, it controls neither for general time trends nor for firm heterogeneity. Next, we use a regression framework to address these shortcomings. We adjust equation (14):

$$y_{i,t} = \beta_1 \cdot CDS\ trading_{i,t} \times Inst.\ own._{i,t} + \beta_2 \cdot Inst.\ own._{i,t} + \beta_3 \cdot CDS\ trading_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t} \tag{15}$$

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 therefore high shareholder bargaining power.[16] 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.[17]

Table 4 reports the coefficient estimates of equation (15) for the dependent variables distance-to-default, firm value measured by Tobin's q, and firm investment.[18] The same control variables as in Table 3 are included but not reported for brevity.[19] 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 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

[16] Section 4.6 shows the robustness of our results to the use of alternative measures of shareholder bargaining power.

[17] All results are robust if we do not demean institutional ownership.

[18] Specifications with the dependent variables Z-score, return on assets, and PPE growth can be found in Appendix Table A.2.

[19] Specifications without controls can be found in Appendix Table A.3.

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.

Columns 3 and 4 of Table 4 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 expenditure over lagged PPE by 0.003 compared to other firms and compared to the time when no CDS were traded on their debt. The treatment effect is again economically large and corresponds a decrease of -7% relative to median investment (=0.043).

Overall the baseline regressions in Table 4 suggest 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.

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

In the previous analysis we assume that differences in the timing of CDS introduction across firms are exogenous. In this section we conduct a quasi-natural experiment in which an exogenous shock increases the renegotiation frictions induced by CDSs. The event is the implementation of the CDS Big Bang Protocol on April 4, 2009. This regulatory change had two effects. First, it increased the liquidity of the CDS market by harmonizing CDS contracts and setting new market conventions.[20] 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.

The contract and convention changes in the CDS Big Bang increased the renegotiation frictions induced by CDSs as it became easier for creditors to hedge against firm default and as debt renegotiation was officially eliminated as an eligible credit event that would trigger CDS payments (Danis, 2015; Subrahmanyam, Tang, and Wang, 2014). We exploit this exogenous shock employing 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 period from 2008Q1 through 2010Q4.

Table 5 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

[20] 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).

Table 3 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.[21] Column 1 shows a negative and highly significant coefficient estimate of -4.682 for the triple interaction. The increased renegotiation frictions induced by the CDS Big Bang triggered a drop in the distance-to-default of treated firms with trading CDS contracts and high institutional ownership. Columns 4 and 7 show similar adverse effects on firm value (Tobin's q) and investment of treated firms.

A potential concern might be that institutional ownership, our proxy for shareholder bargaining power, is endogenous. To address this concern we lag institutional ownership by one quarter in columns 2, 5, and 8. The treatment effects measured by the coefficients of the triple interaction barely change. Finally, we use the beginning-of-period values of institutional ownership as measured in the quarter when a firm enters the complete sample for the first time (i.e. 2001Q1 for most firms). Again the effects of the 2009 CDS Big Bang remain qualitatively unchanged and statistically significant (columns 3, 6, and 9). Overall, the evidence from this quasi-natural experiment is consistent with Hypothesis 2 which predicts adverse real effects of CDS trading due to renegotiation frictions in firms with high shareholder bargaining power.

4.5 The 2004 net capital rule exemption: Instrumental variable estimation

In the previous section we relied on the 2009 CDS Big Bang as an exogenous shock to CDS-induced renegotiation frictions. In this section we exploit another regulatory event which took place several years before the financial crisis. 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.

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

The 2004 net capital rule exemption has several interesting aspects. First, the exemption 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)."[22] Among the CRTs recognized for regulatory capital requirements were CDSs.[23] We argue that this increased the incentives of creditors to buy CDS protection and thereby exacerbated CDS-induced renegotiation frictions.[24]

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.[25]

Third, even though the net capital rule exemption became effective on August 20, 2014,[26] it did not allow exempted broker-dealers to use internal models and to recognize CDS for regulatory purposes immediately. Instead, the internal models of CSE-affiliated broker-dealers were authorized at different dates.[27] Treatment of firms with relationships

[22]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.

[23]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.

[24]A similar recognition of credit derivatives as CRT tools for commercial banks by the Federal Reserve in 1996 increased their reliance on credit derivatives (Levine, 2010). Moreover, unlike for the 1996 decision about commercial banks, the 2004 change possibly affected both the demand as well as the supply of CDSs. Indeed, the CSEs were also active CDS protection sellers and may have been able to reduce capital requirement on sold CDSs by using internal models.

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

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

[27]Merrill Lynch (January 2005), Goldman Sachs (May 2005), Bear Sterns, Lehman Brothers, and

to different CSEs is thus staggered across time.

We use the staggered recognition of CDSs for regulatory purposes to instrument CDS trading. 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.[28] 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. According to, for example, Atanasov and Black (2015), such a shock-based IV technique is more likely to satisfy the exclusion restriction than conventional IV estimation that only exploits cross-sectional variation.

In columns 1 and 2 of Table 6 we report the first stages for *CDS trading* and the interaction *CDS trading* $\times$ *Inst. own.*[29] 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* $\times$ *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.[30] The Angrist-Pischke F-statistic of excluded instruments exceeds the conventional threshold of 10, reducing concerns about weak instruments.

Columns 3, 4, and 5 of Table 6 show the second stages for the dependent variables

Morgan Stanley (December 2005).

[28]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.

[29]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.

[30]By contrast, *CSE relationship* $\times$ *Institutional ownership* is weakly related to *CDS trading*, and *CDS trading* is significantly related to *CDS trading* $\times$ *Institutional ownership* but its coefficient is economically small. Hence, the instruments allow us to separately identify the endogenous variables (see, e.g., Butler, Fauver, and Mortal, 2009).

distance-to-default, Tobin's q, and investment. The coefficients of the (instrumented) interaction term *CDS trading* × *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 shock-based IV 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.[31]

4.6 Robustness

We begin by establishing the robustness of our results to alternative measures of bargaining power. In columns 1, 4, and 7 of Table 7 we replace the variable *Inst. ownership* by 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* × *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 7 we interact the dummy variable *CDS trading* with *Active ownership*. The new variable measures the fraction of firm equity held by institutional investors that each have allocated at least two percent of their portfolio wealth to the firm in question. We hypothesize that these investors have strong incentives to influence firm policies and are more active in negotiations with creditors as they have

[31] We estimate another two IV specifications (untabulated). First, 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 IV estimation because they were regulated under the Basel Accord and had already been allowed to recognize CDSs for capital requirements before 2004. Second, our results are robust to restricting the analysis to firms that have loans and bond issues reported in Dealscan and SDC over the past-five years.

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 active shareholders. Yet, the coefficient of *CDS trading* $\times$ *Active ownership* is not significantly different from zero for the distance-to-default.[32]

In columns 3, 6, and 9 of Table 7 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 bondholders, firms with more bank debt should have higher *creditor* bargaining power. For these firms we predict *lower* renegotiation frictions induced by CDSs. 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 A.4). In the first robustness test 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 the second robustness 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 riskier and invest less than firms with illiquid CDS contracts and low shareholder bargaining power.[33]

5 Conclusion

When creditors buy CDS protection, they transfer credit risk and cash flow rights to the protection seller but retain control rights. For sufficiently high levels of CDS protection such debt unbundling gives rise to an empty creditor problem where the creditor is less

[32] The results of the event study and the instrumental variable regressions described in the two previous subsections remain qualitatively unchanged when we replace *Inst. ownership* by *Active ownership*.

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

willing to renegotiate and may push the firm into bankruptcy or liquidation even if the continuation of the firm would be welfare-optimal. We study how the severity of this empty creditor problem depends on the bargaining power of shareholders and creditors in the firm.

We show both theoretically and empirically that creditors will buy more CDS protection in the presence of very powerful shareholders which would otherwise leave the creditors only with a small share of firm surplus in debt renegotiation. Next, we provide evidence that these firms, which are prone to suffer from an empty creditor problem, suffer large adverse effects from debt unbundling. 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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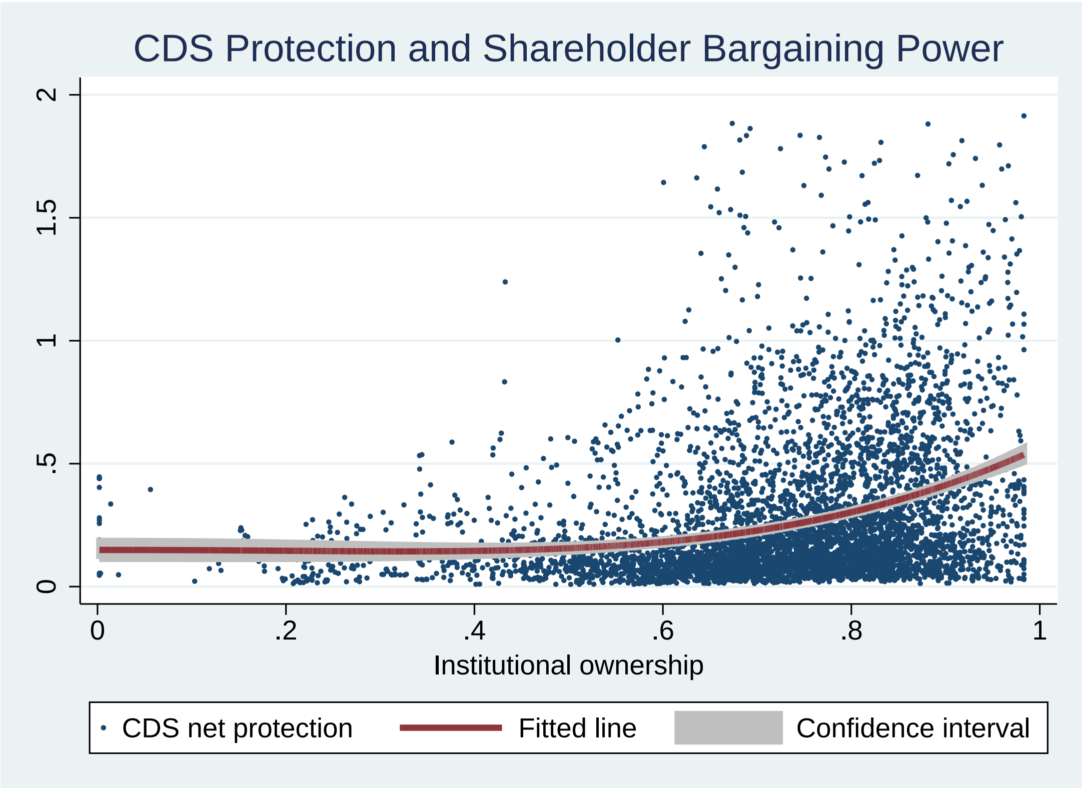

Figure 1: The figure shows the amount of CDS protection traded on firm debt for firms with different shareholder bargaining power. Shareholder bargaining power is proxied by institutional ownership (horizontal axis). The vertical axis shows the ratio of CDS net notional amount to total firm debt. The 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.

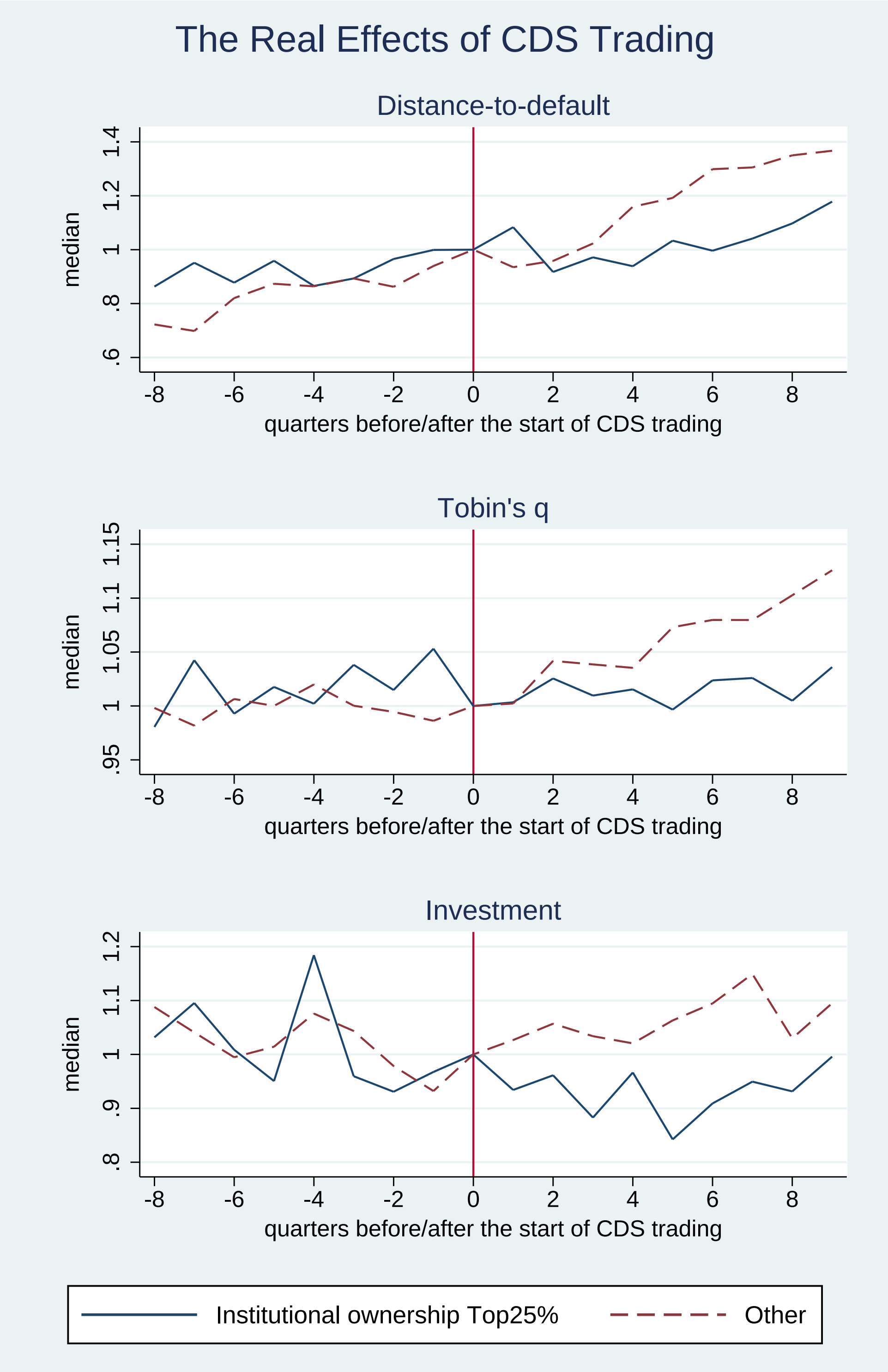

Figure 2: The figure shows the real effects of CDS trading on firms with high and low shareholder bargaining power. The horizontal axes show year-quarters in event-time. At time zero a CDS contract is written on the debt of firms for the first time. The vertical axes show the sample medians of the distance-to-default, Tobin's q, and investment. They are standardized by their respective values at time zero. 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 5,770 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, board of directors' data from IRRC and Riskmetrics, loan data from Dealscan, and bond issue data from SDC. Panel A presents the descriptive statistics of the variables over the entire sample. Panel B presents the descriptive statistics conditioning on firms' CDS trading status. All dollar amounts are in millions of 2010 dollars. Refer to Table A.1 for variable definitions.

Panel A: Whole sample

	Mean	Std.Dev.	P25	Med.	P75	Obs.
CDS trading activity (DTCC)						
CDS net protection	0.325	0.691	0.085	0.164	0.375	5593
CDS gross protection	4.364	9.709	0.988	2.043	5.018	5593
Overinsurance	0.050	0.219	0.000	0.000	0.000	5593
CDS trading activity (Markit)						
5-year CDS spread (bps)	223.301	505.348	46.351	97.233	242.583	17890
CDS liquidity (percentile)	0.498	0.278	0.300	0.510	0.720	21618
CDS traded	0.226	0.419	0.000	0.000	0.000	132827
CDS trading	0.182	0.386	0.000	0.000	0.000	132827
CDS trading (MR)	0.070	0.256	0.000	0.000	0.000	132827
CDS trading (XR)	0.112	0.316	0.000	0.000	0.000	132827
Default risk, firm value, and investment						
Distance-to-default	7.320	7.177	2.838	6.032	10.129	123368
Z-score	-0.062	2.210	-1.165	-0.645	0.059	127021
Tobin's q	1.811	1.163	1.105	1.449	2.076	132827
ROA	-0.007	0.058	-0.009	0.008	0.019	132808
Investment	0.063	0.067	0.023	0.043	0.078	130555
PPE growth	0.007	0.099	-0.029	-0.005	0.028	131184
Bargaining power						
Institutional ownership	0.532	0.297	0.268	0.586	0.794	124834
Institutional ownership (top 5 investors)	0.252	0.128	0.166	0.254	0.335	130757
High and concentrated inst. own.	0.530	0.499	0.000	1.000	1.000	124834
Institutional block-ownership	0.221	0.135	0.115	0.196	0.303	105007
Active ownership	0.059	0.087	0.000	0.023	0.086	131083
Bank debt	0.106	0.147	0.000	0.040	0.161	46067
Other characteristics						
Cash flow	0.001	0.687	0.013	0.071	0.179	125717
Investment grade	0.141	0.348	0.000	0.000	0.000	132827
Rated	0.338	0.473	0.000	0.000	1.000	132827
Stock volatility	0.547	0.360	0.311	0.455	0.656	132827
Book leverage	0.252	0.198	0.089	0.222	0.369	132827
Market leverage	0.185	0.167	0.050	0.142	0.275	132827
Tangibility	0.280	0.233	0.097	0.204	0.403	132827
Size	6.283	1.908	4.834	6.251	7.595	132827
Commercial paper issuer	0.083	0.275	0.000	0.000	0.000	132827

(Continued)

Table 1: – *Continued*

Panel B: CDS firms vs. Non-CDS firms	CDS firms			Non-CDS firms		
	Mean	Med.	Obs.	Mean	Med.	Obs.
CDS trading activity (DTCC)						
CDS net protection	0.325	0.164	5593	.	.	0
CDS gross protection	4.364	2.043	5593	.	.	0
Overinsurance	0.050	0.000	5593	.	.	0
CDS trading activity (Markit)						
5-year CDS spread (bps)	223.301	97.233	17890	.	.	0
CDS liquidity (percentile)	0.498	0.510	21618	.	.	0
CDS traded	1.000	1.000	24225	0.054	0.000	108602
CDS trading	1.000	1.000	24225	0.000	0.000	108602
CDS trading (MR)	0.385	0.000	24225	0.000	0.000	108602
CDS trading (XR)	0.615	1.000	24225	0.000	0.000	108602
Default risk, firm value, and investment						
Distance-to-default	8.768	7.877	23364	6.982	5.634	100004
Z-score	-0.694	-0.770	22442	0.074	-0.604	104579
Tobin's q	1.704	1.478	24225	1.835	1.440	108602
ROA	0.010	0.012	24222	-0.011	0.006	108586
Investment	0.047	0.039	24078	0.067	0.045	106477
PPE growth	0.003	-0.002	24112	0.008	-0.006	107072
Bargaining power						
Institutional ownership	0.733	0.768	22962	0.487	0.497	101872
Institutional ownership (top 5 investors)	0.276	0.265	24124	0.246	0.251	106633
High and concentrated inst. own.	0.495	0.000	22962	0.538	1.000	101872
Institutional block-ownership	0.207	0.183	20879	0.225	0.200	84128
Active ownership	0.095	0.068	24174	0.051	0.011	106909
Bank debt	0.058	0.004	14598	0.128	0.072	31469
Other characteristics						
Cash flow	0.122	0.083	23280	-0.027	0.067	102437
Investment grade	0.600	1.000	24225	0.039	0.000	108602
Rated	0.953	1.000	24225	0.201	0.000	108602
Stock volatility	0.369	0.304	24225	0.587	0.494	108602
Book leverage	0.319	0.289	24225	0.237	0.200	108602
Market leverage	0.221	0.188	24225	0.177	0.128	108602
Tangibility	0.314	0.255	24225	0.273	0.194	108602
Size	8.876	8.792	24225	5.705	5.758	108602
Commercial paper issuer	0.397	0.000	24225	0.013	0.000	108602

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 Table A.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
Adjusted R^2	0.20	0.30	0.30

Table 3: 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 expenditure 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. 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 Table A.1 for variable definitions.

	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
Observations	119816	122331	129472	129454	121965	122450
Adjusted R^2	0.27	0.31	0.12	0.08	0.06	0.04

Table 4: 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 expenditure 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 3 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 Table A.1 for variable definitions.

	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
Observations	112766	112766	121612	121612	114582	114582
Adjusted R^2	0.26	0.26	0.14	0.13	0.06	0.06

Table 5: The CDS Big Bang: A quasi-natural experiment
Shown are estimates from panel regressions that exploit the introduction of the CDS Big Bang Protocol in 2009Q2 as a quasi-natural experiment. The sample contains firm-quarter observations for the time window 2008Q1-2010Q4 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 expenditure scaled by lagged PPE). All specifications include the same firm controls as in Table 3 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 Table A.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
Adjusted R^2	0.40	0.39	0.39	0.21	0.20	0.20	0.08	0.08	0.08

Table 6: 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 expenditure scaled by lagged PPE). All specifications include the same firm controls as in Table 3 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 Table A.1 for variable definitions.

	1st stage		2nd stage			2nd stage: Lagged regressor		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CDS trading	CDS trading × Inst. own.	Dist.-to-def.	Tobin's q	Investment	Dist.-to-def.	Tobin's q	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 7: 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 expenditure scaled by lagged PPE). In columns 1, 4, and 7, the dependent variables are regressed on ownership of 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 *Active ownership*, defined as the fraction of firm equity held by active investors. 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 3 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 Table A.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 × Active ownership		0.840			-0.721***			-0.024***	
		(0.68)			(-4.57)			(-3.16)	
Active ownership		4.526***			1.089***			0.024***	
		(6.93)			(10.44)			(4.50)	
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)
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
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118449	119183	40156	127428	127745	43786	120153	120424	42081
Adjusted R^2	0.27	0.27	0.20	0.13	0.13	0.14	0.06	0.06	0.05

Appendix for

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

Table A.1: Definition of variables

Variable	Definition
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 gross protection	Ratio of CDS gross notional amount from DTCC at quarter-end to total debt. Total debt is `dlttq+dlcq` in Compustat.
Overinsurance	Indicator variable equal to one if *CDS net protection* is larger than one.
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*).
CDS liquidity (percentile)	Percentile of CDS illiquidity measure from Markit computed following Junge and Trolle (2015) and multiplied by (-1).
CDS trading	Indicator variable equal to one in the period after initiation of CDS trading based on Markit data.
CDS traded	Indicator variable equal to one if the firm has CDSs traded over the period 2001-2014 based on Markit data.
CDS trading (MR)	Indicator equal to one if the CDS contract type with the largest number of daily observations in the firm-quarter has a "Modified restructuring" (MR clause) credit event definition.
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.
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.
High and concentrated inst. own.	Indicator equal to one if neither *Institutional ownership* nor the Herfindahl index of *Institutional ownership* belong to the bottom quartile of their distribution.
Institutional block-ownership	Fraction of shares outstanding held by institutional block-holders from Thomson 13f.
Active ownership	Fraction of firm equity held by investors that each have allocated at least 2% of their portfolio wealth to the firm.
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.
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 CRSP daily returns over the last quarter.
Book leverage	Book leverage defined as `(dlcq+dlttq)/atq` in Compustat.
Market leverage	Market leverage defined as `(dlcq+dlttq)/(prccq×cshoq+atq−ceqq)` in Compustat.
Tangibility	PPE to total assets defined as `ppentq/atq` in Compustat.

(Continued)

Table A.1: – *Continued*

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.
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.
Noncompliant	Indicator variable equal to one if the firm did not have a majority of independent directors in 2001.

Table A.2: 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 3 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 Table A.1 for variable definitions.

	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
Observations	114911	114911	121594	121594	115041	115041
Adjusted R^2	0.31	0.31	0.08	0.08	0.05	0.05

Table A.3: 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 expenditure 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. 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 Table A.1 for variable definitions.

	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
Observations	112978	116295	121612	121594	119577	120153
Adjusted R^2	0.18	0.07	0.09	0.04	0.03	0.02

Table A.4: 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 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 regression samples are restricted to firms that have a quoted CDS contract on its debt for at least one quarter in period 2001Q1-2014Q4 (firm 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 *Inst. own.* is replaced by *CDS liqu. (pct)*, which equals the firm's percentile of the Junge and Trolle (2015) CDS liquidity measure (averaged over a given quarter). All specifications include the same firm controls used in Table 3 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 Table A.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
Adjusted R^2	0.36	0.38	0.18	0.21	0.11	0.13