IWH Halle Institute for Economic Research
Member of the Leibniz Association

Discussion Papers

No. 10
June 2016

Shareholder Bargaining Power and the Emergence of Empty Creditors

Stefano Colonnello, Matthias Efing, Francesca Zucchi

Authors

Stefano Colonnello
Corresponding author
Otto-von-Guericke University Magdeburg and
Halle Institute for Economic Research (IWH) –
Member of the Leibniz Association
Department of Financial Markets
E-mail: Stefano.Colonnello@iwh-halle.de
Tel +49 345 7753 773

Matthias Efing
HEC Paris
E-mail: efing@hec.fr

Francesca Zucchi
Federal Reserve Board of Governors,
United States
E-mail: Francesca.Zucchi@frb.gov

The responsibility for discussion papers lies solely with the individual authors. The views expressed herein do not necessarily represent those of the IWH. The papers represent preliminary work and are circulated to encourage discussion with the authors. Citation of the discussion papers should account for their provisional character; a revised version may be available directly from the authors.

Comments and suggestions on the methods and results presented are welcome.

IWH Discussion Papers are indexed in RePEc-EconPapers and in ECONIS.

Editor

Halle Institute for Economic Research (IWH) –
Member of the Leibniz Association

Address: Kleine Maerkerstrasse 8
D-06108 Halle (Saale), Germany
Postal Address: P.O. Box 11 03 61
D-06017 Halle (Saale), Germany

Tel +49 345 7753 60
Fax +49 345 7753 820

www.iwh-halle.de

ISSN 2194-2188

Shareholder Bargaining Power and the Emergence of Empty Creditors*

June 2018

Abstract

Credit default swaps (CDSs) can create empty creditors who potentially force borrowers into inefficient bankruptcy but also reduce shareholders' incentives to default strategically. We show theoretically and empirically that the presence and the effects of empty creditors on firm outcomes depend on the distribution of bargaining power among claimholders. Firms are more likely to have empty creditors if these would face powerful shareholders in debt renegotiation. The empirical evidence confirms that more CDS insurance is written on firms with strong shareholders and that CDSs increase the bankruptcy risk of these same firms. The ensuing effect on firm value is negative.

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

JEL Classification: G32, G33, G34

* An old version of this paper was circulated under the title *Empty Creditors and Strong Share-holders: The Real Eects of Credit Risk Trading*. We thank Bill Schwert (the editor), Kevin Aretz, Patrick Augustin, Mascia Bedendo, Francesco Columba, Giuliano Curatola, Matt Darst, François Derrien, Rüdiger Fahlenbrach, Emilia Garcia-Appendini, Heng Geng, Denis Gromb, Reint Gropp, Yalin Gündüz, Rainer Haselmann, Harald Hau, Harry Huizinga, Oğuzhan Karakaş, Michael Koetter, Evren Örs, Matthew Ringgenberg, Marti Subrahmanyam, Konstantin Wagner, Wolf Wagner, Qizhou (Léo) Xiong, and Adam Zawadowski, and seminar participants at the 14th Paris December Finance Meeting, the Goethe University Doctoral Workshop (Riezlern), the CONSOB-ESMA-Bocconi Conference (Milan), the 2017 European Winter Finance Summit (Zürs), the 10th Swiss Winter Conference on Financial Intermediation (Lenzerheide), and the 24th Annual Meeting of the German Finance Association (Ulm) for comments and suggestions. We thank Cornelius Schmidt and Rüdiger Fahlenbrach for sharing data. Matthias Efing acknowledges financial support from Investissements d'Avenir (ANR-11-IDEX- 0003/ Labex Ecodec/ANR-11-LABX-0047). The views in the paper are those of the authors and do not necessarily reflect those of the Federal Reserve System or its staff.

1. Introduction

Debt ownership typically combines contingent control and cash flow rights. Yet, credit default swaps (CDSs) allow creditors to insure against borrower default and, at the same time, to retain the right to push a delinquent firm into bankruptcy. Bolton and Oehmke (2011, henceforth BO) predict that this separation of rights can create "empty creditors" who have lower incentives to renegotiate distressed debt but, for this very reason, might also reduce shareholders' incentives to default strategically. The ensuing effects on corporate decisions have been studied in a growing strand of literature (e.g., Ashcraft and Santos, 2009; Saretto and Tookes, 2013; Subrahmanyam, Tang, and Wang, 2014, 2017; Danis and Gamba, 2018). Yet, little effort has been made to understand which firms are most prone to face empty creditors. This paper tries to fill this gap and studies how the distribution of bargaining power between claimholders determines the rise of empty creditors.

In a limited commitment model à la BO, we show that creditors buy more CDS insurance if, ceteris paribus, shareholders can extract a larger surplus share in distressed debt renegotiation. For sufficiently large shareholder bargaining power, empty creditors insure to the point where they liquidate the firm excessively often. We test these predictions empirically and confirm the positive effect of shareholder bargaining power on the demand for CDSs. We also find that adverse effects of CDSs on bankruptcy risk (and on firm value and investment) are concentrated in firms with high shareholder bargaining power, which is again consistent with our hypotheses.

We start with a theoretical analysis of how the distribution of bargaining power between claimholders affects creditor demand for CDS insurance. Absent CDSs, shareholder bargaining power is detrimental to uninsured creditors because: (i) it decreases the creditor surplus share in debt renegotiation and (ii) it makes strategic default more appealing to shareholders. CDS insurance helps creditors address these problems. First, CDSs strengthen the creditors' bargaining position in distressed renegotiation by providing them with an outside option. Second, by making creditors tougher in renegotiation, CDSs reduce the shareholders' incentives to default strategically. Thus, CDS protection is more valuable to creditors that would have to bargain with strong shareholders. We predict that more CDS protection is written on firms whose shareholders have high bargaining power.

To test this hypothesis, we construct several measures of shareholder bargaining power based on differences in ownership structure. In our first specification, we follow Alanis, Chava, and Kumar (2016), Davydenko and Strebulaev (2007), and others and simply use institutional ownership as a power proxy. Compared to retail investors, institutional investors are assumed to exert stronger influence in debt renegotiation, possibly due to higher sophistication, coordination, and monitoring capacity. In panel regressions with firm fixed effects, we confirm that institutional ownership positively affects the amount of CDS insurance written on firms. However, this finding masks important heterogeneity among different institutional owners. Ceteris paribus, shareholder bargaining power should be lower in the presence of passive shareholders like index-tracking funds or exchange-traded funds (ETFs) but higher in the presence of active investors with high economic exposure to the firm. Consistent with this prediction, our results remain unchanged if we correct institutional ownership for holdings by quasi index-tracking funds (as defined by Bushee, 2001) or if we focus on concentrated monitoring ownership (as defined by Fich, Harford, and Tran, 2015). Finally, we find that CDS demand is also higher if managers' own wealth is sensitive to shareholder value and creditors should expect them to side with shareholders in debt renegotiation.

Ownership structure and, therefore, our measures of shareholder bargaining power are potentially endogenous. We exploit the annual reconstitution of the Russell 1000 and the Russell 2000 indexes as a shock to ownership structure.[1] As both indexes are value-weighted, firms experience a sharp increase in ownership by Russell-tracking index funds after switching from the bottom of the Russell 1000 to the top of the Russell 2000.[2] We interpret this discontinuity in passive ownership as a shock to shareholder bargaining power. We exploit the fact that index assignment around the threshold between Russell indexes is exogenous and implement the instrumental variable specification proposed by Schmidt and Fahlenbrach (2017). Consistent with our first hypothesis, we find that an increase in *passive* ownership (a *decrease* in shareholder bargaining power) reduces the likelihood that CDSs are introduced on firm debt.

We next analyze how the positive relation between shareholder bargaining power and CDS protection affects the firm's bankruptcy risk. Our theory suggests that, by buying more CDS insurance, creditors of firms with powerful shareholders improve their outside option in distressed debt renegotiation, which triggers two effects. First, CDS insurance decreases creditors' incentives to renegotiate the debt contract and increases their incentives to force the firm into bankruptcy. The reason is that creditors are unwilling to restructure the outstanding debt whenever the renegotiation surplus falls short of the promised CDS payment in bankruptcy. Second, CDS insurance increases the creditors' share of renegotiation surplus, which reduces shareholders' incentives to default strategically and engage in such renegotiation. The model shows that the net effect of CDS insurance on bankruptcy risk is always positive. Therefore, our second hypothesis predicts an unambiguously positive effect of CDSs on bankruptcy risk, which increases with shareholder bargaining power.

Our empirical analysis of bankruptcy risk begins with a simple event study. We follow Subrahmanyam, Tang, and Wang (2014) and study credit rating changes around the

[1] Each year, Russell assigns the 1,000 U.S. stocks with the largest market capitalization to the Russell 1000 whereas the 2,000 next largest firms are sorted into the Russell 2000.

[2] The increase in passive index-tracking ownership following index switching is mirrored by a decrease in active ownership (Fich, Harford, and Tran, 2015; Coles, Heath, and Ringgenberg, 2017).

introduction of CDS trading on firm debt. Consistent with our second hypothesis, we find that rating downgrades after CDS introduction are twice as high for firms with powerful shareholders (as measured by institutional ownership). Furthermore, we find that CDS introduction is associated with a significant decrease in firms' distance-to-default only if we condition on the top 25% of firms with the highest shareholder bargaining power. This heterogeneous response in credit risk suggests that CDSs create an empty creditor problem, in particular in firms with strong shareholders.

Our credit risk analysis relies on the assumption that the timing of CDS introduction is exogenous—at least conditional on covariates and firm fixed effects. This assumption is potentially violated and, hence, we make additional efforts to strengthen identification. First, we follow Danis (2017), Gündüz, Ongena, Tümer-Alkan, and Yu (2017), and others and conduct an event study in a narrow window around the CDS Big Bang of 2009.[3] This regulatory reform improved the availability and liquidity of CDSs, then making it easier for creditors to purchase credit protection and to become "empty." 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. We find that firms with outstanding CDSs and powerful shareholders experience an increase in bankruptcy risk during the first six calendar quarters after the Big Bang. As an alternative way to strengthen identification, we implement the overlap weighting method by Li, Morgan, and Zaslavsky (2018), which improves the covariate balance across firms with CDS and firms without CDS contracts (see Bartram, Conrad, Lee, and Subrahmanyam, 2018). Ensuring comparability of CDS and non-CDS firms at least along observable dimensions, we still find that CDS firms with powerful shareholders appear riskier than otherwise similar firms without CDSs.

Our main theoretical predictions and empirical findings so far all suggest the existence

[3] Gündüz, Ongena, Tümer-Alkan, and Yu (2017) study the CDS "Small" Bang in Germany.

of an empty creditor problem in firms with powerful shareholders. A related question is then whether these same firms also experience stronger effects of CDSs on firm value and investment. In the model, shareholder bargaining power affects the relation between CDS insurance and firm value in two opposing ways. First, as explained, it increases the probability of bankruptcy and, thus, the probability-weighted deadweight loss due to bankruptcy costs. This effect is value-decreasing. Second, CDS insurance can cause a reduction in the probability of strategic default and, thus, in the probability-weighted loss due to renegotiation costs. This second effect is value-enhancing.

We test empirically whether the value-decreasing or the value-enhancing effect of CDSs dominates in firms with strong shareholders and empty creditors. Panel regressions show that Tobin's q, return on assets, (scaled) capital expenditures, and fixed asset growth of firms with powerful shareholders all decrease relative to other firms after CDS introduction. Firms with powerful shareholders seem to suffer economically large adverse effects after CDS introduction. By contrast, the real effects of CDS trading on firms with weak shareholders are indistinguishable from zero.

The effects of CDSs on corporate stakeholders and policies have been studied extensively in the theoretical and in the empirical literature. On the theory side, Hu and Black (2008) are among the first to warn against CDSs creating empty creditors and raising the incidence of inefficient bankruptcies. The model by BO formalizes this negative effect but, at the same time, also shows how empty creditors can discipline shareholders and reduce their strategic default incentives. More recently, Danis and Gamba (2018) have modeled the positive and negative effects of CDSs and empty creditors in a model with dynamic investment and financing. Compared to these papers, our theoretical analysis derives testable predictions regarding the relation between the relative bargaining power of different claimholders and the severity of the empty creditor problem.

Numerous empirical papers have studied the benefits and costs of CDSs for companies.

Several of them ask whether CDSs improve firms' access to debt markets. For example, Kim (2016) shows that CDSs can decrease the cost of debt. By contrast, Narayanan and Uzmanoglu (2018a,b) find that the credit spread of the average firm (as well as its cost of equity) increases. Yet, Ashcraft and Santos (2009) find no evidence that CDSs lower the cost of debt. Finally, Saretto and Tookes (2013) show that CDS trading increases firm leverage and debt maturities, which suggests improved firm access to credit, whereas Hirtle (2009) finds only limited evidence that banks supply more credit as they buy CDSs.

Another group of empirical papers focuses on the potentially detrimental effects of CDSs on firms. Subrahmanyam, Tang, and Wang (2014, 2017) show that CDSs are associated with higher credit risk, to which firms respond with a build-up of precautionary cash buffers. Danis (2017) provides further evidence of the empty creditor problem showing that creditors of CDS firms are less likely to vote in favor of distressed exchange offers. By contrast, Bedendo, Cathcart, and El-Jahel (2016) do not find any evidence that distressed CDS firms are more likely to file for bankruptcy.

Our main empirical contribution to this literature is to identify one important dimension of heterogeneity in the empty creditor theory. Specifically, we show that the distribution of bargaining power among shareholders and creditors predicts whether and how much CDS insurance is written on firms. This, in turn, explains differences in the severity of the empty creditor problem across firms. The paper by Bartram, Conrad, Lee, and Subrahmanyam (2018) pursues a similar objective in that it also studies variation in CDS effects in a large cross-section of firms. However, they focus on country-level variation in economic and legal conditions and not on differences in ownership structure and shareholder bargaining power. Further references to the CDS literature can be found in the surveys of Augustin, Subrahmanyam, Tang, and Wang (2014) and Augustin, Subrahmanyam, Tang, and Wang (2016).

The paper proceeds as follows. Section 2 builds on the BO model and shows how creditors' demand for CDSs and its effects on bankruptcy risk depend on the distribution of bargaining power between creditors and shareholders. Section 3 describes the data. Section 4 shows the empirical relation between shareholder bargaining power, CDS protection, and bankruptcy risk. Section 5 studies the real effects of CDS trading. Section 6 describes additional robustness tests. Section 7 concludes. Technical details are collected in the Appendix.

2. Hypotheses development

We extend the framework developed by BO to analyze how bargaining power affects the creditors' optimal level of CDS protection and the ensuing empty creditor problem. Additional calculations are reported in Appendix A.

Assumptions. Agents are risk-neutral and have rational expectations. The risk-free rate is zero. We consider a firm that can undertake a two-period project requiring a setup cost F at $t = 0$. If undertaken, the project generates uncertain cash flows at $t = 1, 2$. The cash flow at $t = 1$ can be high C_1^H with probability θ or low $C_1^L < C_1^H$ with probability $1 - \theta$. The cash flow at $t = 2$ can be high C_2^H with probability ϕ or low $C_2^L < C_2^H$ with probability $1 - \phi$. As in BO, the realization of the time-2 cash flow is revealed to shareholders at $t = 1$. We also follow BO in that the low realization of the time-1 cash flow (C_1^L) and the liquidation value of the firm are set to zero.

The firm is financed with debt and equity. The debt contract is issued to a single creditor and specifies a repayment $R < C_1^H$ at $t = 1$. If shareholders meet this payment, the creditor and shareholders part ways, and shareholders are the only claimants on the time-2 cash flow. If shareholders fail to make this payment, the creditor has the right to force the firm into bankruptcy or can renegotiate the debt contract with shareholders. Following BO, we do not discriminate on whether bankruptcy takes place via Chapter 7 or Chapter 11 and interpret renegotiation as an out-of-court workout.

The firm faces a limited commitment problem. Only the minimum time-1 cash flow is verifiable, whereas all other cash flows can be diverted by shareholders. This means that if the high cash flow realizes at $t = 1$, shareholders can meet the debt obligation R or can claim to have received zero and default. We refer to this outcome as a strategic default. If, instead, the low cash flow realizes at $t = 1$, shareholders do not have enough funds to meet the contractual repayment. We refer to this outcome as a liquidity default.

The time-2 cash flow cannot be contracted upon at $t = 0$, but can be made verifiable at $t = 1$ by incurring a proportional verification cost $1 - \lambda \in (0, 1)$. Because cash flow verification makes renegotiation possible, $1 - \lambda$ can be interpreted as a renegotiation cost. The surplus created in renegotiation, λC_2, is split between shareholders and the creditor via Nash bargaining à la Fan and Sundaresan (2000).[4] Absent CDSs, the relative bargaining powers are $\eta \in (0, 1)$ for shareholders and $1 - \eta$ for the creditor.[5]

The creditor can buy CDS protection at $t = 0$. CDSs are fairly priced and provide the creditor with the promise of a gross payment π if a credit event occurs at $t = 1$. A credit event is verified if shareholders do not meet the contractual payment R, and the creditor and shareholders fail to renegotiate the debt contract at mutually acceptable terms.

Benchmark with no CDSs. Suppose that there are no CDSs traded on the firm's debt. After non-payment of R at $t = 1$ (following a strategic or liquidity default), the creditor forces the firm into bankruptcy or renegotiates the debt contract. In renegotiation, Nash bargaining implies that shareholders' payoff is $\eta\lambda C_2$ (i.e., a fraction η of the renegotiation surplus λC_2), whereas the creditor's payoff is $(1 - \eta)\lambda C_2$. Thus, the creditor is always

[4] We do not assume the "outside option principle" to regulate renegotiation in the presence of CDS protection. Following this principle, the creditor takes the maximum of what he would receive absent CDS and his outside option generated by CDSs. Because our focus is on bargaining power, we assume that the creditor receives his outside option plus a share of the remaining surplus (which depends on his bargaining power), as considered by BO in their Appendix A.2.

[5] We assume that when the creditor is indifferent between renegotiation and bankruptcy, he renegotiates the debt contract.

better off renegotiating than forcing the firm into bankruptcy. As in BO, the probability of bankruptcy is zero absent CDSs.

Shareholders factor renegotiation outcomes into their repayment/strategic default decision. If the realization of the time-1 cash flow is high, shareholders meet the contractual debt repayment if the following inequality holds:

$$C_1^H - R + C_2 \geq C_1^H + \eta\lambda C_2 \,. \tag{1}$$

The left-hand (respectively, right-hand) side is the shareholders' payoff from repayment (from strategic default). Absent CDSs, the shareholders' payoff from strategic default increases with η. Shareholders meet the debt obligation if the inequality $C_2(1-\eta\lambda) \geq R$ holds. We assume that the inequality $C_2^H(1-\lambda) \geq R$ holds, which implies that shareholders meet the debt obligation at least when the time-2 cash flow realization is high, for any η.[6]

Introducing CDSs. We next assume that CDSs are traded on the firm debt. In renegotiation, Nash bargaining implies that shareholders' payoff is $\eta(\lambda C_2 - \pi)$, whereas the creditor's payoff is $\lambda C_2(1-\eta) + \eta\pi$. Notably, CDS protection offers an outside option to the creditor, which enables him to extract a greater surplus share. At the same time, CDS protection reduces the creditor's incentives to renegotiate. Renegotiation only occurs if the time-2 cash flow is sufficiently large, i.e., if $\lambda C_2 \geq \pi$ holds. If, instead, $\lambda C_2 < \pi$, the creditor triggers bankruptcy and collects the CDS payment.

Taking renegotiation outcomes into account, shareholders meet the debt obligation

[6] If the opposite inequality held, shareholders would always default strategically after a high realization of the time-1 cash flow. Because we focus on how CDSs introduction changes equilibrium outcomes and the role of bargaining power thereof, we rule out this degenerate case.

after a high realization of the time-1 cash flow if the following inequality holds:

$$C_1^H - R + C_2 \geq C_1^H + \max\left[\eta(\lambda C_2 - \pi); 0\right]. \tag{2}$$

The left-hand (respectively, right-hand) side is the payoff to shareholders if they service the debt obligation (default strategically). Comparing Eq. (1) with Eq. (2) illustrates that CDS protection reduces the shareholders' payoff from strategic default.

We show that the optimal level of credit protection π chosen by the creditor only takes one of two values (as in BO): either a "low" level, $\pi_L \equiv \lambda C_2^L$, or a "high" level, $\pi_H \equiv \lambda C_2^H$.[7] The choice between π_L and π_H is governed by the following trade-off. The high level of credit protection allows the creditor to extract a larger surplus share in renegotiation but, at the same time, prevents efficient renegotiation from happening if the renegotiation surplus is low (i.e., if $\lambda C_2^L < \pi_H$ holds).

As CDSs are fairly priced,[8] the actual benefit to the creditor from buying CDSs comes from: (i) improving his bargaining position in renegotiation, and (ii) preventing shareholders from defaulting strategically. As we show, effect (ii) only arises if the required repayment R is sufficiently low. By contrast, for a large R, introducing CDSs does not change the shareholders' decision to default strategically or to service the debt (by Eq. (2)). We solve for the creditor's choice of $\pi \in \{\pi_L, \pi_H\}$ in these two distinct cases.

Case (1): CDSs do not prevent strategic default ($R > C_2^L$). If $R > C_2^L$, it follows directly from Eq. (2) that the shareholders' decision to default or to meet the debt obligation is the same as in the case without CDSs, for any $\pi \in \{\pi_L, \pi_H\}$. After a high realization of the time-1 cash flow, shareholders meet the debt obligation if the time-2 realization is

[7] Any other amount of CDS protection is dominated from the creditor's perspective. When the level of credit protection exceeds λC_2^L, it is optimal to raise the level of credit protection up to λC_2^H to maximize the effect of increased bargaining power on renegotiation outcomes. Any level of credit protection exceeding λC_2^H would eliminate renegotiation altogether and is dominated.

[8] Fair CDS pricing implies that the expected CDS payment (which the creditor receives if the insured credit event occurs) and the CDS premium exactly offset in the creditor's payoff.

high, and default strategically if the time-2 realization is low.[9]

The level of credit protection affects the creditor's willingness to renegotiate the debt contract in default. If the creditor chooses the low level of credit protection π_L, he renegotiates the debt obligation in default irrespective of the time-2 cash flow realization. If the creditor chooses the high level of credit protection π_H, he renegotiates the debt contract only if the time-2 cash flow is high. If, instead, shareholders default and the time-2 cash flow is low, the renegotiation surplus falls short of the CDS payment (i.e., $\lambda C_2^L < \pi_H$) and, thus, the creditor forces the firm into bankruptcy.

Simple calculations show that the creditor chooses π_H if shareholder bargaining power is greater than the critical level $\bar{\eta}$, defined as follows:[10]

$$\bar{\eta} = \frac{C_2^L(1-\phi)}{\phi(1-\theta)(C_2^H - C_2^L)}. \tag{3}$$

Intuitively, the creditor chooses the high protection level π_H if, otherwise, powerful shareholders ($\eta > \bar{\eta}$) would leave the creditor with only a small surplus share in debt renegotiation. When the creditor chooses π_H because $\eta > \bar{\eta}$, he forces the firm into bankruptcy if the realization of the time-2 cash flow is low. Compared to the case without CDS, the probability of bankruptcy increases from zero to $1 - \phi$ (which is exactly the probability of the time-2 cash flow being low). Conversely, if shareholder bargaining power is so low that $\eta \leq \bar{\eta}$ holds, the creditor's optimal level of credit protection is π_L, and bankruptcy probability remains zero (as in the case with no CDSs).

Case (2): CDSs prevent strategic default ($R \leq C_2^L$). If $R \leq C_2^L$, Eq. (2) implies that shareholders meet the debt obligation for any $\pi \in \{\pi_L, \pi_H\}$ provided that the realization

[9] Because $R > C_2^L > C_2^L(1-\eta\lambda)$, shareholders default strategically after a high time-1 cash flow and a low time-2 cash flow realization, both in the presence and in the absence of CDSs. A low realization of the time-1 cash flow always leads to liquidity default.

[10] Simple calculations in Appendix A show that $\bar{\eta} < 1$ if the time-2 cash flow is sufficiently volatile (see Eq. (A.9)). A similar result holds for $\tilde{\eta}$ defined in Eq. (4) (see Eq. (A.17)).

of the time-1 cash flow is high (meaning that shareholders have enough cash flows to cover the required repayment R). In particular, if the realization of the time-1 cash flow is high, shareholders *do* meet the debt obligation if the time-2 cash flow realization is low—i.e., when they would default strategically if there were no CDSs and $R > C_2^L(1 - \eta\lambda)$ held. Hence, CDSs help curb strategic default.

The level of credit protection determines how liquidity default (after a low realization of the time-1 cash flow) is resolved. If the creditor chooses π_L, he always renegotiates the debt contract. If the creditor chooses π_H, the creditor renegotiates the debt obligation if the time-2 cash flow is high, whereas he forces the firm into bankruptcy if the time-2 cash flow is low.

We show that it is optimal for the creditor to choose π_H if shareholder bargaining power exceeds the critical level $\tilde{\eta}$ defined as follows:

$$\tilde{\eta} = \frac{C_2^L(1 - \phi)}{\phi(C_2^H - C_2^L)}. \tag{4}$$

When the creditor chooses the high level of credit protection π_H as $\eta > \tilde{\eta}$, the probability of firm bankruptcy is positive and equal to $(1 - \theta)(1 - \phi)$ (i.e., bankruptcy happens after a low realization of both the time-1 and time-2 cash flows). If, instead, shareholder bargaining power is low ($\eta \leq \tilde{\eta}$), the creditor chooses π_L, and the probability of bankruptcy is equal to zero as in the case without CDSs.

Testable hypotheses. Our analysis illustrates that the creditor chooses the high level of credit protection *if* shareholder bargaining power is sufficiently large. Absent CDSs, shareholder bargaining power is detrimental to creditors for two reasons. First, powerful shareholders extract a larger surplus share in renegotiation. Second, powerful shareholders have weaker incentives to service the debt obligation (and greater incentives to default strategically). Our analysis illustrates that CDS protection can mitigate both these problems. First, it increases the creditor's surplus share in renegotiation. Second, it can reduce the shareholders' incentives to default strategically. Therefore, CDS protection is more valuable for creditors facing more powerful shareholders. The high level of credit protection, however, makes the creditor unwilling to renegotiate the debt contract when the renegotiation surplus is low, which raises the probability of bankruptcy. We formulate our testable hypotheses.[11]

Hypothesis 1: *Firms with powerful shareholders are prone to have higher levels of credit protection written on their debt.*

Hypothesis 2: *After CDSs introduction, the probability of bankruptcy increases for firms with powerful shareholders relative to other firms.*

We next turn to test our hypotheses.

3. Data

In this section, we describe the data and the variables used in our empirical analysis.

3.1. Data sources

We extract quarterly accounting data and daily stock returns for a sample of public U.S. firms between 2001 and 2014 from the CRSP-Compustat database. We exclude financial institutions and utilities as well as firm-years with missing sales, total assets, common shares outstanding, share price, or calendar date. We also exclude firms with zero financial debt and firms with market or book leverage outside of the unit interval.

[11] For the sake of simplicity, our predictions are based on a binomial model similar to BO, in which optimal credit protection and firm bankruptcy probability do not vary continuously with shareholder bargaining power. Our testable hypotheses are confirmed in a model in which cash flows have a continuous distribution. In such a setup, the creditor's optimal level of credit protection and the probability of bankruptcy continuously vary with shareholder bargaining power. We report this alternative model in the Internet Appendix (Section C).

In addition, we require firms to report total assets and property, plant, and equipment (PPE) in excess of $10 million and $1 million, respectively.

We match the resulting sample with CDS pricing data from Markit (starting in January 2001) and with CDS volume data for the top 1,000 reference firms from the Depository Trust & Clearing Corporation (DTCC, starting in the fourth quarter of 2008). We use the institutional investor classification on the website of Brian Bushee to distinguish between active and passive investors reported in the Thomson Reuters Institutional Holdings (13f) database. Moreover, the data on the website of Antti Petajisto are used to identify funds that track one of the Russell 1000 or Russell 2000 indexes in the Thomson Reuters Mutual Fund Holding database.[12] We get data on Russell 1000 and Russell 2000 constituents for years 2000 through 2010 from FTSE Russell and information regarding the raw market capitalization of these index constituents from Schmidt and Fahlenbrach (2017). Finally, we extract information regarding managers' equity incentives from Execucomp. We winsorize variables at the 1st and 99th percentile to reduce the influence of outliers.

3.2. Variable definitions and summary statistics

We construct several measures of shareholder bargaining power using our detailed ownership structure data. In our baseline specification, we follow Alanis, Chava, and Kumar (2016), Davydenko and Strebulaev (2007), and others and use *Institutional ownership* as a bargaining power proxy. In a second step, we distinguish between *Active* and *Passive institutional ownership* and break out the shareholdings of quasi index-tracking institutions, as identified by Bushee (2001). All else equal, shareholder bargaining power

[12] The Bushee (2001) classification is available on http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html until 2015. Information on funds' primary Morningstar Benchmarks is available on http://www.petajisto.net until 2009. Following Coles, Heath, and Ringgenberg (2017), we include closet indexers with an active share less than 0.6 in the computation of passive *Russell-tracking ownership*. We further add the holdings of the Russell 1000/2000 ETFs of the Ishares family.

should be higher (respectively, lower) in the presence of active (passive) institutional ownership. Further, we hypothesize that shareholders will be more active and tougher in debt renegotiation if they have more skin in the bargaining outcome. To measure the economic exposure of institutional shareholders, we check for each investor-firm relationship whether the investor's equity stake in the target firm is in the top 10% of his portfolio (Fich, Harford, and Tran, 2015). Finally, we hypothesize that high ownership concentration is associated with higher bargaining power, as a small coalition of shareholders should find it easier to coordinate and to present a common front in negotiations (e.g., Aslan and Kumar, 2012).

The existing governance literature lends credibility to the choice of *(Active) Institutional ownership* as a measure of shareholder bargaining power. For example, McCahery, Sautner, and Starks (2016) show that institutional investors frequently engage with management and actively intervene in corporate governance. The high monitoring capacity of institutional investors appears especially important during debt renegotiations, which are typically carried out by management and not directly by shareholders. Consistently, Chakraborty and Gantchev (2013) show that managers secure more equity-friendly deals in terms of lower interest spreads and larger debt principals after private investments of institutional investors in public equity. Overall, *Institutional ownership* seems to alleviate agency problems and to strengthen shareholders' influence in debt renegotiations.[13]

Table 1 reports summary statistics for the different measures of shareholder bargaining power in the final sample of 5,843 firms (see Appendix Table B.1 for variable definitions). Average *Institutional ownership* equals 53%. For roughly 25% of the observations, institutional investors hold more than 80% of firm equity, which suggests that ownership of

[13] In Internet Appendix D, we report additional empirical analyses that show that institutional shareholders are more active in debt renegotiation than other investors. For example, as *Institutional ownership* moves from the 25th to the 75th percentile, the probability that shareholders form an equity committee in Chapter 11 increases from 6.7% to 23.3%. Following technical default after covenant violations, institutional shareholders manage to avert strong cuts in investment, unlike other shareholders.

these firms is sophisticated and associated with high bargaining power. After correcting *Institutional ownership* for the shareholdings of passive quasi index-tracking institutions, we find that remaining *Active institutional ownership* by strong investors still accounts for 18% of total equity in the average firm. The average firm has 0.88 monitoring shareholders with significant economic exposure to the firm. Average ownership concentration among the top five institutional investors equals 25% and exceeds 33% in the top quartile of the distribution.

We consider managerial wealth-to-performance sensitivity (WPS) as a second source of shareholder bargaining power. Intuitively, if managers' private wealth is more sensitive to shareholder value, managers should have stronger incentives to side with shareholders in debt renegotiations. Shareholder bargaining power should thus be higher. Table 1 reports summary statistics for managers' private WPS as defined by Edmans, Gabaix, and Landier (2009). Executives are classified as CFOs according to the procedure of Jiang, Petroni, and Wang (2010). In our sample, the average management team has a WPS of 11.44. CEOs typically exhibit a higher WPS than CFOs.

Further, Table 1 shows summary statistics for the CDS trading status of firms. The binary variable *CDS traded* equals one for firms that have CDSs traded on their debt in at least one quarter over the sample period and zero for firms that are never traded in the CDS market. In our sample, there exist 742 CDS firms which account for 23% of the firm-quarter observations. The binary variable *CDS trading* captures the timing of CDS introduction and equals one in firm-quarters in which a CDS is traded on the firm (and zero before the onset of CDS trading). It equals one for 18% of all firm-quarters. CDS notional amounts are available for 5,593 firm-quarters after September 2008. In this subsample, the amount of *CDS gross protection* written on the average firm equals 4.4 times of total debt. After netting, CDS notional amounts decrease to, on average, 32.5% of total firm debt (*CDS net protection*).

Our main measure of credit risk is the naïve distance-to-default as defined by Bharath and Shumway (2008), which hinges on the functional form by Merton (1974) (but does not require a numerical solution of the model). In Internet Appendix K, we also use the Altman's Z-score as modified by MacKie-Mason (1990) as an alternative risk measure (low values indicate high default risk). Both variables have been shown to predict corporate default (e.g., Bharath and Shumway, 2008). In Internet Appendix E, we show that these measures also predict the subset of credit events that trigger CDS payments.

Finally, we use Tobin's q to measure firm value and the ratio of capital expenditures to PPE to measure investment. In Internet Appendix K, we also show results for the return on assets (ROA) as an asset-side measure of firm value, and PPE growth as an alternative measure of investment.[14]

4. Empirical analysis

In this section, we empirically test Hypotheses 1 and 2.

4.1. Hypothesis 1: Shareholder bargaining power and CDS protection

In debt renegotiation, creditors of firms with more powerful shareholders receive a relatively smaller fraction of the continuation value of the firm. Hypothesis 1 predicts that these creditors try to improve their bargaining position by buying more CDS insurance. Consistent with this hypothesis, the left panel of Fig. 1 shows a positive correlation between *Institutional ownership*, our main measure of shareholder bargaining power, and the amount of CDS insurance written on firms. We verify this result in a regression

[14] In Internet Appendix H, we show summary statistics of firm characteristics in different sub-samples of firms with and without CDSs and with high or low *Institutional ownership*.

framework:

$$CDS\ net\ protection_{i,t} = \beta_1 \cdot Institutional\ ownership_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}, \quad (5)$$

where the subscripts i and t indicate firm and calendar quarter, respectively. The coefficient of interest is β_1, which we predict to be positive. We control for book leverage, asset tangibility, firm size, indicator variables for the rating and the investment grade status of the firm, the presence of a commercial paper program, lagged Tobin's q, and stock volatility. We include firm fixed effects υ_i, calendar quarter fixed effects ν_t, and fiscal quarter fixed effects $FQ_{i,t}$.[15] Standard errors are clustered at the firm level.

Column 1 of Table 2 reports a positive and significant coefficient estimate for shareholder bargaining power as proxied by *Institutional ownership.* The effect is economically significant. An increase of *Institutional ownership* by 30% (about one standard deviation) is associated with an increase of *CDS net protection* by approximately 0.04 (about 25% relative to the median and 12% relative to the mean). The size and the statistical significance of the regression coefficient increase if we exclude shareholdings by passive quasi index-tracking funds and consider only *Active institutional ownership* (column 2). We also find that more CDS protection is written on firms with a higher *Number of monitoring shareholders* with large economic exposure to the firm (column 3) or if ownership is more concentrated among the five largest shareholders (not significant). Finally, we show that more CDS protection is written on firms whose managers (in particular, the CFO) have a high WPS (columns 5 and 6).[16] In other words, CDS demand is higher if managers are more likely to side with shareholders in debt renegotiation because managers

[15] In Table K.2 in the Internet Appendix, we also control for industry-time fixed effects.

[16] We consider all equity holdings when calculating the WPS of management. In unreported regressions, we find that results remain qualitatively unchanged if we only consider unvested equity holdings which management cannot easily liquidate as the firm approaches financial distress. Our findings are also robust to excluding stock option holdings (which might be far out of the money in future financial distress).

own equity themselves.

The analysis in columns 1 to 6 of Table 2 is based on the relatively small sample from DTCC, which only reports CDS net notional amounts for the 1000 largest reference firms and only after the fourth quarter of 2008. To extend the analysis to the full sample of 5,843 U.S. firms and the entire sample period 2001Q1-2014Q4, we replace the continuous variable *CDS net protection* by the binary variable *CDS trading* and estimate a logit model.[17] Column 7 of Table 2 reports a positive average marginal effect of *Institutional ownership* on the likelihood of *CDS trading*. According to the right panel of Fig. 1, the predicted probability increases by roughly 0.6% as *Institutional ownership* increases from the 25th to the 75th percentile (0.268 and 0.794, respectively). This effect is economically large compared to the predicted probability of CDS trading for the average firm in the regression sample (=2.1%). Overall, the evidence suggests that CDS insurance is more often written on firms whose creditors would have to bargain with strong institutional shareholders in the future.

4.2. Endogeneity of ownership structure

Our bargaining power measures are based on differences in ownership structure, which itself is potentially endogenous. To identify a causal effect of shareholder bargaining power on the demand for CDS protection, we study variation in passive equity ownership generated by the annual reconstitution of the Russell 1000 and the Russell 2000 indexes.

Each year, on the last business day of May, Russell assigns the 1,000 U.S. firms with the largest stock market capitalization to the Russell 1000 index, whereas the 2,000 next largest firms enter the Russell 2000 index. The reconstitution of the Russell indexes generates non-trivial variation in passive stock ownership around the index cut-off. This

[17] Average marginal effects are very similar when estimated in probit regressions. We follow Ashcraft and Santos (2009) and consider all the available observations for non-CDS firms and observations up to and including the quarter of CDS introduction for CDS firms.

is true because both indexes are value-weighted and stocks at the bottom of the Russell 1000 receive much smaller index weights than stocks at the top of the Russell 2000. As the amounts of money benchmarked to the two indexes are of approximately the same order of magnitude (Chang, Hong, and Liskovich, 2015), switching from the bottom of the Russell 1000 to the top of the Russell 2000 should generate a jump in passive ownership by Russell-tracking investors.

We use the benchmark classification provided by Petajisto (2013) to identify passive investors whose primary Morningstar Benchmark is one of the Russell 1000 or Russell 2000 indexes in the Thomson Reuters Mutual Fund Holdings (s12) database. Fig. 2 shows indeed a clear discontinuity in *Russell-tracking ownership* at the cutoff between the Russell 1000 and Russell 2000. We interpret this jump as a decrease in shareholder bargaining power, which should reduce creditors' incentives to buy CDS insurance.

Around the threshold between the Russell 1000 and the Russell 2000, index assignment is arguably random and would naturally lend itself to the estimation of a sharp regression discontinuity design (RDD) specification. However, Russell does not disclose the precise measure of market capitalization that they use to rank and assign stocks to the two indexes. Hence, researchers need to calculate an approximate ranking based on public data. We use the measure of raw market capitalization constructed by Schmidt and Fahlenbrach (2017), who rely on information from CRSP, Compustat, and Capital IQ for this purpose.[18] While our approximate ranking strongly predicts index assignment (see Fig. F.1 in the Internet Appendix), the association is not perfect and, hence, we

[18] Alternatively, one might consider approximating the true ranking that Russell uses for index assignment with a ranking based on the observable index weights of stocks, which Russell publishes in June. Our results are robust to this alternative approach. However, Schmidt and Fahlenbrach (2017) caution against the use of ranks based on index weights, because Russell adjusts its (proprietary) measure of market capitalization for shares that are not part of the free float before calculating index weights. If endogenous, this free-float adjustment will invalidate random index assignment (see Appendix A of Schmidt and Fahlenbrach, 2017). Indeed, Wei and Young (2017) show that there exist important *ex-ante* differences *prior* to index reconstitution between the ownership structure of firms with low index weights in the Russell 1000 and firms with high index weights in the Russell 2000.

do not use sharp RDD. Instead, we implement the IV estimation proposed in Schmidt and Fahlenbrach (2017). The first stage is specified in first differences, which removes firm-specific and time-invariant variation:

$$\Delta \textit{Russell-tracking ownership}_{i,t} = \beta_1 \cdot RU1 \rightarrow RU2_{i,t} + \beta_2 \cdot RU2 \rightarrow RU1_{i,t} + \delta \cdot \Delta Rank_{i,t} + \gamma \cdot \Delta X_{i,t} + \alpha_t + \theta_j + \mu_{i,t}, \quad (6)$$

where α_t and θ_j denote time and industry fixed effects. Moreover, $RU1 \rightarrow RU2$ and $RU2 \rightarrow RU1$ are indicator variables equal to one if the firm switches to the Russell 2000 or to the Russell 1000, respectively, and $\Delta Rank$ equals the number of ranks the (raw) market capitalization changes at index reconstitution.

In column 1 of Table 3, we include the same controls as Schmidt and Fahlenbrach (2017). The Kleibergen-Paap F-statistic exceeds the conventional threshold of 10, confirming that index reconstitution generates non-trivial variation in passive *Russell-tracking ownership*. In column 2, we add the controls from our baseline specification in Table 2. Column 5 reports the corresponding second stage, in which the probability of CDS trading is specified as a function of instrumented *Russell-tracking ownership*:

$$\Delta \textit{CDS trading}_{i,t} = \beta_3 \cdot \Delta \textit{Russell-tracking own. (predicted)}_{i,t} + \gamma \cdot \Delta X_{i,t} + \alpha_t + \theta_j + \epsilon_{i,t}. \quad (7)$$

As expected, the estimate for β_3 is negative (column 5). The probability that CDS insurance is written on a firm decreases after an exogenous increase in passive ownership by Russell-tracking funds—consistent with Hypothesis 1.

We also test whether the increase in *Russell-tracking ownership* is offset by a decrease in ownership by other passive investors that do not track Russell indexes. To this end, we replace *Russell-tracking ownership* with the broader variable *Passive institutional ownership*, which comprises ownership by *any* passive institution with low portfolio turnover and high portfolio diversification (Bushee, 2001). Columns 3 and 6 show that our results remain qualitatively unchanged. Column 4 shows that index switching also generates significant variation in *Active institutional ownership*—consistent with evidence reported in Fich, Harford, and Tran (2015) and Coles, Heath, and Ringgenberg (2017). Finally, column 7 confirms that the negative effect of *Passive institutional ownership* on *CDS trading* is mirrored by a positive effect of *Active institutional ownership*. All else equal, CDS insurance is more often written on firms with powerful active shareholders and less often on firms with passive institutional investors.[19]

4.3. Hypothesis 2: Shareholder bargaining power and bankruptcy risk

As creditors of firms with powerful shareholders have strong incentives to buy CDS protection, these same firms are likely to suffer from an empty creditor problem. Hypothesis 2 predicts a heterogeneous treatment effect of CDS introduction on the probability of bankruptcy. Firms with relatively powerful shareholders are expected to become riskier relative to other firms.

In a first test, we conduct an event study and analyze rating changes around the introduction of CDS trading. We follow Subrahmanyam, Tang, and Wang (2014) and compare each firm's credit rating in the year preceding CDS introduction with its rating two years after that. Fig. 3 plots two distributions of rating changes measured in notches. The grey bars show the rating changes of the top 25% firms with the most powerful shareholders (as measured by *Institutional ownership*), whereas the white bars show the rating changes of firms with relatively weak shareholders. Positive (negative) values denote rat-

[19] The results in Table 3 use the CDS trading status of firms as dependent variable. We cannot exploit Russell 1000 / 2000 membership for identification in the analysis of CDS amounts because index membership exhibits too little variation in the CDS volume data, which DTCC publishes only for the top 1,000 reference firms in the CDS market and only since the fourth quarter of 2008. In Table G.1 of the Internet Appendix, we follow Aghion, Van Reenen, and Zingales (2013) and replace the broad Russell indexes by the narrower S&P 500 index to instrument *Institutional ownership*. As predicted by Hypothesis 1, we find that higher CDS amounts tend to be written on firms with high (instrumented) *Institutional ownership*.

ing downgrades (upgrades). Consistent with Hypothesis 2, rating downgrades after CDS introduction are significantly larger for firms with powerful institutional shareholders. The mean rating change equals 0.55 for firms with high institutional ownership, whereas ratings of firms with low institutional ownership are, on average, downgraded by only 0.24 notches. The difference is statistically significant in a two-sample t-test. A Wilcoxon-Mann-Whitney rank-sum test rejects the null hypothesis that the rating changes of firms with high and low institutional ownership are identically distributed.

Next, we study the effect of CDS trading on the *Distance-to-default*, which is our main bankruptcy risk measure and is also available for unrated firms. Following Ashcraft and Santos (2009) and others, we exploit differences in the timing of CDS introduction and estimate the following baseline regression:

$$Distance\text{-}to\text{-}default_{i,t} = \beta_1 \cdot CDS\ trading_{i,t} + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}. \tag{8}$$

As in Eq. (5), we saturate the specification with firm fixed effects υ_i, time fixed effects ν_t, and fiscal quarter fixed effects $FQ_{i,t}$. Following Bennett, Güntay, and Unal (2015) and Bhagat, Bolton, and Lu (2015), we control for book leverage, asset tangibility, and firm size. We further include lagged Tobin's q and indicator variables for the rating and investment grade status of the firm and for its reliance on the commercial paper market. If the timing of CDS introduction is exogenous conditional on the controls and fixed effects, the coefficient β_1 will identify the effect of *CDS trading* on the *Distance-to-default*.

In column 1 of Table 4, the coefficient estimate of *CDS trading* is negative but statistically insignificant, which suggests that bankruptcy risk decreases very little after CDSs start trading. However, this result (obtained for the average firm) potentially masks the stronger effects that Hypothesis 2 predicts for firms with powerful shareholders. We therefore add *Institutional ownership* (our main measure of shareholder bargaining power) and the interaction term $CDS\ trading \times Institutional\ ownership$ to the regression specification:

$$
\begin{aligned}
Distance\text{-}to\text{-}default_{i,t} = {} & \beta_1 \cdot CDS\ trading_{i,t} \times Institutional\ ownership_{i,t} \\
& + \beta_2 \cdot Institutional\ ownership_{i,t} \ + \beta_3 \cdot CDS\ trading_{i,t} \\
& + \theta \cdot Controls_{i,t} + \upsilon_i + \nu_t + FQ_{i,t} + \epsilon_{i,t}.
\end{aligned} \tag{9}
$$

The parameter of interest β_1 measures the effect of CDS trading on firms that have high institutional ownership.[20] In column 2 of Table 4, β_1 is negative and statistically significant. Compared to other firms, firms with powerful institutional shareholders become riskier after the start of CDS trading. In column 3, the coefficient of the interaction *CDS trading × Institutional ownership (top 25%)* measures the treatment effect on the top 25% firms with the most powerful shareholders. After the onset of CDS trading, their distance-to-default drops by an additional 0.476 compared to firms with low shareholder power. This effect corresponds to a reduction of -7.9% relative to the median distance-to-default (=6.032). It suggests that CDS firms with relatively powerful shareholders indeed suffer from a strong empty creditor problem. Interestingly, the coefficient of *CDS trading* alone is indistinguishable from zero in column 3. It seems that the distance-to-default of firms with institutional ownership in the lower three quartiles, i.e., firms with weak shareholders, is not adversely affected by CDS trading.

Overall, the evidence suggests that CDS trading increases bankruptcy risk. This effect is concentrated in the sample of firms with relatively powerful shareholders, which is consistent with Hypothesis 2.

[20]As *Institutional ownership* is non-negative and interacted with *CDS trading*, which is also non-negative, we demean institutional ownership to avoid potential multicollinearity problems. All results are robust if we do not demean institutional ownership.

4.4. Endogeneity of CDS trading

Identification in the previous section relies on the assumption that differences in the timing of CDS introduction across firms are exogenous once we control for observable time-varying firm characteristics and firm 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 test aims at addressing this concern.

4.4.1. The 2009 CDS Big Bang

Following Danis (2017) and others, we study the implementation of the CDS Big Bang Protocol on April 4, 2009. The protocol was a major overhaul of the infrastructure and key conventions of the CDS market and the joint response of regulators and market participants to the rapid market growth in the years before 2008 and to the turmoil experienced during the financial crisis. Among others, the changes included the formation of credit event determination committees, auction hardwiring following credit events, and the harmonization of contract terms which would allow trade compression (Markit, 2009).

The CDS Big Bang Protocol is relevant for our study because its implementation exacerbated the empty creditor problem in two ways. First, by improving the liquidity and availability of CDSs, it made credit risk hedging more attractive.[21] Second, the Big Bang removed out-of-court debt restructuring as an eligible credit event for North American CDSs. Before the CDS Big Bang, single-name CDSs with a "Modified Restructuring (MR)" clause would pay buyers of CDS protection following out-of-court debt restructuring too. After the CDS Big Bang, all CDSs had "No restructuring (XR)" clauses, which confine CDS protection to formal bankruptcy (Danis, 2017; Subrahmanyam, Tang, and Wang, 2014). Hence, the CDS Big Bang reduced the incentives of empty creditors to restructure debt out of court.

[21] In an event study regression estimated in the twelve calendar quarters around the CDS Big Bang, we find a statistically significant increase in CDS liquidity (see Table K.1 in the Internet Appendix).

We exploit the implementation of the CDS Big Bang in a difference-in-differences estimation. We define treated firms as those with high shareholder bargaining power (high institutional ownership) and with CDSs traded on their debt at least two quarters before the implementation of the CDS Big Bang Protocol (i.e., in the third quarter of 2008). We argue that the creditors of these firms became tougher in renegotiation after the CDS Big Bang. To reduce the risk of capturing other confounding events, we restrict the sample to the six calendar quarters before and the six quarters after the event.

Table 5 reports the results for the *Distance-to-default*. The same control variables as in Table 4 are included but not reported. The coefficient of the interaction *Post 2009Q1* $\times$ *CDS trading 2008Q3* $\times$ *Institutional ownership* measures the treatment effect. 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 strong institutional shareholders. In column 2, we use the removal of debt restructuring as an eligible CDS trigger event for identification (Narayanan and Uzmanoglu, 2018a). We restrict the treatment group to firms whose CDS contracts have MR clauses before the Big Bang.[22] The coefficient of the refined triple interaction *Post 2009Q1* $\times$ *CDS trading 2008Q3 (MR)* $\times$ *Institutional ownership* is again negative and significant. Compared to CDS firms with low institutional ownership, firms with strong institutional shareholders become riskier after the removal of MR clauses from their CDS contracts.[23]

[22]According to Markit (2009), CDSs with MR clauses were written on investment-grade names, whereas CDSs of high-yield names traded with XR clauses. Hence, the treatment indicator *CDS trading 2008Q3 (MR)* equals one if a firm had a CDS and an investment-grade rating as of 2008Q3.

[23]The CDS Big Bang took place at a time of extraordinary economic turmoil. Therefore, we study a second regulatory event that occurred years before the financial crisis in Table I.1 of the Internet Appendix. Specifically, we exploit the Net Capital Rule Exemption of August 2004, which increased demand for CDS insurance of a selected group of dealer banks. Our findings are robust to the use of this alternative identification strategy.

4.4.2. Overlap weighting

In a second attempt to strengthen identification, we improve the covariate balance between the treatment and control group. We rely on the propensity weighting approach with "overlap weights" proposed by Li, Morgan, and Zaslavsky (2018) (see also Bartram, Conrad, Lee, and Subrahmanyam, 2018). This method proceeds in two steps. First, the probability of treatment (the propensity score) is estimated in a logit model. Second, observations are weighted with their respective treatment propensities to create a synthetic sample in which the distribution of covariates is balanced across treated and control firms. The overlap weights are chosen as:

$$w_{i,t}\left(x_t\right) = \begin{cases} p_{i,t}\left(x_t\right) & \text{for } Z_{i,t} = 0 \\ 1 - p_{i,t}\left(x_t\right) & \text{for } Z_{i,t} = 1, \end{cases} \tag{10}$$

where $Z_{i,t} = 1$ for treated observations (in our application $CDS\ trading = 1$). $p_{i,t}\left(x_t\right)$ is the propensity score for treatment defined as $\Pr\left(Z_{i,t} = 1 | X_{i,t} = x_t\right)$, and $X_{i,t}$ are the covariates included in the logit model. Hence, a treated firm ($Z_{i,t} = 1$) is weighted by its propensity to be assigned to the control group, whereas a control firm ($Z_{i,t} = 0$) is weighted by its propensity of treatment.

These overlap weights have several desirable features according to Li, Morgan, and Zaslavsky (2018). First, they give more importance to observations with scores around 0.5 while reducing the importance of observations with scores close to 0 or 1. Second, being bounded between 0 and 1, the overlap weights do not need to be truncated or winsorized. Third, the method generates "the most overlap in the covariates between treatment groups" (page 8, Li, Morgan, and Zaslavsky, 2018). The pre-treatment distribution of covariates is balanced between the treatment and control group so that treatment is uncorrelated with observables. Finally, propensity (overlap) weighting allows for exact balance in the covariates' means even in small samples. In particular, no observations need to be discarded, as it can be necessary in traditional propensity-score matching.

We apply the overlap weights method to the case of CDS and non-CDS firms. Following Bartram, Conrad, Lee, and Subrahmanyam (2018), we consider firm-quarters with CDS trading as treated observations and assign firm-quarters with *CDS trading* equal to zero to the control group. We use the logit model reported in column 7 of Table 2 to compute the overlap weights and to generate a synthetic sample with improved covariate balance (see Fig. J.1 in the Internet Appendix). Column 3 of Table 5 shows a linear model for firms' *Distance-to-Default* that is estimated in this synthetic sample with weighted observations. Consistent with Hypothesis 2, CDS trading has a significant and negative effect on the *Distance-to-default* of firms with strong institutional shareholders. Li, Morgan, and Zaslavsky (2018) recommend using a rich (rather than a parsimonious) logit model to compute the overlap weights. Therefore, we estimate a second specification with more covariates besides those reported in the logit model of Table 2.[24] The corresponding treatment effect on the *Distance-to-Default* of firms with high institutional ownership is again negative and significant (column 4).

5. The real effects of CDS trading

The analysis so far shows that creditors of firms with powerful shareholders buy more CDS protection, which in turn raises the probability of firm bankruptcy. We now analyze the ensuing effects on firm value and shareholders' willingness to invest.

[24] Specifically, we add covariates for firms' internal cash flow, payout, net borrowing, debt maturity, and age. Missing values for some of these variables explain the lower sample size in column 4 of Table 5. In columns 3 and 4 of Table 5, we do not include covariates that will be studied as outcome variables in our real effects analysis in Table 7.

5.1. Theoretical insights

The stylized model in Section 2 shows that the creditor's benefit from CDSs stems from improving his bargaining position in renegotiation as well as curbing shareholders' incentives to default strategically. These benefits have conflicting effects on firm value:

- *Value-decreasing effect:* The creditor's improved bargaining position makes the creditor tougher in default, as he forces the firm into bankruptcy when the renegotiation surplus is low. As a result, the probability-weighted deadweight loss due to bankruptcy costs increases. This effect leads to a decrease in firm value.
- *Value-enhancing effect:* The shareholders' lower incentives to default strategically reduce the probability-weighted deadweight loss due to renegotiation costs. This effect leads to an increase in firm value.

As illustrated in Section 2, the creditor chooses the low level of credit protection π_L when shareholders' bargaining power is sufficiently low. In this case, the creditor is always willing to renegotiate the debt contract in default, and the value-decreasing effect does not arise. The value-increasing effect only arises if some parametric conditions are satisfied (i.e., in Case (2) of Section 2 and if $R > C_2^L(1 - \eta\lambda)$ holds). As a result, firm value either remains unchanged or increases with respect to the case with no CDSs.

When, instead, shareholders' bargaining power is sufficiently large, the creditor chooses the high level of credit protection π_H. The value-decreasing effect arises, because the creditor is not willing to renegotiate debt in default if the realization of the time-2 cash flow is low (as $\lambda C_2^L < \pi_H$). Thus, CDS protection leads either to a decrease in firm value (if the value-increasing effect does not arise) or to an ambiguous effect (if the value-increasing effect arises, according to the parametric conditions reported above). Which effect dominates is an open empirical question.

Finally, we analyze how the CDS-driven change in firm value affects investment decisions at time zero. Shareholders invest at $t = 0$ if firm value exceeds the setup cost

F (equivalently, if equity value exceeds F net of debt issue proceeds). For a given F, the set of projects with positive net present value increases (respectively, decreases) after CDS introduction if the value-enhancing (respectively, value-decreasing) effect of CDS introduction dominates. In the next section, we study empirically whether CDSs have positive or negative effects on firm value and investment.

5.2. Empirical evidence

In Table 6, we check whether the real effects of CDS trading are identified in a formal regression analysis. Columns 1 and 4 show that Tobin's q and investment do not change significantly after CDS contracts start trading on the debt of the average firm. Once more, the result changes once we allow for heterogeneous effects. In columns 2, 3, 5, and 6, the interaction terms *CDS trading* × *Institutional ownership* and *CDS trading* × *Institutional ownership (top 25%)* are negative and highly significant. The top 25% firms with the most powerful shareholders experience an additional drop of -0.127 in Tobin's q and of -0.003 in investment relative to other firms (columns 3 and 6). These effects correspond to reductions of -8.8% and -7% relative to median Tobin's q (=1.449) and median investment (=0.043). Unlike the interaction terms, the coefficients of *CDS trading* alone are indistinguishable from zero in columns 3 and 6. CDSs do not seem to have significant real effects on firms with weak shareholders (i.e., on firms with low *Institutional ownership*). By contrast, the value-decreasing effect described in our theoretical discussion seems to dominate for firms with powerful institutional shareholders.

In columns 1 and 2 of Table 7, we revisit the analysis of the CDS Big Bang. We obtain negative and statistically significant coefficient estimates for the triple interaction *Post 2009Q1* × *CDS trading 2008Q3* × *Institutional ownership*. The CDS Big Bang triggered a drop in the Tobin's q and investment activity of firms with CDS contracts and powerful institutional shareholders. In columns 3 and 4, we reestimate the real effects of *CDS trading* in a synthetic sample with weighted observations and improved covariate balance between CDS and non-CDS firms. Again, the negative and significant coefficient of the interaction term *CDS trading* $\times$ *Institutional ownership* suggests an adverse effect of CDSs on the Tobin's q of firms with strong institutional shareholders, whereas the effect on *Investment* is insignificant in the synthetic sample.

6. Additional robustness tests

We perform a battery of additional robustness tests that confirm our results. First, our empirical findings regarding bankruptcy risk, firm value, and investment are robust if we use alternative dependent variables and replace the distance-to-default by the Z-score, Tobin's q by ROA as an asset-side measure of firm value, and investment by PPE growth (Table K.3 of the Internet Appendix). Second, the effects of CDSs on firms with strong shareholders also remain qualitatively unchanged if we replace *Institutional ownership*, our main measure of shareholder bargaining power, with *Active institutional ownership*, ownership concentration among the five largest shareholders, or the number of monitoring shareholders (Table K.4 of the Internet Appendix). Third, results are also robust if we drop all observations before or after 2009, to purge a structural break in the time series possibly created by the CDS Big Bang (Table K.5 of the Internet Appendix). Fourth, we show in Table K.6 of the Internet Appendix that our results are qualitatively similar if we use different regression samples and remove observations for which (1) *CDS traded* $=$ 0 or (2) *CDS trading* $= 0$.[25]

7. 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. This separation of rights

[25] We rely on CDS liquidity for identification when we drop observations with *CDS trading* $= 0$.

can give rise to empty creditors, who may be unwilling to renegotiate debt and force the firm into inefficient bankruptcies. Yet, empty creditors can also have a disciplining effect on shareholders and reduce their incentives to default strategically. This paper tries to understand which firms are most prone to face empty creditors. Our main contribution is to identify one important dimension of heterogeneity in the effect of CDSs on reference firms. Specifically, we show that the distribution of bargaining power among shareholders and creditors predicts whether and how much CDS insurance is written on firms. In turn, differences in the demand for CDS insurance explains differences in the severity of the empty creditor problem across firms.

Appendix A. Detailed solution to the model in Section 2

The model is solved backwards. We start by deriving the sharing rule in renegotiation, denoted by γ^*. When CDSs are written on the firm debt, γ^* solves:

$$\gamma^* = \arg\max_{\gamma} \left[\gamma\lambda C_2\right]^{\eta} \left[(1-\gamma)\lambda C_2 - \pi\right]^{1-\eta}, \tag{A.1}$$

where the last term illustrates that CDS protection reduces the incremental value from renegotiation to the creditor. By calculations, we get

$$\gamma^* = \eta \left(1 - \frac{\pi}{\lambda C_2}\right). \tag{A.2}$$

The renegotiation payoffs are as reported in the main text. If we substitute $\pi = 0$ into (A.2), we get $\gamma^* = \eta$, which is the fraction of surplus that shareholders get in renegotiation absent CDSs.

We next analyze the two cases reported in the main text. In the following, we use "high" or "low" to indicate outcome paths of the binomial tree. For instance, high/low refers to the path in which the realization of the time-1 cash flow is "high" and the realization of the time-2 cash flow is "low."

Case (1): $R > C_2^L$. Consider the case in which there are no CDSs traded on the firm's debt. In this case, the creditor always renegotiates the debt contract after (liquidity or strategic) default. Liquidity default happens after a low realization of the time-1 cash flow (it therefore occurs along the low/high and low/low paths). After a high realization of the time-1 cash flow, shareholders can meet the debt obligation or default strategically. By Eq. (1), shareholders meet the debt obligation along the high/high path and default strategically along the high/low path, because the following inequalities hold:

$C_2^H(1-\lambda\eta) > R > C_2^L$. Debt value and firm value are given by:

$$E[\text{debt}|\pi = 0] = \theta\phi R + (1-\phi)(1-\eta)\lambda C_2^L + \phi(1-\theta)(1-\eta)\lambda C_2^H \tag{A.3}$$

$$E\left[\text{firm}|\pi = 0\right] = \theta[C_1^H + \phi C_2^H] + (1-\phi)\lambda C_2^L + (1-\theta)\phi\lambda C_2^H. \tag{A.4}$$

We next allow the creditor to buy CDSs protection. We start by considering the case in which the creditor chooses π_L. Because $\lambda C_2 \geq \pi_L$, the creditor always renegotiate the debt contract after (liquidity or strategic) default. As in the case with no CDSs, liquidity default happens after a low realization of the time-1 cash flow. Shareholders default strategically along the high/low path, and meet the debt obligation along the high/high path (by Eq. (2)). Because CDSs are fairly priced (meaning that the expected CDS payment and the CDS premium exactly offset in the creditor's payoff), debt and firm values are given by:

$$E[\text{debt}|\pi_L] = \theta\phi R + (1-\theta)(1-\eta)\phi\lambda C_2^H + \lambda C_2^L[1-\phi+(1-\theta)\eta\phi], \tag{A.5}$$

$$E\left[\text{firm}|\pi_L\right] = \theta[C_1^H + \phi C_2^H] + (1-\phi)\lambda C_2^L + (1-\theta)\phi\lambda C_2^H. \tag{A.6}$$

We now consider the case in which the creditor chooses π_H. In this case, the creditor forces the firm into bankruptcy if shareholders default and the time-2 cash flow realization is low, because the surplus from renegotiation is lower than the creditor's outside option, $\lambda C_2^L < \pi_H$. The creditor renegotiates the debt contract in default if the time-2 cash flow realization is high, because the renegotiation surplus is sufficiently large. By Eq. (2), shareholders default strategically along the high/low path and meet the debt obligation along the high/high path. Debt and firm values are given by:

$$E[\text{debt}|\pi_H] = \theta\phi R + (1-\theta)\phi\lambda C_2^H, \tag{A.7}$$

$$E\left[\text{firm}|\pi_H\right] = \theta[C_1^H + \phi C_2^H] + (1-\theta)\phi\lambda C_2^H. \tag{A.8}$$

The creditor chooses the high level of credit protection π_H if $E[\text{debt}|\pi_H] > E[\text{debt}|\pi_L]$. By simple calculations, this inequality boils down to $(1-\theta)\phi\eta(C_2^H - C_2^L) > C_2^L(1-\phi)$, which is equivalent to $\eta > \bar{\eta}$, as defined in Eq. (3). Because $C_2^H - C_2^L > 0$, the critical value $\bar{\eta}$ is positive. Moreover $\bar{\eta} < 1$ if

$$\frac{C_2^L}{C_2^H} < \frac{(1-\theta)\phi}{1-\theta\phi}, \tag{A.9}$$

i.e., if the time-2 cash flow is sufficiently volatile.

We next analyze how CDS introduction affects firm value. If bargaining power is low ($\eta \leq \bar{\eta}$) so that the creditor chooses π_L, firm value remains unchanged following CDS introduction, because bankruptcy probability remains equal to zero (as in the case with no CDSs). If, conversely, the creditor chooses π_H as $\eta > \bar{\eta}$, firm value decreases because bankruptcy occurs along the high/low and the low/low paths. The decrease in firm value amounts to

$$E[\text{firm}|\pi_H] - E[\text{firm}|\pi = 0] = -(1-\phi)\lambda C_2^L, \tag{A.10}$$

which represents the loss in renegotiation surplus if the time-2 cash flow realization is low (irrespective of the realization of the time-1 cash flow).

Case (2): $R \leq C_2^L$. Consider again the case in which no CDSs are traded on firm debt (in which case the creditor always renegotiates the debt contract in default). Recall that a liquidity default happens after a low realization of the time-1 cash flow (i.e., along the low/high and low/low paths). Moreover, shareholders meet the debt obligation along the high/high path. If $R > C_2^L(1-\eta\lambda)$, shareholders default strategically along the high/low path (by Eq. (1)). Debt and firm values are as in Case (1), respectively given by Eq. (A.3) and Eq. (A.4). If, instead, $C_2^L(1-\eta\lambda) \geq R$, shareholders always meet the debt obligation after a high realization of the time-1 cash flow (i.e., both along the high/high and the high/low paths). In this case, debt and firm values are respectively given by:

$$E[\text{debt}|\pi = 0] = \theta R + (1-\theta)\lambda\left[\phi C_2^H + (1-\phi)C_2^L\right](1-\eta) \tag{A.11}$$

$$E[\text{firm}|\pi = 0] = \theta\left[C_1^H + \phi C_2^H + (1-\phi)C_2^L\right] + (1-\theta)\lambda\left[\phi C_2^H + (1-\phi)C_2^L\right]. \tag{A.12}$$

We next allow the creditor to buy CDSs protection. Consider the case in which the creditor chooses π_L. The creditor always agrees to renegotiate the debt contract after a liquidity default (i.e., he never pushes the firm into bankruptcy), because $\lambda C_2 \geq \pi_L$. Shareholders always meet the debt obligation after a high realization of the time-1 cash flow (along the high/high and the high/low path)—i.e., they never default strategically. Debt and firm values are given by:

$$E[\text{debt}|\pi_L] = \theta R + (1-\theta)\left[(1-\phi)\lambda C_2^L + \phi\lambda C_2^H(1-\eta) + \phi\eta\lambda C_2^L\right] \tag{A.13}$$

$$E[\text{firm}|\pi_L] = \theta\left[C_1^H + \phi C_2^H + (1-\phi)C_2^L\right] + (1-\theta)\lambda\left[\phi C_2^H + (1-\phi)C_2^L\right]. \tag{A.14}$$

Consider now the case in which the creditor chooses π_H. The creditor does not renegotiate the debt contract in default if the realization of the time-2 cash flow is low (because $\lambda C_2^L < \pi_H$). The creditor agrees to renegotiate in default if the realization of the time-2 cash flow is high. By Eq. (2), shareholders always meet the debt obligation (i.e., they do not default strategically) after a high realization of the time-1 cash flow (along the high/high and the high/low path). Debt and firm values are then given by

$$E[\text{debt}|\pi_H] = \theta R + (1-\theta)\phi\lambda C_2^H \tag{A.15}$$

$$E[\text{firm}|\pi_H] = \theta\left[C_1^H + \phi C_2^H + (1-\phi)C_2^L\right] + (1-\theta)\phi\lambda C_2^H. \tag{A.16}$$

It is optimal for the creditor to choose π_H if $E[\text{debt}|\pi_H] > E[\text{debt}|\pi_L]$, which boils down to $\eta > \tilde{\eta}$ (where $\tilde{\eta}$ is defined in Eq. (4)). The critical value $\tilde{\eta}$ is positive. Also, it is lower than one if the following inequality holds:

$$\frac{C_2^L}{C_2^H} < \phi, \tag{A.17}$$

which holds if the time-2 cash flow is sufficiently volatile.

We next analyze the effects of CDS introduction on firm value. Consider first the subcase $R > C_2^L(1-\eta\lambda)$, in which shareholders default strategically along the high/low path absent CDSs. CDS protection curbs strategic default in this case. If bargaining power is low ($\eta \leq \tilde{\eta}$) so that the creditor chooses π_L, bankruptcy probability remains equal to zero. CDSs introduction then leads to an increase in firm value equal to:

$$E[\text{firm}|\pi_L] - E[\text{firm}|\pi = 0] = \theta(1-\phi)(1-\lambda)C_2^L, \tag{A.18}$$

which is the probability-weighted reduction in renegotiation costs along the high/low path (because CDS introduction leads to a reduction in strategic default). If, conversely, $\eta > \tilde{\eta}$, the creditor chooses π_H, so the change in firm value is given by:

$$E[\text{firm}|\pi_H] - E[\text{firm}|\pi = 0] = (1-\phi)C_2^L\left(\theta - \lambda\right). \tag{A.19}$$

In this case, the change in firm value is driven by two offsetting effects. First, bankruptcy occurs along the low/low path, an effect that decreases firm value. Second, strategic default does not occur along the high/low path, an effect that increases firm value. Eq. (A.19) illustrates that firm value (as well as the firm's investment capacity) decreases after CDS introduction if $\theta < \lambda$.

If, instead, $C_2^L(1 - \eta\lambda) \geq R$, shareholders never default strategically (irrespective of the presence of CDS protection). If bargaining power is low ($\eta \leq \tilde{\eta}$) so that the creditor chooses π_L, firm value remains unchanged after CDS introduction. If, conversely, bargaining power is large ($\eta > \tilde{\eta}$) so that the creditor chooses π_H, firm value decreases after CDS introduction because bankruptcy is triggered along the low/low path:

$$E[\text{firm}|\pi_H] - E[\text{firm}|\pi = 0] = -(1 - \theta)(1 - \phi)\lambda C_2^L. \tag{A.20}$$

The right-hand side is negative—meaning that firm value decreases after CDS introduction—and represents the loss in renegotiation surplus if both the time-1 and time-2 cash flow realizations are low.

Appendix B. Variable definition

Table B.1 reports the definitions of the variables used in the empirical analysis.

References

Aghion, P., Van Reenen, J., Zingales, L., 2013. Innovation and institutional ownership. American Economic Review 103, 277–304.

Alanis, E., Chava, S., Kumar, P., 2016. Shareholder bargaining power, debt overhang, and investment. Unpublished working paper. Texas State University.

Ashcraft, A., Santos, J., 2009. Has the CDS market lowered the cost of corporate debt? Journal of Monetary Economics 56, 514–523.

Aslan, H., Kumar, P., 2012. Strategic ownership structure and the cost of debt. Review of Financial Studies 25, 2257–2299.

Augustin, P., Subrahmanyam, M., Tang, D., Wang, S., 2014. Credit default swaps: A survey. Foundations and Trends in Finance 9, 1–196.

Augustin, P., Subrahmanyam, M., Tang, D., Wang, S., 2016. Credit default swaps: Past, present, and future. Annual Review of Financial Economics 8, 175–196.

Bartram, S., Conrad, J., Lee, J., Subrahmanyam, M., 2018. Credit default swaps around the world: Investment and financing effects. Unpublished working paper. University of Warwick.

Bedendo, M., Cathcart, L., El-Jahel, L., 2016. Distressed debt restructuring in the presence of credit default swaps. Journal of Money, Credit and Banking 48, 165–201.

Bennett, R., Güntay, L., Unal, H., 2015. Inside debt, bank default risk, and performance during the crisis. Journal of Financial Intermediation 24, 487–513.

Bhagat, S., Bolton, B., Lu, J., 2015. Size, leverage, and risk-taking of financial institutions. Journal of Banking & Finance 59, 520–537.

Bharath, S., Shumway, T., 2008. Forecasting default with the Merton distance to default model. Review of Financial Studies 21, 1339–1369.

Bolton, P., Oehmke, M., 2011. Credit default swaps and the empty creditor problem. Review of Financial Studies 24, 2617–2655.

Bushee, B., 2001. Do institutional investors prefer near-term earnings over long-run value? Contemporary Accounting Research 18, 207–246.

Chakraborty, I., Gantchev, N., 2013. Does shareholder coordination matter? Evidence from private placements. Journal of Financial Economics 108, 213–230.

Chang, Y., Hong, H., Liskovich, I., 2015. Regression discontinuity and the price effects of stock market indexing. Review of Financial Studies 28, 212–246.

Coles, J., Daniel, N., Naveen, L., 2006. Managerial incentives and risk-taking. Journal of Financial Economics 79, 431–468.

Coles, J., Daniel, N., Naveen, L., 2013. Calculation of compensation incentives and firm-related wealth using Execucomp: Data, program, and explanation. Unpublished working paper. Temple University.

Coles, J., Heath, D., Ringgenberg, M., 2017. On index investing. Unpublished working paper. University of Utah.

Core, J., Guay, W., 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. Journal of Accounting Research 40, 613–630.

Danis, A., 2017. Do empty creditors matter? Evidence from distressed exchange offers. Management Science 63, 1285–1301.

Danis, A., Gamba, A., 2018. The real effects of credit default swaps. Journal of Financial Economics 127, 51–76.

Davydenko, S., Strebulaev, I., 2007. Strategic actions and credit spreads: An empirical investigation. Journal of Finance 63, 2633–2671.

Edmans, A., Gabaix, X., Landier, A., 2009. A multiplicative model of optimal CEO incentives in market equilibrium. Review of Financial Studies 22, 4881–4917.

Fan, H., Sundaresan, S., 2000. Debt valuation, renegotiation, and optimal dividend policy. Review of Financial Studies 13, 1057–1099.

Fich, E., Harford, J., Tran, A., 2015. Motivated monitors: The importance of institutional investors' portfolio weights. Journal of Financial Economics 118, 21–48.

Gündüz, Y., Ongena, S., Tümer-Alkan, G., Yu, Y., 2017. CDS and credit: Testing the Small Bang theory of the financial universe with micro data. Unpublished working paper. Deutsche Bundesbank.

Hirtle, B., 2009. Credit derivatives and bank credit supply. Journal of Financial Intermediation 18, 125–150.

Hu, H., Black, B., 2008. Debt, equity and hybrid decoupling: Governance and systemic risk implications. European Financial Management 14, 663–709.

Jiang, J., Petroni, K., Wang, I., 2010. CFOs and CEOs: Who have the most influence on earnings management? Journal of Financial Economics 96, 513–526.

Kim, G., 2016. Credit derivatives as a commitment device: Evidence from the cost of corporate debt. Journal of Banking & Finance 73, 67–83.

Li, F., Morgan, K. L., Zaslavsky, A. M., 2018. Balancing covariates via propensity score weighting. Journal of the American Statistical Association 113, 390–400.

MacKie-Mason, J., 1990. Do taxes affect corporate financing decisions? Journal of Finance 45, 1471–1493.

Markit, 2009. The CDS Big Bang: Understanding the changes to the global CDS contract and North American conventions. Technical report.

McCahery, J., Sautner, Z., Starks, L., 2016. Behind the scenes: The corporate governance preferences of institutional investors. Journal of Finance 71, 2905–2932.

Merton, R., 1974. On the pricing of corporate debt: The risk structure of interest rates. Journal of Finance 29, 449–470.

Narayanan, R., Uzmanoglu, C., 2018. Credit default swaps and firm value. Journal of Financial and Quantitative Analysis 53, 1227–1259.

Narayanan, R., Uzmanoglu, C., 2018. How do firms respond to empty creditor holdout in distressed exchanges? Unpublished working paper. Binghamton University.

Petajisto, A., 2013. Active share and mutual fund performance. Financial Analysts Journal 69, 73–93.

Saretto, A., Tookes, H., 2013. Corporate leverage, debt maturity and credit supply: The role of credit default swaps. Review of Financial Studies 26, 1190–1247.

Schmidt, C., Fahlenbrach, R., 2017. Do exogenous changes in passive institutional ownership affect corporate governance and firm value? Journal of Financial Economics 124, 285–306.

Subrahmanyam, M., Tang, D., Wang, S., 2014. Does the tail wag the dog? The effect of credit default swaps on credit risk. Review of Financial Studies 27, 2927–2960.

Subrahmanyam, M., Tang, D., Wang, S., 2017. Credit default swaps, exacting creditors and corporate liquidity management. Journal of Financial Economics 124, 395–414.

Wei, W., Young, A., 2017. Selection bias or treatment effect? A re-examination of Russell 1000/2000 Index reconstitution. Unpublished working paper. University of Calgary.

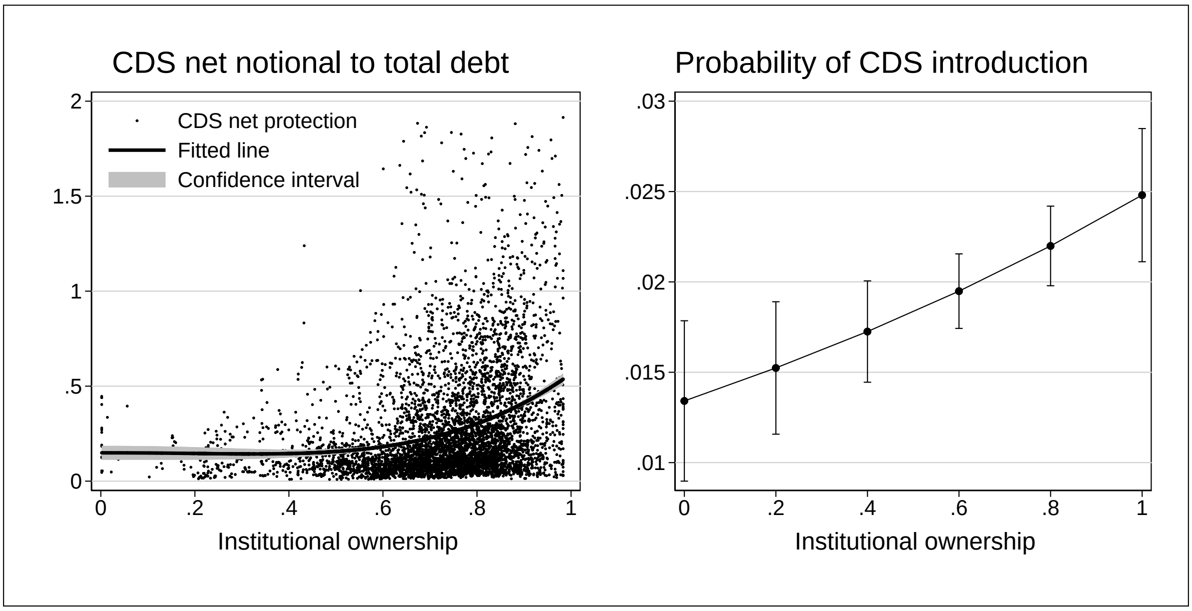

Fig. 1. The left panel of this figure shows the amount of CDS protection written on firms with different shareholder bargaining power (i.e., different institutional ownership). The vertical axis shows the ratio of CDS net notional amount to total firm debt. The fitted line is estimated using a fractional polynomial of institutional ownership. Outliers with CDS protection to debt above a value of two are not displayed. The right panel of this figure shows the predicted probability that CDSs are written on firms with different shareholder bargaining power (i.e., different institutional ownership). The predicted probabilities on the vertical axis are computed from the logit model in column 7 of Table 2. Confidence intervals are drawn for the 5% level.

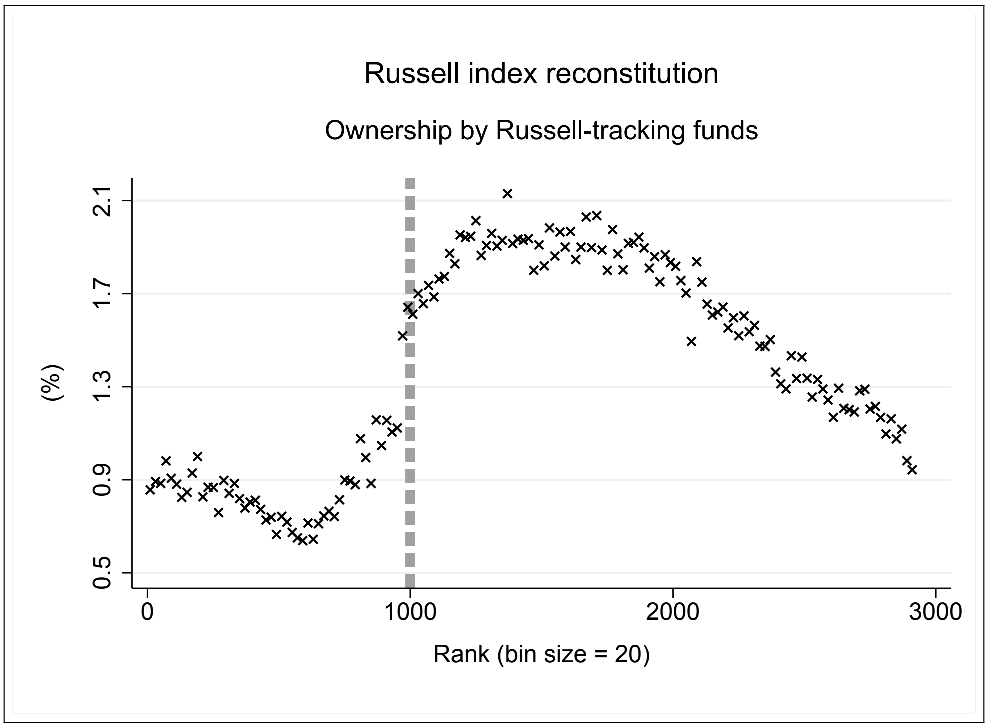

Fig. 2. This figure shows the fraction of equity that is owned by ETFs and index funds that track the Russell 1000 or the Russell 2000. Each marker corresponds to a bin of 20 stocks. The ranking of bins (stocks) is based on the raw market capitalization measure computed by Schmidt and Fahlenbrach (2017) (as an approximation of the proprietary ranking used by Russell to assign stocks to both indexes on the last business day in May of each year). The vertical line indicates the cutoff between constituents of the Russell 1000 (to the left) and constituents of the Russell 2000 index (to the right of the line). The data cover the ten index reconstituation episodes between 2000 and 2009.

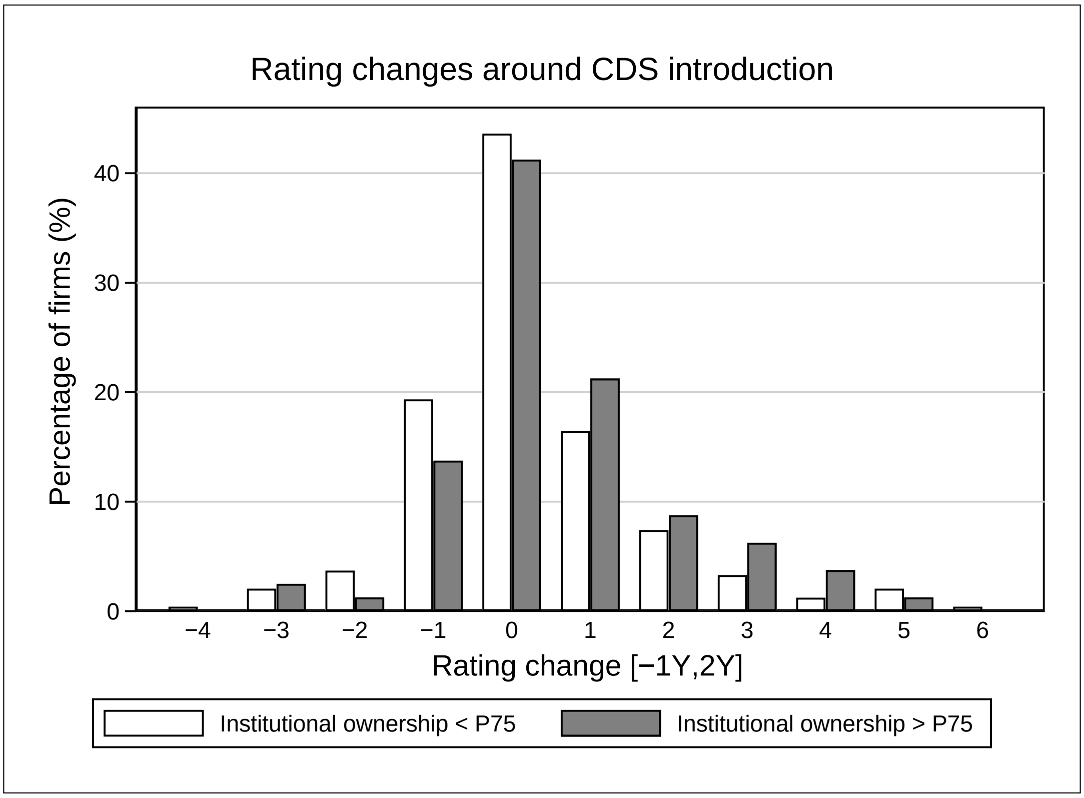

Fig. 3. This figure shows the distribution of rating changes around the introduction of CDSs. Rating changes are computed as the difference between a firm's credit rating two years after and its credit rating one year before CDS introduction. A negative (positive) rating change implies a rating upgrade (downgrade). The grey bars show the distribution of rating changes for companies with powerful shareholders (top 25% firms with the highest institutional ownership), whereas the white bars show the distribution for firms with relatively weak shareholders (bottom three quartiles of institutional ownership 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 used 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, investor classification data from the website of Brian Bushee, and managerial compensation data from Execucomp. FTSE Russell provides information regarding the constituents of the Russell 1000 and Russell 2000 indexes in years 2000 to 2010. All dollar amounts are in millions of 2010 dollars. Refer to Appendix Table B.1 for variable definitions.

	Obs. (1)	Mean (2)	Std. dev. (3)	P25 (4)	Median (5)	P75 (6)
Ownership structure:						
Institutional ownership	124,834	0.532	0.297	0.268	0.586	0.794
Passive institutional ownership	124,100	0.340	0.232	0.130	0.315	0.539
Active institutional ownership	124,100	0.177	0.146	0.063	0.147	0.255
Number of monitoring shareholders	124,109	0.884	2.333	0.000	0.000	1.000
Institutional ownership (top 5 investors)	124,834	0.245	0.126	0.161	0.248	0.327
Managerial wealth-to-performance sensitivity:						
Team WPS	58484	11.437	30.268	2.302	4.452	8.589
CEO WPS	58137	24.428	91.724	2.717	5.874	12.339
CFO WPS	52567	4.710	5.813	1.448	3.005	5.754
CDS trading activity:						
CDS traded (binary)	132,827	0.226	0.419	0.000	0.000	0.000
CDS trading (binary)	132,827	0.182	0.386	0.000	0.000	0.000
CDS net protection	5,593	0.325	0.691	0.085	0.164	0.375
CDS gross protection	5,593	4.364	9.709	0.988	2.043	5.018
Credit risk, firm value, and investment:						
Distance-to-default	123,368	7.320	7.177	2.838	6.032	10.129
Z-score	127,021	0.062	2.210	-0.059	0.645	1.165
Tobin's q	132,827	1.811	1.163	1.105	1.449	2.076
ROA	132,808	-0.007	0.058	-0.009	0.008	0.019
Investment	130,555	0.063	0.067	0.023	0.043	0.078
PPE growth	131,184	0.007	0.099	-0.029	-0.005	0.028
Other firm characteristics:						
Cash flow	125,717	0.001	0.687	0.013	0.071	0.179
Stock volatility	132,827	0.547	0.360	0.311	0.455	0.656
Book leverage	132,827	0.252	0.198	0.089	0.222	0.369
Tangibility	132,827	0.280	0.233	0.097	0.204	0.403
Size	132,827	6.283	1.908	4.834	6.251	7.595
Rated (binary)	132,827	0.338	0.473	0.000	0.000	1.000
Investment grade (binary)	132,827	0.141	0.348	0.000	0.000	0.000
Commercial paper issuer (binary)	132,827	0.083	0.275	0.000	0.000	0.000
Russell 1000 constituent (binary)	108,513	0.216	0.412	0.000	0.000	0.000
Russell 2000 constituent (binary)	108,513	0.383	0.486	0.000	0.000	1.000

Table 2. Shareholder bargaining power and CDS protection
This table shows regression coefficients and average marginal effects estimated in models for CDS protection. Columns 1 to 6 report panel regressions which use *CDS net protection* (i.e., the ratio of CDS net notional amount to total firm debt) as dependent variable. These specifications include firm fixed effects and use a sample covering firm-quarter observations from 2008Q4 to 2014Q4 for which DTCC reports data on CDS notional amounts. Column 7 reports estimated average marginal effects from a logit model for the dependent variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt. This specification includes industry (Fama-French 48 industry groups) fixed effects, and uses a sample that covers the period 2001Q1-2014Q4 and contains all available observations for non-CDS firms and observations up to and including the quarter of CDS introduction for CDS firms. The dependent variables are regressed on different measures of shareholder bargaining power: *Institutional ownership*, *Active institutional ownership*, *Number of monitoring shareholders*, *Institutional ownership (top 5 investors)*, and the wealth-to-performance sensitivities (WPS) of the entire management team, the CFO, and the CEO. All specifications include 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 B.1 for variable definitions.

	CDS net protection						CDS trading
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Institutional ownership	0.133**						0.013***
	(2.15)						(2.87)
Active inst. ownership		0.251***					
		(3.17)					
No. of monitoring shareholders			0.003**				
			(2.18)				
Inst. own. (top 5 investors)				0.061			
				(0.75)			
Team WPS					0.001***		
					(3.32)		
CFO WPS						0.004***	
						(2.66)	
CEO WPS						-0.000	
						(-0.86)	
Book leverage	-0.861***	-0.860***	-0.852***	-0.865***	-1.006***	-1.014***	0.021***
	(-6.34)	(-6.22)	(-6.06)	(-6.21)	(-5.73)	(-5.67)	(3.91)
Tangibility	0.359*	0.397**	0.379**	0.360*	0.332	0.355	0.006
	(1.96)	(2.16)	(2.06)	(1.96)	(1.61)	(1.55)	(1.04)
Size	-0.282***	-0.273***	-0.286***	-0.282***	-0.304***	-0.309***	0.015***
	(-7.61)	(-7.38)	(-7.70)	(-7.51)	(-6.56)	(-6.42)	(16.69)
Rated	0.024	-0.001	0.027	0.031	0.051	0.051	0.020***
	(1.10)	(-0.02)	(0.89)	(1.07)	(1.41)	(1.39)	(5.98)
Investment grade	0.015	0.012	0.014	0.016	0.004	-0.002	0.010***
	(0.45)	(0.34)	(0.41)	(0.48)	(0.10)	(-0.05)	(4.71)
Comm. paper issuer	-0.027	-0.022	-0.024	-0.024	-0.029	-0.018	0.007***
	(-0.68)	(-0.54)	(-0.59)	(-0.60)	(-0.57)	(-0.31)	(3.21)
Tobin's q (lagged)	-0.069**	-0.069**	-0.075**	-0.069**	-0.065*	-0.067**	0.001
	(-2.22)	(-2.24)	(-2.34)	(-2.17)	(-1.97)	(-1.98)	(1.37)
Stock volatility	0.035	0.033	0.025	0.024	0.012	0.005	-0.000
	(0.96)	(0.88)	(0.64)	(0.64)	(0.22)	(0.09)	(-0.11)
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	No
Industry F.E.	No	No	No	No	No	No	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,436	5,436	5,436	5,436	3,787	3,683	101,648
Adjusted / Pseudo R^2	0.90	0.90	0.90	0.90	0.91	0.91	0.71

Table 3. Russell index reconstitution and changes in the likelihood of CDS trading

This table shows coefficient estimates of 2SLS instrumental variable regressions for the likelihood that CDS insurance is written on a firm. The regressions are specified in first differences. Changes in shareholder bargaining power, as proxied by changes in *Russell-tracking ownership*, *(Total) Passive institutional ownership*, and *Active institutional ownership*, are instrumented by changes in Russell 1000 and Russell 2000 membership and rank changes based on the raw market capitalization of index constituents. Inference is based on the ten times when the Russell indexes were reconstituted between 2000 and 2009 (in June of each year). We exclude stocks that are neither in the Russell 1000 nor in the Russell 2000. All specifications include industry (Fama-French 48 industry groups), calendar quarter, and fiscal quarter fixed effects as well as the control variables proposed by Schmidt and Fahlenbrach (2017). In columns 2 through 7, we add the control variables used in Table 2. 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 B.1 for variable definitions.

	First stage				Second stage		
Dependent variables	Δ RU-tracking own.		Δ Passive IO	Δ Active IO	Δ CDS trading		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Russell-tracking own.					-12.889**		
					(-2.25)		
Δ Passive inst. own.						-0.817***	
						(-2.65)	
Δ Active inst. own.							1.600***
							(3.24)
RU1→RU2	0.001***	0.001***	0.008***	-0.004*			
	(6.54)	(6.39)	(4.90)	(-1.95)			
RU2→RU1	-0.000***	-0.000***	-0.003*	-0.003**			
	(-3.07)	(-3.03)	(-1.67)	(-2.33)			
Δ Rank / 100	-0.000**	-0.000**	-0.001***	0.001***			
	(-2.17)	(-2.28)	(-9.61)	(6.96)			
Return	0.000***	0.000***	0.003***	0.014***	0.001	-0.001	-0.025***
	(7.06)	(6.23)	(4.46)	(18.94)	(0.39)	(-0.39)	(-3.21)
ROA	0.002***	0.002***	0.045***	-0.007	0.060	0.091*	0.071
	(3.23)	(3.30)	(6.53)	(-1.08)	(1.15)	(1.69)	(1.38)
Δ Assets	-0.000**	-0.000**	-0.000**	-0.000	0.000*	0.000	0.000
	(-2.10)	(-2.14)	(-2.14)	(-1.28)	(1.77)	(1.12)	(1.41)
Market cap. / 1000	-0.000	-0.000	-0.000	0.000	0.005***	0.005***	0.005***
	(-1.57)	(-1.52)	(-1.10)	(0.50)	(3.06)	(3.08)	(3.08)
Δ Book leverage		0.001	0.011	-0.010	-0.016	-0.011	-0.004
		(1.02)	(1.22)	(-1.37)	(-0.80)	(-0.56)	(-0.19)
Δ Tangibility		-0.000	0.020*	-0.077***	-0.047	-0.028	0.081
		(-0.04)	(1.67)	(-5.79)	(-1.28)	(-0.75)	(1.43)
Δ Rated		0.001	0.004	-0.000	0.013	0.005	0.002
		(1.64)	(1.02)	(-0.12)	(1.36)	(0.64)	(0.26)
Δ Investment grade		-0.001**	-0.002	-0.003	-0.064**	-0.047*	-0.039
		(-2.27)	(-0.49)	(-0.72)	(-2.45)	(-1.96)	(-1.62)
Δ Comm. paper issuer		0.001	0.001	-0.005	-0.053	-0.017	-0.010
		(1.46)	(0.22)	(-0.87)	(-0.81)	(-0.29)	(-0.17)
Δ Tobin's q		0.000	-0.001	0.002***	0.004**	0.002	-0.001
		(1.04)	(-1.64)	(2.71)	(2.25)	(1.26)	(-0.32)
Δ Stock volatility		-0.000	-0.012***	-0.009***	0.003	-0.004	0.020***
		(-1.06)	(-5.94)	(-4.53)	(0.67)	(-0.83)	(3.33)
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,419	32,379	33,478	33,478	32,379	33,478	33,478
F-stat A-P of excl. instr.	15.92	15.23	31.843	20.86			

Table 4. CDS trading, shareholder bargaining power, and credit risk

This table shows estimates from panel regressions for credit risk. The dependent variable is *Distance-to-default*. The dependent variable is regressed on *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, *Institutional ownership* as a proxy for shareholder bargaining power, and the interaction *Institutional ownership* × *CDS trading*. In column 3, the continuous variable *Institutional ownership* is replaced by the indicator variable *Institutional ownership (top 25%)*, which equals one if institutional ownership is in the top-quartile of the regression sample. 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 Appendix Table B.1 for variable definitions.

	Distance-to-default		
	(1)	(2)	(3)
CDS trading × Institutional ownership		-1.546***	
		(-3.20)	
Institutional ownership		1.413***	
		(4.98)	
CDS trading × Inst. ownership (top 25%)			-0.476***
			(-3.08)
Institutional ownership (top 25%)			0.182*
			(1.80)
CDS trading	-0.177	0.269	0.088
	(-1.14)	(1.34)	(0.49)
Book leverage	-14.305***	-14.149***	-14.295***
	(-46.53)	(-44.55)	(-45.47)
Tangibility	-2.231***	-1.943***	-1.974***
	(-5.10)	(-4.41)	(-4.44)
Size	0.295***	0.177**	0.294***
	(3.68)	(2.02)	(3.60)
Rated	-0.438**	-0.469**	-0.460**
	(-2.50)	(-2.55)	(-2.50)
Investment grade	0.764***	0.787***	0.765***
	(3.75)	(3.72)	(3.62)
Comm. paper issuer	0.248	0.228	0.204
	(0.86)	(0.76)	(0.68)
Tobin's q (lagged)	1.243***	1.188***	1.222***
	(24.53)	(21.87)	(23.25)
Firm F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes
Observations	119501	112443	112443
Adjusted R^2	0.53	0.53	0.53

Table 5. Credit risk, the CDS Big Bang, and propensity overlap weighting

This table reports estimates from panel regressions for credit risk, as measured by firms' *Distance-to-default*. Columns 1 and 2 show regression coefficients estimated in the twelve calendar quarters around the introduction of the CDS Big Bang Protocol on April 4, 2009. These regressions include the same firm controls as in Table 4 as well as firm fixed effects. In column 1, the dependent variable is regressed on the indicator variable *CDS trading 2008Q3*, which equals one if the firm has quoted CDS contracts on its debt as of 2008Q3, *Institutional ownership* as a proxy for shareholder bargaining power, the indicator *Post 2009Q1* for the post-event period, and interactions between these three variables. In column 2, *CDS trading 2008Q3* is replaced by the indicator variable *CDS trading 2008Q3 (MR)*, which equals one if the CDS contracts have a "modified restructuring" clause as of 2008Q3. Columns 3 and 4 show regressions of *Distance-to-default* on *CDS trading* and its interaction with *Institutional ownership* as well as Fama-French 48 industry group fixed effects. These specifications are estimated in a synthetic sample in which the pre-treatment distribution of covariates is balanced across treated and control firms using the "overlap weights" method proposed by Li, Morgan, and Zaslavsky (2018). In column 3, the overlap weights are based on a logit model that regresses *CDS trading* on the following covariates: *Institutional ownership*, *Size*, *Book leverage*, *Stock volatility*, *Asset tangibility*, indicator variables for rating status and commercial paper issuance, and industry fixed effects. In column 4, the overlap weights are based on a richer logit specification which additionally controls for firm's internal cash flow, payout, net borrowing, debt maturity, and age. All specifications include 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 B.1 for variable definitions.

	Distance-to-default			
	CDS Big Bang		Overlap weighting	
	(1)	(2)	(3)	(4)
CDS trading 2008Q3 × Inst. own. × Post 2009Q1	-4.682***			
	(-6.86)			
CDS trading 2008Q3 × Institutional ownership	1.131			
	(1.25)			
CDS trading 2008Q3 × Post 2009Q1	0.835***			
	(4.02)			
CDS trading 2008Q3 (MR) × Inst. own. × Post 2009Q1		-5.673***		
		(-5.48)		
CDS trading 2008Q3 (MR) × Institutional ownership		1.646		
		(0.85)		
CDS trading 2008Q3 (MR) × Post 2009Q1		1.653***		
		(5.69)		
Post 2009Q1 × Institutional ownership	2.543***	2.151***		
	(7.39)	(7.12)		
Institutional ownership	-0.034	-0.134	0.846	0.138
	(-0.07)	(-0.29)	(0.72)	(0.10)
CDS trading			0.729	0.185
			(1.33)	(0.34)
CDS trading × Institutional ownership			-3.722**	-3.015*
			(-2.10)	(-1.66)
Controls	Yes	Yes	-	-
Firm F.E.	Yes	Yes	No	No
Industry F.E.	No	No	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes
Logit specification	-	-	Baseline	Add'l covariates
Observations	23,550	23,550	95,185	79,378
Adjusted R^2	0.67	0.66	0.29	0.39

Table 6. CDS trading, shareholder bargaining power, and real outcomes
This table shows estimates from panel regressions for firm value as proxied by Tobin's q (columns 1 to 3) and for investment as measured by capital expenditures scaled by lagged property, plant, and equipment (columns 4 to 6). The dependent variables are regressed on *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, *Institutional ownership* as a proxy for shareholder bargaining power, and the interaction *Institutional ownership* × *CDS trading*. In columns 3 and 6, the continuous variable *Institutional ownership* is replaced by the indicator variable *Institutional ownership (top 25%)*, which equals one if institutional ownership is in the top-quartile of the regression sample. 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 Appendix Table B.1 for variable definitions.

	Tobin's q			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Inst. ownership		-0.776***			-0.013***	
		(-8.42)			(-3.26)	
Institutional ownership		0.933***			0.026***	
		(16.66)			(9.57)	
CDS trading × Inst. own. (top 25%)			-0.127***			-0.003**
			(-4.72)			(-2.27)
Institutional ownership (top 25%)			0.148***			0.004***
			(8.47)			(3.86)
CDS trading	-0.054	0.138***	-0.001	-0.001	0.003**	0.001
	(-1.49)	(3.34)	(-0.03)	(-0.55)	(2.00)	(0.69)
Book leverage	-0.360***	-0.273***	-0.371***			
	(-5.81)	(-4.21)	(-5.72)			
Tangibility	-0.669***	-0.622***	-0.639***			
	(-5.86)	(-5.52)	(-5.60)			
Size	-0.353***	-0.427***	-0.354***			
	(-16.88)	(-19.27)	(-16.48)			
Rated	0.005	0.001	0.005			
	(0.17)	(0.03)	(0.18)			
Investment grade	0.140***	0.128***	0.121***			
	(2.94)	(2.85)	(2.71)			
Comm. paper issuer	-0.144**	-0.116*	-0.126*			
	(-2.09)	(-1.70)	(-1.81)			
Stock volatility	-0.144***	-0.095***	-0.128***			
	(-7.83)	(-5.34)	(-7.06)			
Cash flow				-0.000	-0.001	-0.000
				(-0.01)	(-0.68)	(-0.52)
Tobin's q (lagged)				0.015***	0.015***	0.015***
				(25.99)	(24.47)	(25.26)
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	129149	121305	121305	121656	114285	114285
Adjusted R^2	0.67	0.68	0.67	0.34	0.34	0.34

Table 7. Real outcomes, the CDS Big Bang, and propensity overlap weighting

This table reports estimates from panel regressions for firm value as proxied by Tobin's q (columns 1 and 3) and for investment as measured by capital expenditures scaled by lagged property, plant, and equipment (columns 2 and 4). Columns 1 and 2 show regression coefficients estimated in the twelve calendar quarters around the introduction of the CDS Big Bang Protocol on April 4, 2009. These regressions include the same firm controls as in Table 4 as well as firm fixed effects. The dependent variables are regressed on the indicator variable *CDS trading 2008Q3*, which equals one if the firm has quoted CDS contracts on its debt as of 2008Q3, *Institutional ownership* as a proxy for shareholder bargaining power, the indicator *Post 2009Q1* for the post-event period, and interactions between these three variables. Columns 3 and 4 show regressions of Tobin's q and investment on *CDS trading* and its interaction with *Institutional ownership* as well as Fama-French 48 industry group fixed effects. These specifications are estimated in a synthetic sample in which the pre-treatment distribution of covariates is balanced across treated and control firms using the "overlap weights" method proposed by Li, Morgan, and Zaslavsky (2018). The overlap weights are based on a logit model that regresses *CDS trading* on the following covariates: *Institutional ownership*, *Size*, *Book leverage*, *Stock volatility*, *Asset tangibility*, indicator variables for rating status and commercial paper issuance, and industry fixed effects. All specifications include 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 B.1 for variable definitions.

	CDS Big Bang		Overlap weighting	
	Tobin's q	Investment	Tobin's q	Investment
	(1)	(2)	(3)	(4)
CDS trading 2008Q3 × Inst. own. × Post 2009Q1	-0.224**	-0.013**		
	(-2.34)	(-2.14)		
CDS trading 2008Q3 × Institutional ownership	-0.855***	-0.020**		
	(-6.58)	(-2.21)		
Post 2009Q1 × Institutional ownership	0.110**	0.006*		
	(2.47)	(1.66)		
CDS trading 2008Q3 × Post 2009Q1	-0.024	0.005***		
	(-0.86)	(2.87)		
Institutional ownership	0.783***	0.026***	-0.055	0.008
	(7.44)	(3.49)	(-0.28)	(1.11)
CDS trading			0.165	-0.005**
			(1.64)	(-2.05)
CDS trading × Institutional ownership			-0.497*	0.002
			(-1.77)	(0.21)
Controls	Yes	Yes	-	-
Firm F.E.	Yes	Yes	No	No
Industry F.E.	No	No	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes
Logit specification	-	-	Baseline	Baseline
Observations	25,248	24,350	103,079	101,125
Adjusted R^2	0.82	0.42	0.34	0.20

Table B.1. Definition of variables

Variable	Definition
Ownership structure:	
Institutional ownership	Fraction of shares outstanding held by institutional investors from Thomson 13f.
Russell-tracking ownership	Fraction of shares outstanding held by passive investors whose primary Morningstar Benchmark is one of the Russell 1000 or Russell 2000 indexes in the Thomson Reuters Mutual Fund Holdings (s12) database. We use the benchmark classification provided by Petajisto (2013) available until 2009. Following Coles, Heath, and Ringgenberg (2017), we classify as passive those funds with an active share less than 0.6. We further add the holdings of the Russell 1000/2000 ETFs of the Ishares family.
Passive institutional ownership	Fraction of shares outstanding held by passive (quasi-)index tracking institutions as identified by Bushee (2001).
Active institutional ownership	(Total) Institutional ownership less *Passive institutional ownership*.
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).
Institutional ownership (top 5 investors)	Fraction of shares outstanding held by the top five institutional investors from Thomson 13f.
Managerial wealth-to-performance sensitivity:	
WPS	Managerial wealth-to-(equity)performance sensitivity measure from Execucomp data proposed by Edmans, Gabaix, and Landier (2009), who build on Core and Guay (2002) to compute option deltas. Consistent time-series of equity incentives before and after FAS 123R are obtained following Coles, Daniel, and Naveen (2006) and Coles, Daniel, and Naveen (2013). WPS is computed for the management team (mean across top executives), the CEO, and the CFO. An executive is classified as the CFO following the procedure of Jiang, Petroni, and Wang (2010).
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.
Credit risk, firm value, and investment:	
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.
Other firm characteristics:	
Cash flow	Internal cash flow defined as `(ibq+dpq)/ppentq(t−1)` in Compustat.
Stock volatility	Annualized stock volatility based on CRSP daily returns over the last quarter.
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.
Investment grade	Indicator variable equal to one if a firm has investment grade rating (`splticrm` at least BBB) in Compustat.

(Continued)

Table B.1. – Continued

Rated	Indicator variable equal to one a firm has a long-term issuer rating, `splticrm`, in Compustat.
Commercial paper issuer	Indicator variable equal to if the has issued commercial paper based on information in Capital IQ.
Russel 1000	Indicator variable equal to one in a given firm-quarter if the firm is a Russell 1000 member.
Russel 2000	Indicator variable equal to one in a given firm-quarter if the firm is a Russell 2000 member.
Rank	Rank of (Russell) index constituent based on the raw market capitalization computed by Schmidt and Fahlenbrach (2017).
Raw market capitalization	Estimate by Schmidt and Fahlenbrach (2017) of the market capitalization used by Russell to assign index membership.

Halle Institute for Economic Research –
Member of the Leibniz Association

Kleine Maerkerstrasse 8

D-06108 Halle (Saale), Germany

Postal Adress: P.O. Box 11 03 61

D-06017 Halle (Saale), Germany

Tel +49 345 7753 60

Fax +49 345 7753 820

www.iwh-halle.de

ISSN 2194-2188

Leibniz Association