Internet Appendix to "Shareholder Bargaining Power and the Emergence of Empty Creditors"

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June 27, 2018

C. The model with continuously-distributed cash flows

The model in Section 2 of the main text follows BO in that the cash flows at $t = 1, 2$ can take two values only (high or low). In this environment, the creditor chooses either a low (equal to λC_2^L) or a high (equal to λC_2^H) level of credit protection, as exposed in the main text. In this appendix, we confirm our predictions when cash flows are continuously-distributed between a minimum and a maximum value. In this alternative environment, the creditor's optimal credit protection (as well as bankruptcy probability) varies continuously with η.

Specifically, we depart from the model in the main text in that we assume that the time-1 and time-2 cash flows, denoted by $\tilde{c}_1$ and $\tilde{c}_2$, are independent and *uniformly distributed* on the intervals $[0, C_1]$ and $[0, C_2]$, with $C_1 > 0$ and $C_2 > 0$. As in the binomial model, shareholders do not have enough cash flows to meet the contractual debt obligation R at time 1 if the realization of $\tilde{c}_1$, denoted by c_1, is smaller than R. In

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this case, a liquidity default happens with probability

$$P[\text{liq. default}] = \int_0^R \frac{d\tilde{c}_1}{C_1} = \frac{R}{C_1} \equiv 1 - \theta.$$

Because of the firm's limited commitment problem, any positive time-1 cash flow can be diverted by shareholders. Thus, if c_1 is bigger than R (which happens with probability $\frac{C_1 - R}{C_1} \equiv \theta$), shareholders can pay R back to the creditor or can claim to have received $c_1 = 0$ and default strategically. Note that we have defined θ and $1-\theta$ in a way similar to our binomial model: $1-\theta$ denotes the probability with which a liquidity default happens at time 1 (the time-1 low node in our binomial model), whereas θ denotes the probability with which shareholders have enough cash flows at time 1 to meet the debt obligation (the time-1 high node in our binomial model). As in the binomial model, we assume that the realization of $\tilde{c}_2$, denoted by c_2, is revealed to shareholders at time 1. In the following, we assume that $R > \frac{C_2}{2}$, which implies that the time-2 cash flow is not expected to grant a delayed payment of R.

C.1. Optimal credit protection and bankruptcy probability

Benchmark with no CDSs. We first consider the case in which no CDSs are written on the firm's debt. After non-payment of R at $t = 1$ (following strategic or liquidity default), the creditor can force the firm into bankruptcy or renegotiate the debt contract. In renegotiation, Nash bargaining implies that shareholders get a fraction η of the surplus λc_2, and the creditor gets $1 - \eta$ (as in the binomial model). Thus, the creditor is better off renegotiating than triggering bankruptcy, and the probability of bankruptcy is zero.

Shareholders factor renegotiation outcomes into their repayment/default decision. If $c_1 \geq R$, shareholders meet the contractual debt repayment if

$$c_1 - R + c_2 \geq c_1 + \eta\lambda c_2 \,, \tag{C.1}$$

which is analogous to Eq. (1) in the binomial model. The left-hand side (respectively, right-hand side) is the shareholders' payoff from repayment (strategic default). Shareholders meet the debt obligation if $c_2 \geq \frac{R}{1-\eta\lambda}$.[1]

Introducing CDSs. We next assume that CDSs are written on the firm's debt. In renegotiation, Nash bargaining implies that shareholders get a surplus share $\gamma^* = \eta\left(1 - \frac{\pi}{\lambda c_2}\right)$, whereas the creditor gets $1 - \gamma^* = 1 - \eta\left(1 - \frac{\pi}{\lambda c_2}\right)$, as in the binomial model. Thus, renegotiation occurs if the time-2 cash flow is greater than $\frac{\pi}{\lambda}$. If, instead, the time-2 cash flow falls below this level, the creditor pushes the firm into bankruptcy and collects the CDS payment. As in BO, CDS protection offers an outside option to the creditor, which makes him "tougher" in renegotiation.

Taking renegotiation outcomes into account, shareholders meet the debt obligation at $t = 1$ if $c_1 \geq R$ and the following inequality

$$c_1 - R + c_2 \geq c_1 + \max\left[\eta(\lambda c_2 - \pi); 0\right] \tag{C.2}$$

holds (note that this is analogous to Eq. (2) in the binomial model). The left-hand (respectively, right-hand) side of (C.2) is the payoff to shareholders in repayment (in strategic default). CDS protection reduces the shareholders' payoff from debt renegotiation compared to (C.1). Eq. (C.2) implies that shareholders service the debt obligation if $c_2 \geq \max[\frac{R-\eta\pi}{1-\lambda\eta}, R]$ and default strategically otherwise. We conjecture and verify that $\pi \leq \lambda R$, meaning that the inequalities $\frac{\pi}{\lambda} \leq R \leq \frac{R-\eta\pi}{1-\lambda\eta}$ hold (by simple calculations).

We now analyze the creditor's optimal level of credit protection π^*. After a liquidity default ($c_1 < R$), renegotiation occurs if $c_2 \geq \frac{\pi}{\lambda}$, whereas the creditor forces the firm into bankruptcy and collects the CDS payment otherwise. If, instead, shareholders do have

[1] If $C_2 < \frac{R}{1-\eta\lambda}$, shareholders would default strategically for any c_2. We focus on cases in which the opposite inequality holds.

enough funds to service the debt obligation at $t = 1$ (if $c_1 \geq R$), three outcomes may arise depending on c_2. If $c_2 < \frac{\pi}{\lambda}$, shareholders default strategically, and the creditor forces the firm into bankruptcy and collects the CDS payment. If $\frac{\pi}{\lambda} \leq c_2 < \frac{R-\eta\pi}{1-\lambda\eta}$, shareholders default strategically, and the creditor and shareholders renegotiate the debt contract. If $c_2 \geq \frac{R-\eta\pi}{1-\lambda\eta}$, shareholders meet the obligation R at $t = 1$. The creditor chooses π to maximize his expected payoff:

$$\max_{\pi} \ \theta \left(\int_{\frac{\pi}{\lambda}}^{\frac{R-\eta\pi}{1-\lambda\eta}} \frac{\lambda\tilde{c}_2 - \eta(\lambda\tilde{c}_2 - \pi)}{C_2} d\tilde{c}_2 + \int_{\frac{R-\eta\pi}{1-\lambda\eta}}^{C_2} \frac{R}{C_2} d\tilde{c}_2 \right) + (1-\theta) \int_{\frac{\pi}{\lambda}}^{C_2} \frac{\lambda\tilde{c}_2 - \eta(\lambda\tilde{c}_2 - \pi)}{C_2} d\tilde{c}_2. \tag{C.3}$$

By calculation, we obtain the optimal level of credit protection.

Proposition 1. *If $\pi \leq \lambda R$, the optimal level of credit protection satisfies*

$$\pi^* = \frac{\eta\lambda \left[C_2(1-\theta)(1-\lambda\eta)^2 + R\theta(2-\lambda-\lambda\eta) \right]}{1+\eta-2\eta\lambda-\eta^2\lambda(1-\theta)\left(2-\lambda-\lambda\eta\right)}, \tag{C.4}$$

which increases with shareholder bargaining power η.

Proof. The expression for π^* follows by solving (C.3). The first derivative of π^* with respect to η is given by

$$\frac{\partial \pi^*}{\partial \eta} = \frac{\lambda C_2(1-\theta)(1-\eta\lambda)\left[\eta^2\lambda(1-\theta)(2-\lambda-\eta\lambda^2) + (1-2\eta\lambda)^2 + \eta\lambda(1-2\eta)\right]}{\left(1+\eta-\eta\lambda\left[2+\eta(1-\theta)\left(2-\lambda(1+\eta)\right)\right]\right)^2} + \frac{\lambda R\theta\left[2(1-\eta\lambda)^2 - (1-\eta)^2\lambda + \eta^2\lambda(1-\theta)(2-\lambda-\lambda\eta)^2\right]}{\left(1+\eta-\eta\lambda\left[2+\eta(1-\theta)\left(2-\lambda(1+\eta)\right)\right]\right)^2}$$

The second term is always positive because $2-\lambda-\lambda\eta > 0$ and $2(1-\eta\lambda)^2 > (1-\eta)^2\lambda$. If $\Phi = \eta^2\lambda(1-\theta)(2-\lambda-\eta\lambda^2) + (1-2\eta\lambda)^2 + \eta\lambda(1-2\eta)$ is positive, the first term is also positive and, so, $\frac{\partial\pi^*}{\partial\eta}$ is positive for any η. Suppose now that $\Phi < 0$. By definition, π^*

is the optimal CDS protection if $\pi^* \leq R\lambda$. Plugging (C.4) into this inequality, we have that the following inequality holds

$$\Delta = \frac{R\left[1+\eta-2\eta\lambda-\eta^2\lambda(2-\lambda-\eta\lambda)-\eta\theta(2-\lambda-\eta\lambda)(1-\eta\lambda)\right]}{\eta(1-\eta\lambda)} > C_2(1-\theta)(1-\eta\lambda),$$

where the right-hand side is positive, so the left-hand side needs to be positive too. If $\Phi < 0$, then

$$\frac{\partial \pi^*}{\partial \eta} > \frac{\lambda\Delta\left[\eta^2\lambda(1-\theta)(2-\lambda-\eta\lambda^2)+(1-2\eta\lambda)^2+\eta\lambda(1-2\eta)\right]}{\left(1+\eta-\eta\lambda\left[2+\eta(1-\theta)\left(2-\lambda(1+\eta)\right)\right]\right)^2} + \frac{\lambda R\theta\left[2(1-\eta\lambda)^2-(1-\eta)^2\lambda+\eta^2\lambda(1-\theta)(2-\lambda-\lambda\eta)^2\right]}{\left(1+\eta-\eta\lambda\left[2+\eta(1-\theta)\left(2-\lambda(1+\eta)\right)\right]\right)^2}$$

We want to show that the right-hand side of this inequality is positive. By simple calculations, the right-hand side boils down to

$$\frac{\lambda R\left((1-\lambda\eta)^2+\eta^2\lambda\theta(1-\lambda)\right)}{\eta\left[1+\eta-2\eta\lambda-\eta^2\lambda(2-\lambda-\eta\lambda)\right]} \tag{C.5}$$

which is always positive (both the terms at the numerator are positive, and the denominator is just that of π^*). We then conclude that $\frac{\partial \pi^*}{\partial \eta} > 0$.

We finally verify that $\pi \leq R\lambda$ holds. If $\pi > R\lambda$ held, the inequalities $\frac{R-\eta\pi}{1-\lambda\eta} < R < \frac{\pi}{\lambda}$ would hold by simple calculations. If $c_1 < R$, renegotiation would occur if $c_2 \geq \frac{\pi}{\lambda}$, while the creditor would push the firm into bankruptcy if $c_2 < \frac{\pi}{\lambda}$. If $c_1 \geq R$, two outcomes may occur depending on c_2. If $c_2 < R$, shareholders would default strategically, and the creditor would push the firm into bankruptcy. If, instead, $c_2 \geq R$, shareholders would repay R at $t = 1$. The creditor would choose the level of credit protection to maximize his expected payoff

$$\max_{\pi} \left[\theta \int_{R}^{C_2} \frac{R}{C_2} d\tilde{c}_2 + (1-\theta) \int_{\frac{\pi}{\lambda}}^{C_2} \frac{\lambda \tilde{c}_2 - \eta(\lambda \tilde{c}_2 - \pi)}{C_2} d\tilde{c}_2 \right]. \tag{C.6}$$

By calculations, the optimal level of credit protection would be $\pi_h^* = \frac{\eta \lambda C_2}{1+\eta}$, which increases with η. Substituting this expression into $\pi_h^* > \lambda R$, we obtain $\frac{\eta C_2}{1+\eta} > R$. The left-hand side of this inequality varies in the interval $(0, \frac{C_2}{2})$ depending on η. Because $R > \frac{C_2}{2}$ by assumption, the claim follows. □

The probability of bankruptcy associated with π^* is

$$P[\text{bankruptcy}|\pi = \pi^*] = \int_{0}^{\frac{\pi^*}{\lambda}} \frac{d\tilde{c}_2}{C_2} = \frac{\pi^*}{\lambda C_2}, \tag{C.7}$$

meaning that the probability of bankruptcy increases with π^*. Because π^* increases with η, so does the probability of bankruptcy.

The predictions of the model in the main text are confirmed. Shareholder bargaining power increases the creditor's optimal level of credit protection, which decreases his willingness to renegotiate the debt contract and increases the probability of firm bankruptcy.

C.2. Real effects of CDS protection

When no CDSs are written on the firm's debt, it is easy to show that firm value satisfies the following expression:

$$E[\text{firm}|\pi = 0] = \frac{C_1 + C_2}{2} - \frac{(1-\theta)(1-\lambda)C_2}{2} - \frac{\theta R^2 (1-\lambda)}{2C_2(1-\eta\lambda)^2}. \tag{C.8}$$

The first term in (C.8) is the value of the firm if there were no renegotiation or bankruptcy costs, being just the expected value of cash flows at $t = 0$. The second and third terms represent the deadweight loss due to the renegotiation costs if the firm is delinquent (for liquidity or strategic reasons).

In the presence of CDSs, firm value is the sum of three terms:

$$\begin{aligned} E[\text{firm}|\pi = \pi^*] &= E[\text{firm}|\pi = 0] - \int_0^{\frac{\pi^*}{\lambda}} \frac{\lambda \tilde{c}_2}{C_2} d\tilde{c}_2 + \theta \int_{\frac{R-\eta\pi^*}{1-\lambda\eta}}^{\frac{R}{1-\lambda\eta}} \frac{(1-\lambda)\tilde{c}_2}{C_2} d\tilde{c}_2 \\ &= E[\text{firm}|\pi = 0] - \frac{(\pi^*)^2}{2\lambda C_2} + \frac{\pi^*(1-\lambda)\eta\theta}{C_2(1-\lambda\eta)^2}\left(R - \frac{\eta\pi^*}{2}\right). \end{aligned} \tag{C.9}$$

The first term represents firm value absent CDSs (Eq. (C.8)), whereas the second and third terms are driven by the creditor's CDS insurance. Specifically, the second term is the loss in value due to the creditor's unwillingness to renegotiate debt if shareholders default and the time-2 cash flow is too small to match the outside option offered by CDS protection (i.e., if $c_2 < \frac{\pi^*}{\lambda}$). The third term is the gain in value due to the decrease in the probability of strategic default brought along by CDS protection. Therefore, bargaining power bears two effects on firm value when CDSs are traded on the firm's debt:

1. *Value-decreasing*: CDS protection makes the creditor tougher in renegotiation and, thus, increases the probability-weighted deadweight loss due to bankruptcy costs. Because π^* monotonically increases with bargaining power, this loss increases with shareholder bargaining power.
2. *Value-enhancing*: The higher level of credit protection—and the ensuing reduction in the creditor's willingness to renegotiate—reduces the shareholders' incentives to default strategically and, thus, curtails the probability-weighted deadweight loss due to renegotiation costs.

The net outcome of these effects is ambiguous and spills over to the shareholders' willingness to invest. In fact, shareholders invest at $t = 0$ if equity value exceeds the setup cost of investment net of the debt issue proceeds—equivalently, if firm value exceeds the setup cost, i.e. $E[\text{firm}|\pi = \pi^*] > F$. The right-hand side of this expression is constant, whereas the left-hand side is driven by the two offsetting effects described above.

D. Validation of the shareholder bargaining power measures

In this section, we present several validation tests for the shareholder bargaining power measures used in the paper, *Institutional ownership*, *Active institutional ownership*, *Ownership concentration* among the largest five institutional investors, and the *Number of monitoring shareholders*. We want to check whether shareholders that our proxies predict to be more powerful are indeed able to extract larger concessions from creditors in default. In other words, we study the behavior of institutional, active, concentrated, and monitoring shareholders vis-à-vis creditors during episodes of acute financial distress. By contrast, in the rest of the paper, we are interested whether shareholder bargaining power matters also outside default in the context of credit risk trading (*ex ante* perspective). In this appendix, we consider two situations of default: formal bankruptcy in Chapter 11 and technical default following covenant violations.

D.1. Chapter 11 bankruptcies

One observable mechanism through which shareholders organize and exercise their power is the formation of equity committees in Chapter 11.[2] Betker (1995) and Bharath, Panchapagesan, and Werner (2010) show that the presence of equity committees correlates positively with shareholder-friendly deviations from the absolute priority rule, which explains why creditors typically oppose their formation.[3]

We study the bankruptcies of large U.S. public firms recorded in the UCLA-LoPucki BRD database. After merging BRD with our sample, we have 211 Chapter 11 filings

[2] For instance, in the case of Crusader Energy Group Inc., a company providing business services to energy companies that filed for Chapter 11 in March 2009, a group of institutional shareholders comprising Virtus Capital Advisors, Hawk Opportunity Fund, Greenhill Capital Partners, and Reservoir Capital Group filed a petition for the formation of an official committee.

[3] For instance, the unsecured creditors of Syms Corp., a company operating retail clothing stores that filed for Chapter 11 in November 2011, sought to disband the equity committee, whose members were exclusively institutional shareholders (Esopus Creek Value Series Fund, Franklin Value Investors Trust Fund, and DS Fund I).

between 2001 and 2014. Ideally, we would like to look at the correlation between our bargaining power proxies and deviations from the absolute priority rule (APR). Stronger shareholders should be more likely to obtain APR deviations in their favor. However, the data on distributions to shareholders in bankruptcy in the available sample are sparse (about 30 observations), thus complicating inference.

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

Columns 1 to 4 of Appendix Table D.1 report significant positive correlations between our three measures of shareholder bargaining power and the formation of equity committees in Chapter 11. The probability that an equity committee is formed increases from 5.7% to 23.3% as institutional ownership moves from the 25th percentile to the 75th percentile (see Appendix Fig. D.1).

D.2. Covenant violations

Evidence for the influence of institutional, active, concentrated, and monitoring ownership on ex post outcomes in default can also be found outside Chapter 11. For example, changes in corporate policies around loan covenant violations (technical default) can be informative about the distribution of bargaining power between shareholders and creditors. Most prominently, Chava and Roberts (2008) find that creditors push firms to reduce investment following covenant violations. We hypothesize that creditors will find it harder to convince managers to cut investment if more powerful shareholders potentially lobby against cuts to investment.

To test this idea, we merge our CRSP-Compustat data with the Dealscan database and create a sample with firm-quarter observations.[4] We focus on firms that are subject to current ratio covenants or net worth covenants following Chava and Roberts (2008). We code a firm-quarter as in "covenant violation", if the current ratio or net worth are below the corresponding covenant threshold.

Columns 5 to 8 of Table D.1 show evidence that our four measures of shareholder bargaining power curb the influence of creditors on investments following covenant violations. The positive interaction terms between the four power proxies and the covenant violation indicator variable suggest that institutional, active, concentrated, and monitoring owners succeed in averting strong cuts in investment, unlike other shareholders.

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

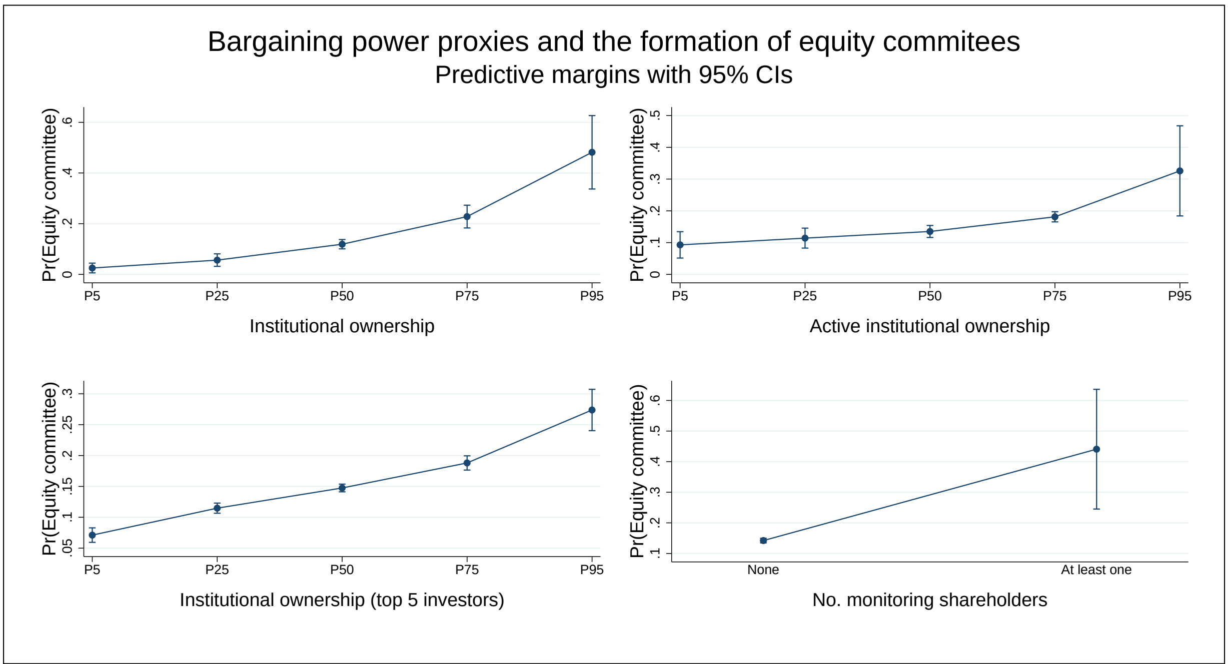

Fig. D.1. This figure shows the predicted probability that shareholders form an equity committee in Chapter 11 conditional on four measures of shareholder bargaining power: Institutional ownership (top left graph), active institutional ownership (top right graph), institutional ownership by the top five institutional investors in the firm (bottom left graph), and the presence of monitoring shareholders (bottom right graph). The horizontal axes report different percentiles of each respective bargaining power measure. The predicted probabilities are computed from the logit models in column 1 to 4 of Table D.1. Confidence intervals are drawn for the 5% level.

Table D.1. Validation of the shareholder bargaining power measures

This table validates our main shareholder bargaining power measures *Institutional ownership*, *Active institutional ownership*, *Ownership concentration* among the largest five institutional investors, and the *Number of monitoring shareholders* against outcomes in Chapter 11 and in covenant violation. Columns 1 to 4 show estimated average marginal effects from cross-sectional logit models that use an indicator variable equal to one if shareholders form an equity committee in Chapter 11 as dependent variable. These specifications control for year and industry (SIC division industry groups) fixed effects, Tobin's q, internal cash flow, and firm size measured as of the last reporting date before the Chapter 11 filing. The sample contains observations from firms that file for Chapter 11 over the period 2001-2014. As only four observations in this small sample have values of *No. monitoring shareholders* larger than one, we instead use the binary variable $\mathbb{1}_{\{No.\ monit.\ shareholders\ >\ 0\}}$ in column 4. Columns 5 to 8 show estimated coefficients from panel regressions for investment defined as capital expenditures scaled by lagged property, plant, and equipment. In each specification, investment is regressed on a covenant violation indicator interacted with the shareholder bargaining power measure at hand. These specifications control for firm, calendar and fiscal quarter fixed effects, Tobin's q, internal cash flow, firm size, and an indicator variable for the investment grade rating status. The sample contains firm-quarter observations for firms that are subject to loan covenants on the current ratio or net worth over the period 2001Q1-2012Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by SIC industry division (columns 1 through 4) and by firm (columns 5 through 8). Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table B.1 for variable definitions.

	Equity committee				Investment			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cov. viol. × Institutional ownership					0.016**			
					(2.41)			
Institutional ownership	0.500***				0.016**			
	(9.00)				(2.36)			
Cov. viol. × Active inst. ownership						0.011		
						(1.06)		
Active Institutional ownership		0.440***				0.011		
		(3.26)				(1.40)		
Cov. viol. × Inst. own. (top 5 inv.)							0.030**	
							(2.04)	
Institutional ownership (top 5 inv.)			0.462***				-0.001	
			(9.87)				(-0.06)	
Cov. viol. × No. monitoring shareholders								0.002***
								(2.80)
Number monitoring shareholders								-0.000
								(-0.45)
$\mathbb{1}_{\{No.\ monit.\ shareholders\ >\ 0\}}$				0.225***				
				(2.87)				
Cov. viol.					-0.017***	-0.011***	-0.016***	-0.010***
					(-3.82)	(-3.41)	(-3.53)	(-4.61)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	No	No	No	No
Firm F.E.	No	No	No	No	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	No	No	No	No	Yes	Yes	Yes	Yes
Observations	158	136	158	136	13,954	13,888	13,954	13,888
Pseudo R^2	0.32	0.29	0.21	0.30				
Adjusted R^2					0.37	0.37	0.37	0.37

E. Validation of credit risk measures

We test how well the naïve distance-to-default as defined by Bharath and Shumway (2008) and the Altman's Z-score as modified by MacKie-Mason (1990) predict the subset of credit events that trigger a CDS payment. In a first step, we obtain CDS auction dates from www.creditfixings.com to unambiguously identify CDS trigger events after June 2005, when auctions became the standard determination mechanism for cash settlement prices of CDS contracts.[5] In a second step, we construct a panel data set that starts in 2005 and ends with the CDS trigger event (CDS auction date) of each firm. The left graph of Fig. E.1 shows the evolution of the distance-to-default prior to a CDS trigger event conditional on calendar-time, fiscal quarter, and firm fixed effects.[6] The graph shows a monotonic decrease that is statistically significant at the 5% level for observations that are at most 16 year-quarters away from the CDS trigger event. The right graph shows a similar evolution for the Altman's Z-score suggesting that both variables are connected to the likelihood of CDS trigger events.

[5] The credit event fixings have been developed by Creditex and Markit in cooperation with the International Swaps and Derivatives Association (ISDA) and derivatives dealers. Both have been administering the credit event fixings since their inception in June 2005. CDS trigger events and, hence, CDS auctions appear to be rare events. In total we observe 37 U.S. corporate CDS auctions in our firm sample.

[6] More precisely, we regress the distance-to-default on binary variables that equal one for observations that are 24 to 20, 20 to 16, 16 to 12, ..., or at most 4 quarters away from the credit event. Hence, the regression coefficients plotted in Fig. E.1 capture the difference in the dependent variable relative to observations that are more than 30 quarters away from the CDS trigger event.

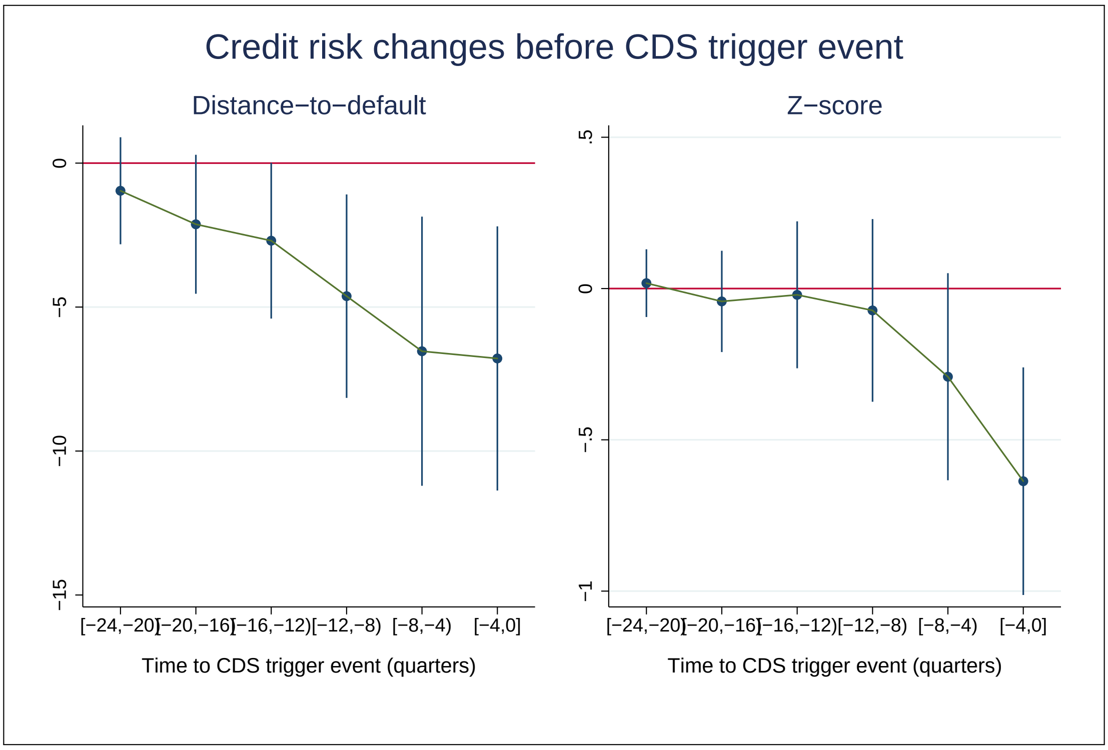

Fig. E.1. This figure shows changes in credit risk as the firm approaches credit events that trigger CDS settlement procedures in accordance with ISDA protocols. The two graphs plot coefficient estimates and confidence intervals of panel regressions with the distance-to-default and Z-score as dependent variables. The regressors of interest are binary variables equal to one if a firm is 24 to 20, 20 to 16, 16 to 12 year-quarters, etc. away from the CDS trigger event. A negative change in the distance-to-default or in the Z-score implies an increase in credit risk relative to observations more than 30 year-quarters away from the credit event. Both regressions control for firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2005Q1-2014Q4. Only firms that experience a CDS trigger event are considered. Robust standard errors are clustered by firm. Confidence intervals are drawn for the 5% level.

F. The Russel experiment

Fig. F.1 below complements the analysis in Section 4.2.

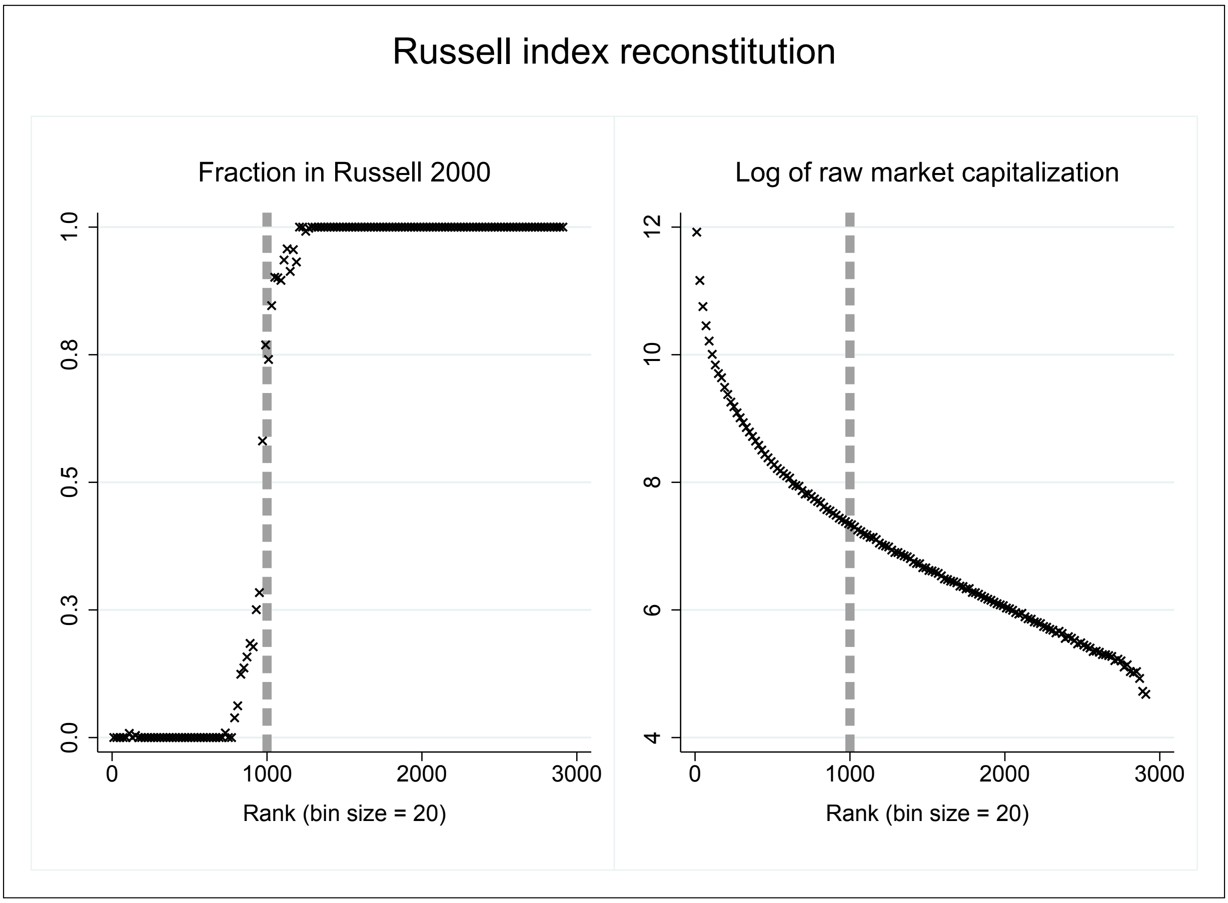

Fig. F.1. This figure shows two graphs that describe the reconstitution of the Russell 1000 and Russell 2000 indexes. The left graph shows the average fraction of stocks per bin in the Russell 2000 index. The right graph shows the (log) raw market capitalization as computed by Schmidt and Fahlenbrach (2017). Each bin contains 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).

G. Hypothesis 1: Instrumental variable estimation for CDS net protection

In Table 3, we exploit a discontinuity in ownership structure at the threshold between the Russell 1000 and the Russell 2000 for identification in models for *CDS trading*. Unfortunately, we cannot use the same identification strategy in our analysis of CDS amounts because Russell 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. Instead, we follow Aghion, Van Reenen, and Zingales (2013) and exploit changes in S&P 500 membership as an instrument for changes in ownership structure and, thus, in shareholder bargaining power.

First, we check whether S&P 500 membership satisfies the relevance condition as an instrument. Roughly 70% of all firms in the DTCC sample are S&P 500 members in at least one quarter between 2008 and 2014. Figure G.1 shows an increase (decrease) in institutional ownership around S&P 500 inclusions (exclusions), which Aghion, Van Reenen, and Zingales (2013) explain with fiduciary duty laws and performance benchmarks that favor S&P 500 firms. Column 1 of Table G.1 reports the first-stage coefficient estimates of the instrument *S&P 500* and the control variables. As expected, the coefficient of the instrument is positive and has an Angrist-Pischke F-statistics close to 10.

Next, we discuss whether the instrument *S&P 500* satisfies the exclusion restriction. Two arguments speak against this concern. First, one would expect S&P 500 constituents to exhibit lower credit risk and to have more stable growth prospects than other firms, in which case hedging incentives should be lower and CDS protection should be negatively correlated with index membership. Secondly and more importantly, S&P states explicitly that index inclusions are not related to changes in firm performance or growth prospects but to how well a given company represents its industry (Aghion, Van Reenen, and Zingales, 2013). To address any remaining concerns, we add the annual stock return as a forward-looking performance measure to the vector of controls.

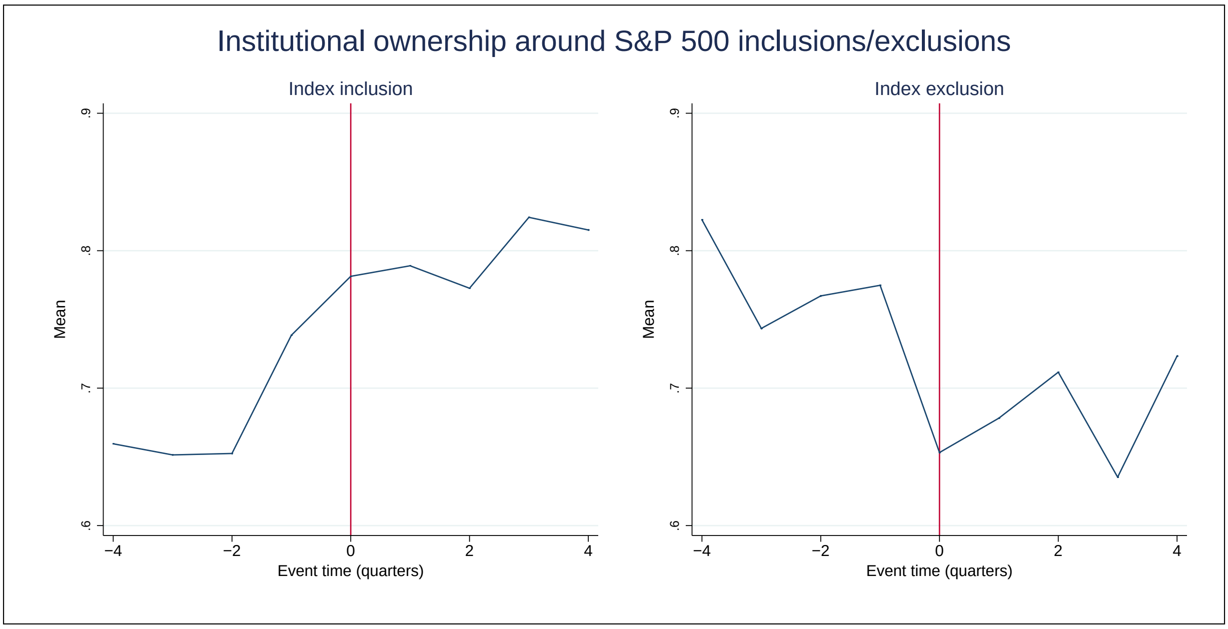

Fig. G.1. This figure shows the dynamics of ownership structure around changes in S&P 500 index membership. The horizontal axes show quarters in event-time. At time zero a firm is included (left graph) or excluded (right graph) from the stock index. The vertical axes show the sample mean of institutional ownership. The sample contains only DTCC firm-quarter observations.

Column 2 of Table G.1 shows the second stage for *CDS net protection*. As predicted by Hypothesis 1, instrumented institutional ownership has a positive (albeit not significant) coefficient. The coefficient is statistically significant at the 10% level in column 3 where we focus on the top 25% firms with the highest institutional ownership (*Institutional ownership (top 25%)*=1).

Table G.1. Shareholder bargaining power and CDS net protection (instrumental variable estimation)
This table shows estimated coefficients from two-stage least squares regressions that use *CDS net protection* (i.e., the ratio of CDS net notional amount to total firm debt at quarter-end) as dependent variable. We instrument shareholder bargaining power, as proxied by *Institutional ownership*, exploiting changes in S&P 500 index membership. *Inst. own.* and *Inst. own. (top 25%)* are instrumented with *S&P 500* which equals one if the firm in a given firm-quarter is a member of the S&P 500 index and zero otherwise. All specifications include calendar quarter, fiscal quarter, and firm fixed effects, and use a sample covering firm-quarter observations from 2008Q4 to 2014Q4 for which DTCC reports data on CDS notional amounts. 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.

Dependent variables	First stage Institutional ownership	Second stage CDS net protection	
	(1)	(2)	(3)
Institutional ownership		1.404	
		(1.61)	
Institutional ownership (top 25%)			0.788*
			(1.76)
S&P 500	0.079***		
	(2.88)		
Return	0.015***	-0.010	-0.016
	(3.26)	(-0.70)	(-0.78)
Book leverage	0.006	-0.844***	-0.938***
	(0.08)	(-6.80)	(-5.36)
Tangibility	-0.004	0.363*	0.287
	(-0.07)	(1.82)	(1.08)
Size	-0.029*	-0.275***	-0.250***
	(-1.89)	(-6.36)	(-4.17)
Rated	0.067	-0.053	-0.024
	(0.65)	(-0.39)	(-0.20)
Investment grade	-0.004	0.019	0.004
	(-0.38)	(0.52)	(0.06)
Comm. paper issuer	0.009	-0.059	-0.030
	(0.39)	(-1.47)	(-0.48)
Tobin's q (lagged)	-0.014*	-0.062*	-0.018
	(-1.82)	(-1.81)	(-0.37)
Stock volatility	-0.076***	0.135**	0.121*
	(-4.24)	(1.98)	(1.84)
Firm F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	No
Fiscal quarter F.E.	Yes	Yes	No
Observations	5,378	5,378	5,378
F-stat A-P test of excl. instr.	8.29		

H. Credit risk and real outcomes: Non-parametric evidence

Table H.1 shows summary statistics for selected variables conditional on shareholder bargaining power and CDS trading status. Panel A focuses on firms with institutional ownership in the lower three quartiles of the distribution. Column 2 reports variable means for firm-quarters without an outstanding CDS contract, whereas column 4 reports variable means for firm-quarters with CDS trading. Columns 5 and 6 of Panel A show that, conditional on low institutional ownership, CDS firms have a significantly higher average distance-to-default, Z-score, and ROA than non-CDS firms. Panel B shows the corresponding variable means in the sample of firms with institutional ownership in the top quartile of the distribution. For these firms with powerful shareholders, CDS trading appears to be associated with a lower distance-to-default and lower Tobin's q, investment, and PPE growth. The two-sample t-tests reported in both panels provide suggestive evidence that CDS trading has adverse effects on firms with powerful institutional shareholders compared to other firms, in line with our main analysis.

Table H.1. Two-sample t-tests for CDS firms and non-CDS firms
This table reports summary statistics of selected variables for a sample of 5,843 U.S. firms, excluding financial institutions and utilities, over the period 2001Q1-2014Q4. We estimate two-sample t-tests for CDS firms and non-CDS firms conditional on high/low shareholder bargaining power as proxied by institutional ownership. Panel A compares variable means of CDS firms and non-CDS firms in the subsample of firms with institutional ownership in the lower three quartiles of the distribution. Panel B compares variable means of CDS firms and non-CDS firms in the subsample of firms with institutional ownership in the top quartile of the distribution. Column 5 in both panels shows the differences in means between firms with and without CDSs. Column 6 reports the standardized test statistic for a two-sample *t*-test. All dollar amounts are in millions of 2010 dollars. Refer to Appendix Table B.1 for variable definitions.

Panel A: Firms with low shareholder bargaining power

	Non-CDS firms		CDS firms			
	Obs. (1)	Mean (2)	Obs. (3)	Mean (4)	Difference (5)	*t*-stat (6)
Credit risk, firm value, and investment:						
Distance-to-default	73,018	6.325	10,258	9.589	-3.265	-46.33
Z-score	77,002	-0.324	9,922	0.707	-1.032	-39.01
Tobin's q	80,297	1.793	10,912	1.798	-0.005	-0.38
ROA	80,285	-0.017	10,910	0.012	-0.029	-44.23
Investment	78,533	0.065	10,838	0.045	0.020	27.69
PPE growth	79,029	0.005	10,851	0.003	0.001	1.24
Other firm characteristics:						
Cash flow	75,255	-0.086	10,502	0.123	-0.209	-27.26
Stock volatility	80,297	0.635	10,912	0.372	0.263	68.29
Book leverage	80,297	0.236	10,912	0.318	-0.082	-40.05
Tangibility	80,297	0.279	10,912	0.326	-0.046	-19.43
Size	80,297	5.347	10,912	8.912	-3.565	-238.39
Rated (binary)	80,297	0.154	10,912	0.950	-0.796	-224.73
Investment grade (binary)	80,297	0.031	10,912	0.624	-0.594	-249.67
Commercial paper issuer (binary)	80,297	0.013	10,912	0.434	-0.421	-203.91

Panel B: Firms with high shareholder bargaining power

	Non-CDS firms		CDS firms			
	Obs. (1)	Mean (2)	Obs. (3)	Mean (4)	Difference (5)	*t*-stat (6)
Credit risk, firm value, and investment:						
Distance-to-default	21,010	9.160	8,692	7.968	1.192	11.24
Z-score	21,022	0.684	8,349	0.691	-0.007	-0.48
Tobin's q	21,575	1.962	8,828	1.618	0.344	25.73
ROA	21,571	0.008	8,828	0.010	-0.002	-5.56
Investment	21,421	0.070	8,785	0.050	0.020	28.45
PPE growth	21,477	0.017	8,796	0.005	0.012	11.67
Other firm characteristics:						
Cash flow	20,830	0.141	8,523	0.132	0.009	1.24
Stock volatility	21,575	0.435	8,828	0.376	0.059	20.39
Book leverage	21,575	0.234	8,828	0.316	-0.082	-36.11
Tangibility	21,575	0.253	8,828	0.302	-0.049	-17.01
Size	21,575	6.854	8,828	8.563	-1.708	-143.93
Rated (binary)	21,575	0.349	8,828	0.943	-0.594	-111.79
Investment grade (binary)	21,575	0.073	8,828	0.506	-0.433	-98.57
Commercial paper issuer (binary)	21,575	0.013	8,828	0.243	-0.230	-73.05

I. Credit risk and real outcomes: Net Capital Rule Exemption

In our main analysis, we rely on the 2009 CDS Big Bang to address endogeneity concerns. Here, we exploit another regulatory event that took place several years before the financial crisis, i.e. in a fundamentally different economic environment than the CDS Big Bang. On August 20, 2004 the Securities and Exchange Commission (SEC) exempted a group of broker-dealers from the Net Capital Rule, which had been effective since 1975. The regulatory event allowed the exempted broker-dealers to use their own internal risk models to calculate haircuts and capital levels for securities holdings.

The Net Capital Rule Exemption has three interesting aspects. First, the exemption allowed the recognition of credit risk transfers (CRTs) that would result in lower regulatory capital requirements: "the deductions for [derivatives-related] credit risk would recognize appropriate offsets as a result of hedging strategies for CRT instruments (Bank for International Settlements, 2004)."[7] CDSs were among the CRTs recognized for regulatory capital requirements. We argue that this regulatory change increased the creditors' demand for CDS protection and thereby exacerbated the empty creditor problem.

Second, the exemption only applied to broker-dealers that were part of so-called consolidated supervised entities (CSEs), back then Bear Sterns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley.[8] Broker-dealers that were not part of CSEs "would not get relief for using credit derivatives as hedges for credit risk (Bank for International Settlements, 2004)."[9] We conjecture that the Net Capital Rule Exemption only affected firms with public debt and loans underwritten or extended by a CSE.[10]

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

[8] These institutions faced significant stress in 2008 and 2009. Yet, we do not believe that this confounds our empirical analysis as the Net Capital Rule Exemption took place four years earlier.

[9] The broker-dealers of two commercial banks, Citigroup and JP Morgan Chase, were also exempted from the Net Capital Rule. We ignore both commercial banks in our baseline estimation because they were regulated under the Basel Accord and had been allowed to recognize CDSs for capital requirements already before 2004. However, our results are robust to including both institutions.

[10] Note that the CSE holding companies themselves had never been subject to the net capital rule.

Third, even though the Net Capital Rule Exemption became effective on August 20, 2014,[11] it did not allow exempted broker-dealers to use internal models and to recognize CDSs for regulatory purposes immediately. Instead, the internal models of CSE-affiliated broker-dealers were authorized at different dates throughout 2005.[12]

We use Dealscan and SDC data to identify firms that have relationships with treated lenders and bond underwriters, i.e., with institutions that are affected by the regulatory event and likely to increase the use of CDS contracts. More specifically, we define the dummy variable $\textit{CSE relationship}_{i,t}$ which equals one (i) if the firm has public debt and loans that were underwritten or extended by a CSE in the previous five years and (ii) if the CSE has already been authorized to use its internal risk models and hence to recognize CDSs for regulatory purposes.[13] The first condition (i) exploits heterogeneity in firm-bank relationships, whereas the second condition (ii) exploits differences in the timing of the regulatory shock to firm-bank relationships.

We use the regulatory shock to creditor demand for CDS insurance as a source of exogenous variation in $\textit{CDS trading}_{i,t}$. In columns 1 and 2 of Table I.1, we use $\textit{CSE relationship}_{i,t}$ and the interaction $\textit{CSE relationship}_{i,t} \times \textit{Inst. own.}_{i,t}$ to instrument $\textit{CDS trading}_{i,t}$ and the interaction $\textit{CDS trading}_{i,t} \times \textit{Inst. own.}_{i,t}$. As expected, the instruments have significant positive coefficient estimates. A CDS contract is more likely to be written on a firm if one of its creditors has been exempted from the Net Capital Rule and can recognize CDS protection for regulatory purposes.[14] The Angrist-Pischke F-statistic of

Nevertheless, their capital requirements were reduced thanks to the Net Capital Rule Exemption of their affiliated broker-dealers (Levine, 2010).

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

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

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

[14] The instruments allow us to identify the endogenous variables separately (see, e.g., Butler, Fauver, and Mortal, 2009). The instrument $\textit{CSE relationship}_{i,t}$ is strongly related to $\textit{CDS trading}_{i,t}$ whereas its correlation with $\textit{CDS trading}_{i,t} \times \textit{Inst. own.}_{i,t}$ is economically small. By contrast, $\textit{CSE relationship}_{i,t}$

excluded instruments exceeds 10. To provide further evidence that the relevance condition of the instruments is satisfied, we show in columns 3 and 4 of Table K.1 that the CDSs of firms with treated creditors ($\textit{CSE relationship}_{i,t} = 1$) become more liquid.

Column 3 to 5 of Table I.1 shows the second stage for distance-to-default, Tobin's q, and investment, respectively. The coefficient of the (instrumented) interaction term $\textit{CDS trading (pred.)}_{i,t} \times \textit{Inst. own.}_{i,t}$ is negative and highly significant in each case. Overall, our instrumental variable estimation suggests that CDS trading has an adverse *causal* effect on the bankruptcy risk, Tobin's q, and investment activity of firms with powerful shareholders.

$\times$ $\textit{Inst. own.}_{i,t}$ is strongly related to $\textit{CDS trading}_{i,t} \times \textit{Inst. own.}_{i,t}$ but not to $\textit{CDS trading}_{i,t}$.

Table I.1. The 2004 Net Capital Rule Exemption and the real effects of CDS trading

This table shows estimates from two-stage least squares panel regressions for credit risk as measured by distance-to-default, for firm value as measured by Tobin's q, and for investment as measured by capital expenditures scaled by lagged property, plant, and equipment. We use a regulatory shock to creditor demand for CDS insurance, the Net Capital Rule Exemption of August 20, 2004, as a source of exogenous variation in *CDS trading*. This regulatory change allowed broker-dealers to use their own internal models to assess risk and calculate adequate capital levels. It applied to broker-dealers that were part of so-called consolidated supervised entities (CSEs), i.e., the five major U.S. investment banks as of 2004: Bear Sterns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley. After the 2004 exemption, CSE-affiliated broker-dealers were allowed to reduce their capital requirements for derivatives-related credit risk through hedging with CDSs. The CDS availability indicator *CDS trading* and its interaction with *Institutional ownership* are instrumented with *CSE relationship* and its interaction with *Institutional ownership*. *CSE relationship* is an indicator variable equal to one in a given firm-quarter if (i) the firm has had public debt underwritten or loans extended by a CSE in the previous five years and (ii) the CSE has already obtained the authorization to use internal models. Columns 1 and 2 report first-stage estimates. Columns 3 to 5 report second-stage estimates. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. All specifications include the same firm controls as in Table 4 and Table 6 as well as firm, calendar quarter, and fiscal quarter fixed effects. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table B.1 for variable definitions.

	1st stage		2nd stage		
	CDS trading	CDS trading × Inst. own.	Distance-to-default	Tobin's q	Investment
	(1)	(2)	(3)	(4)	(5)
CSE relationship	0.209***	-0.043***			
	(9.04)	(-4.13)			
CSE relationship × Inst. own.	0.055	0.480***			
	(0.89)	(11.96)			
Institutional ownership	-0.053***	0.090***	1.892***	0.914***	0.030***
	(-3.43)	(9.81)	(5.34)	(12.61)	(9.04)
CDS trading (pred.) × Inst. own.			-5.831***	-0.716**	-0.035***
			(-3.97)	(-2.14)	(-2.68)
CDS trading (pred.)			0.549	-0.059	0.035***
			(0.57)	(-0.25)	(4.29)
Controls	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes
Observations	112,443	112,443	112,443	121,305	114,285
F-stat A-P test of excl. instr.	86.06	150.59			

J. Covariate balancing of sample firms

Fig. J.1 complements the analysis in Section 4.4.2 of the paper by showing the kernel density of selected covariates for treatment and control firm-quarters before and after applying the overlap weighting method proposed by Li, Morgan, and Zaslavsky (2018).

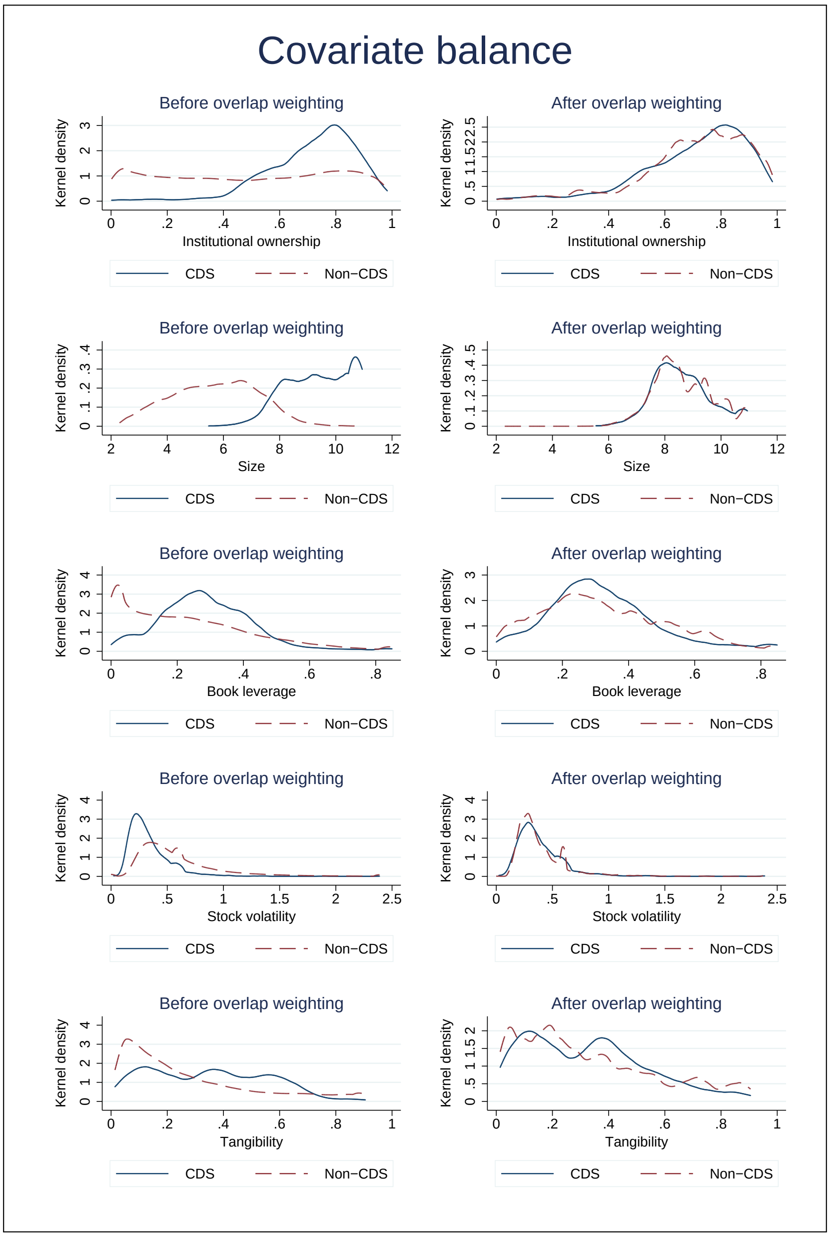

Fig. J.1. This figure shows the kernel density of selected covariates for treatment and control firm-quarters before and after applying the overlap weighting method proposed by Li, Morgan, and Zaslavsky (2018). This figure only shows the continuous covariates from the logit specification used for creating the synthetic sample in column 3 of Table 5. The binary covariates (*Rated*, *Investment grade*, and *Commercial paper issuer*) are included in the logit model but are not plotted.

K. Further empirical results

K.1. CDS liquidity after the CDS Big Bang and the Net Capital Rule Exemption

As mentioned in Section 4.4.1, Table K.1 shows a significant increase in CDS liquidity in the twelve calendar quarters around the CDS Big Bang (columns 1 and 2) and around the implementation of the Net Capital Rule Exemption of 2004 (columns 3 and 4). The latter is used as an alternative identification strategy in Internet Appendix I.

Table K.1. CDS Liquidity after the CDS Big Bang and after the Net Capital Rule Exemption
This table shows estimated coefficients from models for changes in CDS liquidity around the CDS Big Bang of April 4, 2009 and around the Net Capital Rule Exemption of CSE-affiliated broker-dealers, which was introduced on August 20, 2004 and implemented throughout 2005. CDS liquidity is computed as the negative of the CDS illiquidity measure of Junge and Trolle (2015). In columns 1 and 2, CDS liquidity is regressed on the indicator variable *Post 2009Q1* that equals one for firm-quarters after the CDS Big Bang. In columns 3 and 4, CDS liquidity is regressed on the indicator variable *CSE relationship* that equals one in a given firm-quarter if (i) the firm has had public debt underwritten or loans extended by a CSE in the previous five years and (ii) the CSE has already obtained the authorization to use internal models. *CSE relationship* is based on all the lead lenders from Dealscan and underwriters of non-convertible debt from SDC that have had a relationship with a given firm in the previous five years. The sample periods are chosen to cover the respective events (CDS Big Bang on April 4, 2009 and 2005Q1 to 2005Q4 for the Net Capital Rule Exemption) plus an additional twelve calendar quarters surrounding the respective event windows. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table B.1 for variable definitions.

	CDS liquidity			
	CDS Big Bang		Net Capital Rule Exemption	
	(1)	(2)	(3)	(4)
Post 2009Q1	0.511***	0.736***		
	(5.54)	(6.98)		
CSE relationship			0.597***	0.480***
			(5.11)	(4.57)
Book leverage		-11.693***		-1.925***
		(-5.53)		(-3.21)
Tangibility		-8.885***		-2.600**
		(-4.36)		(-2.35)
Size		0.242		0.109
		(0.60)		(0.65)
Rated		-1.449*		-1.292
		(-1.93)		(-1.44)
Investment grade		-0.269		-0.123
		(-0.86)		(-1.00)
Comm. paper issuer		2.316***		1.098***
		(3.90)		(4.59)
Tobin's q (lagged)		0.828***		0.392***
		(4.56)		(5.01)
Firm F.E.	Yes	Yes	Yes	Yes
Time F.E.	No	No	No	No
Period	2007Q4-2010Q3	2007Q4-2010Q3	2003Q3-2007Q2	2003Q3-2007Q2
Observations	5,686	5,663	7,332	7,297
Adjusted R^2	0.39	0.44	0.41	0.44

K.2. Additional robustness tests

- Table K.2: Saturating panel regressions with time-by-industry fixed effects.
- Table K.3: Alternative measures of credit risk, firm value, and investment.
- Table K.4: Alternative measures of shareholder bargaining power, CDSs, and effects on bankruptcy risk, firm value, and investment.
- Table K.5: Restricting regression samples to observations from either before or after 2009 to remove a potential structural break generated by the CDS Big Bang.
- Table K.6: Restricting regression samples to firms with *CDS traded* = 1 or, alternatively, to firms with *CDS trading* = 1.

Table K.2. Specifications with industry-by-quarter fixed effects

This table shows estimates from panel regressions for CDS protection, credit risk, firm value, and investment, including industry-by-quarter (Fama-French 48 industry groups) fixed effects. Columns 3 and 4 analyze the logarithm of *CDS net protection* (i.e., the ratio of CDS net notional amount to total firm debt at quarter-end) plus one as dependent variable. These specifications use the same control variables as in Table 2 over a sample covering firm-quarter observations for the period 2008Q4-2014Q4 for which DTCC data on CDS notional amount are available. Columns 3 and 4 analyze credit risk as measured by the distance-to-default. Columns 5 and 6 analyze firm value as measured by Tobin's q. Columns 7 and 8 analyze investment as measured by capital expenditures scaled by lagged property, plant, and equipment. Columns 3 through 8 include the same firm controls as in Table 4 and Table 6 as well as firm and fiscal quarter fixed effects, and use a sample containing firm-quarter observations for the period 2001Q1-2014Q4. In odd columns, the dependent variable is regressed on institutional ownership *Inst. own.* as a proxy of shareholder bargaining power, *CDS trading*, and the interaction *Inst. own.* × *CDS trading*. In even columns, the continuous variable *Inst. own.* is replaced by the indicator variable *Inst. own. (top 25%)*, which equals one if institutional ownership is in the top 25% quartile of the regression sample. 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		Distance-to-default		Tobin's q		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CDS trading × Institutional ownership			-1.440***		-0.815***		-0.014***	
			(-2.98)		(-9.14)		(-3.31)	
Institutional ownership	0.124**		1.415***		0.929***		0.027***	
	(2.10)		(5.13)		(16.76)		(9.97)	
CDS trading × Inst. own. (top 25%)				-0.474***		-0.141***		-0.003**
				(-3.08)		(-5.38)		(-2.49)
Institutional ownership (top 25%)		0.029**		0.201**		0.150***		0.004***
		(2.23)		(2.06)		(8.72)		(4.47)
CDS trading			0.481**	0.323*	0.120***	-0.021	0.003	0.000
			(2.40)	(1.79)	(2.94)	(-0.53)	(1.61)	(0.28)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	No	No	No	No	No	No	No	No
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,301	5,301	111,956	111,956	120,797	120,797	113,794	113,794
Adjusted R^2	0.91	0.91	0.54	0.54	0.69	0.69	0.35	0.35

Table K.3. Alternative dependent variables

This table shows estimates from panel regressions for the dependent variables *Z-score*, *ROA*, and *PPE growth* as measures of credit risk, firm value, and investment activity. The dependent variables are regressed on the indicator variable *CDS trading*, *Institutional ownership* as a proxy of shareholder bargaining power, and the interaction *Inst. own.* × *CDS trading*. In columns 3, 6, and 9, 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 25% quartile of the regression sample. All specifications include the same firm controls as in Table 4 and Table 6 as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table B.1 for variable definitions.

	Z-score			ROA			PPE growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CDS trading × Institutional ownership		-0.245*			-0.007**			-0.016**	
		(-1.84)			(-2.09)			(-2.32)	
Institutional ownership		0.304***			0.010***			0.047***	
		(3.58)			(4.86)			(11.93)	
CDS trading × Inst. own. (top 25%)			-0.034			-0.002*			-0.004**
			(-1.07)			(-1.91)			(-2.28)
Institutional ownership (top 25%)			0.029			0.002***			0.008***
			(1.44)			(2.87)			(6.14)
CDS trading	0.097**	0.168***	0.117**	-0.001	0.001	0.000	-0.004*	0.002	-0.001
	(2.13)	(3.16)	(2.51)	(-0.52)	(1.00)	(0.22)	(-1.90)	(0.78)	(-0.36)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	122,019	114,610	114,610	129,131	121,287	121,287	122,138	114,740	114,740
Adjusted R^2	0.87	0.87	0.87	0.55	0.55	0.55	0.15	0.16	0.16

Table K.4. Alternative measures of shareholder bargaining power, CDS, and real outcomes
This table shows panel regressions for *Distance-to-default*, *Tobin's q*, and *Investment*. Instead of *Institutional ownership*, we use three alternative ownership variables as measures of shareholder bargaining power. *Active institutional ownership* is defined as institutional ownership corrected for the shareholdings of (quasi-)index tracking institutional investors. *Institutional ownership (top 5 investors)* measures ownership concentration as the fraction of outstanding shares held by the top five investors of the firm. *No. of monitoring shareholders* counts the institutional investors whose holding value in the firm is in the top 10% of their portfolio. All specifications include the same firm controls, fixed effects, and regression samples as in Tables 4 and 6. 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			Tobin's q			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CDS trading × Active institutional ownership	-1.087*			-0.358***			-0.020***		
	(-1.68)			(-3.36)			(-4.65)		
Active institutional ownership	1.260***			1.275***			0.035***		
	(3.79)			(17.82)			(9.75)		
CDS trading × Inst. own. (top 5 inv.)		-3.293***			-0.359**			-0.018**	
		(-3.60)			(-2.23)			(-2.41)	
Institutional ownership (top 5 investors)		-0.257			-0.301***			0.011**	
		(-0.55)			(-3.47)			(2.28)	
CDS trading × No. monitoring shareholders			-0.058			-0.142***			-0.001***
			(-1.08)			(-14.76)			(-2.78)
Number monitoring shareholders			0.436***			0.202***			0.001***
			(10.32)			(23.75)			(3.81)
CDS trading	0.189	0.804**	-0.150	0.107**	0.042	0.160***	0.006***	0.005**	0.001
	(0.87)	(2.46)	(-0.91)	(2.23)	(0.70)	(4.62)	(3.37)	(2.08)	(0.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112393	112443	112399	120569	121305	120577	113640	114285	113645
Adjusted R^2	0.53	0.53	0.53	0.68	0.67	0.69	0.35	0.34	0.34

Table K.5. Regression samples restricted to period before and after the 2009 CDS Big Bang
This table shows estimates from models for *CDS net protection* and *CDS trading* in Panel A and for *Distance-to-default*, *Tobin's q*, and *Investment* in Panel B. Models for *CDS trading* are specified as logit regressions (estimated average marginal effects reported). Models for all other dependent variables are linear panel regressions. The sample periods are chosen such that they exclude the structural break caused by the CDS Big Bang in 2009Q2, i.e., we drop all observations either before or after the Big Bang depending on whether more observations are available before or after. In columns 1 to 3 of Panel A, given that more observations with data on CDS net protection are available after the Big Bang, we restrict the sample period to 2009Q2-2014Q4. In all remaining columns of Panel A as well as in Panel B, given that more observations are available before the Big Bang, we restrict the sample period to 2001Q1-2009Q1. The independent variables are *Institutional ownership* as a proxy of shareholder bargaining power, *CDS trading*, and the interaction *Inst. own.* × *CDS trading*. *Inst. own. (top 25%)* equals one if *Inst. own.* is in the top 25% quartile of the regression sample. All specifications include the same firm controls and fixed effects as in Tables 2, 4, and 6. 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.

Panel A

	CDS net protection		CDS trading	
	(1)	(2)	(3)	(4)
Institutional ownership	0.113*		0.015***	
	(1.95)		(3.43)	
Institutional ownership (top 25%)		0.030**		0.004***
		(2.19)		(2.69)
Firm F.E.	Yes	Yes	No	No
Industry F.E.	No	No	Yes	Yes
Controls, time, and fiscal quarter F.E.	Yes	Yes	Yes	Yes
Sample	2009Q2-2014Q4	2009Q2-2014Q4	2001Q1-2009Q1	2001Q1-2009Q1
Observations	4,814	4,814	71,131	71,131
Adjusted / Pseudo R^2	0.92	0.92	0.68	0.67

Panel B

	Distance-to-default		Tobin's q		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
CDS trading × Institutional ownership	-2.139***		-0.665***		-0.009	
	(-3.33)		(-5.63)		(-1.60)	
Institutional ownership	1.730***		1.091***		0.035***	
	(5.79)		(16.50)		(9.97)	
CDS trading × Inst. own. (top 25%)		-0.447**		-0.502***		-0.004**
		(-2.49)		(-8.00)		(-2.10)
Institutional ownership (top 25%)		0.215**		0.298***		0.005***
		(2.05)		(8.50)		(3.95)
CDS trading	0.593***	0.277	0.123***	0.258***	0.004**	0.003*
	(2.63)	(1.46)	(2.88)	(4.55)	(2.04)	(1.70)
Controls, firm, time, and fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Sample	2001Q1-2009Q1	2001Q1-2009Q1	2001Q1-2009Q1	2001Q1-2009Q1	2001Q1-2009Q1	2001Q1-2009Q1
Observations	75,617	75,617	81,597	81,597	75,696	75,696
Adjusted R^2	0.63	0.63	0.70	0.10	0.35	0.35

Table K.6. Regression samples restricted to traded and trading firms

This table shows estimates from panel regressions for *Distance-to-default*, *Tobin's q*, and *Investment*. In columns 1, 2, and 3, the regression samples are restricted to firms that have a quoted CDS contract on their debt for at least one quarter in the period 2001Q1-2014Q4 (firms are *CDS traded*). In these columns, the dependent variables are regressed on *Institutional ownerhsip* as a proxy for shareholder bargaining power, the indicator variable *CDS trading*, which equals one if the firm has quoted CDS contracts on its debt, and the interaction *Inst. own.* × *CDS trading*. In columns 4, 5, and 6, the regression samples only comprise observations with a quoted CDS contract in each firm-quarter (firms are *CDS trading*). In these columns, the variable *CDS trading* is replaced by *CDS liquidity (pct)*, which equals the firm's percentile of the negative of the Junge and Trolle (2015) CDS illiquidity measure (averaged over a given quarter). All specifications include the same firm controls used in Table 4 and Table 6 as well as firm, calendar quarter, and fiscal quarter fixed effects. The sample contains firm-quarter observations for the period 2001Q1-2014Q4. The t-statistics (in parentheses) are calculated with robust standard errors clustered by firm. Significance at the 10%, 5%, and 1% level is indicated by *, **, ***, respectively. Refer to Appendix Table B.1 for variable definitions.

	Sample: *CDS traded* = 1			Sample: *CDS trading* = 1		
	Dist.-to-def. (1)	Tobin's q (2)	Investment (3)	Dist.-to-def. (4)	Tobin's q (5)	Investment (6)
CDS trading × Inst. own.	0.652	-0.440***	-0.012**			
	(0.95)	(-3.39)	(-2.10)			
CDS trading	-0.716***	0.131***	-0.004**			
	(-3.33)	(2.84)	(-2.30)			
CDS liqu.(pct)× Inst. own.				-3.405***	0.047	-0.010
				(-2.79)	(0.23)	(-1.24)
CDS liqu. (pct)				2.029***	0.105	0.008***
				(5.32)	(1.62)	(3.17)
Institutional ownership	-1.105	0.443***	0.022***	0.246	-0.142	0.006
	(-1.57)	(3.39)	(3.53)	(0.30)	(-1.24)	(1.21)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Fiscal quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,017	25,333	24,214	16,773	17,396	16,701
Adjusted R^2	0.60	0.72	0.48	0.59	0.77	0.52

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