Does the Tail Wag the Dog? The Effect of Credit Default Swaps on Credit Risk

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Outline

- Current Research: Recent Working Papers
- Empty Creditor Problem
- Literature and Hypothesis
- Data and Empirical Methods
- CDS Trading and Credit Risk
- Understanding the Mechanisms
- Hypotheses and Results

Current Research: Recent Working Papers

- "Background Risk and Trading in a Full-Information Rational Expectations Economy," (with R.C. Stapleton and Q. Zeng).

- "Private Placements to Owner-Managers: Theory and Evidence," (previously titled "Private Placements, Regulatory Restrictions and Firm Value: Theory and Evidence from the Indian Market," (with V.R Anshuman and V.B. Marisetty).

- "Liquidity and Portfolio Management: an Intra-day Analysis," (with J. Cherian and S. Mahanti).

- "Liquidity in the Securitized Product Market," (with N. Friewald and R. Jankowitch). ←

- "Does the Tail Wag the Dog? The Effect of Credit Default Swaps on Credit Risk," (with D.Y. Tang and S.Q. Wang). ←

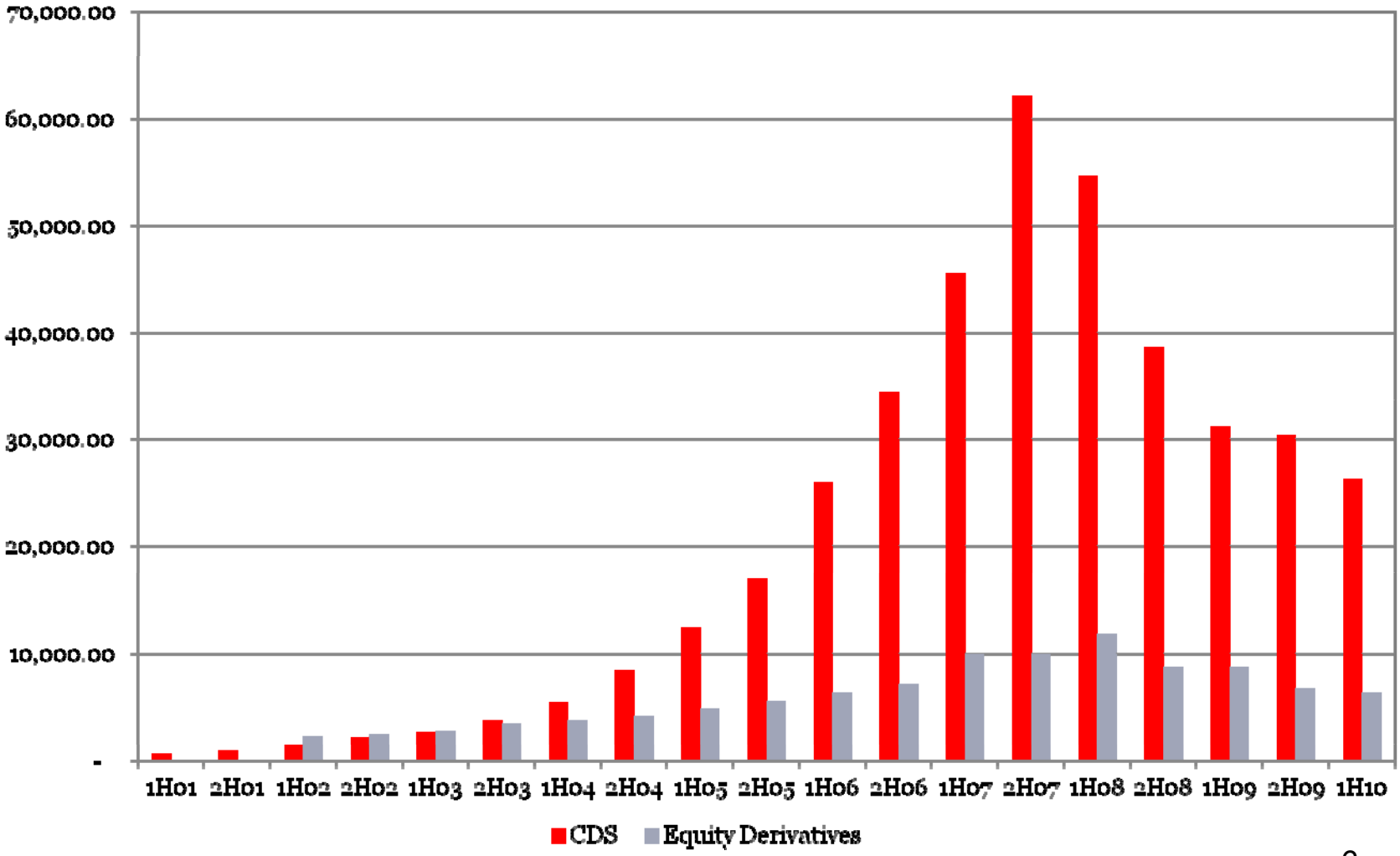
Empty Creditor Problem: Examples

- CIT Group filed for Chapter 11 in November 2009
  - Bankruptcy recovery rate 68.125%
  - Restructuring exchange offer 82.5% in July 2009
  - 90% creditors voted for restructuring
  - Biggest creditor: Bank of America, rumored CDS protection buyer
  - Goldman made loan to CIT in June 2008, bought CDS in January 09
- YRC got into financial difficulty in 2009
  - 95% creditors approved restructuring plan
  - Brigade Capital, hedge fund with rumored CDS protection, tried to hold-out the restructuring
  - Workers threatened to protest in front of hedge fund offices
  - Goldman stopped making the market for YRC CDS
  - Reached restructuring agreement in 2011

Credit Default Swaps (CDS)

- Insurance-like contracts on losses from credit events
- Tool for credit risk transfer, allows shorting of credit
- CDS permit the creation of “empty creditors”!
  - Potentially detach the economic interest from voting power of creditors
  - Significantly change the debtor-creditor landscape
- Headline news re: AIG in ‘08-’09, Greece today, and often mentioned in the popular press
- Potential to change the behavior of investors, especially in distress, increasing the probability of bankruptcy

Global Notional Size (ISDA Survey)



CDS: Savior or Evil?

- Greenspan, 98-05: CDS is “extraordinarily useful”
- Soros, 2009: CDS is “instrument of destruction” and should be banned
- U.S. Dodd-Frank regulates CDS
- E.U. intends to ban “naked CDS”
- China and India launched on-shore CDS trading
- Stulz (2010) asks for a better understanding of CDS
- Duffie (2010): don’t throw the baby out with the bathwater

Our Study

- Empirically examine the impact of CDS trading on bankruptcy risk
  - We find that CDS trading increases bankruptcy risk
  - The relationship seems causal from propensity score matching and other methods
- Understand the channels for the effect
  - Establish evidence for the “empty creditor” channel modeled by Bolton and Oehmke (2011)

Prior Studies

- Acharya and Johnson (2007): insider trading in CDS
- Implications of CDS trading on CDS users:
  - Duffee and Zhou (2001), Fung, Wen, and Zhang (2011)
- Implications of CDS trading on reference entities:
  - Ashcraft and Santos (2009): CDS increases borrowing cost for risky firms
  - Saretto and Tookes (2011): CDS firms are able to maintain higher leverage and longer debt maturity

“Empty Creditor” Model

- Bolton and Oehmke (2011)
- Three-period investment model with interim payment and continuation, giving rise to strategic default
- CDS increases debt capacity, allows funding more projects
- Lenders become tougher negotiators and curb strategic default
- Some lenders over-insure (relative to the social optimum), become “empty creditors”, force inefficient bankruptcies

Hypotheses

- **H1**: Bankruptcy risk increases after CDS introduction
- **H2**: Bankruptcy risk increases with the amount of CDS outstanding
- **H3**: CDS effect is more severe for CDS that excludes restructuring as credit event
- **H4**: Number of lenders increases after CDS introduction

Data

- CDS transactions 1997-2009 from CreditTrade and GFI (cross-checked with Markit)
  - 901 CDS introduction for N.A. corporates
- Bankruptcy data from New Generation Research, Altman, FISD, UCLA-LoPucki, Moody's
  - 1628 bankruptcies; 60 with CDS
- Firm accounting and financial data from CRSP and Compustat
- Bond trading data from TRACE

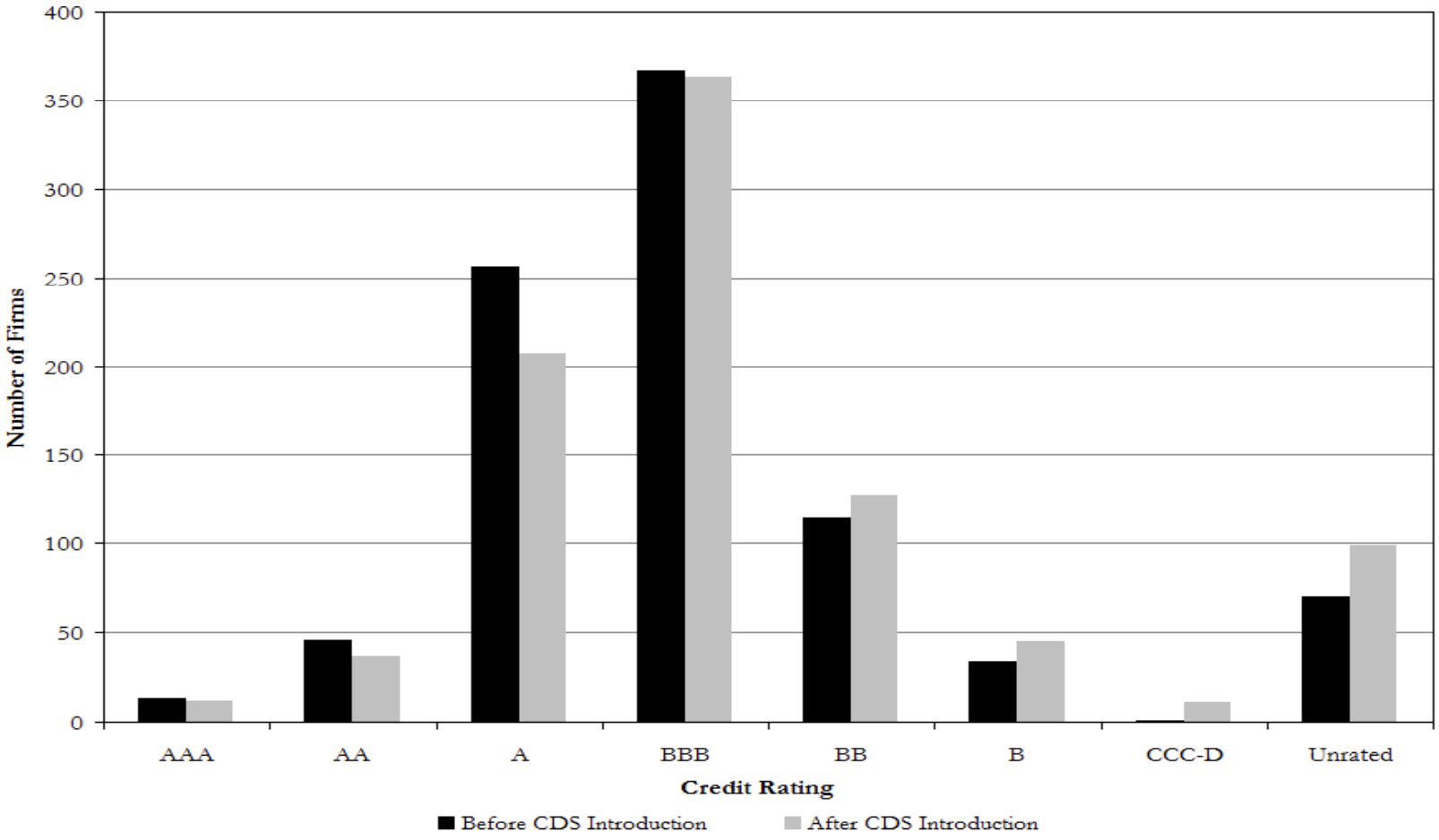
Variables and Methodology

- *CDS Firm*: Indicator for firms with CDS at any time
- *CDS Active*: Indicator for CDS introduction and after
- Proportional Hazard model (Bharath and Shumway (2008)

$$\Pr(Y_{it} = 1 | X_{it-1}) = \frac{1}{1 + \exp(-\alpha - \beta' X_{it-1})}$$

  - Rating downgrading
  - Bankruptcy filing
  - Control variables: size, leverage, volatility, stock return, profitability

CDS Introduction and Rating Change



Test H1: Baseline Results

	Probability of Downgrades		Probability of Bankruptcy	
ln(E)	−0.736 * **	−0.735 * **	−0.710 * **	−0.713 * **
	(0.014)	(0.014)	(0.024)	(0.024)
ln(F)	0.503 * **	0.507 * **	0.713 * **	0.711 * **
	(0.015)	(0.015)	(0.023)	(0.023)
$1/\sigma_E$	−0.017	−0.062 * *	−1.675 * **	−1.626 * **
	(0.026)	(0.027)	(0.131)	(0.131)
$r_{it-1} - r_{mt-1}$	−0.252 * **	−0.281 * **	−1.331 * **	−1.320 * **
	(0.035)	(0.035)	(0.111)	(0.111)
NI/TA	−0.000	−0.003	−0.038 * **	−0.038 * **
	(0.024)	(0.025)	(0.013)	(0.013)
CDS Firm		0.755 * **		−2.009 * **
		(0.057)		(0.711)
CDS Active	1.371 * **	0.691 * **	0.400 * *	2.373 * **
	(0.045)	(0.067)	(0.177)	(0.729)
Time Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
R-Square	14.75%	15.08%	24.06%	24.18%
N	658966	658966	658966	658966
# of Downgrades(Bankruptcy)	3863	3863	940	940
CDS Active Odds Ratio	3.939	1.925	1.492	10.73
CDS Active Marginal Effect	0.78%	0.39%	0.06%	0.33%
Sample Probability of a Downgrade(Bankruptcy)	0.59%	0.58%	0.14%	0.14%

Endogeneity in CDS Trading

- Potential endogeneity in CDS trading
  - Firms are self-selected into CDS trading
  - It is possible that investors expect the increase in bankruptcy risk for a firm and initiate CDS trading on it
- To control for endogeneity, we use:
  - Distance-to-default matching: matching firm based on default probability
  - Propensity score matching
  - Two-stage Heckman correction

Test H1: Distance-to-Default Matching

	Probability of Downgrades		Probability of Bankruptcy	
ln(E)	−0.447 ***	−0.462 ***	−0.891 ***	−0.923 ***
	(0.028)	(0.027)	(0.113)	(0.114)
ln(F)	0.270 ***	0.318 ***	0.865 ***	0.853 ***
	(0.031)	(0.030)	(0.118)	(0.116)
$1/\sigma_E$	−0.008	−0.155 ***	−1.971 ***	−1.905 ***
	(0.038)	(0.042)	(0.317)	(0.315)
$r_{it-1} - r_{mt-1}$	−0.090	−0.614 ***	−0.101	−0.076
	(0.056)	(0.073)	(0.196)	(0.191)
NI/TA	−0.700 ***	−0.845 ***	−0.994 ***	−0.331
	(0.221)	(0.133)	(0.259)	(0.221)
CDS Firm		1.307 ***		−1.809 **
		(0.100)		(0.759)
CDS Active	1.313 ***	0.586 ***	0.773 ***	2.196 ***
	(0.069)	(0.083)	(0.299)	(0.759)
Time Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
R-Square	8.03%	12.02%	23.05%	23.16%
N	119143	119143	119143	119143
# of Downgrades(Bankruptcy)	1469	1469	67	67
CDS Active Odds Ratio	3.717	1.797	2.166	8.989
CDS Active Marginal Effect	1.46%	0.64%	0.04%	0.12%
Sample Probability of a Downgrade(Bankruptcy)	1.14%	1.13%	0.05%	0.05%

Propensity Score Matching

- Following Ashcraft and Santos (2009)
- Significant determinants of CDS trading are:
  - +: Size, Leverage, Rated, Bond Turnover
  - -: Volatility, Distance-to-default
- Pseudo R2 is 0.37
- Model estimates are used to match firm characteristics and control for unobserved omitted variables

Test H1: Difference-in-Difference Results

	(-1,1)			(-1,2)		
Variables	CDS Firm	Matched	Difference	CDS Firm	Matched	Difference
Δ Leverage	0.006	−0.010	0.016 ∗ ∗	0.003	−0.020	0.023 ∗ ∗
Δ EDF	0.022	0.018	0.004∗	−0.012	−0.054	0.042 ∗ ∗∗
Δ Z-Score	−0.405	−0.373	−0.032∗	−0.424	−0.266	−0.158∗
Δ Rating	0.385	0.260	0.126∗	0.717	0.642	0.075

Test H1: Propensity Score Matching

	Probability of Downgrades	Probability of Bankruptcy
ln(E)	−0.121***	−0.492***
	(0.021)	(0.091)
ln(F)	0.111***	0.593***
	(0.023)	(0.09)
$1/\sigma_E$	−0.251***	−1.883***
	(0.035)	(0.269)
$r_{it-1} - r_{mt-1}$	−0.344***	−0.799***
	(0.045)	(0.262)
NI/TA	0.054	1.869
	(0.096)	(1.139)
CDS Firm	−0.320***	−1.819**
	(0.065)	(0.732)
CDS Active	0.718***	1.865**
	(0.076)	(0.76)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
R-Square	8.72%	27.64%
N	113731	113731
# of Downgrades(Bankruptcy)	2157	82
CDS Active Odds Ratio	2.051	6.456
CDS Active Marginal Effect	1.33%	0.13%
Sample Probability of a Downgrade(Bankruptcy)	1.90%	0.07%

Test H1:Two-Stage Heckman Correction

	Probability of Downgrades	Probability of Bankruptcy
ln(E)	−0.662 * **	−0.639 * **
	(0.015)	(0.022)
ln(F)	0.415 * **	0.646 * **
	(0.015)	(0.022)
$1/\sigma_E$	−0.134 * **	−1.403 * **
	(0.029)	(0.126)
$r_{it-1} - r_{mt-1}$	−0.345 * **	−1.330 * **
	(0.038)	(0.109)
NI/TA	0.003	−0.032 * *
	(0.021)	(0.013)
CDS Firm	0.649 * **	−2.277 * **
	(0.059)	(0.71)
CDS Active	1.432 * **	2.680 * **
	(0.086)	(0.744)
Inverse Mills Ratio	−0.706 * **	−0.003
	(0.051)	(0.115)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
R-Square	14.64%	22.42%
N	657438	657438
# of Downgrades(Bankruptcy)	3723	940
CDS Active Odds Ratio	4.187	14.585
CDS Active Marginal Effect	0.80%	0.37%
Sample Probability of a Downgrade(Bankruptcy)	0.58%	0.14%

Test H1: CDS Effect and Analyst Coverage

	Probability of Bankruptcy		
	Low Analyst Coverage	High Analyst Coverage	Full Sample
ln(E)	−0.596 ∗ ∗∗	−0.713 ∗ ∗∗	−0.712 ∗ ∗
	(0.032)	(0.024)	(0.024)
ln(F)	0.584 ∗ ∗∗	0.711 ∗ ∗∗	0.710 ∗ ∗
	(0.032)	(0.023)	(0.023)
$1/\sigma_E$	−1.773 ∗ ∗∗	−1.626 ∗ ∗∗	−1.660 ∗ ∗
	(0.209)	(0.131)	(0.133)
$r_{it-1} - r_{mt-1}$	−1.286 ∗ ∗∗	−1.320 ∗ ∗∗	−1.319 ∗ ∗
	(0.156)	(0.111)	(0.111)
NI/TA	−0.026	−0.038 ∗ ∗∗	−0.039 ∗ ∗
	(0.017)	(0.013)	(0.013)
CDS Firm	−1.537	−2.009 ∗ ∗∗	−2.021 ∗ ∗
	(1.006)	(0.711)	(0.711)
CDS Active	1.986∗	2.373 ∗ ∗∗	2.329 ∗ ∗
	(1.044)	(0.729)	(0.737)
CDS Active* Low Coverage			0.134
			(0.359)
Low Coverage			−0.129∗
			(0.070)
Time Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
R-Square	20.12%	28.71%	24.21%
N	256404	402562	658966
# of Bankruptcies	450	490	940
CDS Active Marginal Effect	0.34%	0.32%	0.32%
Sample Probability of Bankruptcy	0.18%	0.12%	0.14%

Summary of H1 Testing Results

- CDS trading is positively related to bankruptcy risk

- Relationship is:
  - robust to controlling for endogeneity in CDS trading
  - robust to controlling for rating status and rating change effects

Understanding the Mechanisms

- Potential channels:
  - Monitoring channel
  - Restructuring channel
- They can co-exist, we want to establish which one is more important
- Restructuring channel predicts:
  - H2: Bankruptcy risk increases with the amount of CDS outstanding
  - H3: CDS effect is more severe for CDS that excludes restructuring as credit event
  - H4: Number of lenders increases after CDS introduction

Test H2: Exposure Matters

	Probability of Bankruptcy
ln(E)	−0.689 * **
	(0.026)
ln(F)	0.652 * **
	(0.026)
$1/\sigma_E$	−1.533 * **
	(0.104)
$r_{it-1} - r_{mt-1}$	−0.620 * **
	(0.075)
NI/TA	−0.076 * **
	(0.023)
CDS Firm	−0.582 * **
	(0.211)
Active CDS Outstanding/Debt	0.071 * *
	(0.032)
Time Fixed Effects	Yes
Industry Fixed Effects	Yes
R-Square	15.82%
N	658966
# of Bankruptcies	940
Active CDS Outstanding/Debt Odds Ratio	1.074
Active CDS Outstanding/Debt Marginal Effect	0.01%
Sample Probability of Bankruptcy	0.14%

Test H3: Restructuring as a Credit Event

	Probability of Bankruptcy		
	Model 1	Model 2	Model 3
ln(E)	−0.716 * **	−0.717 * **	−0.716 * **
	(0.024)	(0.024)	(0.024)
ln(F)	0.715 * **	0.716 * **	0.715 * **
	(0.023)	(0.023)	(0.023)
$1/\sigma_E$	−1.636 * **	−1.645 * **	−1.641 * **
	(0.132)	(0.131)	(0.132)
$r_{it-1} - r_{mt-1}$	−1.327 * **	−1.327 * **	−1.325 * **
	(0.111)	(0.111)	(0.111)
NI/TA	−0.037 * **	−0.037 * **	−0.037 * **
	(0.013)	(0.013)	(0.013)
CDS Firm	−0.206	−0.163	−0.432*
	(0.195)	(0.210)	(0.255)
No Restructuring CDS	1.315 * *		1.557 * **
	(0.565)		(0.599)
Modified Restructuring CDS		0.572	0.858
		(0.492)	(0.528)
Time Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
R-Square	24.06%	24.04%	24.08%
N	658966	658966	658966
# of Bankruptcies	940	940	940
NR CDS Odds Ratio	3.725		4.745
MR CDS Odds Ratio		1.772	2.358
NR CDS Marginal Effect	0.18%		0.22%
MR CDS Marginal Effect		0.01%	0.12%
Sample Probability of Bankruptcy	0.14%	0.14%	0.14%

Test H4: Creditor Coordination

- Relationship bank may have reputation concerns
- Lead bank is the delegated monitor
- Other banks may find it attractive to lend
- CDS trading encourages lending, but then lender coordination is more difficult and resulting in failure

Test H4: Change in the Number of Lenders

	Δ Number of Banks
Δ Ln(Asset)	6.291 * **
	(1.849)
Δ ROA	−0.396
	(2.76)
Δ Leverage	8.581*
	(5.201)
Δ Tangible Asset/Total Asset	−1.586
	(10.84)
CDS Active	2.432 * *
	(1.069)
Time Fixed Effects	Yes
Industry Fixed Effects	Yes
R-Square	9.75%
N	496

Test H4: Lender Coordination Failure

	Probability of Bankruptcy
ln(E)	−0.669 * **
	(0.026)
ln(F)	0.683 * **
	(0.024)
$1/\sigma_E$	−1.763 * **
	(0.136)
$r_{it-1} - r_{mt-1}$	−1.339 * **
	(0.111)
NI/TA	−0.040 * **
	(0.013)
CDS Firm	−2.210 * **
	(0.712)
CDS Active	2.378 * **
	(0.728)
Number of Banks	0.153 * **
	(0.035)
Time Fixed Effects	Yes
Industry Fixed Effects	Yes
R-Square	24.32%
N	658966
# of Bankruptcies	940
CDS Active Odds Ratio	10.783
Number of Banks Odds Ratio	1.165
CDS Active Marginal Effect	0.33%
Number of Banks Marginal Effect	0.02%
Sample Probability of Bankruptcy	0.14%

Summary and Extensions

- CDS trading causes bankruptcy risk to increase
- Finding consistent with “empty creditor” model of Bolton and Oehmke (2011)
- CDS trading affects banking relationships
  - Tougher lenders in recent times – post active CDS markets
- Welfare effects of CDS introduction: Increase in risk versus access to capital