Did CDS Trading Improve the Market for Corporate Bonds?

SANJIV DAS
Santa Clara University

MADHU KALIMIPALLI
Wilfrid Laurier University

SUBHANKAR NAYAK
Wilfrid Laurier University

FDIC/JFSR September 2011

In this paper

- We examine whether the introduction of CDS improved the bond market in terms of its underlying
  - efficiency, quality and liquidity.

- Taking a time-series perspective we ask:
  - Did an issuer's bonds become more efficient and liquid
    - after CDS trading was instituted on the reference instruments of the issuer?

- From a cross-sectional perspective we examine:
  - Are bonds of issuers on which CDS contracts trade more efficient and liquid than
    - bonds of issuers on which no CDS contracts are traded?

- Findings are robust to several variations.
- Rene Stulz (2009): Credit Default Swaps and the Credit Crisis
    - "…. much research is needed to understand better and quantify the social gains and costs of derivatives in general and credit default swaps in particular…."

Fig 1: Corporate bond trading before and after the commencement of CDS trading

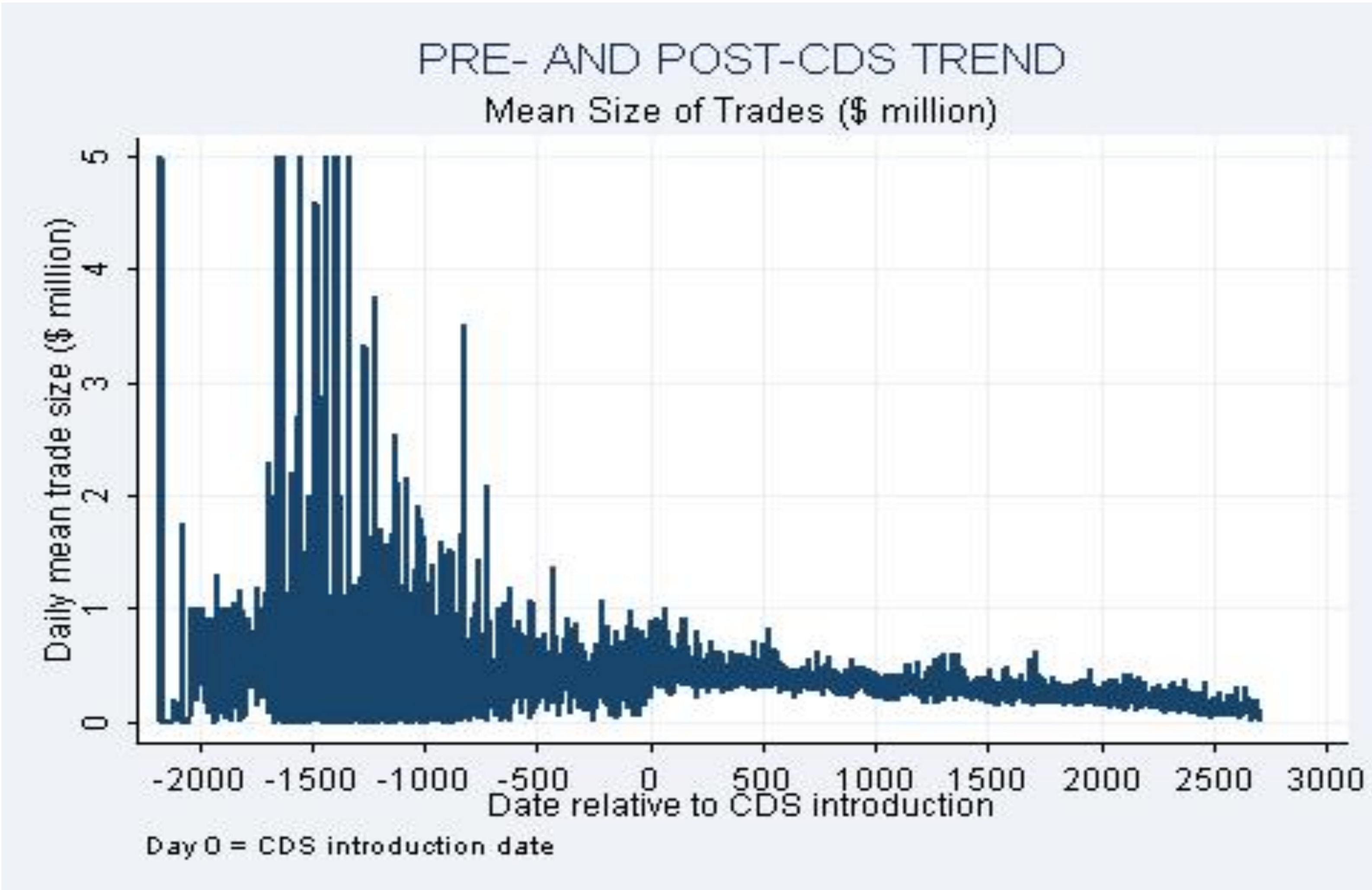
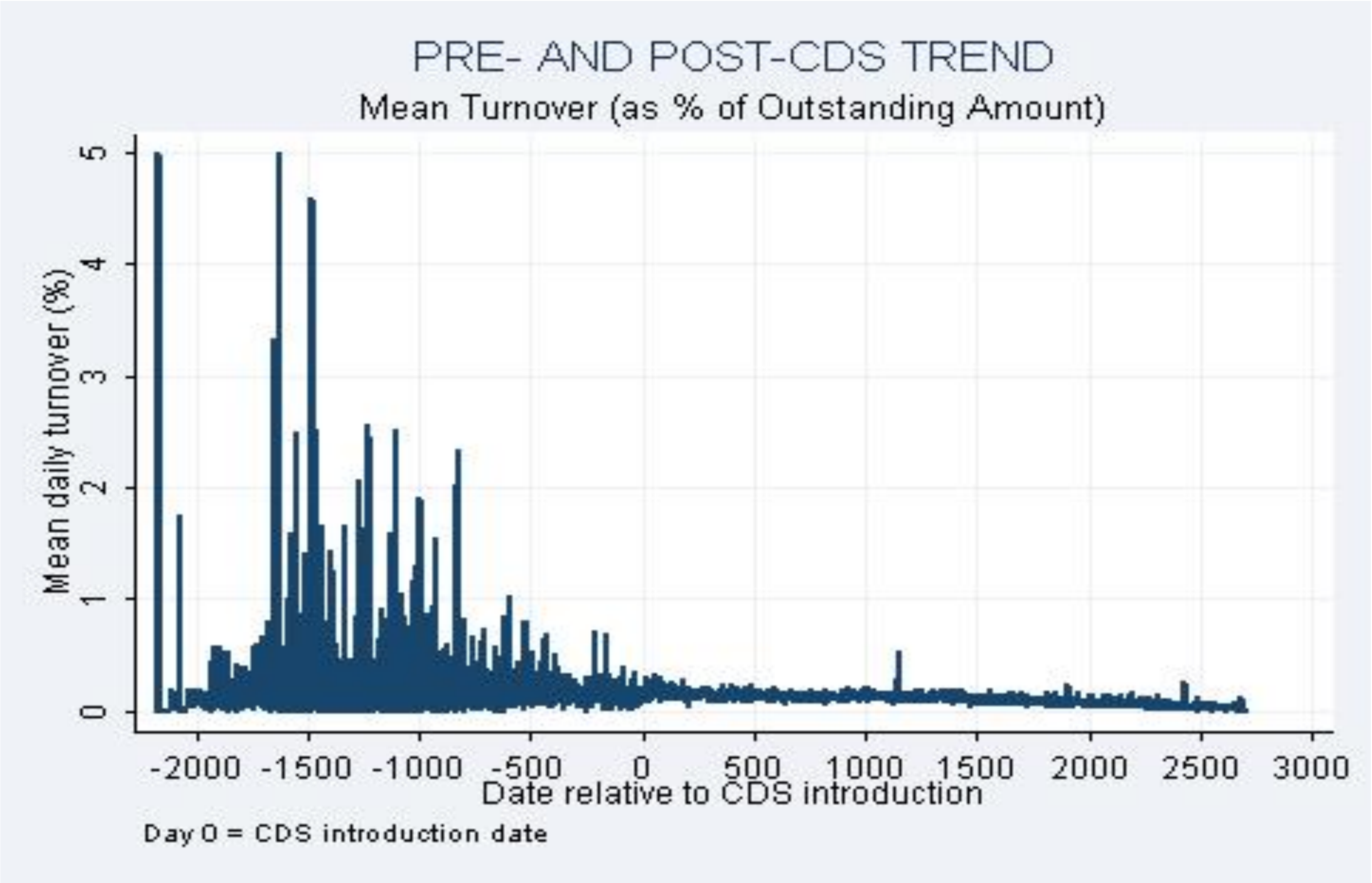
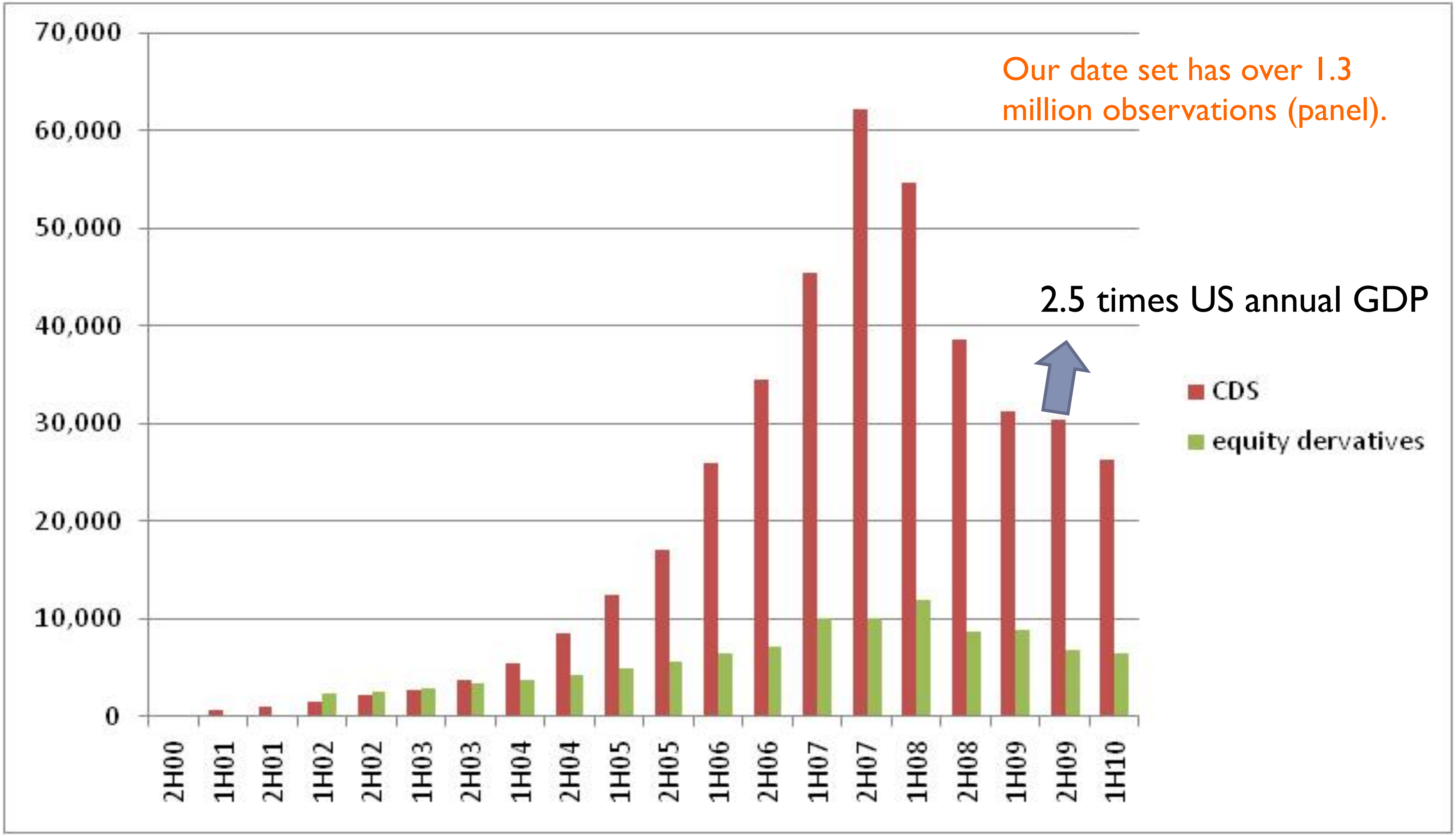


Fig 2: Bond turnover before and after the commencement of CDS trading



Notional Amounts Outstanding (in bi USD)
Source: ISDA



Our date set has over 1.3 million observations (panel).

2.5 times US annual GDP

Extant literature: overview

I. Relative efficiency of stock vs. bond markets
  - "Stocks are more efficient"
    - Kwon(1996); Downing, Underwood and Xing (2009); Gebhardt, Hvidkjaer and Swaminathan (2005);
  - "Bonds are more/equally efficient"
    - Hotchkiss and Ronen (2002); Ronen and Zhou (2009);

II. Price leadership role of CDS vs. stock and bond markets
  - the CDS market leads the bond market in determining the price of credit risk
  - Stocks lead CDS

III. Impact of CDS markets on debt and loan markets
  - Impact of CDS on cost of borrowing and market quality of equity

- Complements earlier work on Impact of options on the underlying equity markets
  - The effects are mainly positive (lower volatility, higher trading volume and relaxing short-sale constraints)

II.Price leadership role of CDS vs. stock and bond markets

- Blanco, Brennan and Marsh (2005):
  - the CDS market leads the bond market in determining the price of credit risk.
    - For 27 firms they examined, the CDS market contributes on average around 80% of price discovery

- Hull, Predescu and White (2005):
  - CDS market effectively anticipates credit rating down grades or negative credit rating changes in the market

II. Contd..

- Norden and Wagner (2008):
  - They find that CDS spreads explain loan rates much better than spreads of similar-rated bonds.

- Forte and Pena (2009):
  - find that stocks lead CDS and bonds more frequently than the reverse, and CDS market leads the bond market.

- Norden and Weber (2009):
  - They find that stock returns lead CDS and bond spread changes, and the CDS market contributes more to price discovery than the bond market
    - (stronger for US than for European firms)

- Baba and Inada (2009):
  - subordinated bond and CDS spreads for Japanese banks are largely cointegrated, and the CDS spread plays a bigger role in price discovery than the bond spread

III. Impact of CDS markets on debt and loan markets

- Ashcraft and Santos (2009):
  - CDS introduction has not lowered the cost of debt financing or loan funding for the average borrower

- Boehmer, Chava and Tookes (2010):
  - Examine the implications of derivatives and corporate debt markets
    - on equity market quality.
  - They find that listed options have more liquid equity and more efficient stock prices.
    - By contrast, firms with traded CDS contracts have less liquid equity and less efficient stock prices.
  - Overall, they find that the impact of CDS markets is generally most negative, followed by corporate bond markets, and then options.

- Ismailescu and Phillips (2011) :
  - Most recently, in sovereign bond markets, provide evidence that the introduction of sovereign CDS swaps improved efficiency in the underlying bonds.

Data sources

- CDS:
  - Bloomberg
  - Single-name 5yr CDS (60%)
- Bond:
  - TRACE and FISD
- Stocks:
  - CRSP
- Swap and VIX:
  - Datastream
- Time frame: 2002-2008

- Assumption:
  - CDS starting date in Bloomberg is the date of CDS introduction
- CDS introduction:
  - CDS market is OTC and hence decentralized
  - CDS introduction is initiated by the dealer banks depending on factors such as
    - size of outstanding debt on an issuer, underlying credit risk of the issuer, and demand for credit protection.

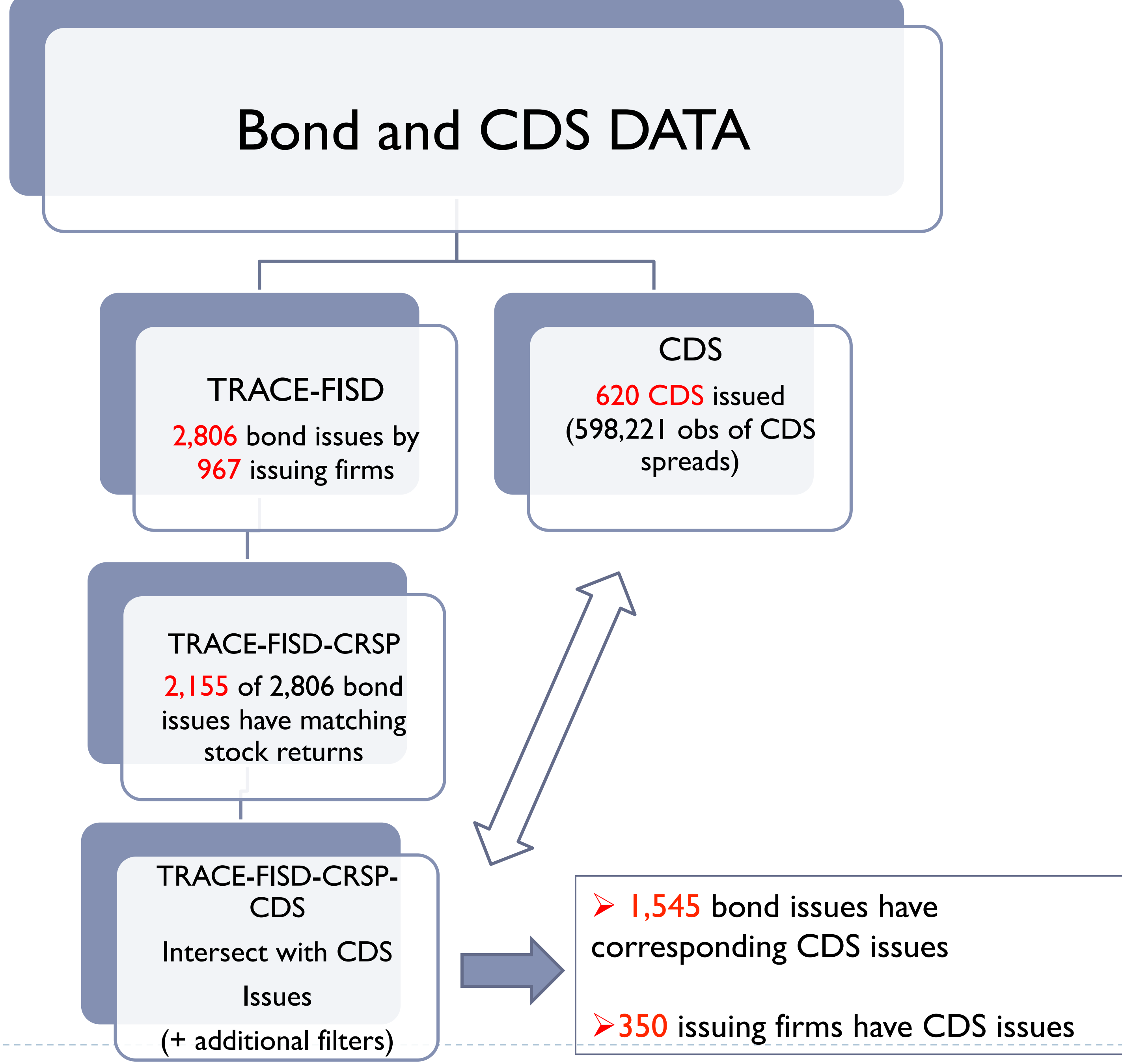

Bond and CDS DATA
TRACE-FISD
2,806 bond issues by 967 issuing firms
CDS
620 CDS issued (598,221 obs of CDS spreads)
TRACE-FISD-CRSP
2,155 of 2,806 bond issues have matching stock returns
TRACE-FISD-CRSP-CDS
Intersect with CDS Issues
(+ additional filters)
1,545 bond issues have corresponding CDS issues
350 issuing firms have CDS issues

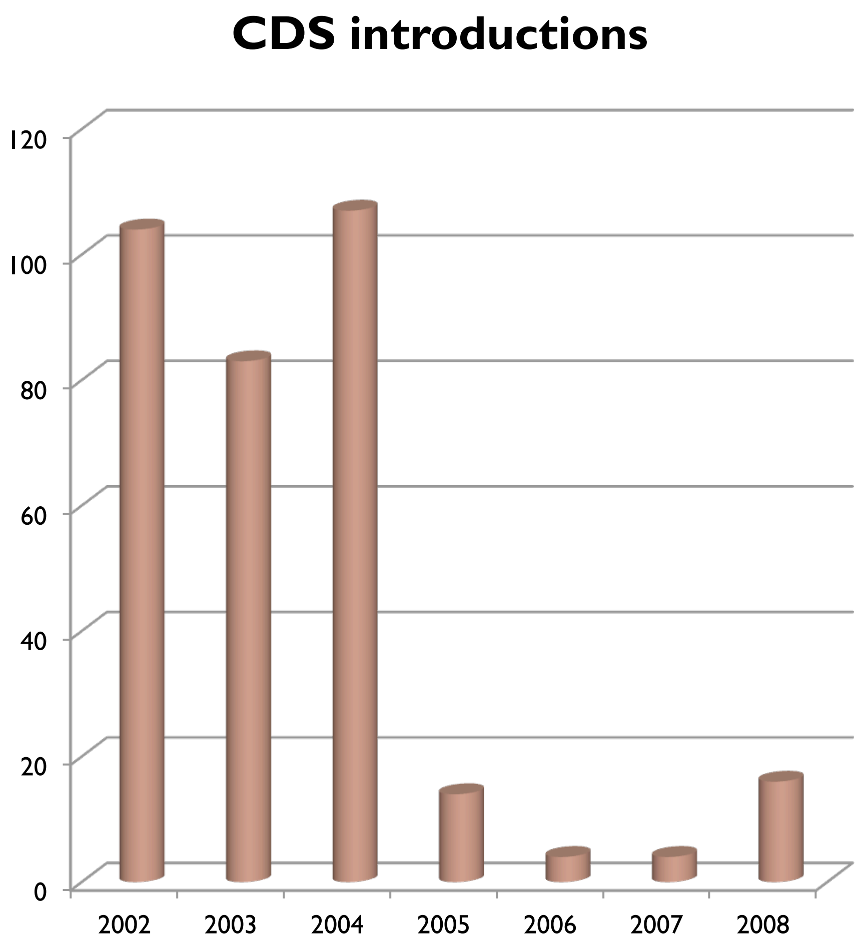
Table 1: Data & Summary statistics

Panel A: Final merged data summary statistics

- Sample period: 2002-2008
- 1,545 bond issues by 350 issuing firms with CDS issues
- 1,365,381 time-series observations (bond issues × trading days)
- 883.74 trading days per bond issue

- 1,545 bond issues:
  - 1,352 senior issues, remaining some form of junior issues
  - 1,520 fixed coupon issues, 25 zero coupon issues
  - all issues non-convertible
  - 662 callable, remaining non-callable
  - 63 putable, remaining non-putable
  - 983 Industrials, 355 Financials, 207 Utilities

Table 2, Panel A: CDS and Bond data



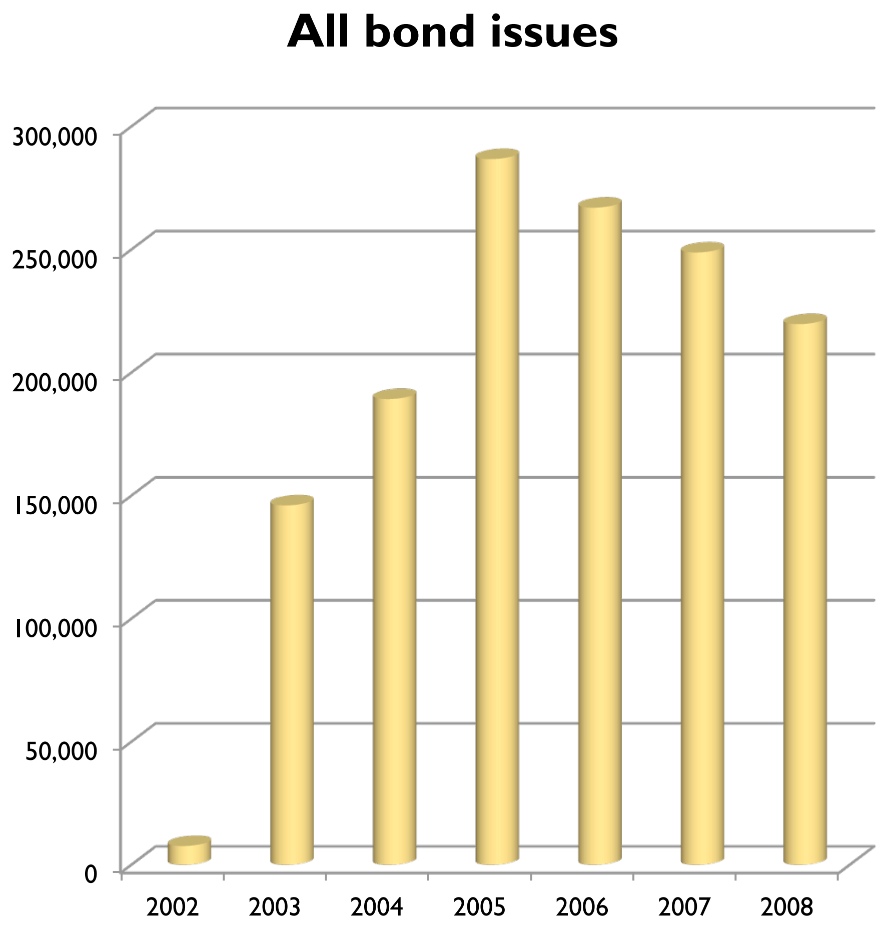


Table 2: Post-CDS correlations

Panel D: Correlations between contemporaneous and lagged return variables based on criteria 1 (NOBS: 187,003)

	$bndret_t$	$bndret_{t-1}$	$cdsret_t$	$cdsret_{t-1}$	$stkret_t$	$stkret_{t-1}$	$tryret_t$	$tryret_{t-1}$	$vixchng_t$	$vixchng_{t-1}$
$bndret_t$	1.000*									
$bndret_{t-1}$	−0.428*	1.000*								
$cdsret_t$	−0.071*	−0.051*	1.000*							
$cdsret_{t-1}$	−0.035*	−0.072*	0.195*	1.000*						
$stkret_t$	0.031*	0.003	−0.161*	−0.016*	1.000*					
$stkret_{t-1}$	0.036*	0.029*	−0.202*	−0.156*	0.002	1.000*				
$tryret_t$	0.047*	0.011*	0.072*	0.007*	−0.095*	−0.058*	1.000*			
$tryret_{t-1}$	0.009*	0.047*	0.050*	0.069*	−0.006*	−0.092*	0.019*	1.000*		
$vixchng_t$	−0.015*	−0.005	0.096*	−0.006	−0.485*	0.072	0.112*	0.009*	1.000*	
$vixchng_{t-1}$	−0.025*	−0.012*	0.135*	0.084*	0.015*	−0.496*	0.083*	0.104*	−0.112*	1.000*

* correlation values significant at 1% level

Bond returns are:

- -vely correlated to lagged bond returns, suggesting that there may be frequent return reversals in the bond markets.
- +vely correlated to
  - stock and Treasury returns, and
- -vely correlated to
  - volatility and CDS spreads, both contemporaneously and lagged.

Empirical Analysis of Bond Efficiency

We run partitioned (i.e., pre-CDS period versus the post-CDS period) panel regressions. The regression model is as follows:

$$\begin{aligned} BONDRET_{it} &= a_{i0} + a_{i1}STKRET_{it} + a_{i2}TRYRET_{it} + a_{i3}\Delta VIX_{it} \\ &\quad + a_{i4}\Delta CDSSPRD_{it} \\ &\quad + b_{i0}BONDRET_{i,t-1} + b_{i1}STKRET_{i,t-1} + b_{i2}TRYRET_{i,t-1} \\ &\quad + b_{i3}\Delta VIX_{i,t-1} + b_{i4}\Delta CDSSPRD_{i,t-1} \end{aligned}$$

Bond Efficiency tests

1. In all regressions we compute the F–statistic for the joint significance of the lagged variables – if the lagged variables are jointly significant, it implies that the bonds are relatively inefficient.

contemporaneous data

2.

$$D_1 = 1 - \left(\frac{\text{Constrained } R^2}{\text{Unconstrained } R^2} \right) \in (0, 1)$$

Contemporaneous & lagged data

The higher D_1 is, the greater the extent to which current bond returns are explained by lagged information – D_1 is a measure of bond inefficiency. We ran this test for each bond separately.

Hou and Muskowitz (RFS,2005)

Panel regressions

- Diagnostic tests
  1. heteroskedasticity:
     - exists, highly significant
  2. auto-correlation in residuals:
     - minor/marginal issue, weak significance
  3. multicollinearity:
     - doesn't exist, no significance
  4. clustering effect:
     - clusters based on either year or issuing firm with multiple bonds
     - doesn't exist, no significance

- Only (1) and (2) are relevant, and hence Newey West HAC correction is applied to the regressions

Table 4: Partitioned panel regressions

Panel A: Sample-selection criteria 1												
	Without lagged bond returns						With lagged bond returns					
	Pre-CDS panel		Post-CDS panel				Pre-CDS panel		Post-CDS panel			
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
$stkret_t$	0.014	0.00	0.008	0.00	0.006	0.00	0.018	0.00	0.008	0.00	0.005	0.00
$tryret_t$	0.484	0.00	0.478	0.00	0.499	0.00	0.535	0.00	0.530	0.00	0.556	0.00
$vixchng_t$	−0.011	0.08	−0.004	0.01	−0.003	0.05	−0.008	0.18	−0.006	0.00	−0.004	0.00
$cdsret_t$					−0.005	0.00					−0.007	0.00
$bndret_{t-1}$							−0.413	0.00	−0.432	0.00	−0.439	0.00
$stkret_{t-1}$	0.010	0.00	0.008	0.00	0.005	0.00	0.017	0.00	0.012	0.00	0.007	0.00
$tryret_{t-1}$	0.081	0.28	0.119	0.00	0.144	0.00	0.254	0.00	0.313	0.00	0.359	0.00
$vixchng_{t-1}$	−0.002	0.79	−0.007	0.00	−0.005	0.00	−0.005	0.39	−0.007	0.00	−0.005	0.00
$cdsret_{t-1}$					−0.002	0.00					−0.004	0.00
intercept	0.011	0.01	0.002	0.03	0.004	0.00	0.015	0.00	0.003	0.00	0.006	0.00
NOBS	11,128		187,003		187,003		11,128		187,003		187,003	
Adj R^2	0.008		0.005		0.010		0.178		0.191		0.201	
F-stat, overall	14.42		126.96		156.74		75.13		1046.29		930.70	
p-value	0.00		0.00		0.00		0.00		0.00		0.00	
F-stat, lagged	4.21		60.15		36.19		115.10		1646.84		1350.01	
p-value	0.00		0.00		0.00		0.00		0.00		0.00	
Mean $D1$	0.20		0.35		0.24		0.96		0.98		0.96	

Table 5:Joint panel regressions

Panel A: Sample-selection criteria 1

	Without lagged bond returns		With lagged bond returns	
	coefficient	p-value	coefficient	p-value
$stkret_t \times (1 - CDS)$	0.015	0.00	0.018	0.00
$tryret_t \times (1 - CDS)$	0.490	0.00	0.542	0.00
$vixchng_t \times (1 - CDS)$	−0.012	0.07	−0.008	0.15
$stkret_t \times CDS$	0.006	0.00	0.005	0.00
$tryret_t \times CDS$	0.499	0.00	0.556	0.00
$vixchng_t \times CDS$	−0.003	0.05	−0.004	0.00
$cdsret_t \times CDS$	−0.005	0.00	−0.007	0.00
$bndret_{t-1} \times (1 - CDS)$			−0.412	0.00
$stkret_{t-1} \times (1 - CDS)$	0.010	0.00	0.018	0.00
$tryret_{t-1} \times (1 - CDS)$	0.086	0.25	0.260	0.00
$vixchng_{t-1} \times (1 - CDS)$	−0.002	0.76	−0.005	0.35
$bndret_{t-1} \times CDS$			−0.439	0.00
$stkret_{t-1} \times CDS$	0.005	0.00	0.007	0.00
$tryret_{t-1} \times CDS$	0.144	0.00	0.359	0.00
$vixchng_{t-1} \times CDS$	−0.005	0.00	−0.005	0.00
$cdsret_{t-1} \times CDS$	−0.002	0.00	−0.004	0.00
intercept	0.004	0.00	0.006	0.00
NOBS	198,131		198,131	
Adj R^2	0.010		0.199	
F-stat, overall (p-value)	96.05 (0.00)		556.68 (0.00)	
When $CDS = 0$				
F-stat, contemp. (p-value)	22.74 (0.00)		30.42 (0.00)	
F-stat, lagged (p-value)	4.44 (0.00)		115.05 (0.00)	
When $CDS = 1$				
F-stat, contemp. (p-value)	246.82 (0.00)		361.24 (0.00)	
F-stat, lagged (p-value)	36.18 (0.00)		1350.25 (0.00)	

Table 6: Joint panel regressions with CDS dummy interaction

Panel A: Sample-selection criteria 1

	Without lagged bond returns		With lagged bond returns	
	coefficient	p-value	coefficient	p-value
$stkret_t$	0.015	0.00	0.018	0.00
$tryret_t$	0.490	0.00	0.542	0.00
$vixchng_t$	−0.012	0.07	−0.008	0.15
$bndret_{t-1}$			−0.412	0.00
$stkret_{t-1}$	0.010	0.00	0.018	0.00
$tryret_{t-1}$	0.086	0.25	0.260	0.00
$vixchng_{t-1}$	−0.002	0.76	−0.005	0.35
$stkret_t \times CDS$	−0.009	0.02	−0.013	0.00
$tryret_t \times CDS$	0.009	0.91	0.014	0.85
$vixchng_t \times CDS$	0.009	0.18	0.004	0.50
$cdsret_t \times CDS$	−0.005	0.00	−0.007	0.00
$bndret_{t-1} \times CDS$			−0.027	0.20
$stkret_{t-1} \times CDS$	−0.006	0.09	-0.011	0.00
$tryret_{t-1} \times CDS$	0.057	0.46	0.099	0.17
$vixchng_{t-1} \times CDS$	−0.004	0.55	0.000	0.96
$cdsret_{t-1} \times CDS$	−0.002	0.00	−0.004	0.00
intercept	0.004	0.00	0.006	0.00
NOBS	198,131		198,131	
Adj R^2	0.010		0.199	
F-stat, overall (p-value)	96.05 (0.00)		556.68 (0.00)	
F-stat, all interaction variables (p-value)	62.51 (0.00)		106.32 (0.00)	
F-stat, only lagged interaction variables (p-value)	10.61 (0.00)		51.67 (0.00)	

Table 9: Robustness tests

Panel A: Sample selection criteria 1

		Without lagged bond returns			With lagged bond returns		
		F-statistics (p-value)			F-statistics (p-value)		
Sub-sample	NOBS	Overall model	All interaction variables	Lagged interaction variables	Overall model	All interaction variables	Lagged interaction variables
Full 2002–2009 period	198,131	96.05 (0.00)	62.51 (0.00)	10.61 (0.00)	556.68 (0.00)	106.32 (0.00)	51.67 (0.00)
Excluding 2007–2008	154,126	103.41 (0.00)	46.89 (0.00)	3.58 (0.01)	526.09 (0.00)	93.46 (0.00)	32.35 (0.00)
Only 2002–2004	73,762	53.91 (0.00)	10.42 (0.00)	3.21 (0.01)	287.17 (0.00)	20.04 (0.00)	13.55 (0.00)
Excluding 2002–2003	159,110	69.15 (0.00)	51.55 (0.00)	10.13 (0.00)	414.14 (0.00)	88.39 (0.00)	42.52 (0.00)
Only 1-year post-CDS	23,703	14.75 (0.00)	3.70 (0.00)	0.38 (0.83)	81.98 (0.00)	6.96 (0.00)	3.34 (0.01)
Only 2-years post-CDS	58,462	38.86 (0.00)	13.03 (0.00)	3.78 (0.00)	212.13 (0.00)	23.57 (0.00)	16.95 (0.00)
Only 3-years post-CDS	98,981	60.60 (0.00)	19.39 (0.00)	2.53 (0.04)	357.90 (0.00)	37.02 (0.00)	18.33 (0.00)
Low amount outstanding	55,499	18.62 (0.00)	12.49 (0.00)	6.12 (0.00)	236.41 (0.00)	21.62 (0.00)	15.58 (0.00)
High amount outstanding	142,632	83.50 (0.00)	53.12 (0.00)	6.49 (0.00)	329.09 (0.00)	87.18 (0.00)	36.55 (0.00)
Small sized firms	91,671	44.13 (0.00)	37.82 (0.00)	9.03 (0.00)	264.49 (0.00)	62.26 (0.00)	33.12 (0.00)
Large sized firms	106,213	58.40 (0.00)	27.87 (0.00)	3.36 (0.01)	298.05 (0.00)	46.59 (0.00)	18.20 (0.00)

Panel B: Sample selection criteria 2

		Without lagged bond returns			With lagged bond returns		
		F-statistics (p-value)			F-statistics (p-value)		
Sub-sample	NOBS	Overall model	All interaction variables	Lagged interaction variables	Overall model	All interaction variables	Lagged interaction variables
Full 2002–2009 period	411,148	69.81 (0.00)	32.40 (0.00)	12.50 (0.00)	390.60 (0.00)	42.69 (0.00)	35.94 (0.00)
Excluding 2007–2008	307,128	92.30 (0.00)	21.36 (0.00)	5.30 (0.00)	347.77 (0.00)	41.02 (0.00)	28.08 (0.00)
Only 2002–2004	137,953	53.36 (0.00)	6.67 (0.00)	2.88 (0.02)	196.47 (0.00)	11.91 (0.00)	10.69 (0.00)
Excluding 2002–2003	341,486	47.77 (0.00)	25.89 (0.00)	11.32 (0.00)	299.14 (0.00)	33.53 (0.00)	29.84 (0.00)
Only 1-year post-CDS	60,290	17.71 (0.00)	2.53 (0.01)	0.69 (0.60)	64.71 (0.00)	3.91 (0.00)	1.98 (0.08)
Only 2-years post-CDS	130,526	42.90 (0.00)	7.95 (0.00)	4.64 (0.00)	159.45 (0.00)	13.78 (0.00)	13.34 (0.00)
Only 3-years post-CDS	213,016	62.55 (0.00)	10.91 (0.00)	4.41 (0.00)	256.66 (0.00)	19.69 (0.00)	17.10 (0.00)
Low amount outstanding	157,374	15.17 (0.00)	5.69 (0.00)	2.51 (0.04)	180.63 (0.00)	7.76 (0.00)	6.74 (0.00)
High amount outstanding	253,774	60.84 (0.00)	29.44 (0.00)	10.87 (0.00)	216.40 (0.00)	37.55 (0.00)	30.75 (0.00)
Small sized firms	187,490	31.53 (0.00)	19.86 (0.00)	8.61 (0.00)	181.68 (0.00)	27.43 (0.00)	23.23 (0.00)
Large sized firms	223,153	44.03 (0.00)	14.39 (0.00)	3.85 (0.00)	218.00 (0.00)	16.78 (0.00)	12.24 (0.00)

Table 10: Diff-in-Differences

$$\begin{aligned} bndret_{it} &= \alpha_i + \beta_1 CV_i + \beta_2 LV_i + \beta_3 CDS_{it} * CV_i + \beta_4 CDS_{it} * LV_i \\ &+\beta_5 E_i * CV_i + \beta_6 E_i * LV_i + \beta_7 E_i * CDS_{it} * CV_i + \beta_8 E_i * CDS_{it} * LV_i \end{aligned}$$

where

$CV_i \equiv \{stkret_{it}, tryret_{it}, vixchng_{it}, cdsret_{it}\}$

$LV_i \equiv \{bndret_{i,t-1}, stkret_{i,t-1}, tryret_{i,t-1}, vixchng_{i,t-1}, cdsret_{i,t-1}\}$

$CDS_{it} = 1$ if post-CDS period and 0 if pre-CDS period

$E_i = 1$ for event sample of CDS-issuers and 0 for control sample of non-issuers

	F-statistics (*p*-value)			
	Sample selection criteria 1		Sample selection criteria 2	
Regression coefficients	Without lagged bond returns	With lagged bond returns	Without lagged bond returns	With lagged bond returns
[Full model]	67.89 (0.00)	342.01 (0.00)	49.42 (0.00)	258.61 (0.00)
$\beta_1 + \beta_2$	49.43 (0.00)	113.49 (0.00)	39.74 (0.00)	116.83 (0.00)
β_2	46.78 (0.00)	146.87 (0.00)	42.39 (0.00)	153.83 (0.00)
$\beta_3 + \beta_4$	1.35 (0.23)	1.43 (0.19)	2.70 (0.01)	3.23 (0.00)
β_4	2.34 (0.07)	1.69 (0.15)	3.24 (0.02)	2.97 (0.02)
$\beta_5 + \beta_6$	9.43 (0.00)	11.29 (0.00)	5.94 (0.00)	5.96 (0.00)
β_6	8.64 (0.00)	14.96 (0.00)	6.24 (0.00)	6.59 (0.00)
$\beta_7 + \beta_8$	62.33 (0.00)	104.98 (0.00)	32.91 (0.00)	41.97 (0.00)
β_8	10.81 (0.00)	49.60 (0.00)	13.67 (0.00)	34.84 (0.00)

Table 7:Market Quality Before and After Introduction of CDS

$r_t = m_t - m_{t-1} + s_t - s_{t-1}$ $\qquad q = 1 - \frac{\sigma_s^2}{\sigma_r^2}$ $\qquad r_t = e_t - a \cdot e_{t-1}$

We report market quality of the bond market before and after the introduction of CDS. We employ all individual bonds with at least 30 valid trading days in both pre- as well as post-CDS periods (82 bonds meet this criteria) and, for each sub-period, compute the Hasbrouck q measure of market quality,

$$q = \frac{\sigma_e^2 - 2a \cdot Cov(e_t, e_{t-1})}{\sigma_e^2 + a^2\sigma_e^2 - 2a \cdot Cov(e_t, e_{t-1})}$$

where a is the coefficient on a MA(1) process without intercept for bond returns, σ_e^2 is the variance of MA(1) residuals, and $Cov(e_t, e_{t-1})$ is the covariance of lagged MA(1) residuals.

	Sub-period		t-statistic
	Pre-CDS	Post-CDS	of difference
Parameter a	0.20	0.29	−0.51
Residual variance σ_e^2	0.55	2.87	−2.11
Covariance $Cov(e_t, e_{t-1})$	−0.00	−0.02	0.65
q measure	0.86	0.82	1.32

Out of 82 bonds overall, 45 bonds experience decrease in value of q measure after the introduction of CDS, and 37 bonds experience increase in value

- pre-CDS median q = 0.892
- post-CDS median q = 0.878
- Z-statistic of difference = 0.378 (p-value = 0.7053)

Market quality for the equity and CDS

- The sample comprised 107 stocks with at least 30 trading days of data pre- and post-CDS. Pre-CDS,
  - on average across stocks,
    - *$q = 0{:}98$ and post-CDS, $q = 0{:}99$ (the difference is not statistically significant).*
  - *The quality of equity markets* is thus much higher than that of bonds.

- For the post-CDS period, we also examined the quality of the CDS market.
  - We used 325 individual CDS with at least 30 trading days data to compute *q*.
    - *The average is $q = 0{:}92$ ($s{:}d{:} = 0{:}07$).*
  - *Hence, CDS markets* are of higher quality than bond markets, though not as high quality as equities.

Liquidity

Panel B: Based on 82 individual bonds					
Liquidity measure	Pre-CDS period NOBS	Pre-CDS period Value	Post-CDS period NOBS	Post-CDS period Value	t-statistic of difference
Average of					
total # of daily trades	11,335	53.98	25,601	64.44	−4.89
mean # of daily trades	11,335	4.60	25,601	5.21	−3.37
Average (in $ million) of					
total daily trade size	11,335	20.78	25,601	19.58	1.26
mean daily trade size	11,335	0.40	25,601	0.27	9.75
Average (as % of outstanding) of					
total daily turnover	11,335	0.40	25,601	0.26	10.15
mean daily turnover	11,335	0.11	25,601	0.06	14.62
LOT measure (as fraction)					
zero return days	257	0.10	257	0.09	1.71
zero volume days	257	0.77	257	0.79	−1.35
zero return + zero volume days	257	0.87	257	0.88	−0.97
Covariance illiquidity measure	82	0.43	82	0.56	−0.28
Amihud illiquidity measure	82	9.57	82	23.89	−2.82

Why does CDS introduction not enhance the liquidity of cash bonds?

- CDS and bonds are significantly different assets.
  - CDS has built-in financing.
- CDS appeals to levered money with shorter horizons and more frequent trading.
- Bonds appeal to real money with longer horizons and less frequent trading.
- Without CDS, both groups trade credit in bonds.
- With introduction of CDS, only inactive, real-money accounts trade bonds, resulting in low liquidity.

Summary

- We find no evidence that corporate bonds become more efficient after the introduction of CDS trading.
  - Our evidence suggests that efficiency might have dropped

- Hasbrouck's market quality measure does not improve after CDS trading begins,
  - suggesting that CDS markets did not enhance bond market quality.

- Whereas the mean number of daily trades increased with the growth of bond markets over time, many other measures such as :
  - the mean size of the trades
  - daily turnover, LOT, covariance illiquidity, and Amihud's metric
  - All indicate no improvement liquidity after the CDS were introduced

- Taken together, the results suggest that CDS introduction did not improve corporate bond market efficiency, liquidity or quality.

Implications

1. The CDS markets are very active and mostly (about 95%) dominated by institutional traders and hence a venue for informed trading

- At the same time corporate bond markets
  - (a) witnessed proliferation of CDO -securitization market , whereby bonds were sitting inside the pools and not actively traded , and
  - (b) captured most of the buy-hold investors

- For these reasons, as the institutional investors migrated to the CDS markets, the bond markets became less illiquid and inactive…
    - (though TRACE mandate improved bond market liquidity somewhat: Harris & Piwowar 2006; Bessembinder et al., 2006)

Implications contd.

2. Our findings provide insights into how the bond markets may be impacted following the CDS introduction and have bearings on the recent reforms in the OTC derivatives market.

3. Our findings also have bearings on
   - where informed trading and hence price discovery might take place, thereby indicating that excessive regulations in CDS markets may be costly.
   - Blanco, Brennan and Marsh (2005): Price discovery occurs in the CDS market
     - because of (micro) structural factors that make it the most convenient location for the trading of credit risk, and
     - because there are different participants in the cash and derivative markets who trade for different reasons.
   - Easley, O'Hara and Srinivas (1998)
     - show that price discovery role of options should be more pronounced when the liquidity of the option market is higher compared to that of the stock market
     - when options provide higher leverage and
     - when the probability of informed trading is high.