

Credit Derivatives and Loan Pricing

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Outline

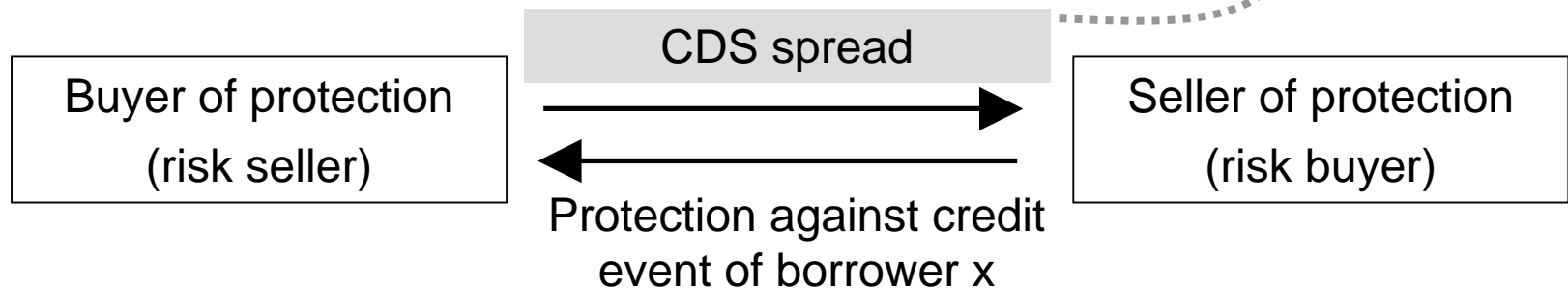
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1 Motivation

- Impact of credit derivatives on bank lending (loan volume, this paper: loan rates)?
- Bank lending: Constituents of loan rates



- Credit default swaps (CDS)



1 Motivation

Research question:

Existence of a robust relationship between CDS spreads and loan spreads?

- Statistically and economically significant (uni-/multivariate)?
- Intertemporal nature (lead lag vs. contemporaneous)?
- Responsiveness over time?

Economic reasons for a potential relationship:

1. Hedging of banks (for borrowers traded in CDS markets)
2. CDS as pricing benchmark (ratings-based pseudo CDS spreads for borrowers not traded in CDS markets)

1 Motivation

- Related literature:

Loan and bond markets	
Cook/Spellman (2005)	Low risk firms: loan spread premium, high risk firms: loan spread discount
Altman/Gande/Saunders (2006)	Prices on loan sales more sensitive to credit events than bond prices
Loan markets (international)	
Carey/Nini (2004)	Loan spreads smaller in Europe
CDS, bond and stock markets	
Blanco/Brennan/Marsh (2005)	CDS → Bonds
Norden/Weber (2005)	Aktien → CDS → Bonds
Credit risk transfer and lending volume	
Roth (2006), Hirtle (2007)	Credit risk transfer has a positive impact on lending volume

→ No study on the relationship between CDS and loan spreads!

2 The data: overview and variables

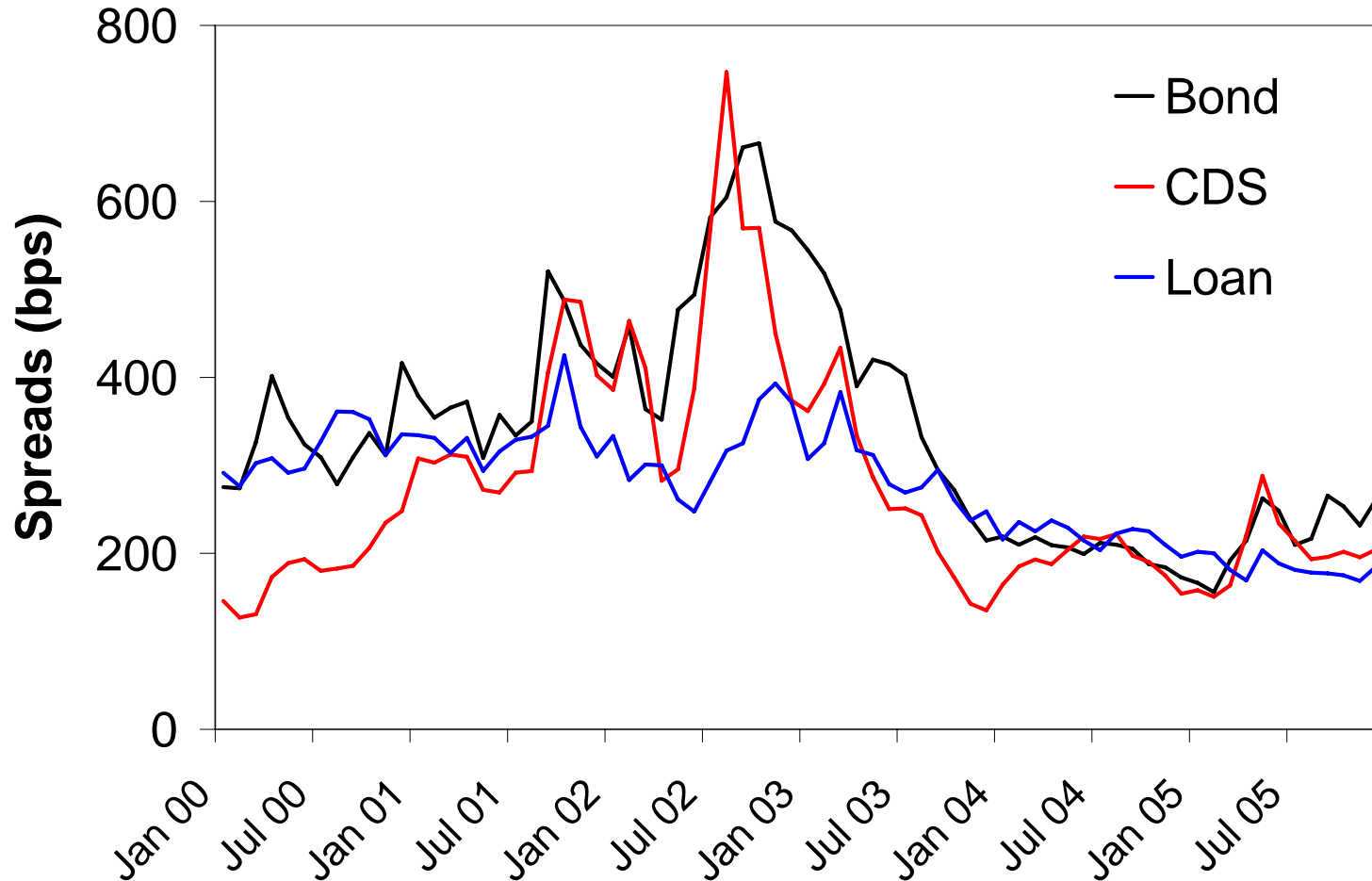
- Aggregate data for U.S. corporates, monthly frequency, January 2000 - December 2005
 - Allows time series analysis
 - But: Loan and CDS spreads differ due to several reasons, no firm- and industry-specific controls
 - Conservative approach (bias against finding a relationship)
- Corporate loan spreads (Standard & Poor's)
 - From syndicated loans
 - Spreads for new issues only (60-80 deals per month)
 - With (all-in spreads) and without fees
 - Ratings BB/BB- and B+/B (constant rating time series)

2 The data: overview and variables

- CDS spreads (CreditTrade, bank data)
 - Senior unsecured debt
 - 5 years maturity (benchmark)
 - Equally weighted index by regions, ratings, frequency (monthly averages, end-of-month, end-of-week etc.)
- Corporate bond spreads (Moody's, Lehman Brothers)
 - U.S. corporate and corporate high-yield index, rating-specific spreads (BBB, BB, B)
- Control variables (FED, DataStream, CreditTrade)
 - Risk-free interest rates: 5 year swap rates, term premium
 - Stock market: S&P 500, implied volatility index VIX (CBOE)
 - CDS liquidity: relative bid-ask spreads from CDS market

2 The data: overview and variables

- Average loan, bond & CDS spread levels (2000-2005)



3.1 Empirical analysis: the baseline model

- Methodological remarks
 - First differences because of stationarity (instead of levels)
 - Capturing causal relationships across markets (lead-lag)
 - Focus on loan spread changes of B-rated firms (ΔL^B_t)
 - Most recent information from the CDS market (ΔC^{eom}_{t-1})
 - Global CDS spreads (instead of U.S. only)
 - Lagged dependent variable (loan spread change from previous month ΔL^B_{t-1}) to control for serial correlation
- Model specification

$$\Delta L^B_t = \alpha + \beta \Delta L^B_{t-1} + \gamma \Delta C^{eom}_{t-1} + \varepsilon_t$$

3.1 Empirical analysis: the baseline model

- Regression results for the baseline model
(OLS estimator, robust standard errors):

Dep. Var.: ΔL_t^B	Coeff.	p-val.
ΔL_{t-1}^B	-0.26 **	0.034
ΔC_{t-1}^{eom}	1.15 ***	0.000
Const.	-1.72	0.567
Obs.	70	
R^2	0.3338	

→ Significantly positive impact of CDS on loan spread changes, economically meaningful, R^2 relatively high (without lagged dependent variable: $R^2 = 0.25$)

3.2 Empirical analysis: extensions and robustness

- Including bond spread changes and macro control variables
- Vector error correction model (Loan, CDS)
- Additional tests confirm the baseline model
 - Constant BBB rating CDS spreads
 - Loan, bond and CDS spreads for same rating
 - Average CDS spread from previous month
 - Percentage changes of all credit spreads
 - Newey-West estimator

3.2 Empirical analysis: extensions and robustness

- Including bond spreads and macro control variables

Dep. Var.:	Model I		Model II		
	Coeff.	p-val.	Coeff.	p-val.	
ΔL_t^B					
ΔL_{t-1}^B	-0.25	0.106	-0.27 **	0.015	
$\Delta B_{t-1}^{B, eom}$	-0.06	0.458	-0.10	0.127	→ CDS coeff.
ΔVIX_{t-1}	5.44 ***	0.006	1.42	0.583	lower but still
R_SP500_{t-1}			-144.97	0.414	significantly
$\Delta SWAP5_{t-1}$			10.23	0.461	positive, adj.
$\Delta TERM_{t-1}$			-0.06	0.712	R^2 not much
ΔCPI_{t-1}			7.61	0.147	increased
ΔIP_{t-1}			-3.18	0.614	
$\Delta DOWN_{t-1}$	25.29 *	0.075	17.08	0.326	
$\Delta RELS_{t-1}$			269.57	0.362	
ΔC_{t-1}^{eom}			1.05 ***	0.001	
Const.	-0.28	0.929	-3.96	0.316	
Obs.	70		70		
Adj. R^2	0.231		0.341		

3.3 Loan-specific information in CDS and bond spreads

- Step 1: Explain loan spreads with CDS & bonds spreads

Dep. Var.:	Bond & CDS spreads		Bond spreads only	
	Coeff.	p-val.	Coeff.	p-val.
ΔL_t^B				
ΔL_{t-1}^B	-0.25 *	0.057	-0.23	0.164
$\Delta B_{t-1}^{B, eom}$	-0.05	0.303	0.11	0.100
ΔC_{t-1}^{eom}	1.34 ***	0.000		
Const.	-1.93 ***	0.533	-0.84	0.810
Obs.	70		70	
R ²	0.3450		0.1072	
Adj. R ²	0.3150		0.0810	

→ Significantly positive impact of CDS on loan spread changes, (almost) no impact of bond spreads changes, adj. R² for CDS higher!

3.3 Loan-specific information in CDS and bond spreads

- Step 2: Explain CDS & bonds spreads by macro factors

Dep. Var.:	ΔC_t		ΔB_t	
	Coeff.	p-val.	Coeff.	p-val.
ΔVIX_t	1.29 **	0.013	1.58 **	0.043
R_SP500_t	-88.81 *	0.069	-32.69	0.626
$\Delta SWAP5_t$	-8.24 *	0.053	-47.94 ***	0.000
$\Delta TERM_t$	0.07	0.272	0.24 ***	0.000
Const.	0.38	0.705	-074	0.515
Obs.	70		70	
R^2	0.4239		0.7141	
Adj. R^2	0.3890		0.6970	

→ Different sensitivities of CDS & bond spreads, CDS (as loan spreads) less related to macro factors than bond spreads!

3.4 Empirical analysis: responsiveness over time

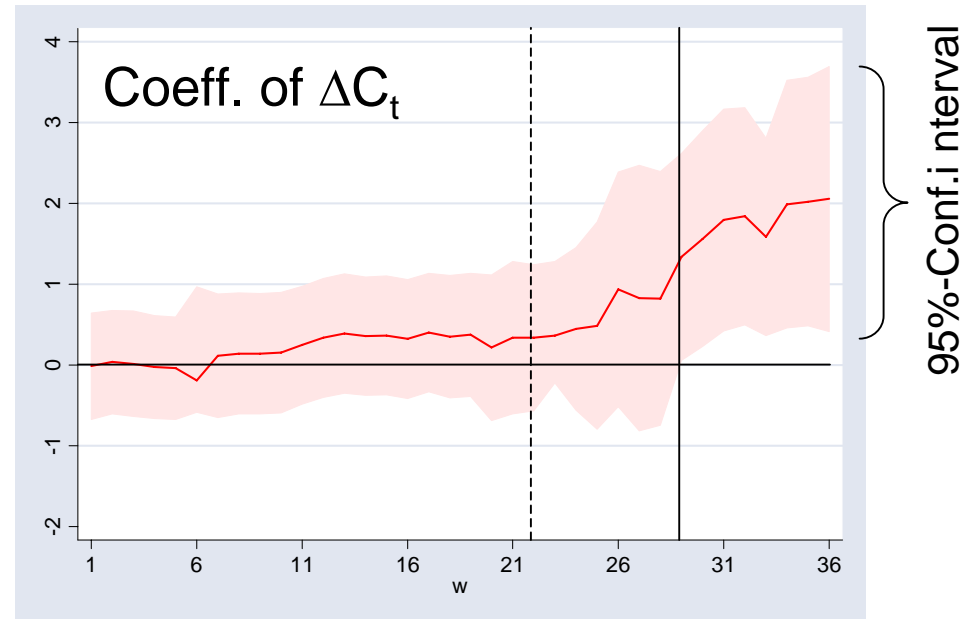
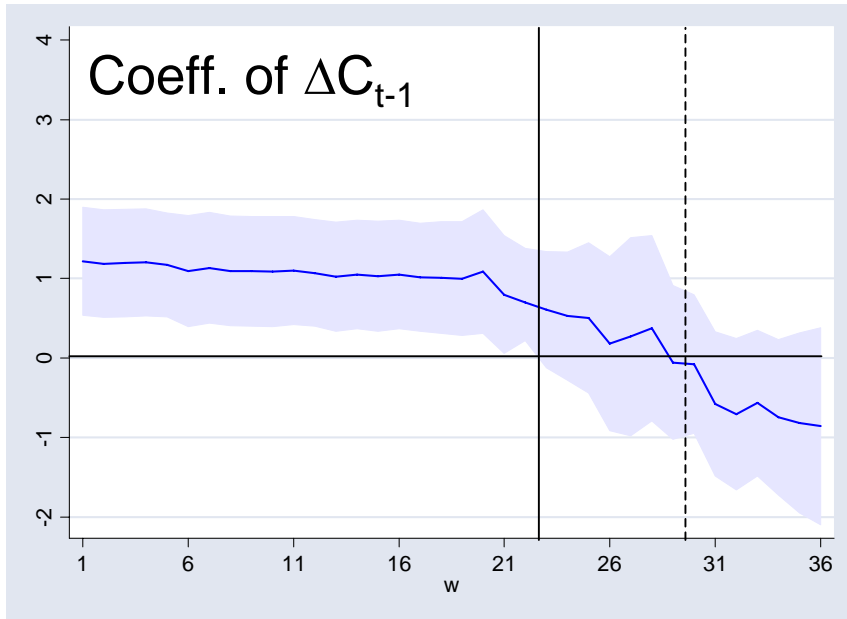
- The baseline model including CDS spread changes from t and $t-1$ by sub-periods

	First half of sample		Second half of sample	
Dep. Var.: ΔL_t^B	Coeff.	p-val.	Coeff.	p-val.
ΔL_{t-1}^B	-0.31 *	0.084	-0.00	0.983
ΔC_t	-0.01	0.965	2.06 **	0.016
ΔC_{t-1}^{eom}	1.21 ***	0.001	-0.85	0.168
Const.	-1.06	0.820	-1.71	0.603
Obs.	35		35	
R^2	0.4662		0.2451	

→ Relationship changes from a lead-lag to a contemporaneous one

3.4 Empirical analysis: responsiveness over time

- Rolling window regressions on ΔL^B_t (Start: 03/2000, ..., 02/2003)



→ Coeff. of ΔC_{t-1} decreases, coeff. of ΔC_t increases, i.e. CDS information is reflected faster by loan spreads!

3.4 Empirical analysis: responsiveness over time

- Do all factors (CDS *and* macro factors) shift to a contemporaneous relationship? → Comparing the adj. R²

Adj. R ²	First half of sample (2000-2002)		Second half of sample (2003-2005)	
	Lag 1	Contemp.	Lag 1	Contemp.
Macro model <i>without</i> CDS	0,267	> 0,224	0,196	> 0,165
Baseline model <i>only</i> with CDS	0,433	> 0,178	-0,011	< 0,162

→ Impact of CDS shifts to a contemporaneous relationship while there is no such shift for the macro factors!

4 Conclusions and implications

- CDS markets influence banks' pricing of syndicated loans to U.S. corporates (hedging, pricing benchmark)
 - Statistically and economically significant
 - Robust results (e.g. to the inclusion of bond spreads)
 - Loan spreads have become more sensitive and CDS information is reflected faster in loan spreads in recent years
- Implications and further research
 - Changing paradigm: from relationship pricing to market-oriented pricing?
 - Increasing volatility of corporate financing costs?
Procyclicality of lending?
 - Differentiation by financial systems, banks, and borrowers