Insider Trading in Credit Derivatives

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Introduction

Credit Derivatives.

- Perhaps the most important and successful financial innovation of the last decade.
- Deemed by many (including Alan Greenspan) as efficient mechanisms to transfer risks from banking sector to capital markets.
- However, like any insurance market, credit derivatives entail complications:

  1. *Ex-ante* asymmetric information.

  2. *Ex-post* moral hazard.

- We are concerned with the first of these effects.

  If this market is serving an important social function, protecting its integrity may be a valid policy objective.

Recent events

Early 2002. Allegations stem from Xerox, Enron, Fujitsu, others.

> *"...firms with large lending departments would always come in and buy protection at exactly the right moment."*

October 2002. PIMCO white paper alleges widespread abuses:

> *"Credit default markets are a mechanism with which friendly commercial bankers ... can profit by betraying and destroying their clients through the use of inside information."*

Summer 2003. Rumors around Mirant, Marconi restructurings. Joint Market Practices Forum (BMA/ISDA/LSTA) issues voluntary guidelines on information sharing inside banks.

May 2004. Financial Stability Forum (IOSCO/BSBS/IAIS) report.

Spring 2005. ISDA/LMA, BIS recommendations.

Recent events (Cont'd)

''Use of material non-public information by securities and credit derivative market participants will be embraced by these new laws on insider dealing. *Knowledge gleaned from bank lending relationships is the main area of scrutiny, so far as the use of non-public information in these markets is concerned."*

(Creditflux, January 2005, www.creditflux.com)

''*[B]anks must not use private knowledge about corporate clients to trade instruments such as credit default swaps (CDS), says a report drawn up by five bodies including the International Swaps and Derivatives Association and the Loan Market Association...* The warning highlights the challenges credit derivatives pose to banks and regulators trying to build a functioning market infrastructure... [M]any banks and institutions are trading CDS instruments in the same companies they finance - sometimes because they want to reduce the risks to their own balance sheets."

(Financial Times, April 25, 2005 - 'Banks warned on insider trading threat posed by market for credit derivatives')

Why study insider trading in credit derivatives?

- Adverse selection may have undesirable consequences both for the liquidity of the market and for its *scope*.
- Hence both welfare and policy implications may be significant.
  - ▶ Will credit derivatives be sufficiently liquid when required the most?
    - ∗ For protection against risky credits.
    - ∗ For protection in periods of systematic stress.
- Additional (mainly academic) reasons:
  - ▶ Credit derivatives are a good laboratory for studying asymmetric information.
    - ∗ Potentially informed players are well-identified :
      - **-** Relationship banks
    - ∗ Nature of private information is unambiguous:
      - **-** Purpose of bank monitoring is to identify credit risk.

Previous empirical research on insider trading

Insider trading lowers liquidity, increases trading costs.

- Easley, Kiefer, O'Hara, Paperman (1996); Chun & Charoenwong (1998); Bettis, Coles & Lemmon (2000); Brockman & Chung (2003); Fishe & Robe (2004).

Insider trading raises cost of equity capital.

- Bhattacharya & Daouk (2002).

Insider trading increases volatility.

- Du & Wei (2003).

Other related research

Credit derivatives: empirical work on levels of credit premia.

- Blanco, Brennan & Marsh (2003); Longstaff, Mital & Neis (2003).

Liquidity in debt markets.

- Fleming & Remolana (1997,1999); Fleming (2001); Schultz (2001); Hotchkiss & Ronen (2002); Chordia, Sarkar, Subrahmanyam (2003).

Summary of results

- Our study is concerned with two facets of the problem

  1. Is there evidence of actual insider trading in CDS markets?

  Methodology: Time-series, cross-sectional tests of inter-market information flow.

  2. Is there evidence that insider trading is harmful to the markets?

  Methodology: Cross-sectional tests of liquidity and price determinants.

- To date, our findings are as follows.

  1. There is a significant, permanent information flow from CDS markets to equity markets:

  - ▶ Concentrated in times when credit risk is most severe.
  - ▶ Increasing in the number of informed insiders.

  2. No evidence however that this has affected the liquidity and prices in the credit markets.

Methodology

Question: How to identify insider trading?

- No actual trade data available (so far) in CDS market.
- No identification of transacting parties.
- Hence no possibility of finding "smoking guns".

Our Answer: Isolate instances when CDS market anticipates moves in stock market.

- Note maintained hypotheses:
  1. Weakly efficient equity market.
  2. Incomplete arbitrage between markets by informed players.
- Subsequent analysis: argue that these instances are (a) not due to illiquidity or other effects; and (b) are strong when incentives to exploit private information are strong, but absent otherwise.
  - ▶ These reinforce our interpretation that permanent information flow is evidence of, at least, informed revision of quotes.

Data

- We obtained a data set of daily closing quotes for the most widely traded CDS names (“benchmarks") from January 2001 through October 2004.
  - ▶ No back-filling.
  - ▶ Firms dropped only upon bankruptcy or merger or acquisition.
  - ▶ Supposedly not matrix prices: actual electronic quotes on the trading platform, or received by voice brokers.
  - ▶ End of the day before or coincident with that for US stock market.
- Focus on North American corporate credits, and obtain matching information on the underlying companies from CRSP and Compustat.
- We employ a specially constructed proxy for the number of potentially informed traders for any one target entity:
  - ▶ This is the number of commercial/investment banks which have participated in an outstanding syndicated loan origination or credit facility.

Table 1: Summary Statistics

	Low	Median	High
CDS level (mid price, BP)	13	81	2400
CDS bid-ask spread (BP)	1	20	2000
Credit rating	Ba3/BB-	Baa1/BBB+	AAA/Aaa2
Firm size (equity mkt val, $mm)	720	15820	412900
Firm debt (book val, $mm)	9	8874	312684
Firm leverage (debt at book val)	0.00	0.21	0.65
Average stock volume (mm shrs/day)	0.14	2.65	76.1
Average stock turnover (pct/day)	0.2	0.56	2.68
Average stock volatility (ann std dev)	0.24	0.39	0.83
Number of Bond Issues	0	9	71
Observations/day	9	46	62

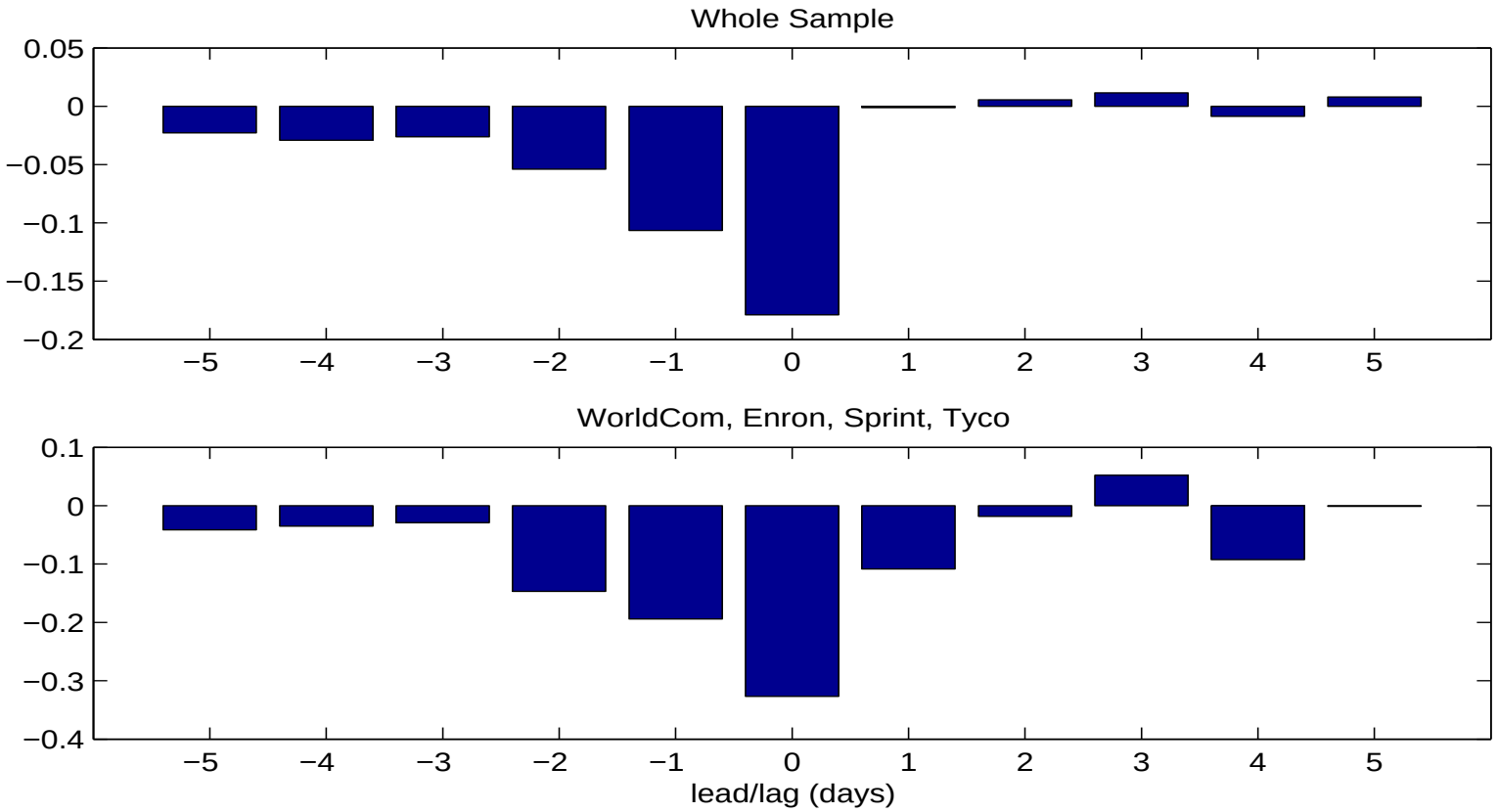
The table describes the firm characteristics for our sample of credit derivatives. Sample statistics are computed across all observations, except average stock trading statistics which are computed across firms.

Preliminary evidence

- Look first at the cross-correlation between changes in CDS prices and stock returns for evidence that information is revealed first in the CDS market.
- Previous studies of bond responses to stock moves find slow adjustment of bond prices:
  - ▶ Bonds have negative cross-correlation with up to several days' lag of stock returns.
  - ▶ Effects most likely due to poor data; wide spreads.
- We would only expect to observe insiders exploiting information in the CDS market *when there is significant negative information.*

Hypothesis: If insiders were active in our sample, firms that experienced severe credit deterioration may exhibit significant cross-covariance of CDS changes with future stock returns.

Figure 1: Cross Correlation of Stock Returns and CDS Changes.



The figure shows the cross-correlation between percent changes in CDS prices at time t and stock returns at time $t+k$ as a function of k. In each panel the cross-correlations for individual firms are averaged across firms.

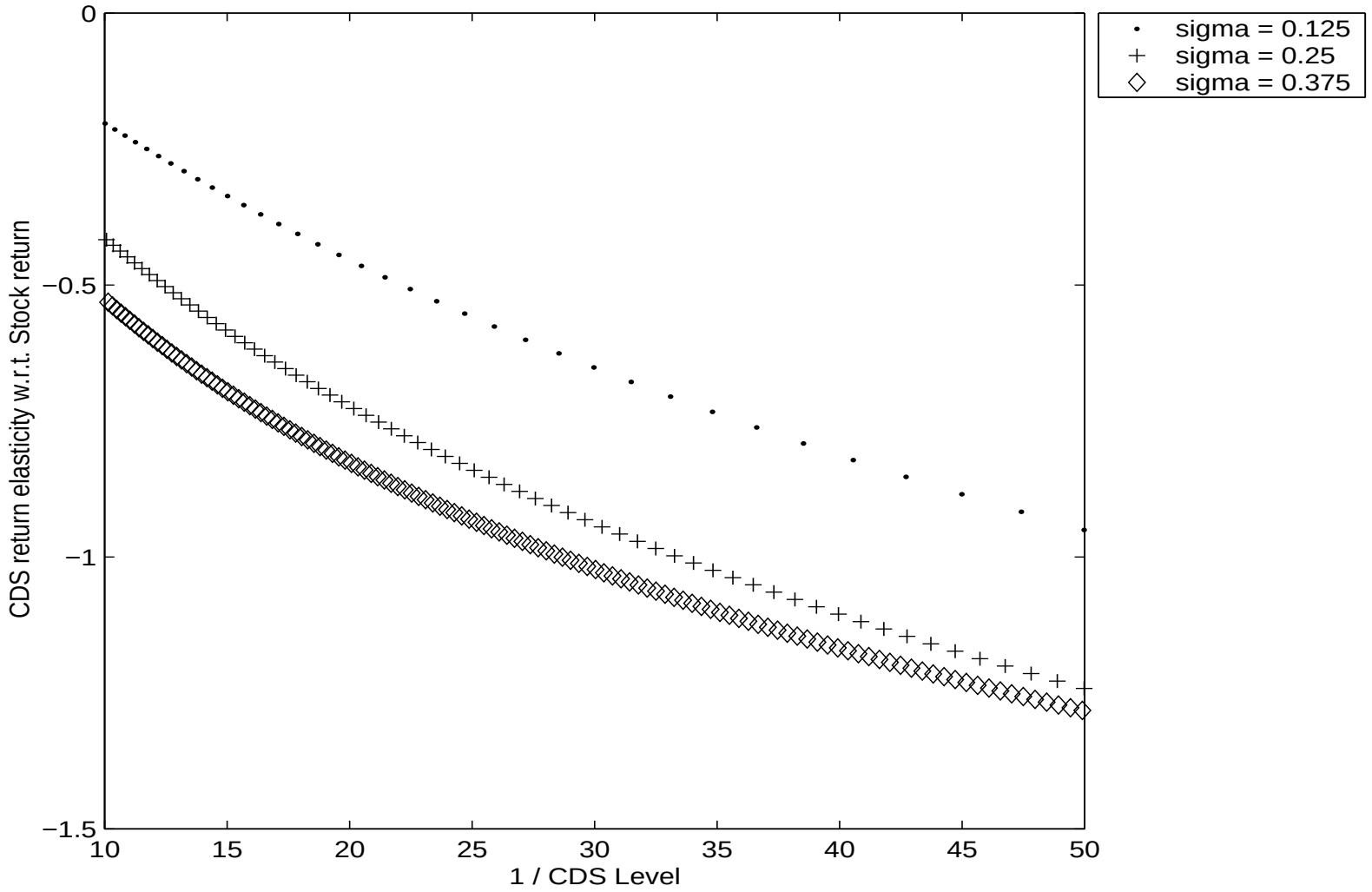
Econometric analysis

- First construct daily time series of CDS *innovations* for each firm.
  - ▶ Orthogonal to coincident and past stock-market innovations.
  - ▶ Orthogonal to past CDS innovations.
- Then examine when these innovations predict stock returns.
- N.B. The relationship of CDS and stock-market returns is inherently non-linear. We control for this based on Merton (1973) model.
  - ▶ c.f. Schaefer and Strebulaev (2003) for evidence that these hedge rations are accurate, even if model is oversimplified.

$$(\text{CDS return})_{i,t} = \alpha_i + \sum_{k=0}^{5} [\beta_{i,t-k} + \gamma_{i,t-k} / (\text{CDS level})_{i,t}](\text{Stock return})_{i,t-k} + u_{i,t}.$$

- The term $u_{i,t}$ is our innovation series.

Figure 2: Merton (1973) model credit-spread elasticity.



<u>Result 1:</u> CDS innovations affect stock returns more under adverse credit conditions.

- Specification:

$$\begin{aligned}(\text{stock return})_t &= a + \sum_{k=1}^{5} [b_k + b_k^D \cdot (\text{Credit-condition Dummy})_t](\text{CDS innovation})_{t-k} \\ &+ \sum_{k=1}^{5} [c_k + c_k^D \cdot (\text{Credit-condition Dummy})_t](\text{stock return})_{t-k} + \varepsilon_t.\end{aligned}$$

- Credit conditions dummies flag :
  - ▶ A one-day decline in CDS level of 50 basis points in future;
  - ▶ Permanent widening of the CDS level to 100+ basis points in future; or
  - ▶ Low credit rating (A3/A- or worse).
- Coefficients on dummies are significantly negative.
  - ▶ c.f. Table 2.

<u>Result 2:</u> Information flow from CDS to stocks increases in level of credit spread.

- Compute firm-specific summary measure of information flow and examine variation across firms.
  - ▶ Controls for firm-level heterogeneity in the CDS-stock market linkage.
  - ▶ Gives equal weight to all firms.
  - ▶ Similar to Hou and Moskowitz (2005).

$$(\text{stock return})_{i,t} = a_i^f + \sum_{k=1}^{5} b_{i,k}^f (\text{CDS innovation})_{i,t-k} + \sum_{k=1}^{5} c_{i,k}^f (\text{stock return})_{i,t-k} + \varepsilon_t.$$

$$\theta_i = \sum_{k=1}^{5} b_{i,k}^f.$$

- Sort firms by theta and examine firm specific characteristics by quintile.
- Significant negative theta only in lowest quintile.
- Note that these are the largest, most liquid firms!

Table 3: Information flow from CDS market to stock market

PANEL A: PROPERTIES OF θ

Mean	=	0.0043
t-stat	=	0.4600
Min	=	−0.1961
Max	=	0.3262

Panel A shows univariate properties of θ, the firm-specific measure of permanent information flow from CDS innovations to stock markets. In the first stage, we run for each firm i the time-series regression

$$(\text{stock return})_{i,t} = a_i^f + \sum_{k=1}^{5} b_{i,k}^f (\text{CDS innovation})_{i,t-k} + \sum_{k=1}^{5} c_{i,k}^f (\text{stock return})_{i,t-k} + \varepsilon_t.$$

Then, θ_i is the measure of permanent information flow from CDS market to the stock market for firm i, defined as $\theta_i = \sum_{k=1}^{5} b_{i,k}^f$.

PANEL B: PROPERTIES (MEDIANS) OF FIRMS IN DIFFERENT θ-QUINTILES

	Q1	Q2	Q3	Q4	Q5
Average θ	−11%	−2%	1%	4%	8%
CDS level (mid price, BP)	185	108	101	79	68
CDS bid-ask spread (BP)	26	21	20	18	17
Credit rating	27	27	26	27	26
Firm size (equity mkt val, $mm)	28021	12477	9663	12677	13862
Firm debt (book val, $mm)	12785	7178	4136	6864	6380
Firm leverage (debt at book val)	0.28	0.32	0.33	0.33	0.27
Average stock volume (mm shrs/day)	8.07	2.10	1.37	1.71	2.49
Average stock turnover (pct/day)	5.4	6.4	4.8	5.0	5.6
Average stock volatility (ann std dev)	0.40	0.37	0.33	0.33	0.33
Number of Bond Issues	12.6	7.1	5.2	12.0	5.8

For Panel B, firms are ranked into quintiles based on the first-stage estimates of θ, Q1 being the quintile with the smallest (most negative) estimates, and Q5 being the quintile with the largest estimates. The summary statistics reported for each quintile are the medians (across firms) of the time-series means of the characteristics for each firm.

Relating information flow to information asymmetry

- To test our claim that information flow is a measure of informed trading, we assess its dependence on a direct gauge of the number of informed insiders – as well as other controls.
  - ▶ Informed insiders are relationship banks.
  - ▶ Count relationships based on participation in syndicated loans/facilities.
  - ▶ Results are robust to
    - ∗ Syndicate role (lead/participant)
    - ∗ Subset of banks studied
    - ∗ Inclusion of subsidiary loans
    - ∗ Using loan amounts or number of facilities
    - ∗ Relationship duration
- One would expect more insiders to lead to more insider trading because
  - ▶ More information gathering activity; and/or
  - ▶ Less incentive not to exploit information when syndicates are large.

TABLE 4: BANK RELATIONSHIP SUMMARY STATISTICS

PANEL A: DISTRIBUTION ACROSS ALL OBSERVATIONS

	Low	Median	High
Number of Bank Relationships (leads)	0	16	50
Number of Bank Relationships (all)	0	29	69
Average Relationship Length (yrs.)	0.3	4.1	7.2
Number of Active Facilities	0	4	36
Amount of Active Facilities ($mm)	0	4019	66099

PANEL B: FIRM CHARACTERISTICS

	Few (0-11)	Middle (12-22)	Many (23-50)
Rating	Baa1/BBB+	Baa1/BBB+	Baa1/BBB+
Volatility	0.36	0.38	0.39
Leverage	0.18	0.26	0.22
Transparency	8	8	9
Size	11478	13470	25845
Book Debt	4463	8120	19168
Number of Active Facilities	2	4	11
Amount of Active Facilities ($mm)	1642	3636	10206

Bank relationship statistics are reported for all firm-date observations for the sample studied in Section 3. Relationships are defined to by outstanding syndicated loan committments originated after 1996. Only the top 100 syndicated lenders are included in the count. The top panel shows the range of some relationship statistics. The bottom panel shws the average of some firm characteristics when the observations are sorted into three groups based on the number of (lead) relationships.

<u>Information flow and insiders</u> – continued

- Main specification:

$$\text{stock return}_t = a_0 + [b_0 + b_1(\text{number of insiders})](\text{CDS innovation})_{t-1} + \sum_{k=1}^{5} c_k \,\text{stock return}_{t-k} + \varepsilon_t$$

- Results:
  - ▶ Controlling for number of banks, there is no average information flow.
  - ▶ Bank coefficient (b_1) is negative and significant.
    - ∗ A firm with 50 banks would have about 4% information flow every day.
    - ∗ *No* conditional information flow when CDS innovation is negative (i.e. good news).
    - ∗ Effect is robust to using 5-day horizon.
    - ∗ Also robust to outliers, non-normality, and errors-in-variable corrections (c.f. Table 6).

TABLE 5:
REGRESSIONS OF STOCK RETURNS ON CDS INNOVATIONS

	(A)	(B)	(C)	(D)	(E)	(F)
b_0	-0.0080	0.0095			-0.0057	0.0155
	(2.93)	(1.78)			(1.96)	(3.22)
b_1		-0.00094				-.00093
		(3.81)				(3.62)
b_0^+			-0.0095	0.0216		
			(2.27)	(2.793)		
b_1^+				-0.0016		
				(4.78)		
b_0^-			-0.0065	-0.0031		
			(1.52)	(0.39)		
b_1^-				-0.0002		
				(0.52)		
a_1					1.0	1.0
					NA	NA
a_2					-0.052	-0.507
					(0.10)	(1.52)
a_3					-0.110	-0.083
					(0.23)	(0.28)
a_4					-0.124	1.193
					(0.25)	(2.60)
a_5					0.082	0.226
					(0.16)	(0.68)

Alternative hypotheses

- Next control for several possible reasons for information-flow association with banks.

$$\text{(stock return)}_t = a_0 + [b_0 + b_1(\text{number of banks}) + b'(\text{other controls})](\text{CDS innovation})_{t-1} + \varepsilon_t$$

1. Is information flow just a scale effect?

- More debt may mean more informed bond markets.

2. Is it due to *uninformed* trading?

- More uninformed activity in bonds may make them relatively more liquid compared to stocks.

3. Is it about risk?

- More banks may indicate more risk. Increases in risk may affect bonds before stock.

- Answer(s): No.

- Note: additional tests fail to reject exogeneity of banks.

TABLE 7: STOCK RETURN REGRESSIONS WITH CONTROLS

	scale		*liquidity*		*risk*	
	(A)	(B)	(C)	(D)	(E)	(F)
b_0	0.0003	0.0091	-0.0110	0.0729	-0.0549	-0.0556
	(0.01)	(0.21)	(0.45)	(1.68)	(1.53)	(1.53)
banks	-0.0010	-0.0008	-0.0009	-0.0010	-0.0011	-.00011
	(3.15)	(1.89)	(2.70)	(3.10)	(4.16)	(4.26)
nonleads			-0.0017			
			(3.73)			
size	0.0003	0.0007				
	(0.10)	(0.22)				
debt	0.0007	0.0013	0.0046	0.0036		
	(0.20)	(0.31)	(1.45)	(1.04)		
loan amt		-0.0031				
		(0.64)				
CDS b/a			0.0078			
			(0.37)			
bonds			0.0157	0.0117		
			(1.82)	(1.37)		
CB ind			-0.0004			
			(1.15)			
volume				-0.0085		
				(2.10)		
turnover				0.0021		
				(0.74)		
ILLIQ				-0.0045		
				(1.63)		
credit spread					0.0019	0.0027
					(1.10)	(1.15)
rating					0.0024	0.0024
					(1.78)	(1.79)
$\lvert r_{t-1} \rvert$						-0.4024
						(4.29)
σ_{6mo}						0.0238
						(1.46)

Is insider trading harmful to these markets?

- The information flow between CDS and stock markets is one-sided: only on adverse credit news.
- The resulting lemon's problem may
  - ▶ Widen the gap in prices between buyers and sellers.
  - ▶ Increase the cost of default insurance.
  - ▶ Lower the equilibrium quantity of insurance provision.
- So test the following:

  Hypothesis 1 If adverse selection is problematic for market liquidity, then more informed insiders will imply wider bid/ask spreads.

  Hypothesis 2 If adverse selection is problematic for market breadth, then more informed insiders will imply higher CDS levels.
- Note that our tests do not examine any other potential consequences of insider trading.
  - ▶ For example, if "perceived fairness" is a policy objective – regardless of price and liquidity effects – our analysis is incomplete.

TABLE 8: ILLIQUIDITY REGRESSIONS

	STOCK ILLIQ		CDS % B/A	
	FM	Panel	FM	Panel
size	-0.2365	-0.2650	0.0480	0.0499
	(10.75)	(5.32)	(8.59)	(3.55)
volume	-0.2197	-0.2078	-0.0414	-0.0429
	(5.21)	(2.99)	(10.59)	(6.02)
r_{1mo}	-0.3098	-0.4386	-0.0144	-0.0364
	(4.10)	(3.33)	(0.48)	(1.42)
σ_{1mo}	0.6789	0.5982	0.0561	0.0780
	(5.59)	(5.54)	(1.71)	(2.42)
banks	-0.0030	-0.0037	-0.0029	-0.0026
	(2.21)	(0.99)	(8.18)	(2.75)
obs	947	71232	947	44932
R^2	0.3834	0.2424	0.2646	0.1365

Stock and credit market illiquidity measures are the dependent variables in daily regressions using both Fama-MacBeth (1973) regressions and panels. STOCK ILLIQ is absolute returns divided by dollar volume (c.f. Amihud (2002)). CDS % B/A is the bid-ask spread as a percentage of the midmarket quote for our sample of credit default swaps. The controls are log market capitalization, stock volume, one month stock return, and one month stock standard deviation. Bank relationships are as described in the text. For the Fama-MacBeth regressions, *obs* is the number of cross-sections, R^2 is the arithmetic average of the R^2s from the individual regressions, and the t statistics have been corrected for six months autocorrelation. For the panels, the specification includes time fixed-effects, and the reported t statistics are adjusted for clustering at the firm level.

TABLE 9: CREDIT SPREAD REGRESSIONS

	(A)		(B)	
	FM	Panel	FM	Panel
r_{6mo}	-90.43	-92.25	-71.60	-93.31
	(4.19)	(4.94)	(2.91)	(4.84)
σ_{6mo}	260.5	439.5	212.6	439.0
	(6.35)	(5.02)	(3.91)	(4.80)
debt	15.59	10.39	12.75	13.26
	(2.79)	(1.03)	(1.87)	(1.73)
leverage	-9.12	73.26	-20.33	65.69
	(0.22)	(1.02)	(0.39)	(0.98)
tangible	53.26	46.23	52.95	44.65
	(2.19)	(1.23)	(2.32)	(1.28)
rating	-20.92	-17.01	-19.57	-17.57
	(6.70)	(3.77)	(5.78)	(4.23)
EDF	0.6424	0.1325	1.3303	0.1325
	(1.73)	(2.03)	(1.30)	(1.97)
banks	-0.2946	0.4508		
	(0.97)	(0.45)		
bid/ask			-74.30	-8.98
			(1.70)	(0.18)
obs	891	39964	891	39964
R^2	0.6140	0.5283	0.6343	0.5276

Results

- No indication that informed trading proxies affect bid/ask; or that bid/ask and informed trading proxies affect levels.
- In fact, evidence suggests a positive association between degree of informed trading and CDS liquidity!

Possible interpretations

- Informed players “take" liquidity when the value of information is high, and “make" liquidity at other times.
  - ▶ Bloomfield and O’Hara (1999, 2000), Hong and Rady (2002), Bloomfield, O’Hara and Saar (2005).
- Informed trade when liquidity is high for exogenous reasons.
  - ▶ More banks means more *uninformed* activity, whose impact on liquidity outweighs that of informed players.
- Multiple informed players with same information cause immediate release of information into prices.
  - ▶ Holden and Subrahmanyam (1992).

Conclusions

We believe there is prima facie *evidence that insider trading exists in the credit derivatives markets.*

- The information flow from CDS to stock markets implies at least a revision of quotes due to non-public information.
- Conditional tests link this directly to presence of insiders.

However, there is no evidence that this has affected liquidity and pricing in the CDS or equity markets.

- The market appears to be coping with the adverse selection problem.
- The case for a regulatory response thus needs to be cautiously evaluated.