Cross-market liquidity and dealer profitability: Evidence from the CDS and bond markets

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† The views expressed herein are solely those of the authors and should not be interpreted as reflecting the views of the Federal Reserve Board of Governors or of any other person associated with the Federal Reserve System.

Introduction (1/2)

- Dealers are financial intermediaries that facilitate trading for clients
  - They maintain an inventory of securities, financed with own capital, that clients can trade on
  - They can also arrange roundtrip transactions for clients
  - Dealers earn profits from spreads, fees, and changes in inventory value
- Does the profit and loss (P&L) experienced by a dealer affect its decision to trade, and the deviation of prices from fundamental values (liquidity)?
- Low P&L in the recent past likely affects a dealer's ability to take risk
  - Financial institutions have risk limits, which constrain risk taking
    - If losses consume capital, risk limits could be reduced
  - Losses could also induce inventory managers to lower risk taking because of career concerns
    - If compensation or job-loss probability depend on performance, managers could reduce risk taking to limit further losses

Introduction (2/2)

- Dealers are sometimes active in multiple markets
  - There can be economies of scale if the asset classes load on similar risks (eg, bonds and CDS)
  - There can be diversification benefits if the asset classes are different (eg, bonds and stocks)
- In these cases, factors that reduce a dealer's propensity to trade can affect liquidity in more than one market
- If the dealer is large/active enough, there could be noticeable changes in liquidity comovement
  - These would be non-fundamental changes, because they reflect dealer-specific issues rather than changes in the economic backdrop
- Our work fits within the broad intermediary asset pricing literature
  - Asset prices are affected by the behavior of selected financial intermediaries that play a key role in the functioning of capital markets

One-Slide Summary

- **What we do**
  - We study how measures of liquidity in the bond and credit default swap (CDS) markets relate to dealer profitability
  - ⇒ We then investigate the relation between dealer profitability and liquidity comovement between bond and CDS markets
- **Why we do it**
  - Dealers provide liquidity by accommodating client trades
  - Dealers maintain an inventory of securities, using their own balance sheet to provide market liquidity
  - Market liquidity is affected by how much inventory risk dealers take
  - Risk taking can change after a dealer experiences losses
  - ⇒ When a dealer is active in multiple markets, there could be non-fundamental changes in liquidity comovement across markets
- **What we find**
  - Low P&L slightly decreases the liquidity of bond trades
  - Low P&L reduces cross-market liquidity correlation
  - The cross-market effect is stronger if dealers are constrained, and bond/CDS liquidity demand is less correlated

Literature review (1/2)

- Financial intermediaries, and broker-dealers in particular, are often marginal price-setters in asset markets
  - Gromb and Vayanos (2002), Brunnermeier and Pedersen (2009), Adrian and Shin (2010), Gârleanu and Pedersen (2011), He and Krishnamurthy (2012, 2013), Adrian, Etula, and Muir (2014)
- Focusing on stocks: an effect of market-maker losses on liquidity provision is found by Comerton-Forde, Hendershott, Jones, Moulton, and Seasholes (2010), commonality in stock liquidity found in Chordia, Roll, Subrahmanyam (2000)
- Liquidity comovemenent across asset classes
  - Acharya, Schaefer, and Zhang (2015), Baele, Bekaert, and Inghelbrecht (2010), Capponi and Larsson (2015), Cespa and Foucault (2014), Hameed, Kang, and Viswanathan (2010), Karnaukh, Ranaldo, and Soderlind (2015)

Literature review (2/2)

- Research has typically focused on stock liquidity, with an increasing interest in over-the-counter (OTC) securities, in particular bonds and CDS
- Bonds:
  - Acharya, Amihud, and Bharath (2013), Bao, O'Hara, and Zhou (2016), Bao, Pan, and Wang (2011), Benos and Zikes (2016), Choi and Huh (2016), Gissler (2017), and Lin, Wang, and Wu (2011)
- CDS:
  - Bongaerts, De Jong, and Driessen (2011), Du, Gadgil, Gordy, and Vega (2016), and Tang and Yan (2008)

Additional details

1) Does higher P&L today increase the likelihood that liquidity will be good tomorrow for the trades in which the dealer participates?
   - Regression of liquidity measure(s) on controls and P&L (daily, weekly, monthly)
2) Does higher P&L affect future correlation between bond market and CDS market liquidity?
   - Regression of within-month correlation of daily CDS/bond liquidity on controls and P&L (monthly)

- Standard errors are double-clustered by dealer and time, dealer-industry fixed-effects included (individual market regressions)
- Standard errors are clustered by dealer, dealer fixed-effects included (cross-market regressions)
- The liquidity variables and the dealer-specific controls are at the date/dealer/industry level
- Matching between bonds and CDS is at the date/dealer/industry level. Matching by date/dealer/CUSIP not feasible due to CDS data

Bond data

- We obtain bond-transaction data from the Trade Reporting and Compliance Engine (TRACE) through Wharton Research Data Services (WRDS)
- We are able to identify dealers thanks to a regulatory data sharing agreement between the Federal Reserve Board and the Financial industry Regulatory Authority (FINRA)
- The time-stamped data include individual trades, and, among other variables, price and volume information
- In case the two trade counterparties are dealers, we know the identities of both. For dealer-to-client trades, we do not have information on the identity of the client
- While the bond data are available as far back as 2002, we focus on 2010 to 2015 because of constraints on the availability of CDS data

CDS data

- The CDS transactions data are from the Depository Trust & Clearing Corporation (DTCC)
- The data cover trades for which an institution supervised by the Federal Reserve Board is one of the parties or the reference entity of the CDS
- We observe the name of each of the CDS parties and of the reference entity, irrespective of whether they are dealers
- The data also contain pricing information (coupon and upfront payment)
- We focus on CDS whose reference entities are U.S. or European companies

Additional data details

- We measure dealer P&L with daily data provided by the Federal Reserve Bank of New York. These data are at the bank-holding company level, by trading desk
- We obtain company credit ratings from CapitalIQ through WRDS, and information about bond issues from the Mergent Fixed Income Securities Database (Mergent FISD)
- We restrict our analysis to large dealers only, similarly to Du, Gadgil, Gordy, and Vega (2016)
  - Bank of America Merrill Lynch, Barclays, Citibank, Goldman Sachs, JP Morgan Chase, Morgan Stanley, RBS Group, UBS and Wells Fargo
- Reference CDS spreads are from Markit through WRDS, and reference prices for bonds are from Bank of America Merrill Lynch (provides secondary market prices for the constituents of the US Corporate Master Index and HY Master II Index)

Summary statistics for bond and CDS transactions

	Summary statistics, by day/dealer/industry							
	Bonds				CDS			
	Dealer buying		**Dealer selling**		**Dealer buying**		**Dealer selling**	
	Obs.	Vol. ($mm)	Obs.	Vol.	Obs.	Vol. ($mm)	Obs.	Vol.
Percentile								
10	34	0.109	35	0.108	4	2.50	5	2.56
25	59	0.21	62	0.204	9	3.55	10	3.65
50	111	0.355	121	0.333	19	5.06	20	5.15
75	332	0.61	342	0.584	35	7.42	37	7.45
90	526	1.22	558	1.24	61	11.17	65	11.25
Average	205	0.551	218	0.544	29	6.51	31	6.53

- Data aggregated by day, dealer, industry
- Bond and CDS markets differ in the number and size of trades
- Bonds: about 200 buy/sell trades of $0.5*mm* per day
- CDS: about 29 buy/sell trades of $6.5*mm* per day

Factors driving the systematic component of bank P&L

	(1)	(2)	(3)		(3)
$Treasury_{(std),t}$	0.438***	0.496***	0.322***	$Treasury^2_{(std),t}$	0.329***
	(7.30)	(8.34)	(5.15)		(7.63)
$VIX_{(std),t}$	-0.577***	-0.677***	-0.489***	$VIX^2_{(std),t}$	-0.041
	(-9.15)	(-10.85)	(-7.78)		(-1.09)
$TED_{(std),t}$	-0.114*	-0.096*	-0.056	$TED^2_{(std),t}$	0.137***
	(-1.92)	(-1.67)	(-0.93)		(3.22)
$BAA_{(std),t}$	0.346***	0.427***	0.081	$BAA^2_{(std),t}$	-0.094**
	(5.43)	(6.74)	(1.06)		(-2.38)
$MKT_{(std),t}$		-0.294***	-0.288***	$MKT^2_{(std),t}$	-0.075***
		(-5.28)	(-6.09)		(-3.53)
$SMB_{(std),t}$		0.027	0.013	$SMB^2_{(std),t}$	0.000
		(0.63)	(0.30)		(0.01)
$HML_{(std),t}$		-0.042	-0.074*	$HML^2_{(std),t}$	-0.019
		(-0.98)	(-1.89)		(-0.86)
Intercept	0.023	0.023	-0.213***		
	(0.60)	(0.61)	(-2.74)		
Obs.	1,113	1,113	1,113		
R^2	0.154	0.194	0.287		

- The first *PC of P&L explains 50.47% of the total P&L variation*
- *VIX has the largest impact followed by Treasury and BAA*
- *PC1 depends non-linearly on Treasury, TED, BAA and MKT*

Treasury-market (il)liquidity and the first PC of P&L

	Treasury market illiquidity	
$Treasury_t$	1.213***	1.257***
	(29.51)	(31.14)
VIX_t	0.509***	0.461***
	(17.47)	(15.56)
TED_t	0.030	0.023
	(1.25)	(0.93)
BAA_t	13.344***	15.912***
	(4.15)	(5.08)
$PC1_t$		-0.025***
		(-5.65)
Intercept	5.647***	5.643***
	(37.50)	(37.87)
Obs.	1,113	1,113
R^2	0.709	0.716

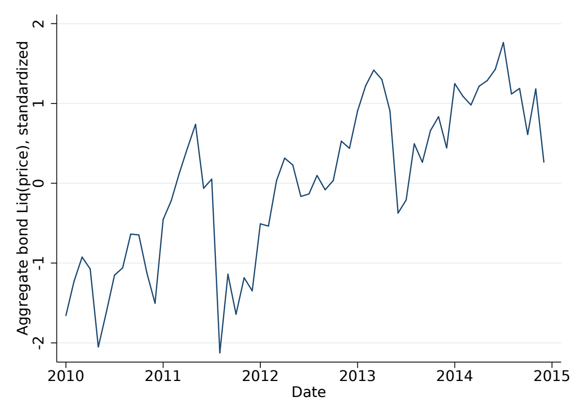
- Dependent variable is the "noise measure" of Treasury market illiquidity of Hu, Pan and Wang (2013)
- It is positively related to *Treasury*, *VIX*, *BAA*, and negatively to $PC1$
- The inclusion of $PC1$ only slightly increases the R^2

Define liquidity

- We consider two measures of corporate bond and CDS liquidity:
  - Quantity: log-volume
    - $Liq^{volume}_{m,d,i,t} = ln\left(\sum_{j\in\{m,d,i,t\}} volume_j\right)$
  - Price: squared deviation from reference price
    - $Liq^{price}_{m,d,i,t} = -1 \cdot ln\left(\sum_{j\in\{m,d,i,t\}} w_j \cdot \left(ln\frac{\text{traded price}_j}{\text{reference price}_j}\right)^2\right)$
    - Weights w_j by volume
  - m: market (bonds or CDS); t: date; d: dealer; i: industry

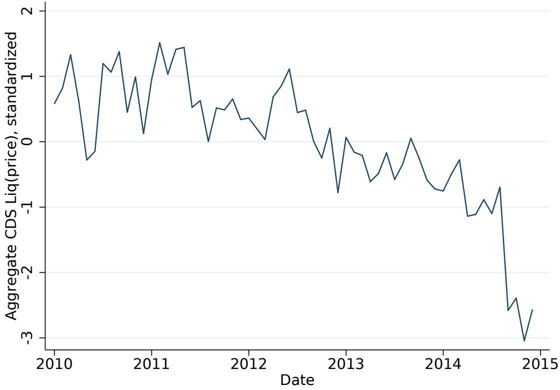
- CDS prices are calculated from reported CDS coupons/upfronts
  - Upfront payments with zero coupon that are equivalent to:
    - the reported upfront/coupon (DTCC)
    - the reported spreads (Markit)
- Conditioning on buy/sell transactions for each dealer we also define $Liq^{price,buy/sell}$ and $Liq^{volume,buy/sell}$ liquidity measures.

Bond market liquidity: price measure



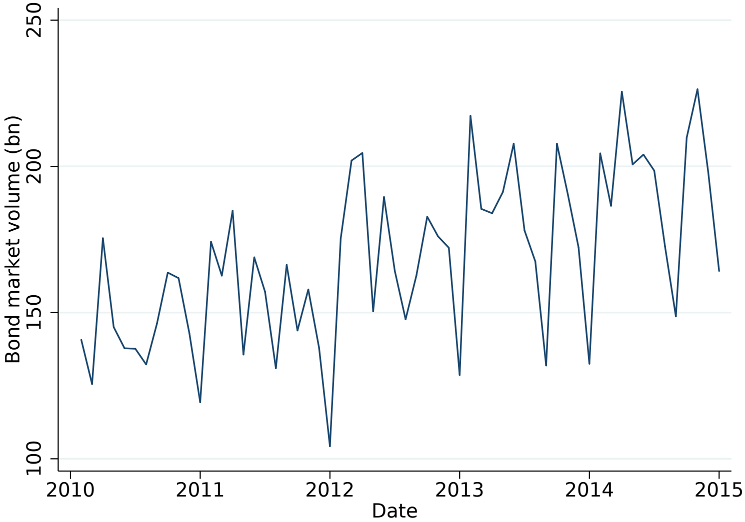
- Bond market liquidity improves slightly over time
- Low bond market liquidity coincides with Greek debt crisis int the mid of 2010, U.S. debt-ceiling negotiations in H2 2011, and the "taper-tantrum" in mid 2013

CDS market liquidity: price measure

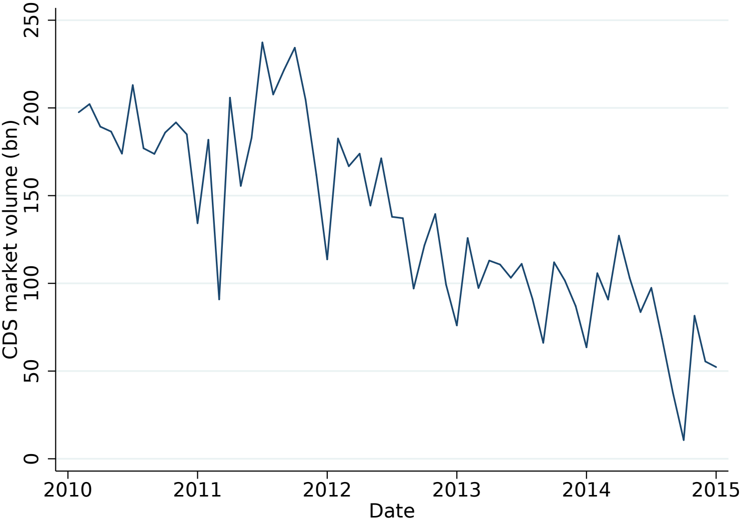


- CDS liquidity deteriorates over time
- The downward trend starts from late 2012: effect of binding regulatory changes?
- Volcker Rule effective in 04/2014, banks likely compliant well ahead

Bond market volume



CDS market volume



Explanatory variables

1) Market-wide variables: 10-year Treasury rate, VIX, TED spread, BAA corporate spread
2) Asset specific variables: total CDS notional, total bond volume
3) Portfolio specific variables: average portfolio bond yield, average portfolio CDS spreads
4) We use a proxy of liquidity demand pressure defined as volume imbalance for each market, from the perspective of dealers taking credit risk
   - bonds: $\frac{volume^{buy}_{bonds,d,i,t} - volume^{sell}_{bonds,d,i,t}}{volume^{buy}_{bonds,d,i,t} + volume^{sell}_{bonds,d,i,t}}$
   - CDS: $\frac{volume^{sell}_{CDS,d,i,t} - volume^{buy}_{CDS,d,i,t}}{volume^{buy}_{CDS,d,i,t} + volume^{sell}_{CDS,d,i,t}}$

Bond and CDS liquidity

Regression of Bond Liquidity on controls and P&L (daily)

	Liq^{volume}		Liq^{price}	
	Buy	Sell	Buy	Sell
$Treasury_t$	-18.789	-19.466	-9.596	-9.341
	(-0.89)	(-0.88)	(-0.78)	(-0.47)
VIX_t	0.261	0.244	-3.889***	-1.050***
	(0.47)	(0.42)	(-13.10)	(-3.16)
TED_t	0.613	0.622	0.534	-0.218
	(0.83)	(0.87)	(1.38)	(-0.51)
BAA_t	-2.241	-1.606	-40.872***	-26.265*
	(-0.21)	(-0.15)	(-4.33)	(-1.78)
$Volume_t^{bonds}$	0.138***	0.136***	-0.004	0.005
	(13.09)	(13.45)	(-0.42)	(0.54)
$PortYield_{d,i,t}$	0.317***	0.343**	-0.913***	-0.728***
	(2.94)	(2.21)	(-10.32)	(-5.37)
$Imbalance_{d,i,t}^{bonds}$	1.452***	-1.110***	0.252***	-0.175***
	(36.00)	(-19.34)	(2.86)	(-2.84)
$CDS_{d,t-1}$	-0.348	-0.357	-0.170	-0.208
	(-1.43)	(-1.45)	(-0.82)	(-0.83)
$P\&L_{d,t-1}$	0.019	0.020	0.021**	0.018
	(1.54)	(1.62)	(2.01)	(1.60)
$P\&L_{d,t-2}$	0.014	0.015	0.016**	0.023***
	(1.40)	(1.47)	(2.54)	(2.60)
$P\&L_{d,t-3}$	0.014	0.014	0.018	0.012
	(1.50)	(1.49)	(1.62)	(1.53)
$P\&L_{d,t-4}$	0.007	0.007	0.011	0.016*
	(0.63)	(0.61)	(1.23)	(1.70)
$P\&L_{d,t-5}$	0.009	0.011	0.010	0.016*
	(1.10)	(1.25)	(1.19)	(1.83)
Obs.	81,303	81,333	81,235	81,308
R^2	0.623	0.594	0.287	0.306

Regression of CDS Liquidity on controls and P&L (daily)

	Liq^{volume}		Liq^{price}	
	Buy	Sell	Buy	Sell
$Treasury_t$	9.750	9.505	37.191***	28.128***
	(1.63)	(1.60)	(9.48)	(6.56)
VIX_t	0.286	0.293	-0.938***	-1.063***
	(1.52)	(1.55)	(-3.29)	(-3.12)
TED_t	-0.203	-0.200	-0.866***	-0.418***
	(-1.58)	(-1.41)	(-4.15)	(-2.91)
BAA_t	15.219	13.851	48.549***	29.577***
	(1.56)	(1.34)	(6.13)	(3.03)
$Volume_t^{CDS}$	0.081***	0.081***	-0.039***	-0.043***
	(10.19)	(9.98)	(-3.60)	(-6.52)
$PortSpread_{d,i,t}$	-0.163***	-0.153***	0.317***	0.268***
	(-14.96)	(-17.60)	(10.51)	(6.74)
$Imbalance_{d,i,t}^{CDS}$	-1.245***	1.201***	0.634***	-0.599***
	(-79.21)	(57.76)	(11.69)	(-25.20)
$CDS_{d,t-1}$	0.095	0.098	0.317***	0.291***
	(1.27)	(1.24)	(3.72)	(4.24)
$P\&L_{d,t-1}$	0.006	0.007	0.027**	0.002
	(0.66)	(0.84)	(2.20)	(0.12)
$P\&L_{d,t-2}$	0.002	0.002	0.000	0.019
	(0.22)	(0.28)	(0.03)	(1.15)
$P\&L_{d,t-3}$	0.014*	0.014*	0.009	-0.005
	(1.91)	(1.79)	(0.75)	(-0.44)
$P\&L_{d,t-4}$	0.009	0.010	-0.003	-0.003
	(1.07)	(1.16)	(-0.17)	(-0.18)
$P\&L_{d,t-5}$	0.005	0.004	-0.016	0.001
	(0.72)	(0.59)	(-0.85)	(0.04)
Obs.	39,264	39,252	39,197	39,198
R^2	0.517	0.526	0.091	0.078

Regression of Bond Liquidity on P&L (weekly/monthly)

	Bonds, weekly				Bonds, monthly			
	Liq^{volume}		Liq^{price}		Liq^{volume}		Liq^{price}	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
$P\&L_{d,t-1}$	0.023	0.025	0.026*	0.034**	0.037	0.036	0.038	0.032
	(1.20)	(1.29)	(1.65)	(2.03)	(1.05)	(1.01)	(1.20)	(0.99)
$P\&L_{d,t-2}$	0.004	0.002	0.009	0.008				
	(0.21)	(0.12)	(0.63)	(0.61)				
$P\&L_{d,t-3}$	0.022	0.025	0.024	0.024				
	(1.20)	(1.29)	(1.63)	(1.57)				
$P\&L_{d,t-4}$	0.024	0.025	0.022	0.030*				
	(1.24)	(1.33)	(1.50)	(1.78)				
Obs.	18,211	18,213	18,206	18,213	4,279	4,280	4,278	4,280
R^2	0.699	0.679	0.400	0.396	0.748	0.737	0.559	0.515

- We can detect an effect of P&L on liquidity even at lower (weekly) frequency

Regression of CDS Liquidity on P&L (weekly/monthly)

	CDS, weekly				CDS, monthly			
	Liq^{volume}		Liq^{price}		Liq^{volume}		Liq^{price}	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
$P\&L_{d,t-1}$	0.032*	0.031*	0.007	-0.004	0.002	0.000	-0.036	-0.043
	(1.93)	(1.95)	(0.27)	(-0.18)	(0.05)	(0.00)	(-1.33)	(-1.23)
$P\&L_{d,t-2}$	-0.026	-0.024	0.014	0.024				
	(-1.54)	(-1.34)	(0.48)	(0.67)				
$P\&L_{d,t-3}$	-0.005	-0.005	0.001	0.008				
	(-0.23)	(-0.26)	(0.03)	(0.34)				
$P\&L_{d,t-4}$	0.008	0.007	-0.007	-0.018				
	(0.48)	(0.43)	(-0.31)	(-0.96)				
Obs.	12,096	12,098	12,091	12,095	3,160	3,160	3,160	3,160
R^2	0.708	0.711	0.151	0.124	0.884	0.891	0.288	0.298

Correlation between bond and CDS liquidity

Correlation for volume-based liquidity measures

	All	Buy bonds Buy CDS	Buy bonds Sell CDS	Sell bonds Buy CDS	Sell bonds Sell CDS
$Volume_t^{bonds}$	-0.556***	-0.519***	-0.377***	-0.529***	-0.402***
	(-8.96)	(-5.46)	(-3.92)	(-6.26)	(-4.47)
$Volume_t^{CDS}$	-0.098	-0.053	-0.047	-0.034	-0.027
	(-1.71)	(-1.19)	(-0.53)	(-0.99)	(-0.74)
$PortYield_{d,i,t}$	-0.097*	-0.176**	-0.100	-0.090	-0.019
	(-2.27)	(-3.15)	(-1.67)	(-0.86)	(-0.34)
$PortSpread_{d,i,t}$	0.154*	0.156***	0.179**	0.131***	0.129**
	(2.19)	(4.49)	(3.46)	(4.06)	(2.90)
$Imbalance_{d,i,t}^{bonds}$	0.403**	0.112	0.199	0.063	0.180**
	(2.45)	(0.56)	(1.32)	(0.46)	(3.16)
$Imbalance_{d,i,t}^{CDS}$	0.084***	0.026	0.032	0.033	0.065
	(4.06)	(0.27)	(0.40)	(0.28)	(0.63)
$CDS_{d,t-1}$	0.081	0.054	-0.064	0.022	-0.081
	(1.47)	(0.74)	(-1.06)	(0.31)	(-1.52)
$P\&L_{d,t-1}$	-0.030	-0.016	-0.022	-0.024	-0.037*
	(-1.87)	(-1.00)	(-1.35)	(-1.68)	(-2.12)
Obs.	2,791	2,497	2,623	2,496	2,624
R^2	0.044	0.034	0.029	0.034	0.027

- The coefficients on the macroeconomic variables are omitted (largely statistically insignificant)

Correlation for price-based liquidity measures

	All	Buy bonds Buy CDS	Buy bonds Sell CDS	Sell bonds Buy CDS	Sell bonds Sell CDS
$Volume_t^{bonds}$	0.018	0.020	-0.049	0.211**	-0.053
	(0.30)	(0.24)	(-0.51)	(3.31)	(-0.46)
$Volume_t^{CDS}$	-0.004	-0.002	-0.080	-0.019	0.023
	(-0.12)	(-0.05)	(-1.89)	(-0.42)	(0.47)
$PortYield_{d,i,t}$	0.070	0.092	-0.016	0.083	-0.000
	(1.57)	(0.89)	(-0.22)	(0.74)	(-0.00)
$PortSpread_{d,i,t}$	0.055*	0.033	0.031	0.023	0.055
	(2.33)	(0.76)	(1.55)	(0.78)	(1.28)
$Imbalance_{d,i,t}^{bonds}$	-0.116	0.141	0.026	-0.151	-0.115
	(-0.66)	(1.10)	(0.20)	(-1.29)	(-0.57)
$Imbalance_{d,i,t}^{CDS}$	-0.135	-0.056***	-0.104	-0.139*	-0.100
	(-1.24)	(-3.84)	(-0.67)	(-2.40)	(-0.48)
$CDS_{d,t-1}$	-0.046	0.017	-0.078	-0.024	-0.085
	(-0.72)	(0.41)	(-1.64)	(-0.74)	(-1.33)
$P\&L_{d,t-1}$	0.036***	0.028**	0.025	0.027*	0.019**
	(3.96)	(3.51)	(1.49)	(2.37)	(3.27)
Obs.	2,791	2,497	2,623	2,496	2,624
R^2	0.015	0.009	0.010	0.013	0.008

- The coefficients on the macroeconomic variables are omitted (mostly statistically insignificant)

Interpretation of our results (1/2)

- Punchline of our results:
  - Low P&L results in weaker comovement in CDS and bond liquidity
- Shouldn't balance-sheet constraints result in stronger comovement?
  - The literature typically studies crisis episodes. In these cases:

  1) Balance-sheet constraints across intermediaries are binding
  2) There is a correlated surge in liquidity demand across asset classes

  - No crisis in our sample: liquidity demand unlikely to be very correlated

⇒ When liquidity supply dries up, observed liquidity correlation is lower reflecting low demand correlation

- When liquidity demand is very negatively correlated, dealers take little net credit risk

  ⇒ P&L coefficient should be larger (stronger effect) when excluding left tail of liquidity-demand correlation

- Results should come from times when most financial intermediaries are constrained – high covered interest rate parity (CIP) deviations

Interpretation of our results (2/2)

- Dealer-specific constraints are more important when other intermediaries are also constrained (high CIP deviations)
- The coefficient on P&L is larger with high CIP deviations and low imbalance correlation
- The coefficient on P&L is largest when excluding the very left tail

		High CIP deviation	Excluding high CIP deviation	High CIP deviation: High imbalance correlation (above 50^{th})	High CIP deviation: Low imbalance correlation (below 50^{th})	High CIP deviation: Low imbalance correlation (10^{th}-50^{th})
ρ^{volume}	$P\&L_{d,t-1}$	-0.032	-0.024	-0.025	-0.048	-0.035
		(-1.29)	(-1.70)	(-0.50)	(-0.78)	(-0.53)
	Obs.	583	2,208	293	288	228
	R^2	0.149	0.032	0.170	0.154	0.165
ρ^{price}	$P\&L_{d,t-1}$	0.130***	0.025	0.094	0.160**	0.225***
		(4.03)	(1.59)	(1.81)	(3.34)	(5.48)
	Obs.	583	2,208	293	288	228
	R^2	0.075	0.012	0.085	0.125	0.186

Correlation analysis, additional robustness

	ρ^{price}				
	All	Buy bonds Buy CDS	Buy bonds Sell CDS	Sell bonds Buy CDS	Sell bonds Sell CDS
Orth. P&L	0.100** (3.23)	0.122* (2.28)	0.054 (1.34)	0.044 (1.32)	0.031 (0.74)
Before Sep. 2014	0.039*** (4.23)	0.028** (3.00)	0.028 (1.69)	0.029** (2.56)	0.024*** (4.37)
Selection model	0.037*** (4.12)	0.028*** (3.61)	0.026 (1.52)	0.027** (2.45)	0.019*** (3.32)

- (Common P&L component?) After removing the common time-series component from P&L (Orth. P&L) the results for price-based liquidity correlation are stronger.
- (Outliers?) After excluding the last four months of 2014 (sharp CDS liquidity deterioration), the results remain statistically significant.
- (Sample selection?) Use Heckman selection model with selection equation for correlations including *VIX*, *PortYield*, *PortSpread*, and their interactions. The results for *P&L* remain broadly unchanged.

Conclusions

- Direct test of whether credit-desk dealer P&L affects dealer liquidity provision in bond and CDS markets.
- Low P&L slightly decreases the liquidity of bond trades.
- The effect of P&L for CDS liquidity is weaker.
- Low P&L reduces cross-market liquidity correlation.
- The cross-market effect is stronger if dealers are balance-sheet constrained, and if bond/CDS liquidity demand is less correlated.