

Anatomy of a Liquidity Crisis: Corporate Bonds in the Covid-19 Crisis

Maureen O'Hara * Xing (Alex) Zhou **

*Cornell University

**Federal Reserve Board

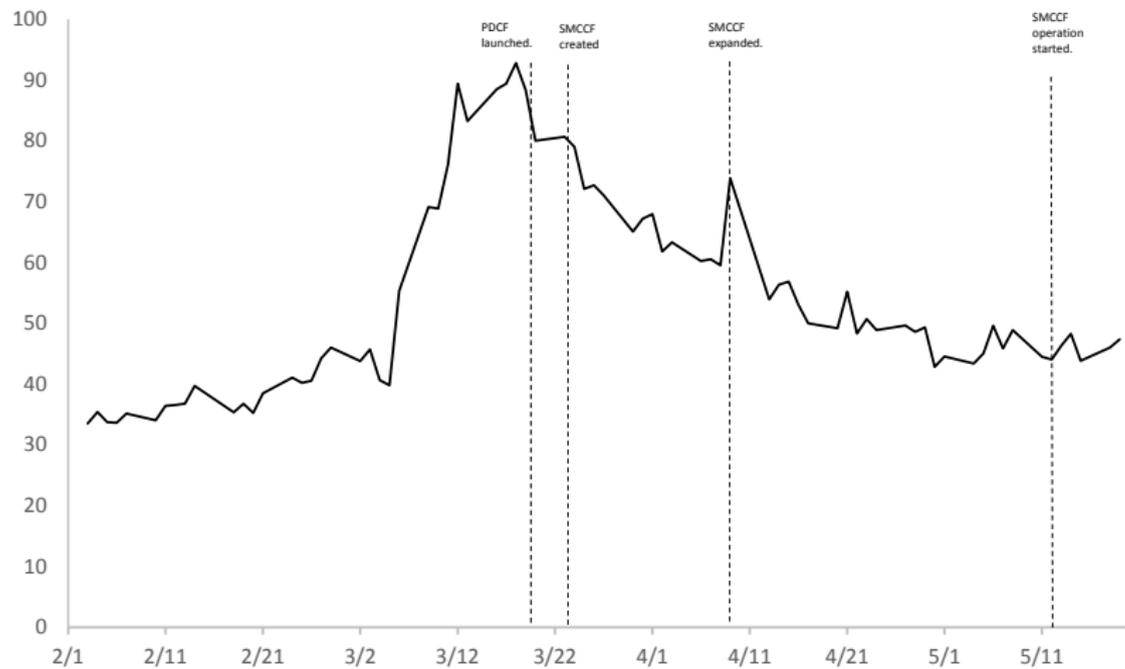
Disclaimer: The views expressed herein are those of the authors and do not necessarily reflect those of the Federal Reserve Board, the Federal Reserve System, or its staff.

Corporate Bond Markets in Covid-19 Crisis

- The Covid-19 pandemic led to acute stress in the corporate bond markets.
 - ▶ Yield spreads soared and liquidity seemingly evaporated.
- Demand for liquidity increased due to changes in risk preferences or asset value expectations:
 - ▶ Unprecedented outflows from fixed income funds (Ma, Xiao and Zeng (2020)).
 - ▶ Larger outflows from less liquid and more vulnerable bond funds (Falato, Goldstein, and Hortascu (2020)).
- Supply of liquidity declined due to funding constraints and increased inventory risks:
 - ▶ Constraints on dealer balance sheet capacity and higher repo financing costs.
 - ▶ Inventory risks caused by one-sided trading.

Transaction Costs and Fed Interventions

$$Cost_T = \ln(P_T / P_T^B) \cdot Sign_T$$



Transaction Costs and Trade Size in IG Bonds

- Three sub-periods: *Normal* (Feb 1-Mar 5); *Crisis* (Mar 6- March 19); *Regulation* (March 20-May 19).

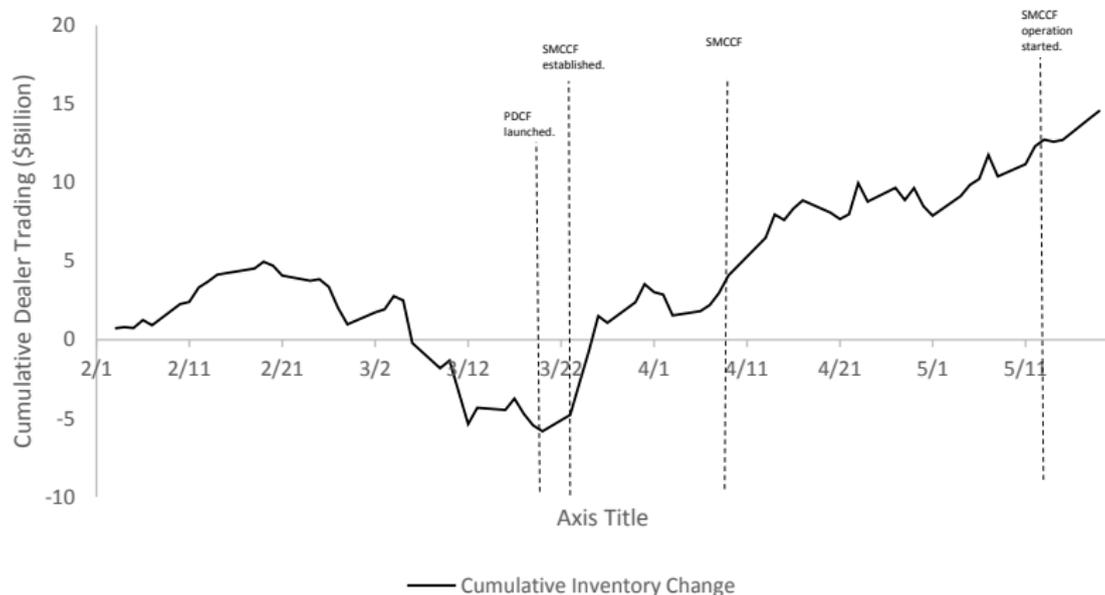


Trading Shifted to Bonds more Liquid in Normal Times

	$\text{Log}(\text{Volume}_{\text{normal}})$	$\text{Log}(\text{Volume}_{\text{crisis}})$	$\text{Log}(\text{Volume}_{\text{crisis}})$
$\text{Cost}_{\text{normal}}$	-0.024*** (-10.48)		-0.005*** (-5.78)
$\text{Cost}_{\text{crisis}}$		0.007*** (8.99)	0.003*** (7.11)
$\text{Log}(\text{Time to Maturity})$	0.176*** (4.39)	-0.339*** (-8.36)	-0.138*** (-6.94)
$\text{Log}(\text{Age})$	-0.682*** (-12.30)	-0.935*** (-14.09)	-0.251*** (-10.58)
$\text{Log}(\text{Amount Outstanding})$			0.418*** (15.10)
$\text{Log}(\text{Volume}_{\text{normal}})$			0.639*** (36.32)
Rating Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes

Dealers' Cumulative Inventories in Corporate Bonds

- Dealers shifted from buying to selling in the Crisis period.
 - ▶ Dealers' inventories declined by \$8 Billion.
 - ▶ Inventories started to increase following Fed interventions.

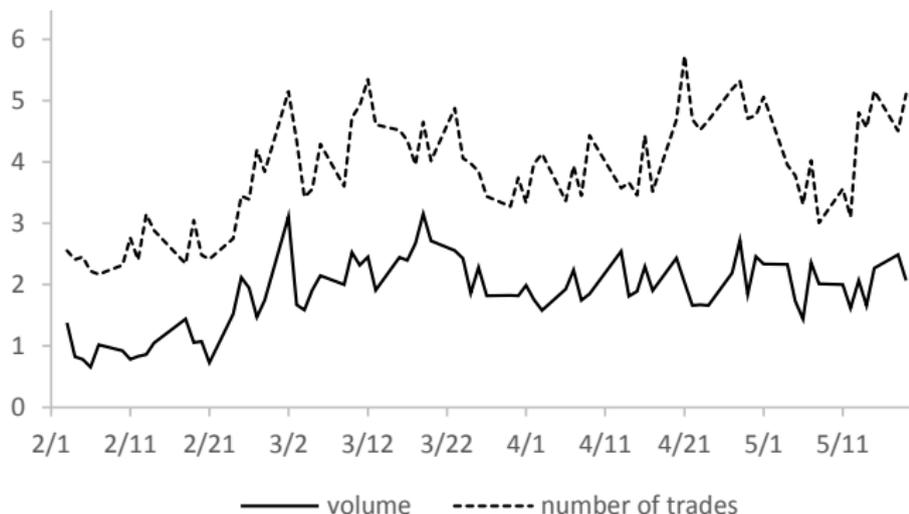


Dealers Inventory Changes and Bond Transaction Costs

	<i>Transaction Cost_t</i>
<i>Cum Dealer Net Buy_{t-1}</i>	0.016 (0.71)
<i>Crisis* Cum Dealer Net Buy_{t-1}</i>	-0.064*** (-3.43)
<i>Regulation* Cum Dealer Net Buy_{t-1}</i>	0.053*** (3.01)
Bond-level Controls	Yes
Bond Fixed Effects	Yes
Credit Rating Fixed Effects	Yes
Dealer Fixed Effects	Yes
Trade Size Fixed Effects	Yes
Day Fixed Effects	Yes

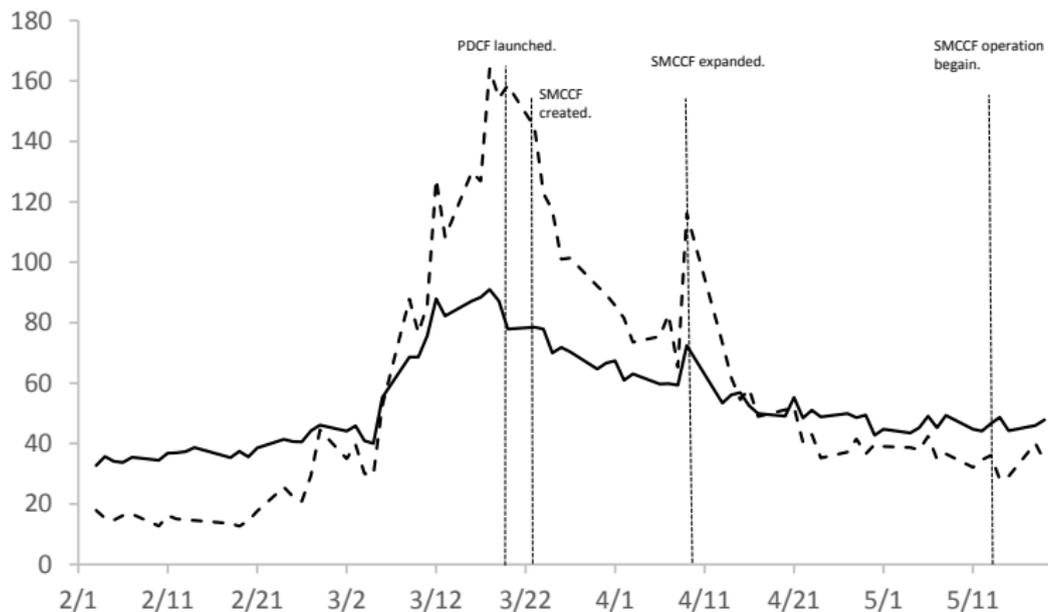
Electronic Customer-to-Customer (C-to-C) Trading

- Recent growth in e-trading brought additional sources of liquidity.
- Regulatory TRACE data allows identification of C-to-C trades.
- Customers stepped up when dealer liquidity provisions were limited.



C-to-C Trading Costs

- Liquidity provided by customers was costly in Crisis.
 - ▶ *Normal*: C-to-C cost was 40% lower than C-to-D cost.
 - ▶ *Crisis*: C-to-C cost surpassed C-to-D cost and reach 165 bps, more than double C-to-D cost.
 - ▶ *Regulation*: C-to-C cost fell below C-to-D cost by April end.



Evaluating the Effects of Fed Liquidity and Credit Facilities

- Our analyses are consistent with the effects of Fed liquidity and credit facilities (SMCCF and PDCF).
- Identification can still be a concern.
 - ▶ The SMCCF was announced right after the implementation of the PDCF.
 - ▶ Other Fed facilities and monetary policy actions could also affect bond market functioning.
- Our strategies: Focus on the segment of the market directly related to the objectives of the facilities.
 - ▶ Triple Diff-in-Diff: Exploit differences in eligible participants and assets.

The PDCF Effects: Empirical Design

- Eligible participants:
 - ▶ PDCF: Primary dealers.
 - ▶ SMCCF: U.S. institutions that satisfy the conflicts-of-interest requirements of section 4019 of the CARES Act.
- Hypothesis on PDCF effects: the additional liquidity increase in IG bonds during the regulation period should be greater for primary dealers.
- Sample: All trades executed within the 2 weeks around the launch of the PDCF (between March 13 and March 26).
- Panel regressions:

$$\begin{aligned} Cost_j = & \alpha + \beta \times Regulation_t \times IG_t \times Primary Dealer_t + Lower Order Interactions \\ & + \gamma \times X_{i,t} + \mu_i + \mu_s + \mu_d + \mu_t + \varepsilon_j \end{aligned}$$

The PDCF Effects: Results

	Full Sample	BBB- vs BB+	Parallel Trends
IG*Regulation	-2.44 (-1.26)	6.261 (1.35)	0.779 (0.20)
IG*Primary Dealer	-9.289*** (-3.02)	7.498 (1.11)	-1.669 (-0.49)
Primary Dealer*Regulation	-1.741 (-0.44)	4.409 (0.62)	7.953 (1.27)
IG*Primary Dealer*Regulation	-10.420** (-2.50)	-16.380* (-1.85)	-13.315* (-1.86)
Bond-level Controls	Yes	Yes	Yes
Bond Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes
Dealer Fixed Effects	Yes	Yes	Yes
Trade Size Fixed Effects	Yes	Yes	Yes
Day Fixed Effects	Yes	Yes	Yes

The SMCCF Effects: Empirical Design

- Eligible assets:
 - ▶ PDCF: IG bonds.
 - ▶ SMCCF: IG bonds maturing in 5 years or less.
- Hypothesis on SMCCF effects: the additional liquidity increase in investment-grade bonds during the regulation period should be greater in bonds maturing in 5 years or less.
- Sample: All trades executed within the 2 weeks around the launch of the PDCF (between March 13 and March 26).

$$\begin{aligned} Cost_j = & \alpha + \beta \times Regulation_t \times IG_t \times Short\ Term_t + Lower\ Order\ Interactions + \gamma \times X_{i,t} \\ & + \mu_i + \mu_s + \mu_d + \mu_t + \varepsilon_j \end{aligned}$$

The SMCCF Effects: Results

	Full Sample	4.5 vs. 5.5 years	Parallel Trend
IG*Regulation	0.112 (0.04)	10.642 (1.26)	6.074 (0.85)
Short Term	-19.586 (-1.34)	-57.533** (-1.99)	-12.138 (-1.23)
Short Term * Regulation	7.348** (2.05)	14.333 (1.33)	7.58 (0.83)
IG*Short Term	12.77 (1.10)	52.304* (1.66)	16.387 (1.50)
IG*Short Term*Regulation	-9.367** (-2.45)	-21.234* (-1.80)	-16.631* (-1.67)
Bond-level Controls	Yes	Yes	Yes
Bond Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes
Dealer Fixed Effects	Yes	Yes	Yes
Trade Size Fixed Effects	Yes	Yes	Yes
Day Fixed Effects	Yes	Yes	Yes

The effects of SMCCF expansion and implementation on bond liquidity

	Expansion	Implementation
Fallen Angel*SMCCF Expansion	-2.052 (-0.41)	
Short Term	-6.24 (-1.52)	
Fallen Angel*Short Term	-6.159 (-0.28)	
SMCCF Expansion*Short Term	2.183** (2.34)	
Fallen Angel*Short Term*SMCCF Expansion	-0.845 (-0.11)	
SMCCF Implementation*Prime Dealer		-2.702*** (-3.67)
Bond-level Controls	Yes	Yes
Bond Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes
Dealer Fixed Effects	Yes	Yes
Trade Size Fixed Effects	Yes	Yes
Day Fixed Effects	Yes	Yes

Conclusions

- Market liquidity is not a given-it emerges from a complex set of interactions.
- As the crisis unfolded, trading changed, dealer behavior changed, and illiquidity emerged.
 - ▶ Electronic C-to-C trades were prohibitively expensive.
 - ▶ Fed interventions contributed to easing the crisis.
- Fed took on a new role of market maker of last resort (Buiter and Sibert (2007)).
- Going forward, this action could have some longer-term effects on the overall market.
 - ▶ May encourage firms to obtain greater leverage.
 - ▶ May influence the assessment and pricing of credit risks and instruments (Small and Clouse (2005)).