Corporate Dash for Cash and

The Crash of Bank Stock Prices

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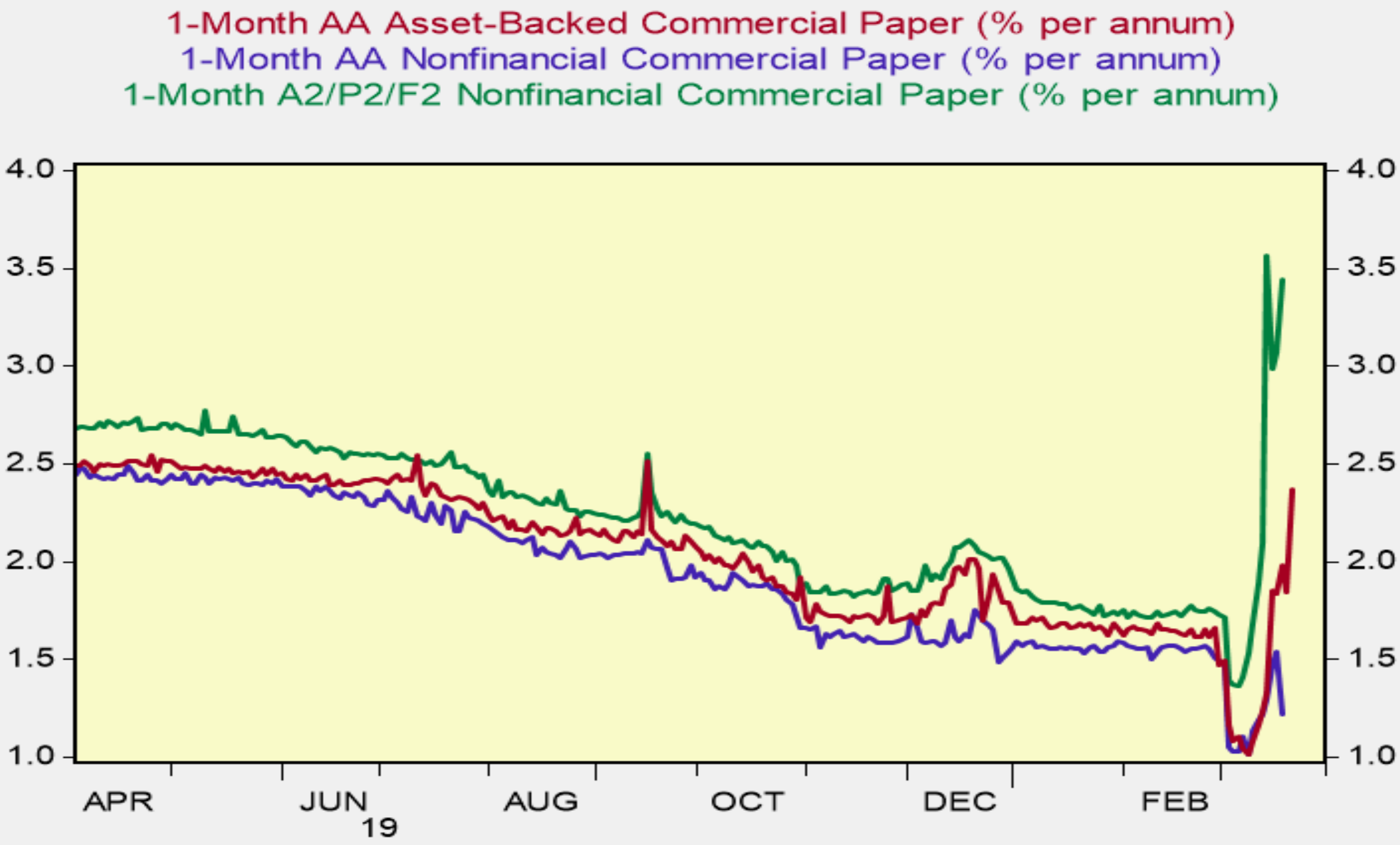
Borrowers are drawing down heavily on bank lines of credit anticipating that market sources of funding may dry up or get costlier, especially short-term commercial paper, creating stress on bank balance-sheets and liquidity conditions and contagion that could aggravate if stress worsens (https://www.bloomberg.com/news/articles/2020-03-12/dash-for-cash-is-on-as-corporate-titans-draw-down-credit-lines):

”Companies are maxing out unused credit lines for extra liquidity. U.S. banks had a total of $2.5 trillion of credit commitments to companies that weren’t used at the end of 2019, with two-thirds of provided by JPMorgan, BofA, Citi & Wells Fargo.”

Why draw down credit lines?

“Freeze” in segments of commercial paper, bank loan and bond markets, …


1-Month AA Asset-Backed Commercial Paper (% per annum)
1-Month AA Nonfinancial Commercial Paper (% per annum)
1-Month A2/P2/F2 Nonfinancial Commercial Paper (% per annum)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
APR
JUN
19
AUG
OCT
DEC
FEB
Source: Federal Reserve Board/Haver Analytics

Borrowing costs have soared as the market has whipsawed

Yields on US corporate debt, by rating class (%)

Source: Ice Data Services

Can banks withstand “tsunami” of credit line drawdowns?

May be, but depends on how severe and wide-spread the stress is…

“Stress Test” of Bank Credit Line Drawdowns based on past recessions

Stress Scenario 1: Firms will experience a stock performance consistent with last two preceding recession periods (all figures are in millions)

Rating	Credit Line	%	Draw-down rate	Expected draw-down
Unrated	$146,807	15.3%	43.2%	$63,421
AAA/AA/A	$257,444	26.9%	20.2%	$52,004
BBB	$323,255	33.7%	20.2%	$65,298
Non-IG	$230,753	24.1%	36.0%	$83,164
	$958,260			**$263,886**

Stress Scenario 2: Firms will use credit lines as they did at the end of 2008 (all figures are in millions)

Rating	Credit Line	%	Draw-down rate	Expected draw-down
Unrated	$146,807	15.3%	39.2%	$57,549
AAA/AA/A	$257,444	26.9%	17.0%	$43,843
BBB	$323,255	33.7%	23.8%	$76,902
Non-IG	$230,753	24.1%	28.5%	$65,788
	$958,260			**$244,081**

How big is this liquidity stress?

- We looked at the 100 largest U.S. banks at the end of 2019, their capitalization and undrawn credit exposure

- If commitments are drawn down as in stress scenario 1, bank Tier 1 capital ratio (as % of risk-weighted assets) drops on average from 12.7% to 11.8%
  - Given better capitalization compared to 2008 and liquidity assistance from the Fed, this does not appear to become a solvency problem

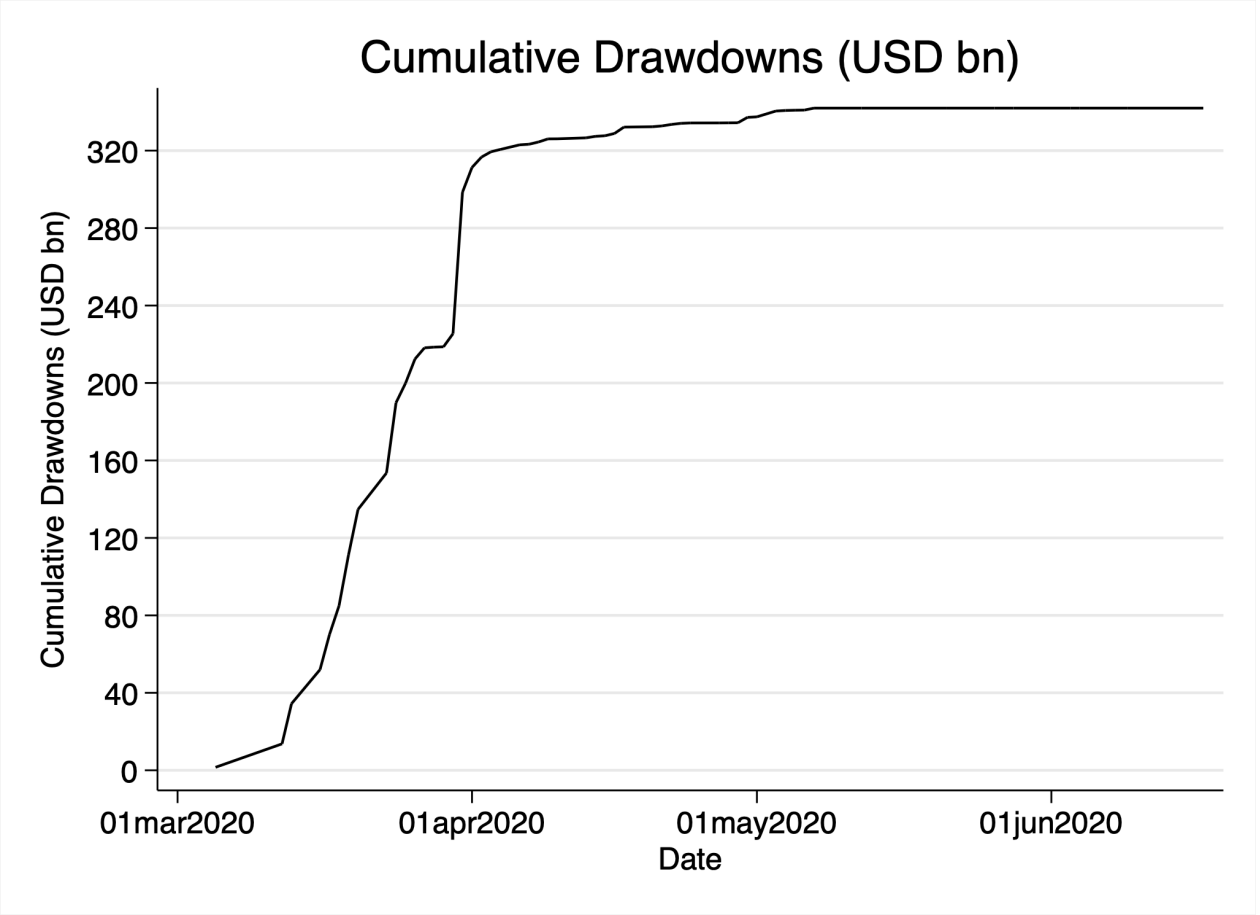
- Extreme adverse scenario? A full draw-down reduces Tier 1 ratio to 10.7%
  - At this point, likely further erosion of their capital through higher default rates
  - Such scenario might bring banks closer to their regulatory minimum requirement

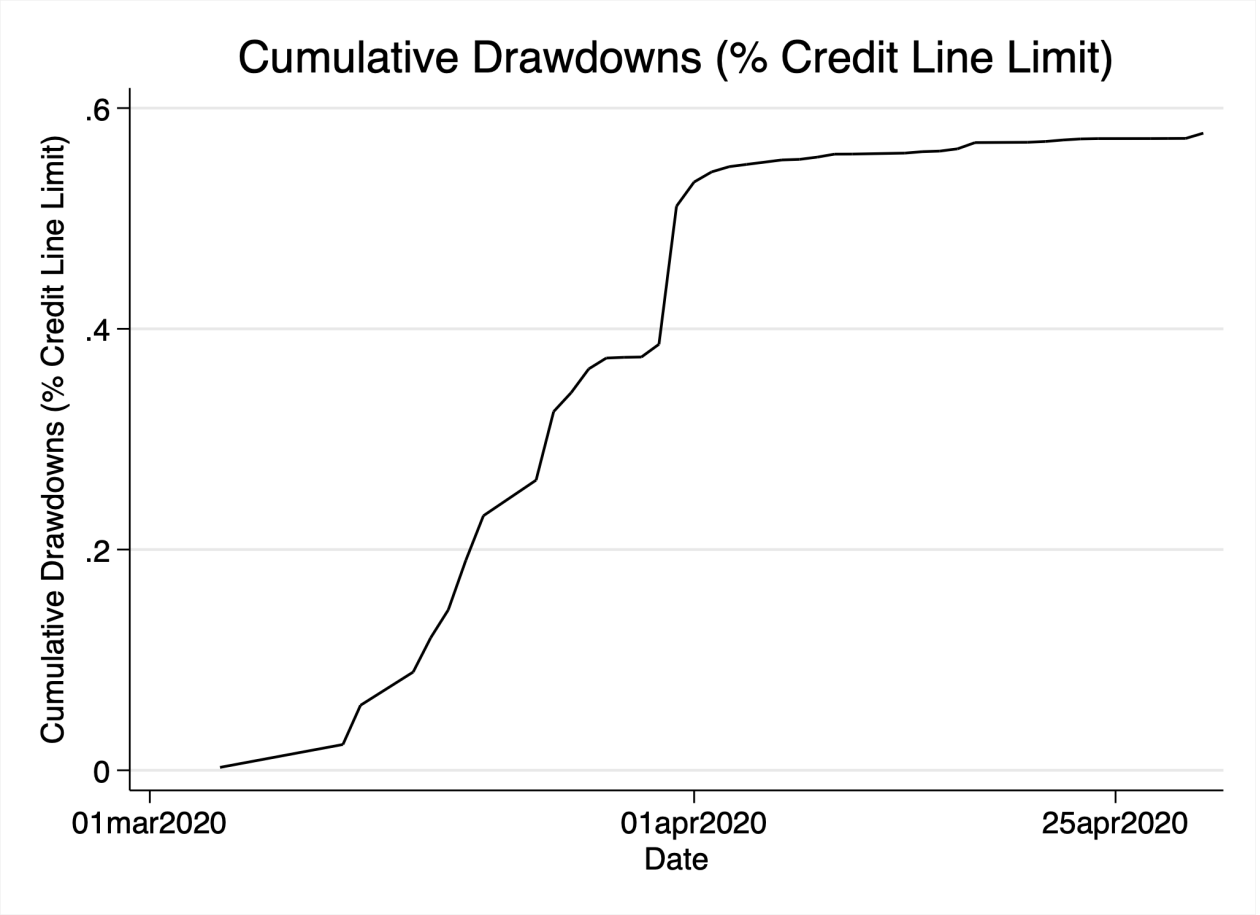
How has the “dash for cash” played out?

The short-term drawdown risk far more intense than past stress scenarios…

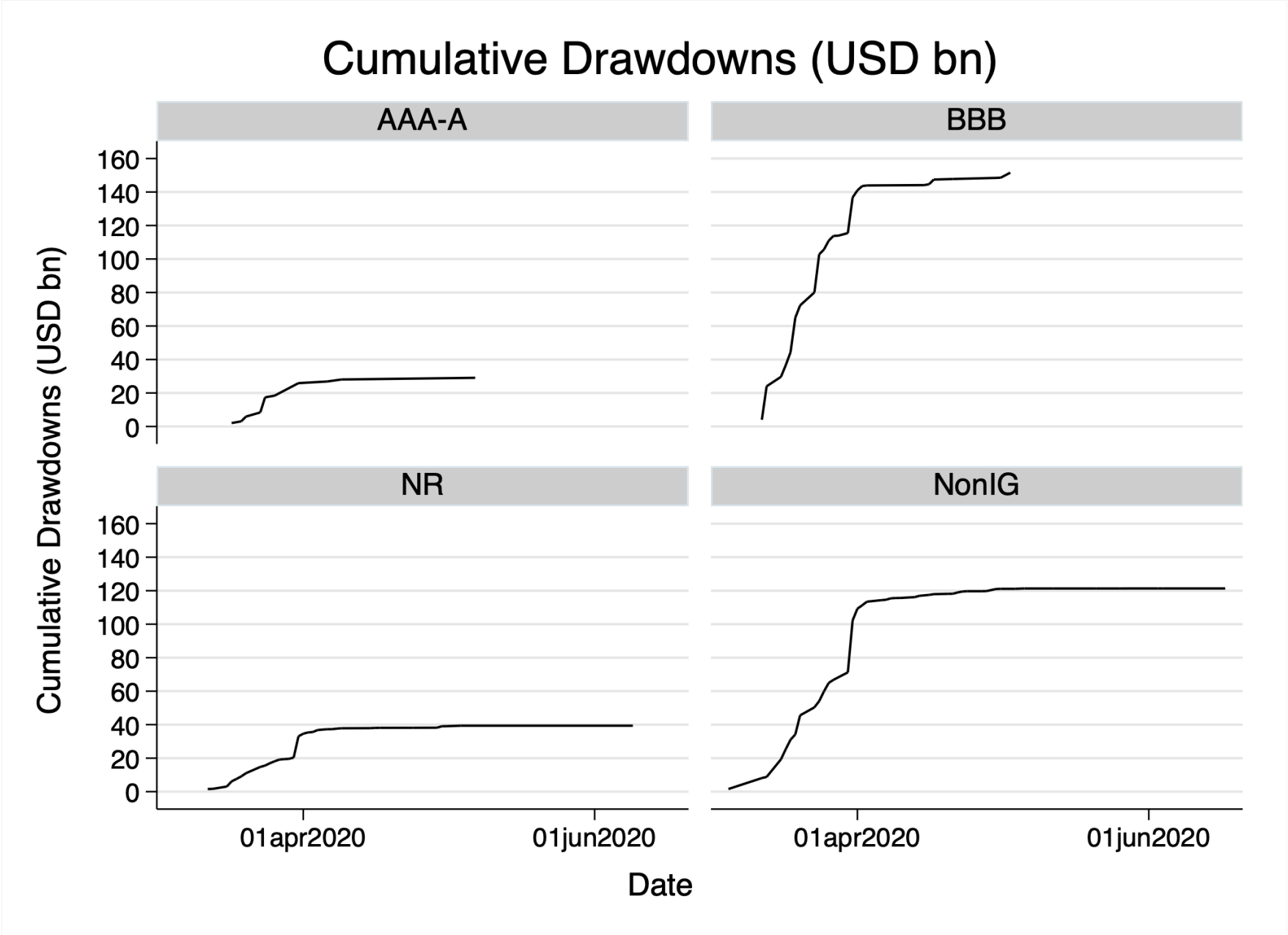
Scramble for cash across board; Fed stabilization; Fallen angel risk for BBB firms

Unprecedented drawdown rate on bank credit lines since early March

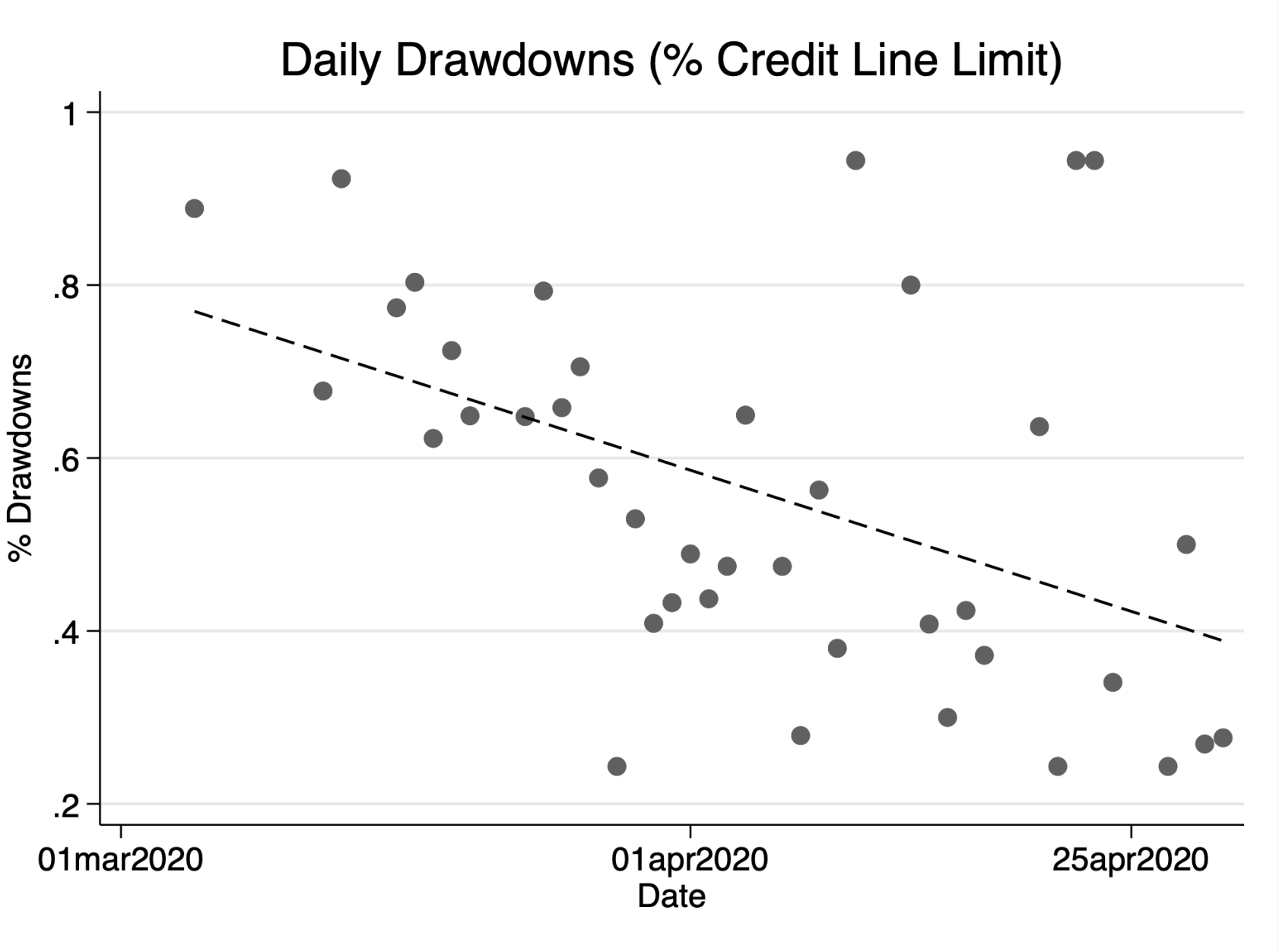




BBB-rated firms and non-IG rated firms draw down most



“Run” on credit lines at the beginning of the crisis



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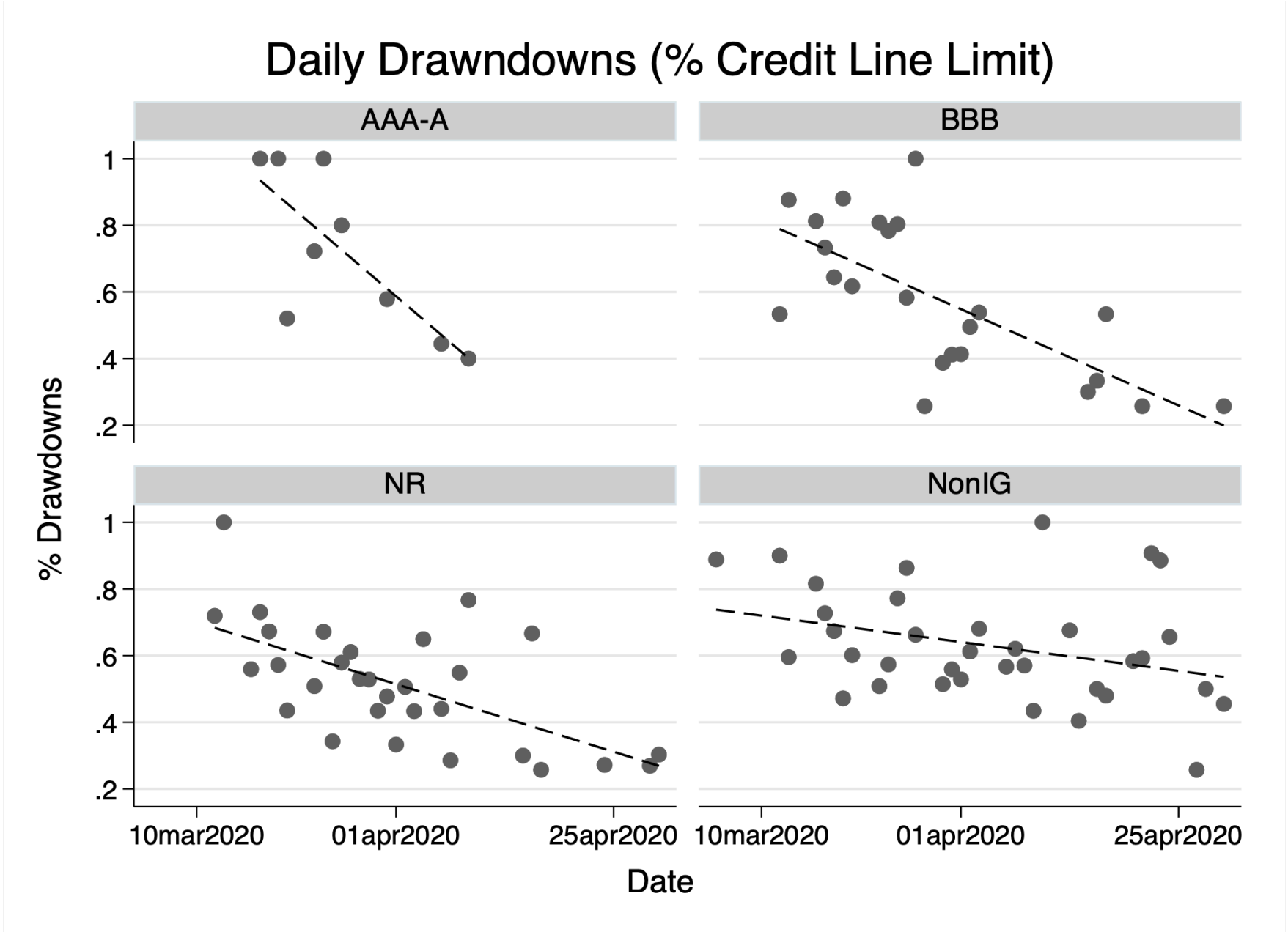
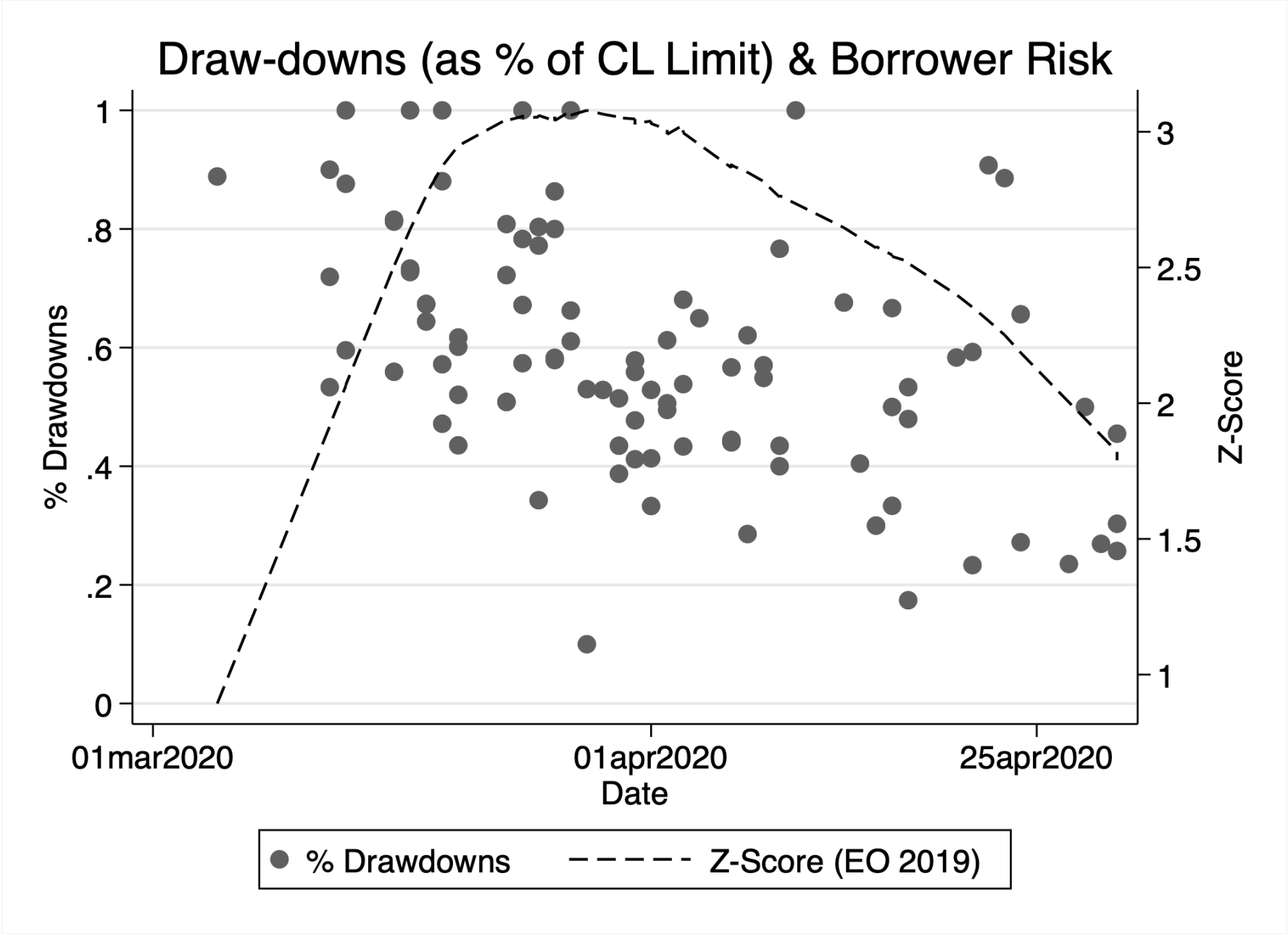


Riskier firms rely on credit line drawdowns



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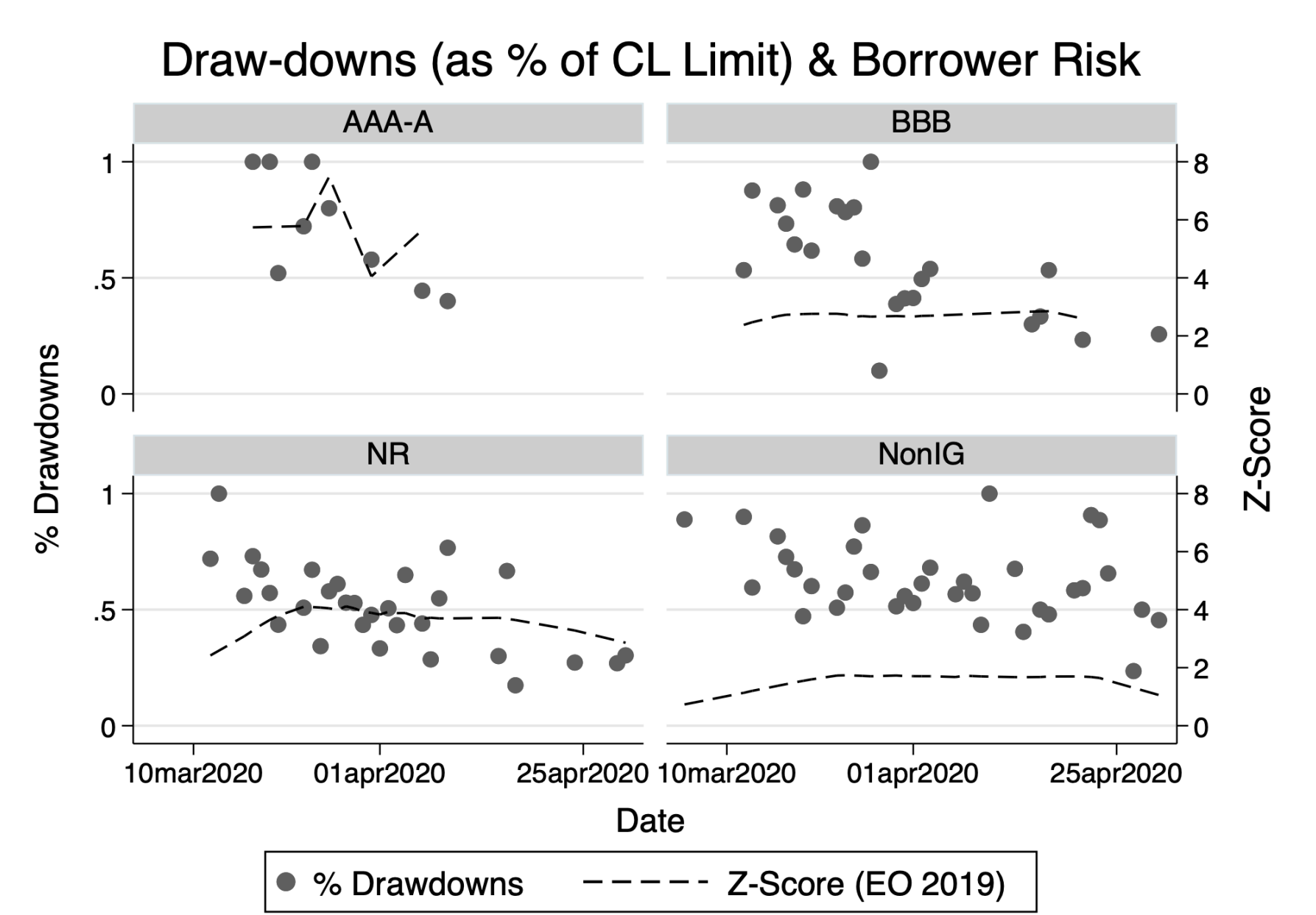
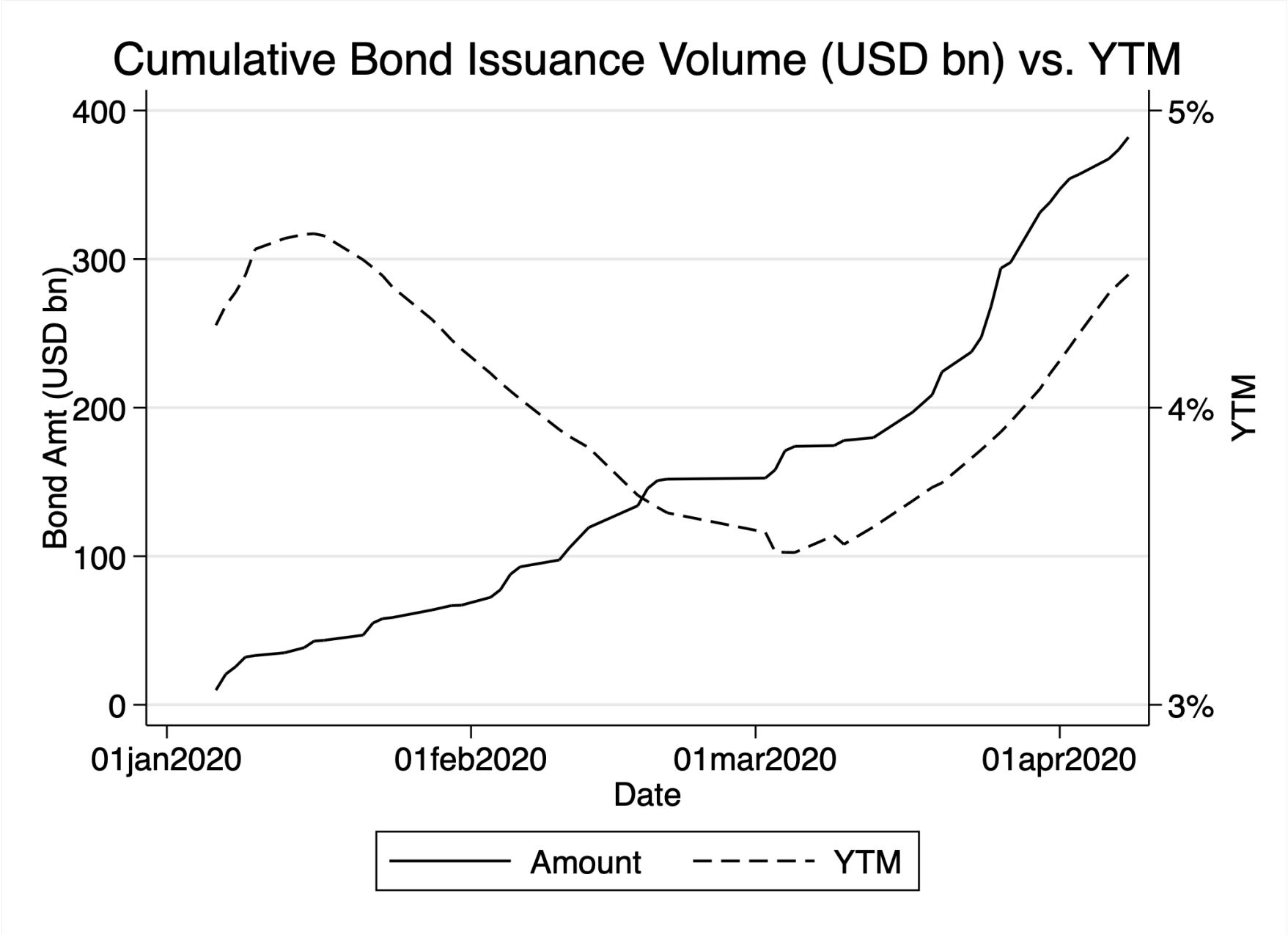
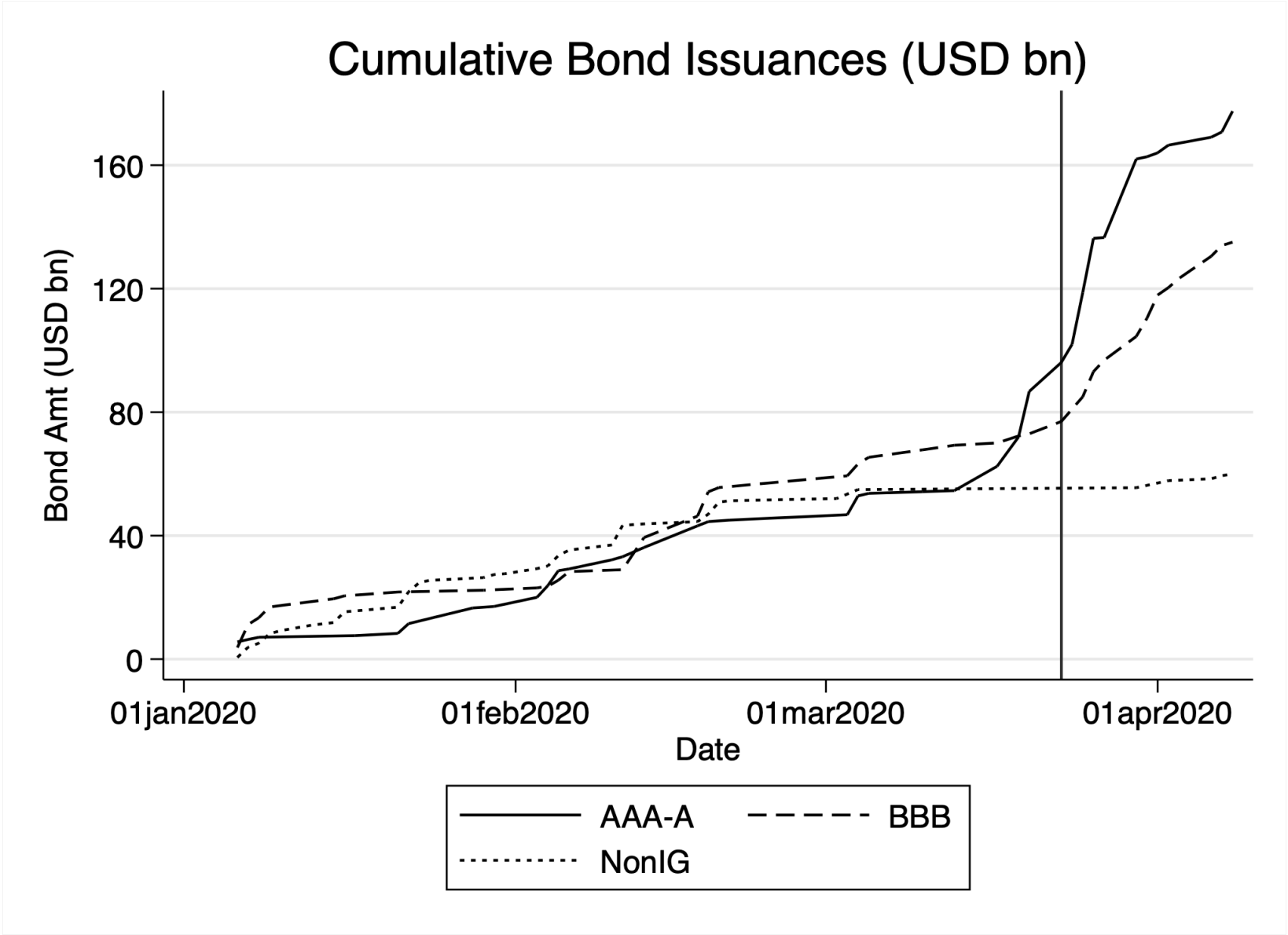


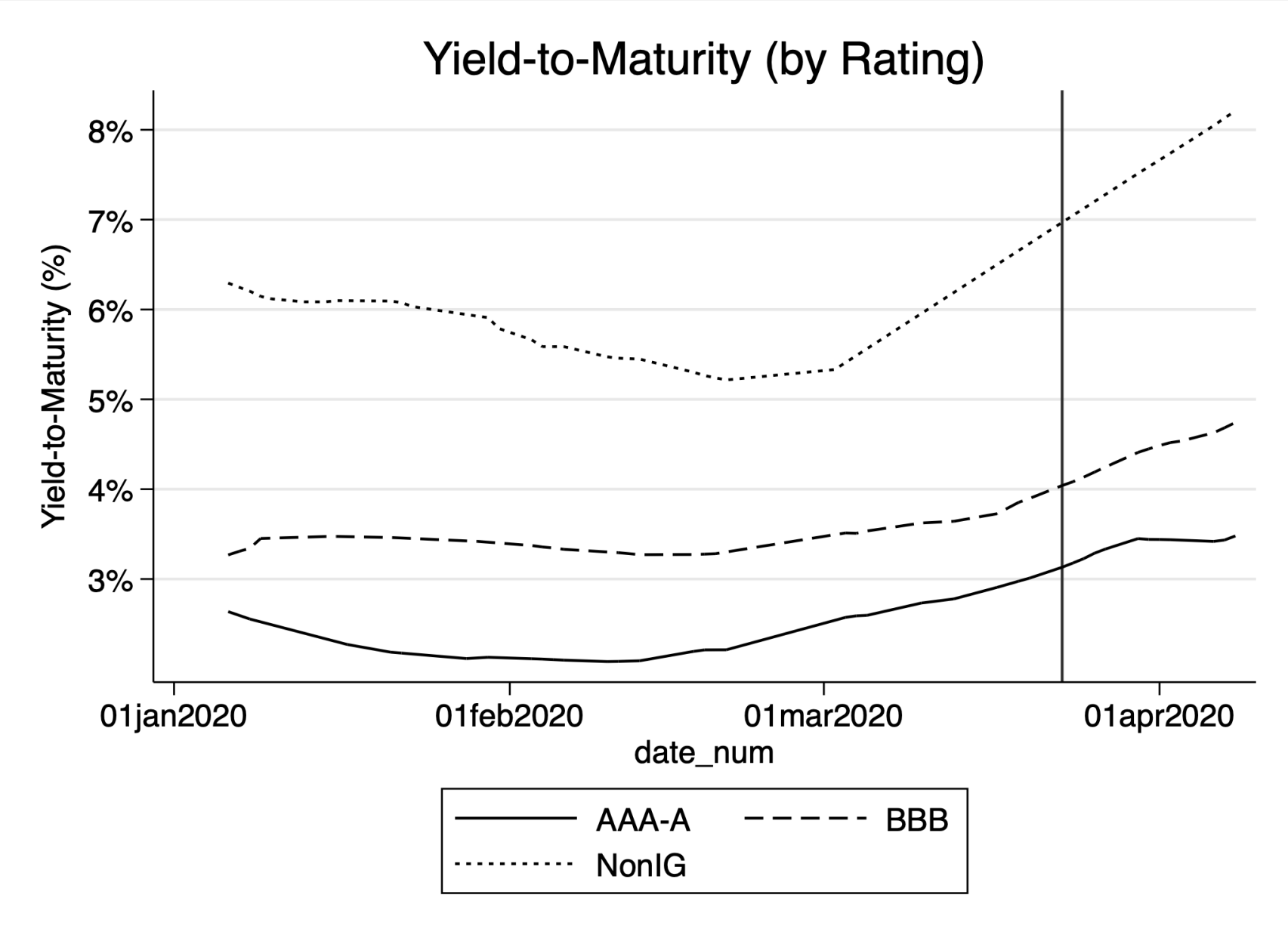
Bond markets shut-down at the beginning of the pandemic



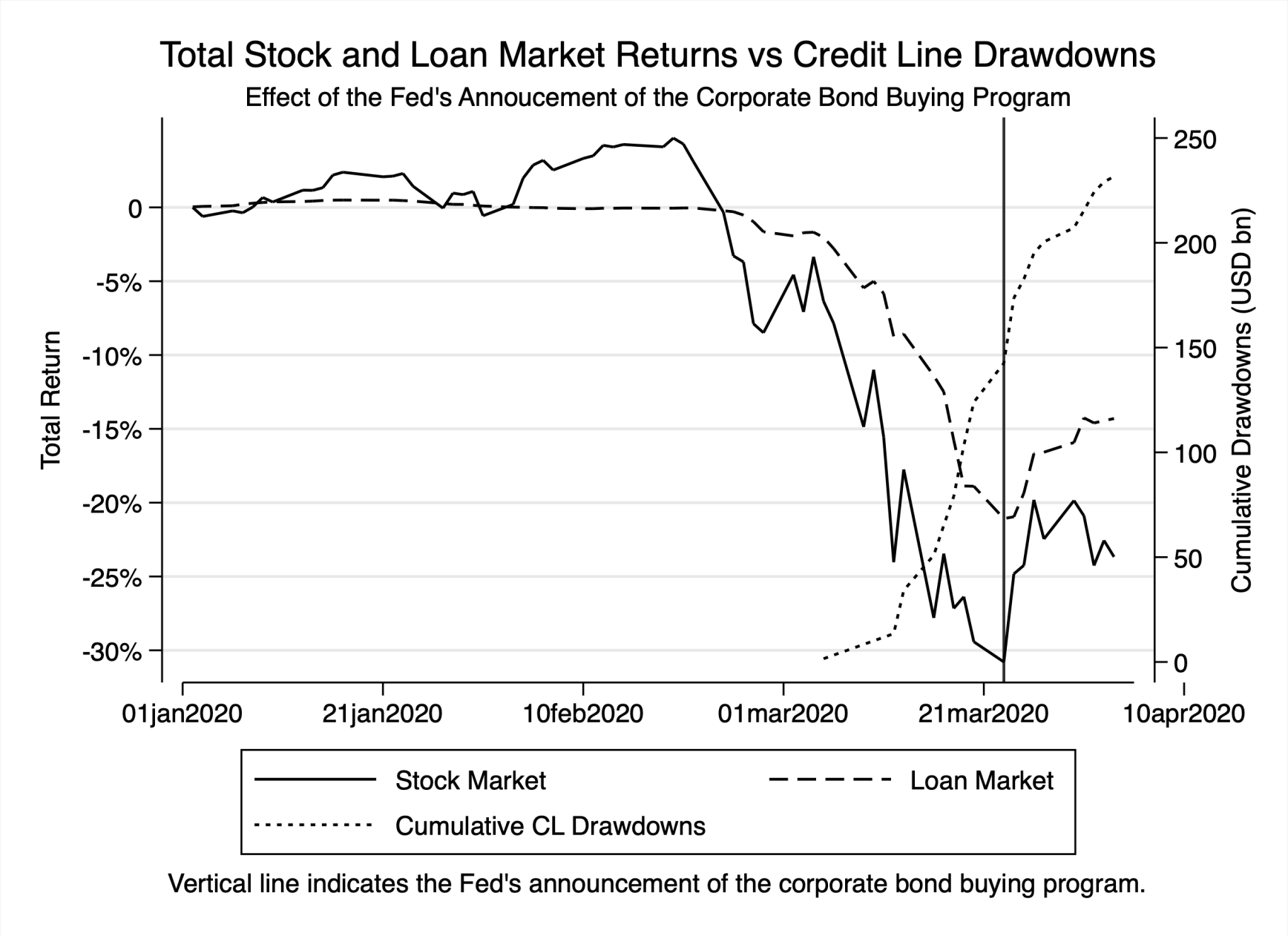
AAA-A rated firms benefited most from Fed interventions



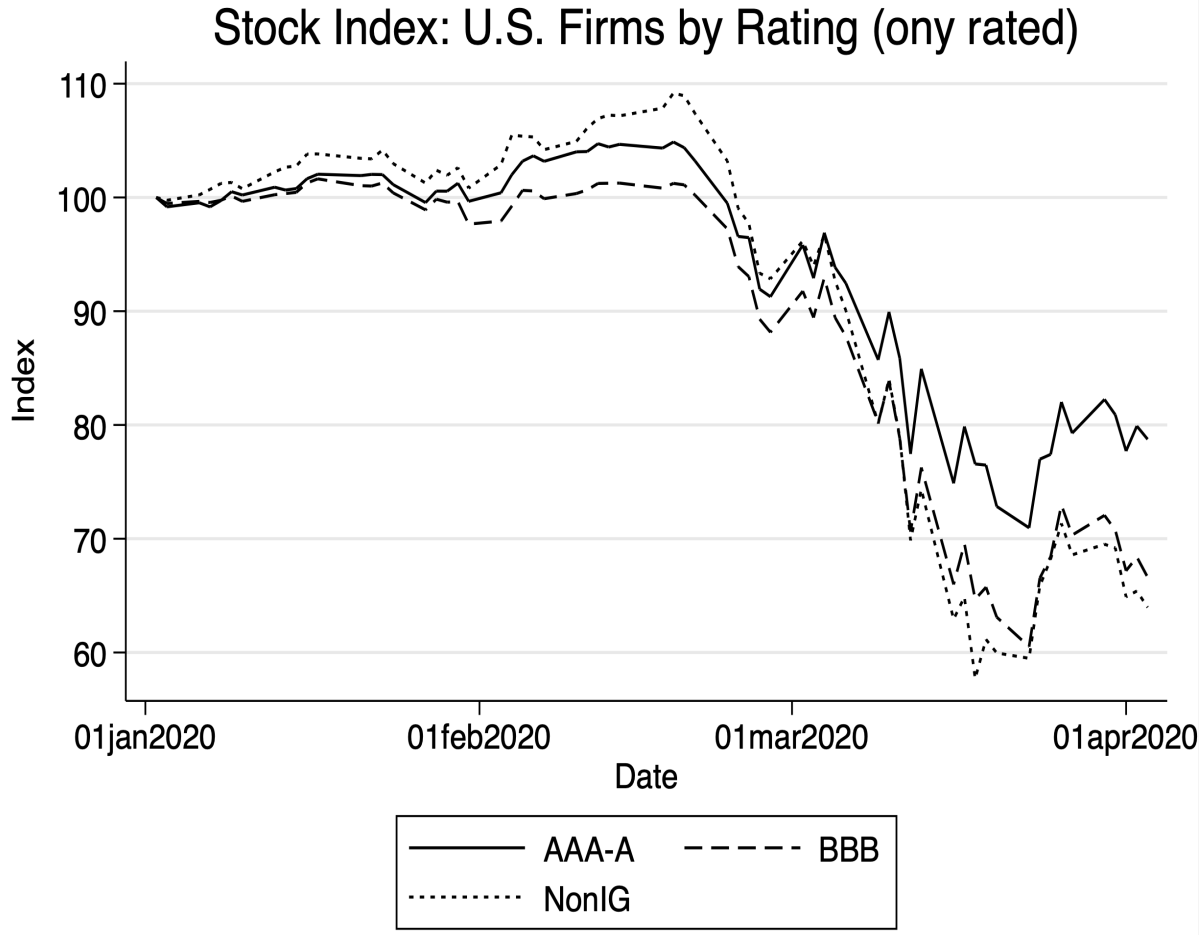
Firms could only issue bonds at substantially higher yield

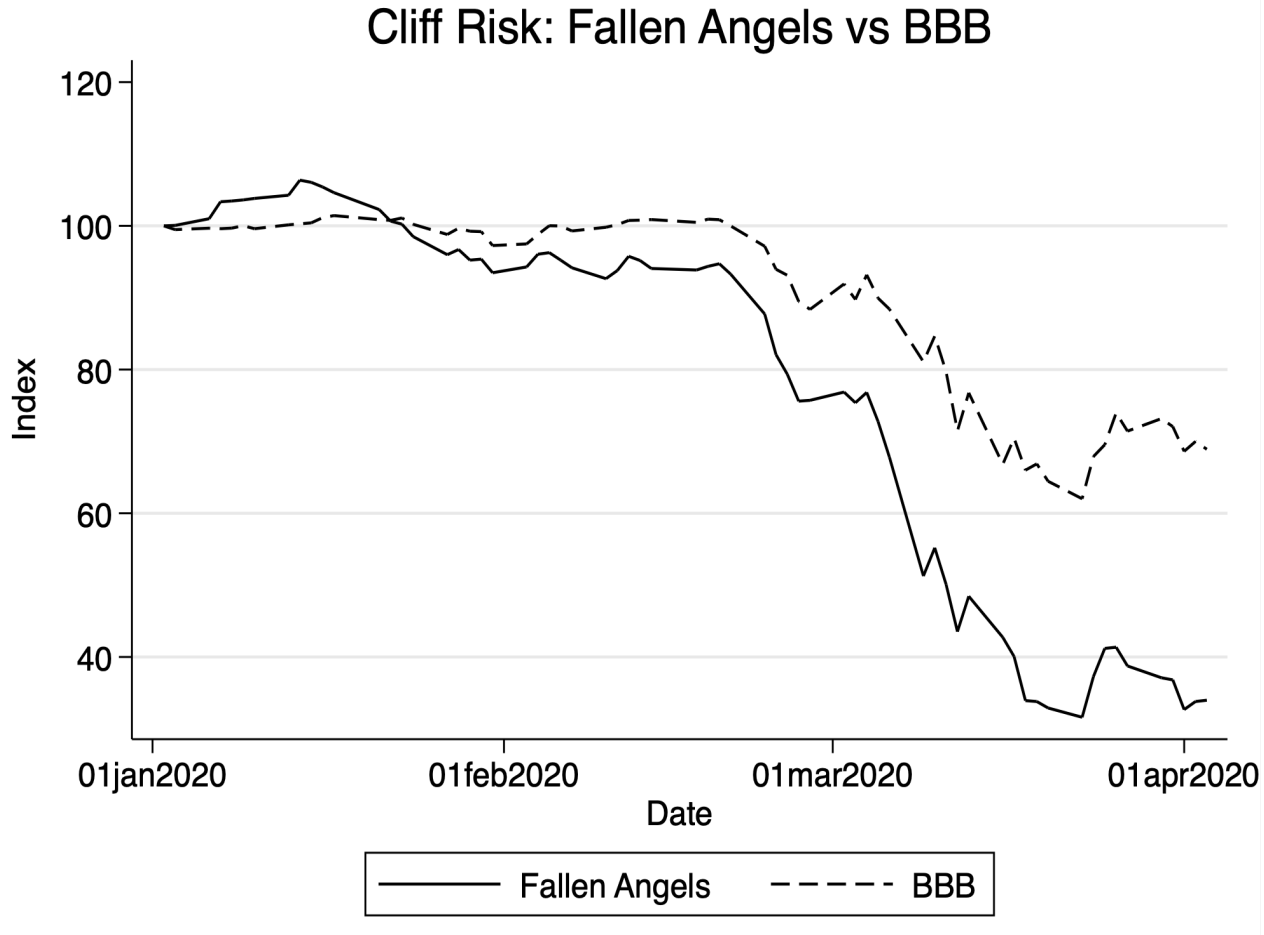


Drawdowns surge after the (i-grade) corporate bond buying program announcement



Cliff-risk: BBB-rated firms perform similar to non-IG rated firms





Firms have access to liquidity through two main sources (without issuing new bonds, loans or commercial paper in the spot market):

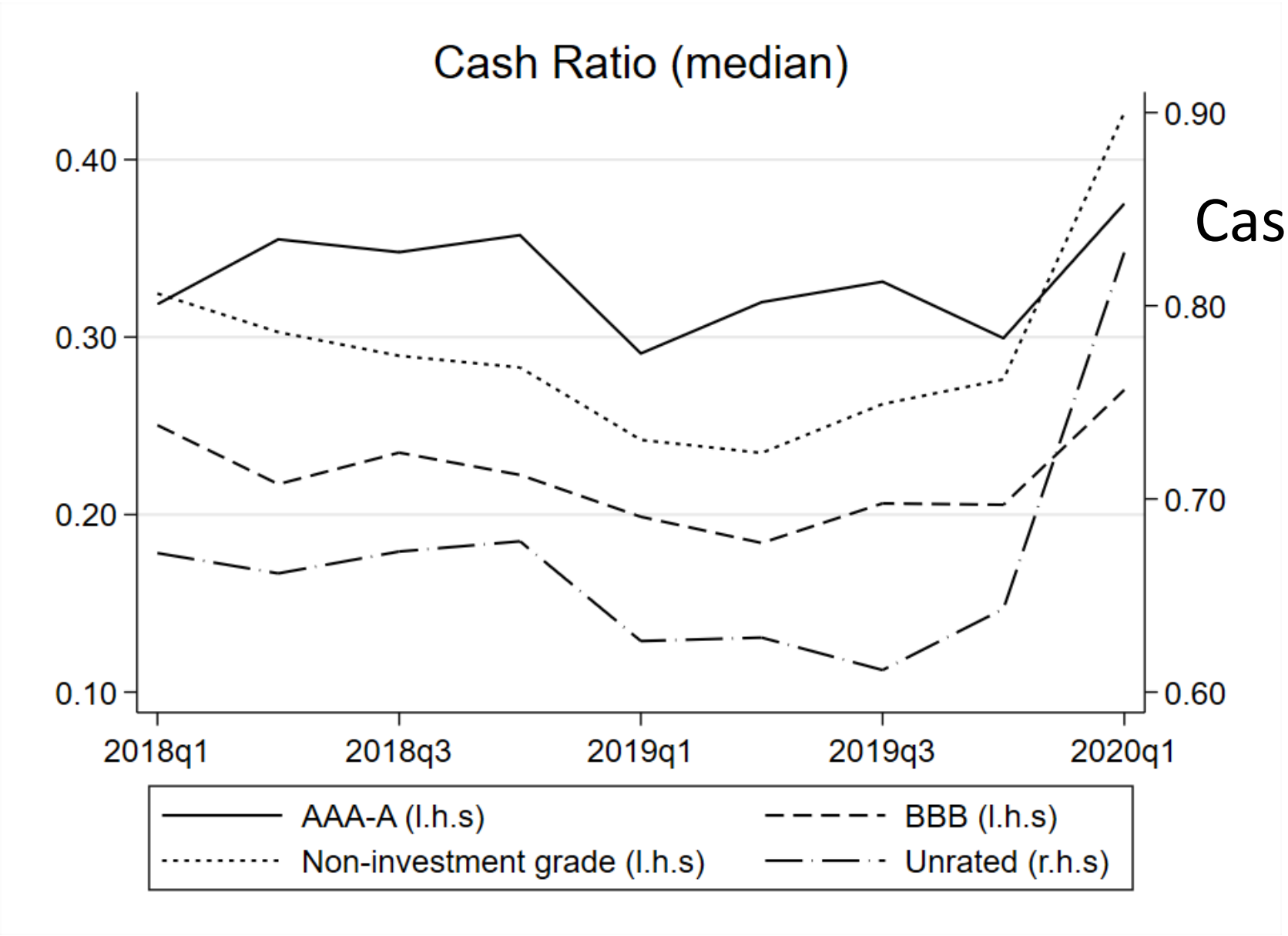
- *Unused Credit Lines*: The sum of undrawn revolvers, undrawn credit lines as backup for commercial paper, and undrawn term loans.
- *Cash and Short-Term Investments*: The sum of cash and short-term investments.

- Hence, we construct a comprehensive measure of firm liquidity as:

- $$Liquidity = \frac{Unused\ credit\ lines + cash\ and\ short\ term\ investments - short\ term\ debt}{Total\ assets}$$

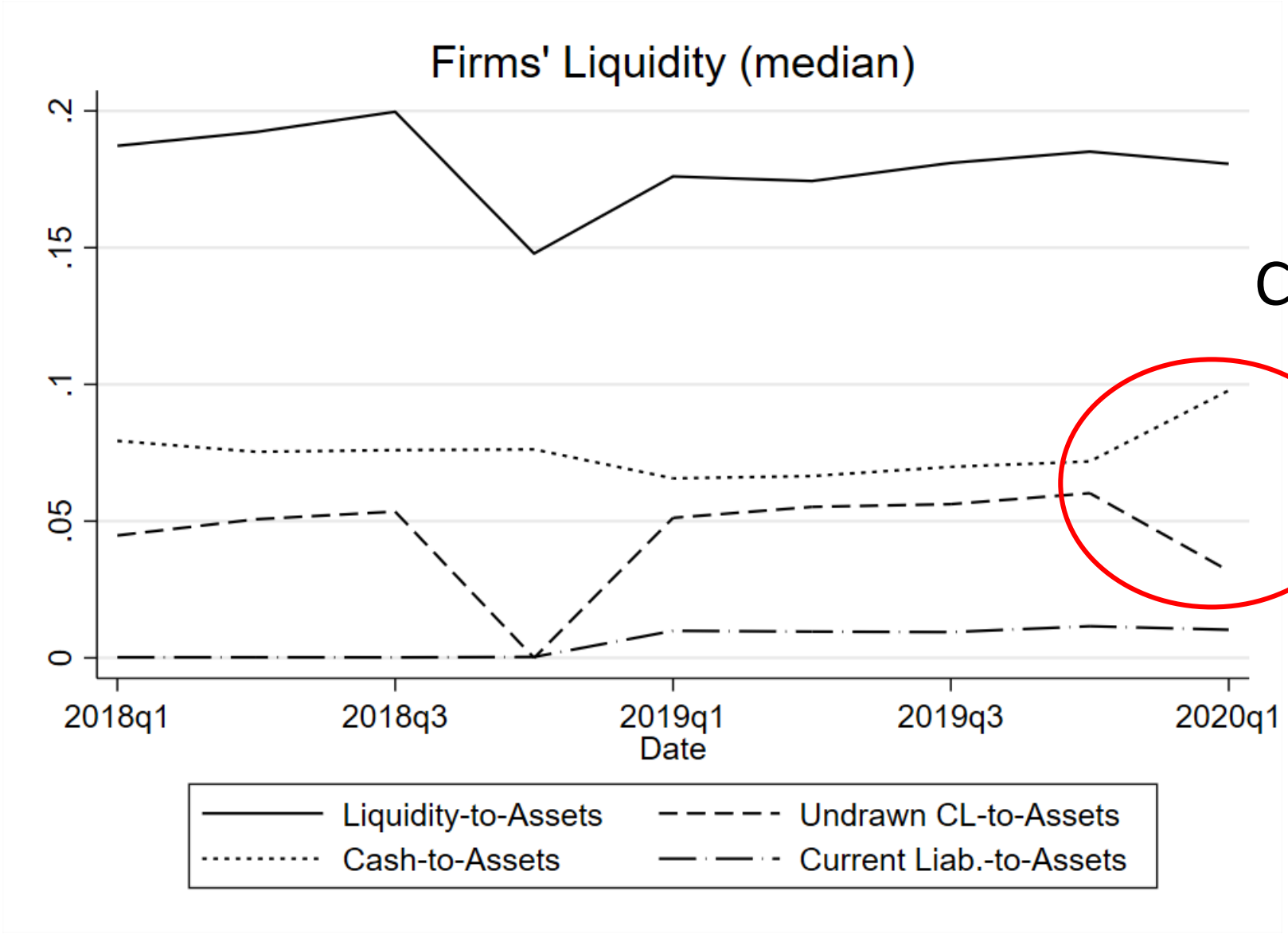
- where *Short-term debt* is the current portion of debt. Using a median split based on *Liquidity*, we classify firms as having high or low access to liquidity.

Dash-for-cash of BBB, non-IG and unrated firms in Q1 2020



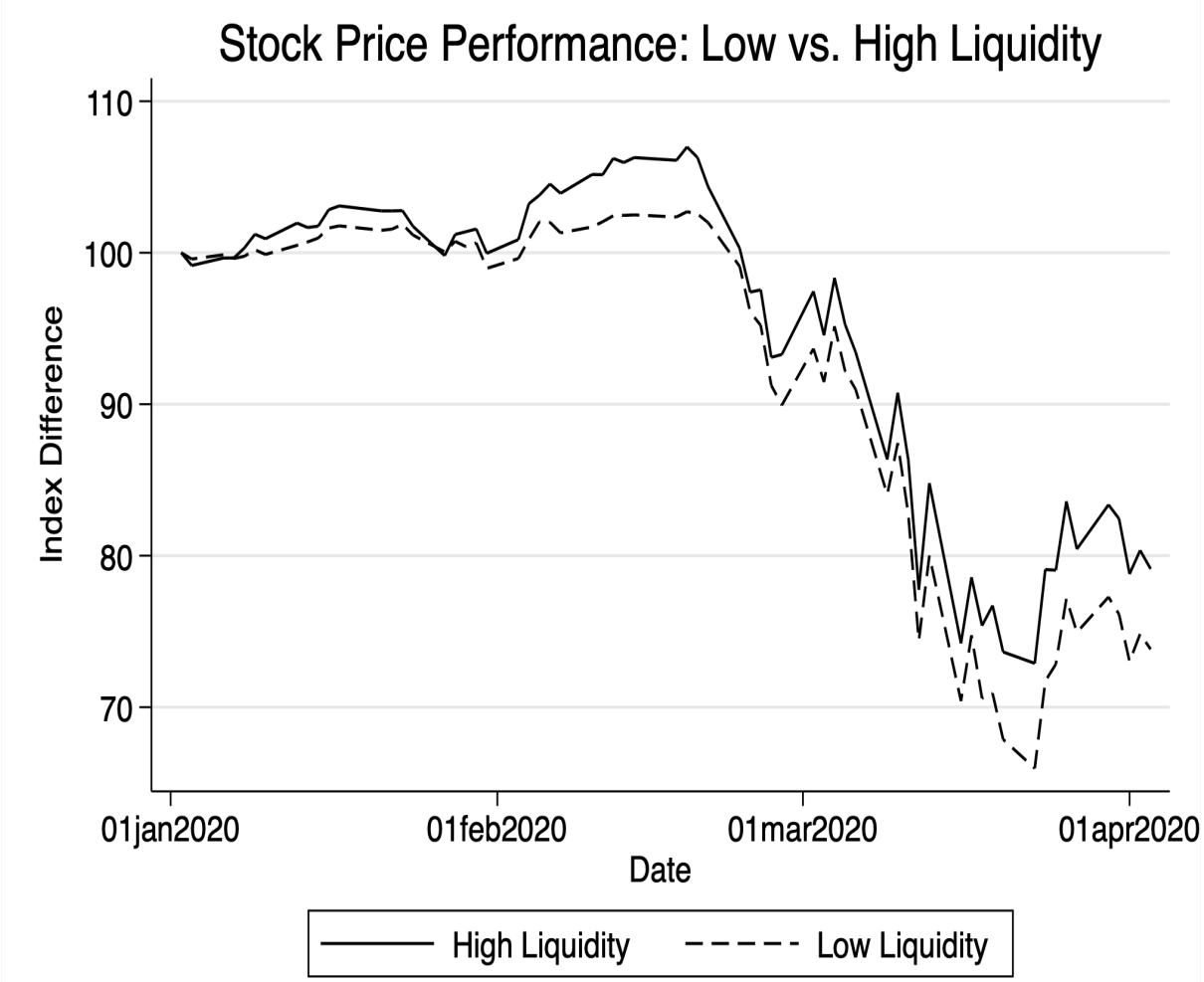
Cash is King!

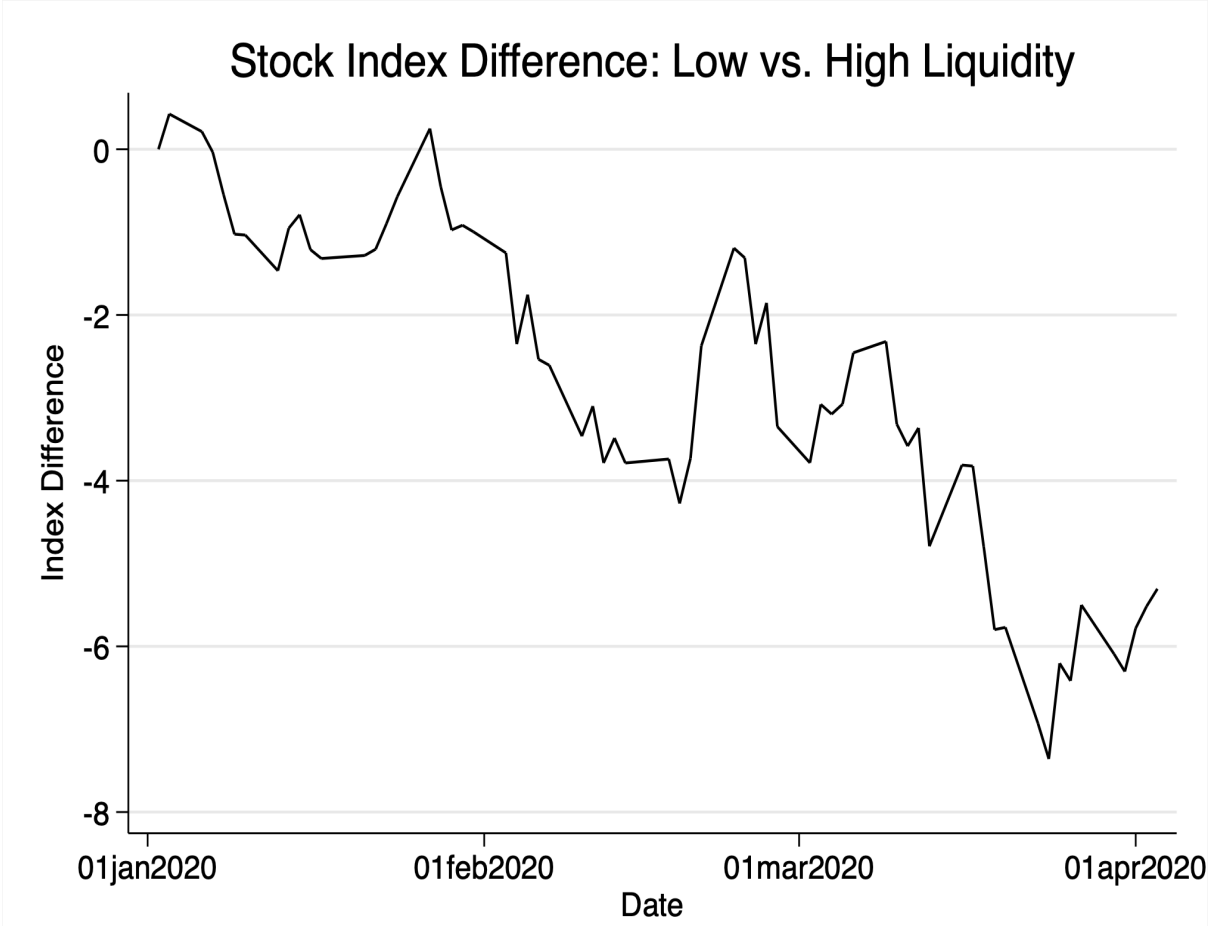
Firms increase cash-asset ratios and decrease undrawn credit in Q1 2020



Cash is King!

Firms with pre-arranged credit lines have been rewarded





Implications for Banks

The Great – sustained – Crash; Episodic Pricing of Liquidity Risk; Solvency Risks; Implications for Stress Tests

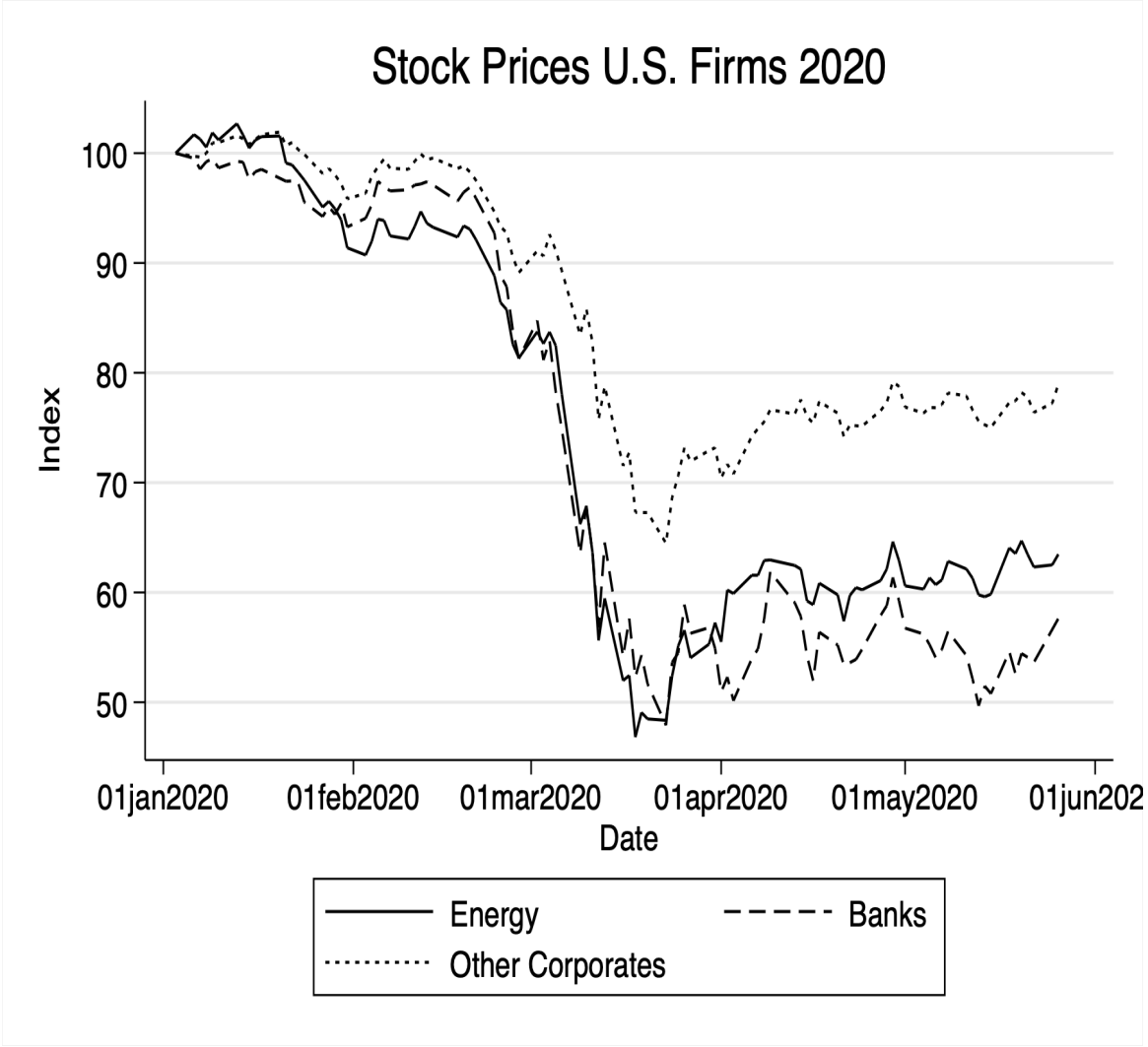
The Great Crash of Bank Stock Prices

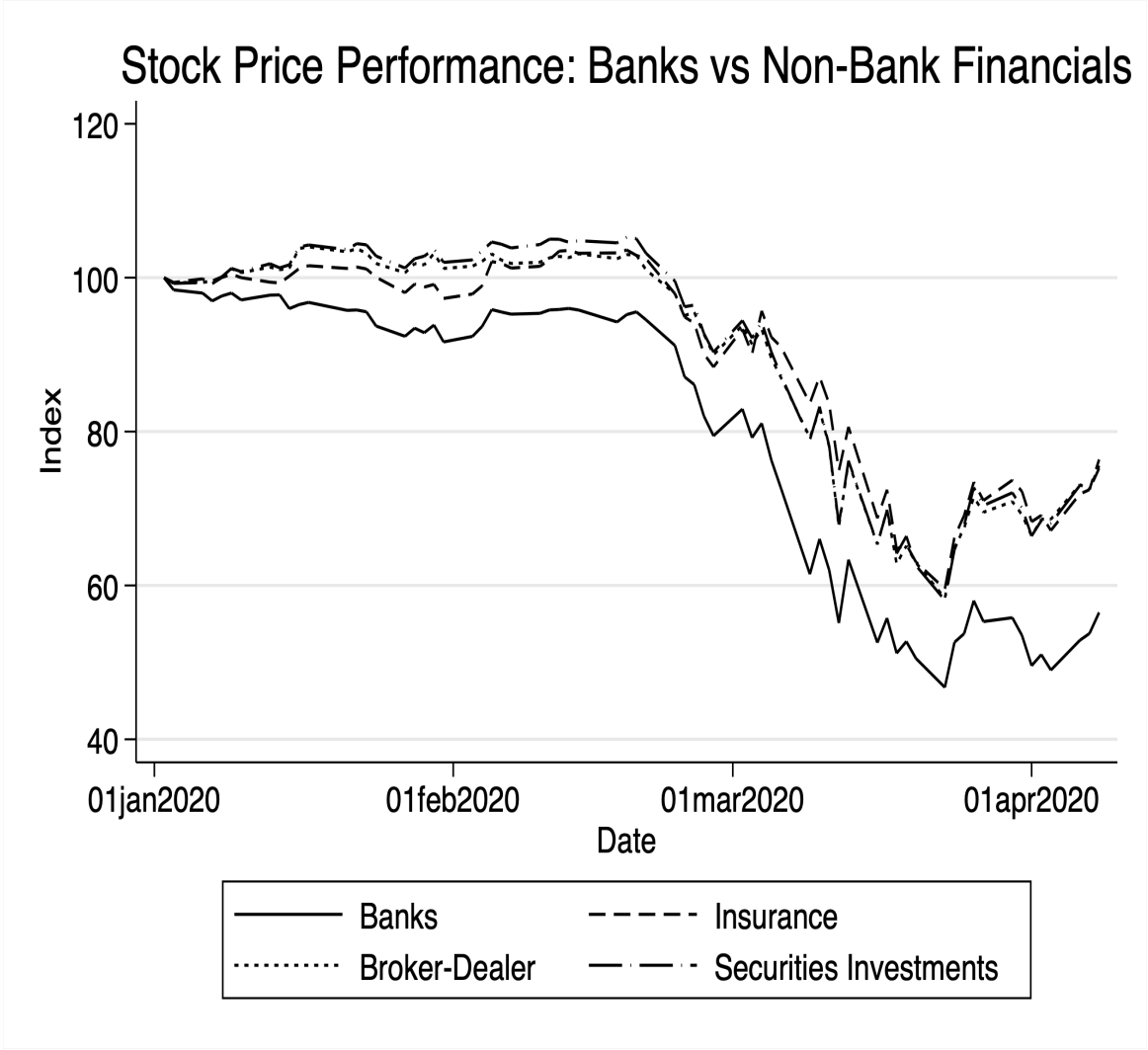
- The COVID-19 pandemic has put the liquidity insurance function of banks for the U.S. economy to a real-life test.
  - Within four weeks, U.S. firms drew down at least USD 235 billion, particularly from BBB-rated and non-investment grade rated firms.

- We observe a rapid and persistent market value decline of U.S. bank equity (50%)

- Is bank “balance-sheet” liquidity priced in banks’ stock returns?
  - Solvency vs Liquidity issues; Expected losses or capital lock-in to drawdowns?

Bank stock returns have done worse than firms and other financials





Measuring balance-sheet liquidity

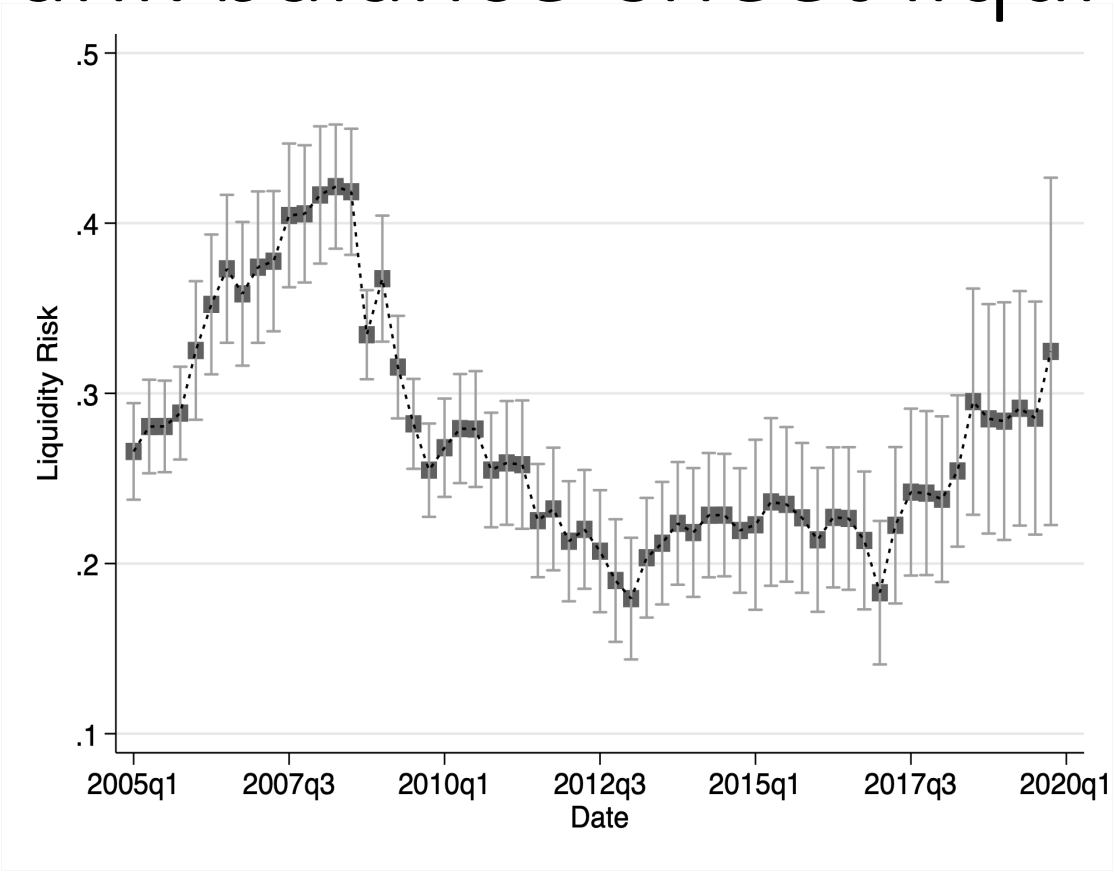
- *Unused Commitments*: The sum of credit lines secured by 1-4 family homes, secured and unsecured commercial real estate credit lines, commitments related to securities underwriting, commercial letter of credit, and other credit lines (which includes commitments to extend credit through overdraft facilities or commercial lines of credit).

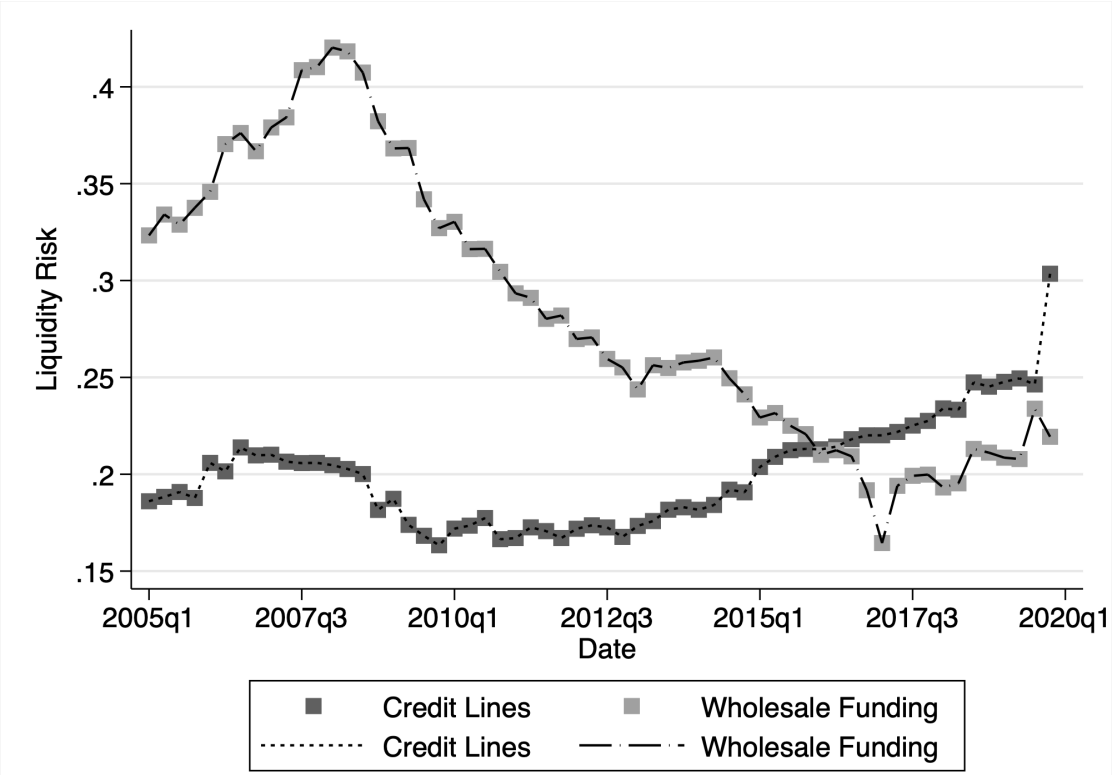
- *Wholesale Funding:* The sum of large time deposits, deposited booked in foreign offices, subordinated debt and debentures, gross federal funds purchased, repos and other borrowed money.

- *Liquidity*: The sum of cash, federal funds sold & reverse repos, and securities excluding MBS/ABS securities

$$Liquidity\ Risk = \frac{Unused\ commitments + Wholesale\ Funding - Liquidity}{Total\ Assets}$$

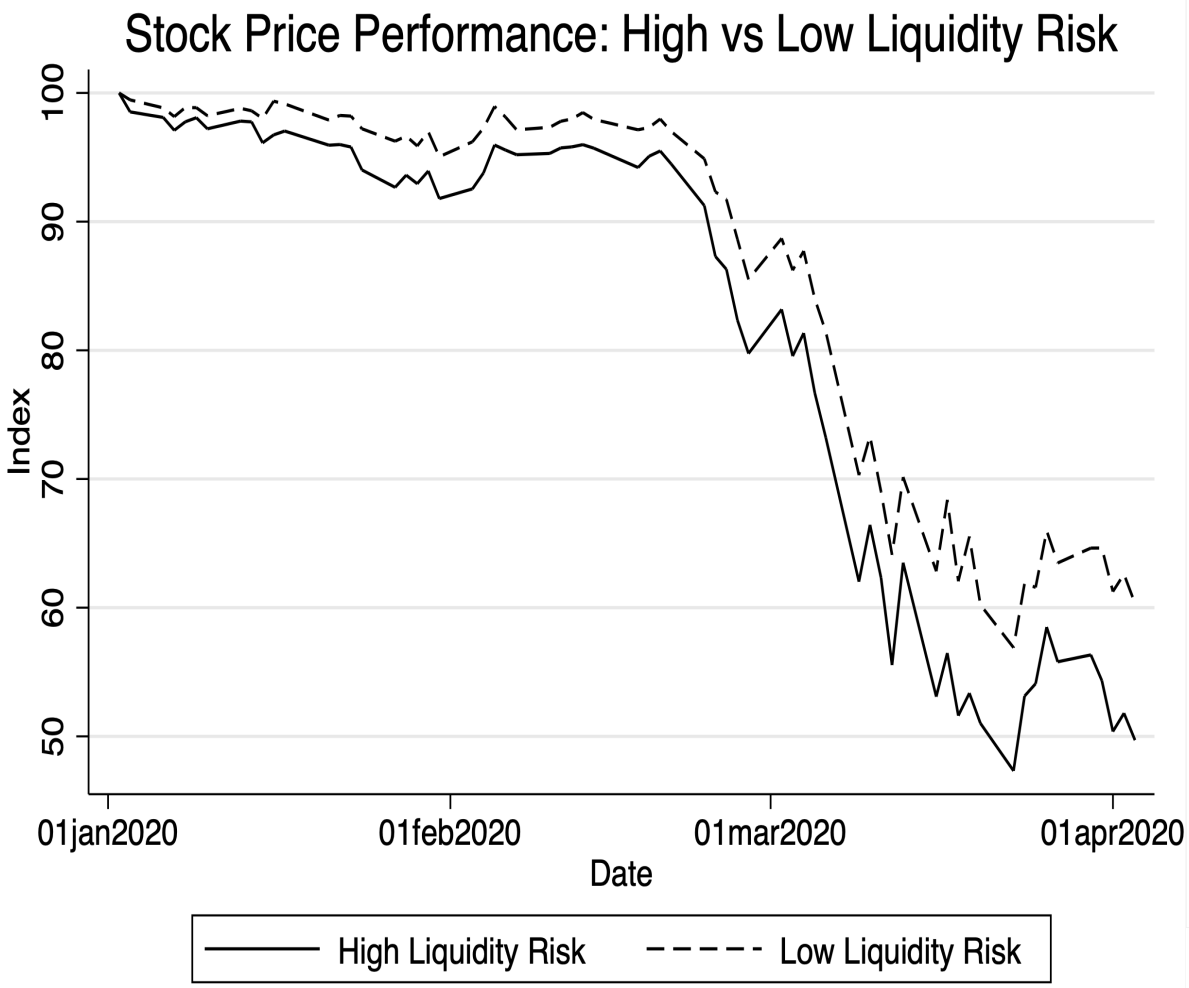
Bank balance-sheet liquidity risk: Q1 2005-Q4 2019

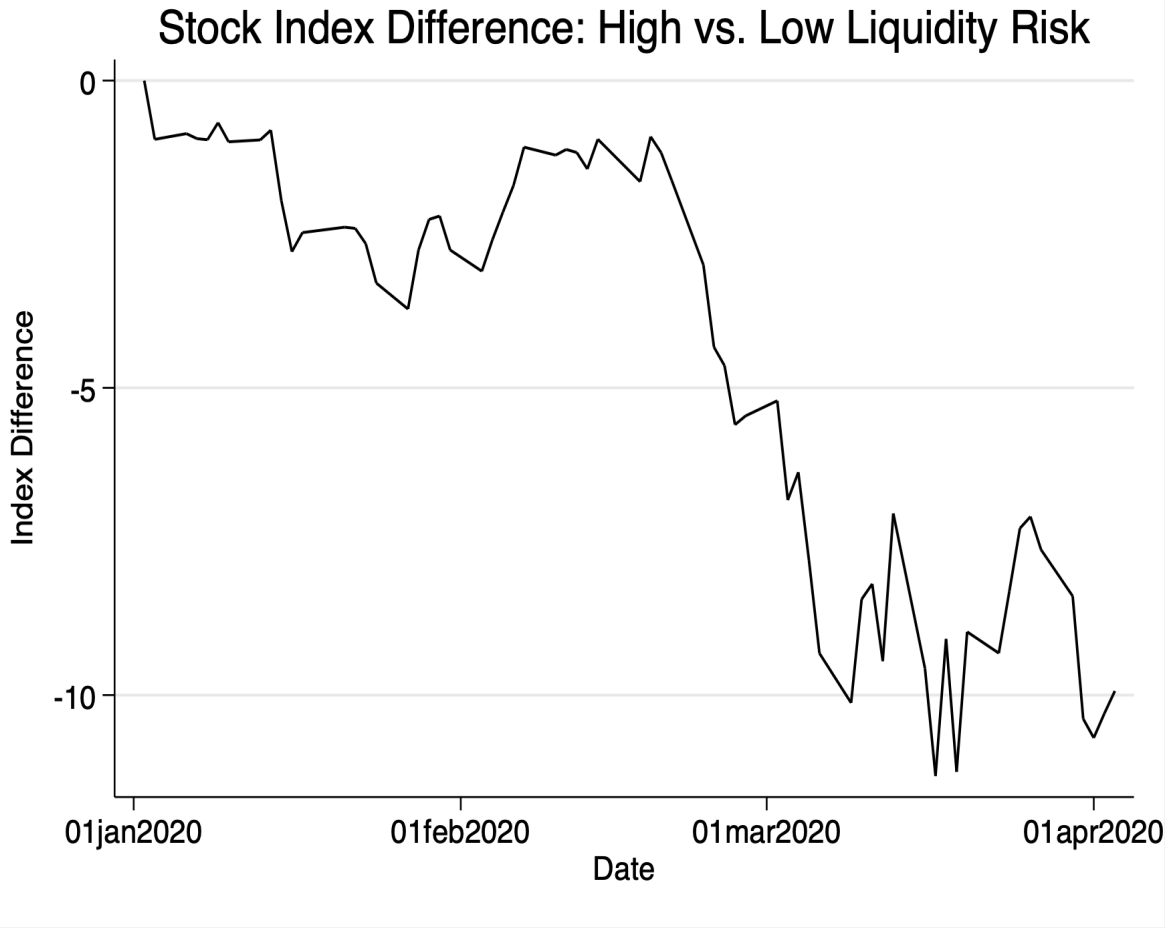




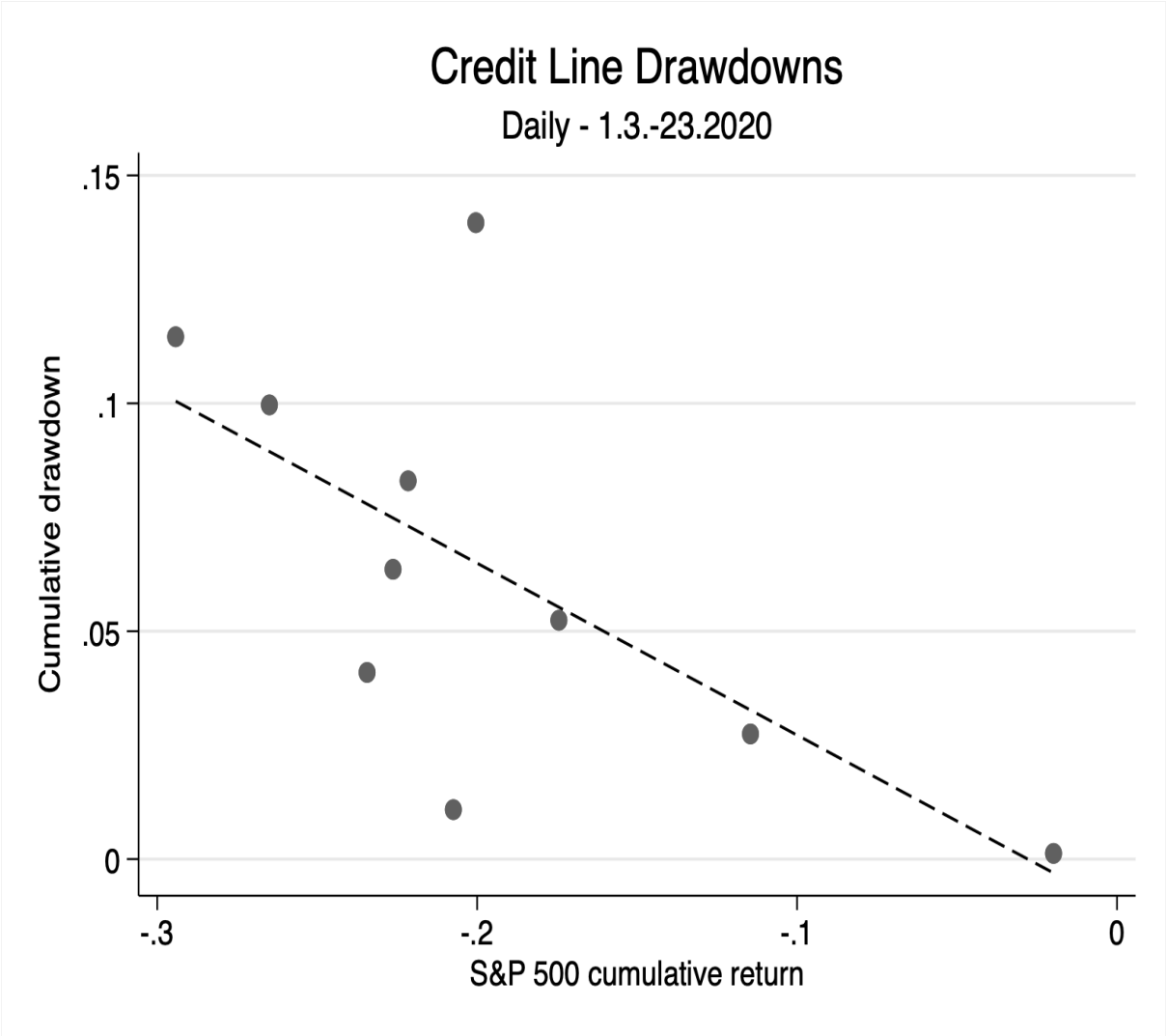
- Bank balance-sheet liquidity risk not as high as pre-2007 but was rising...
- ... particularly because of unused commitments

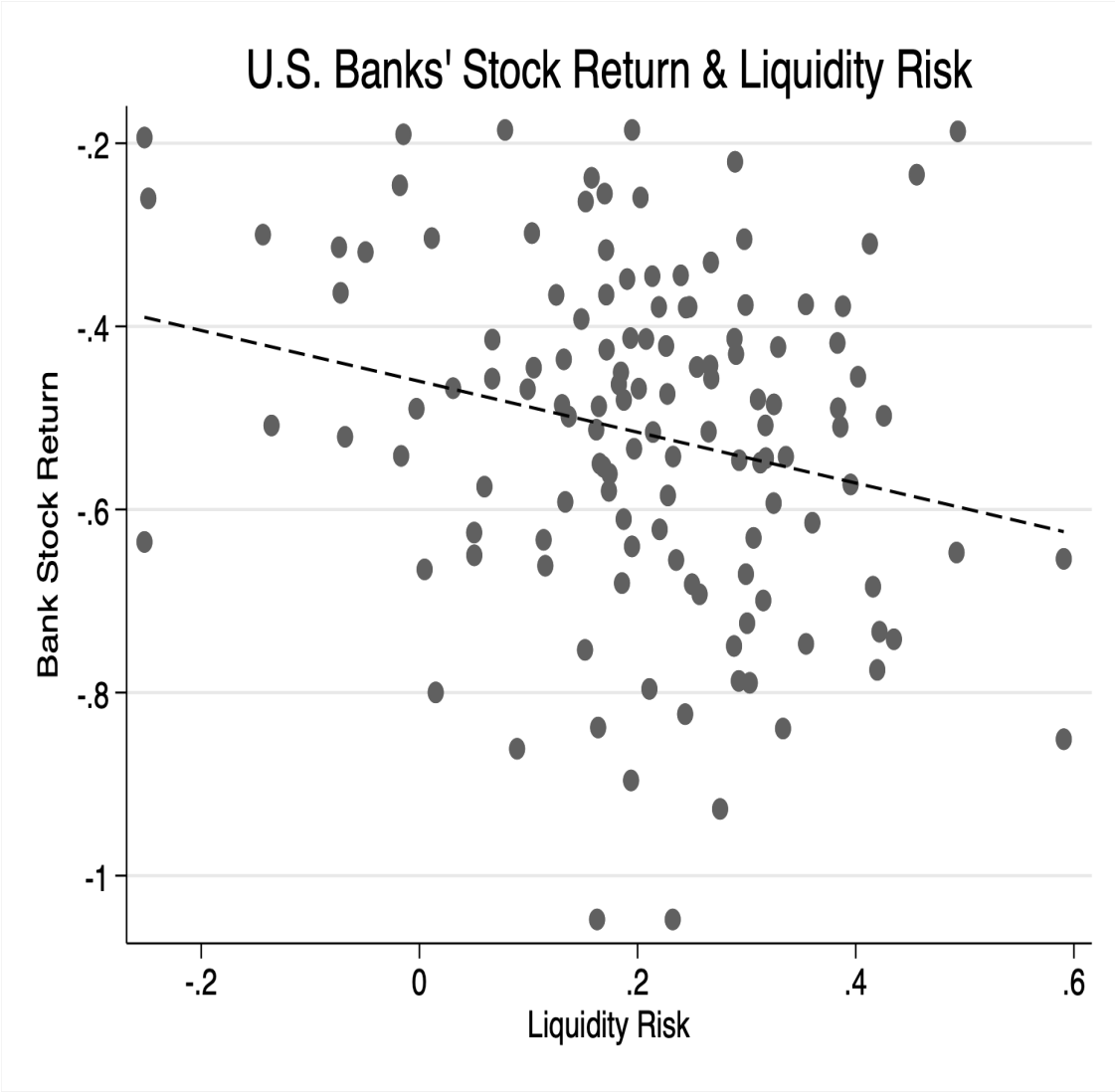
Relative bank stock return crash explained by ex-ante liquidity risk



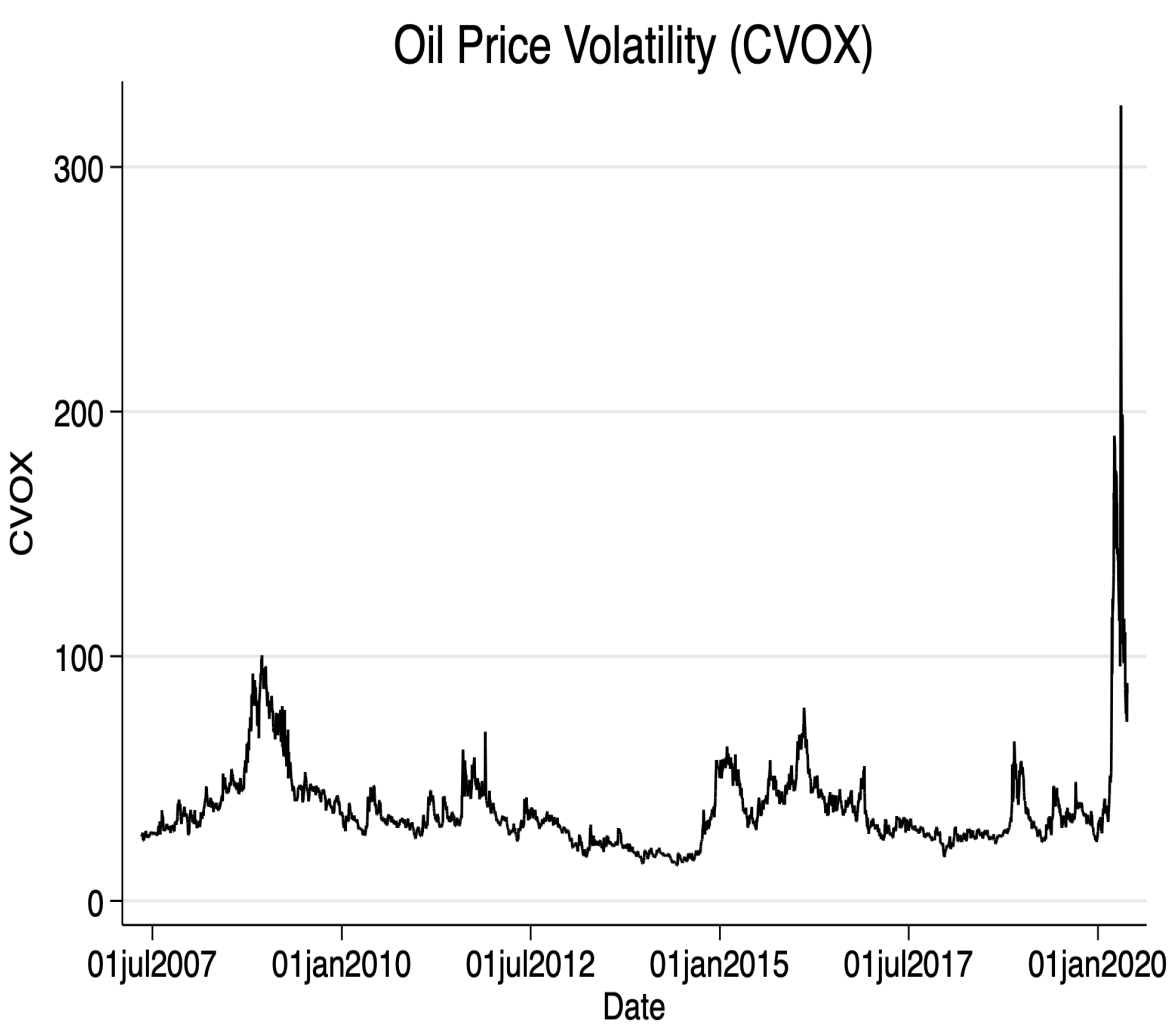


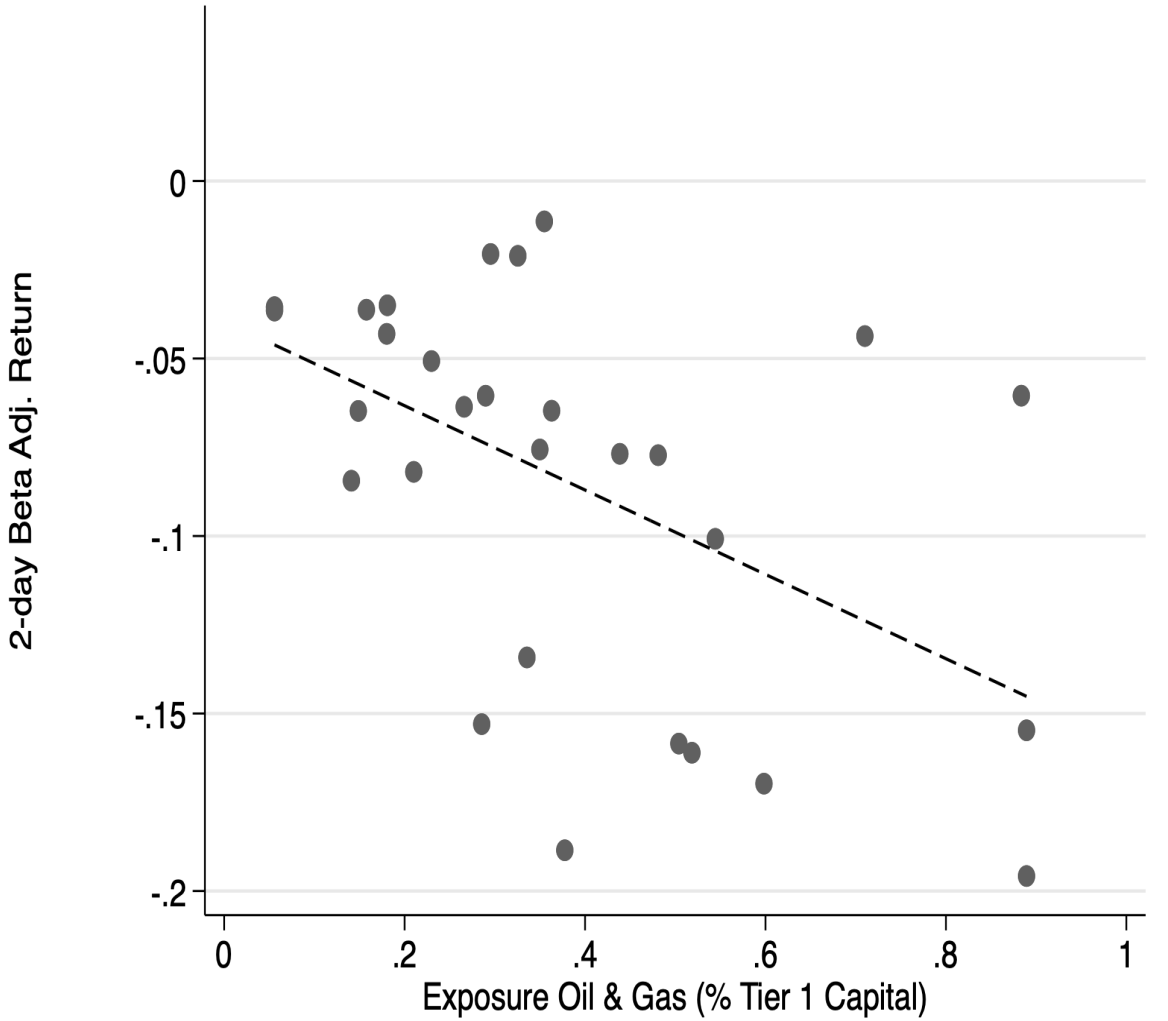
Market and Liquidity Risk “ignite” in March: Risk that risk will change!



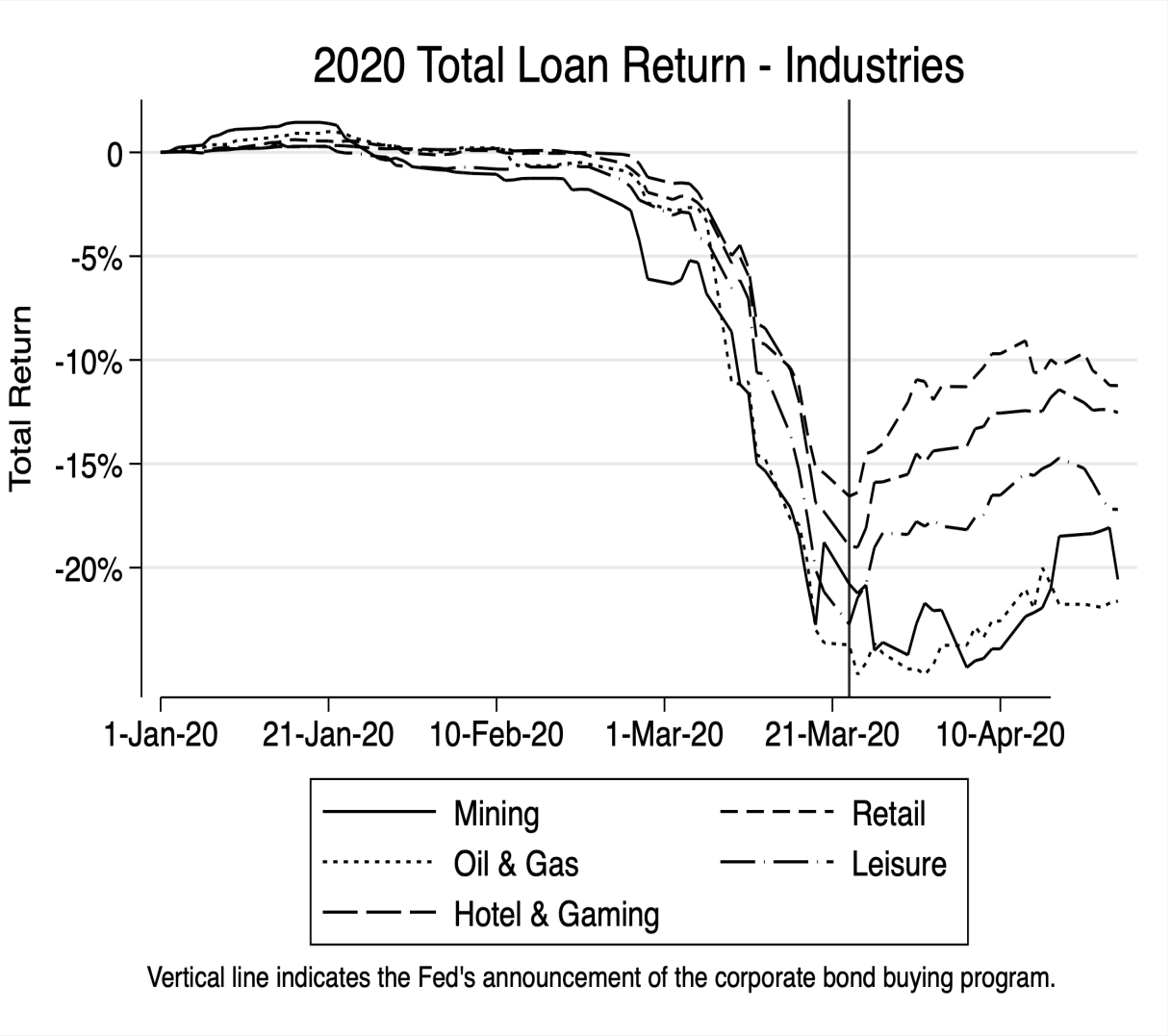


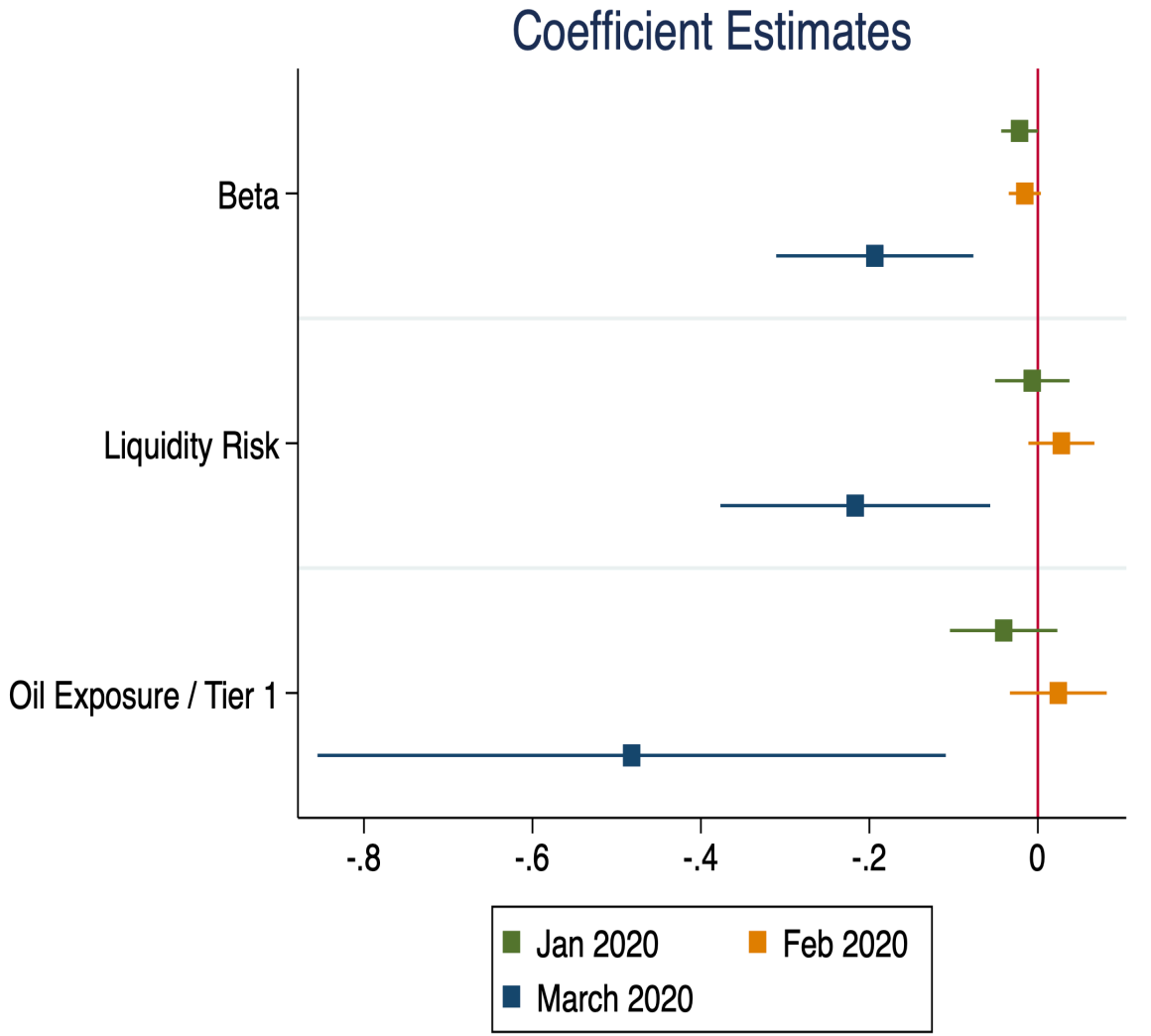
Banks exposed to oil price war (9 Mar) and the resulting crash / vol





Within sectoral exposures, bank risk to fossil fuels “ignites” the most

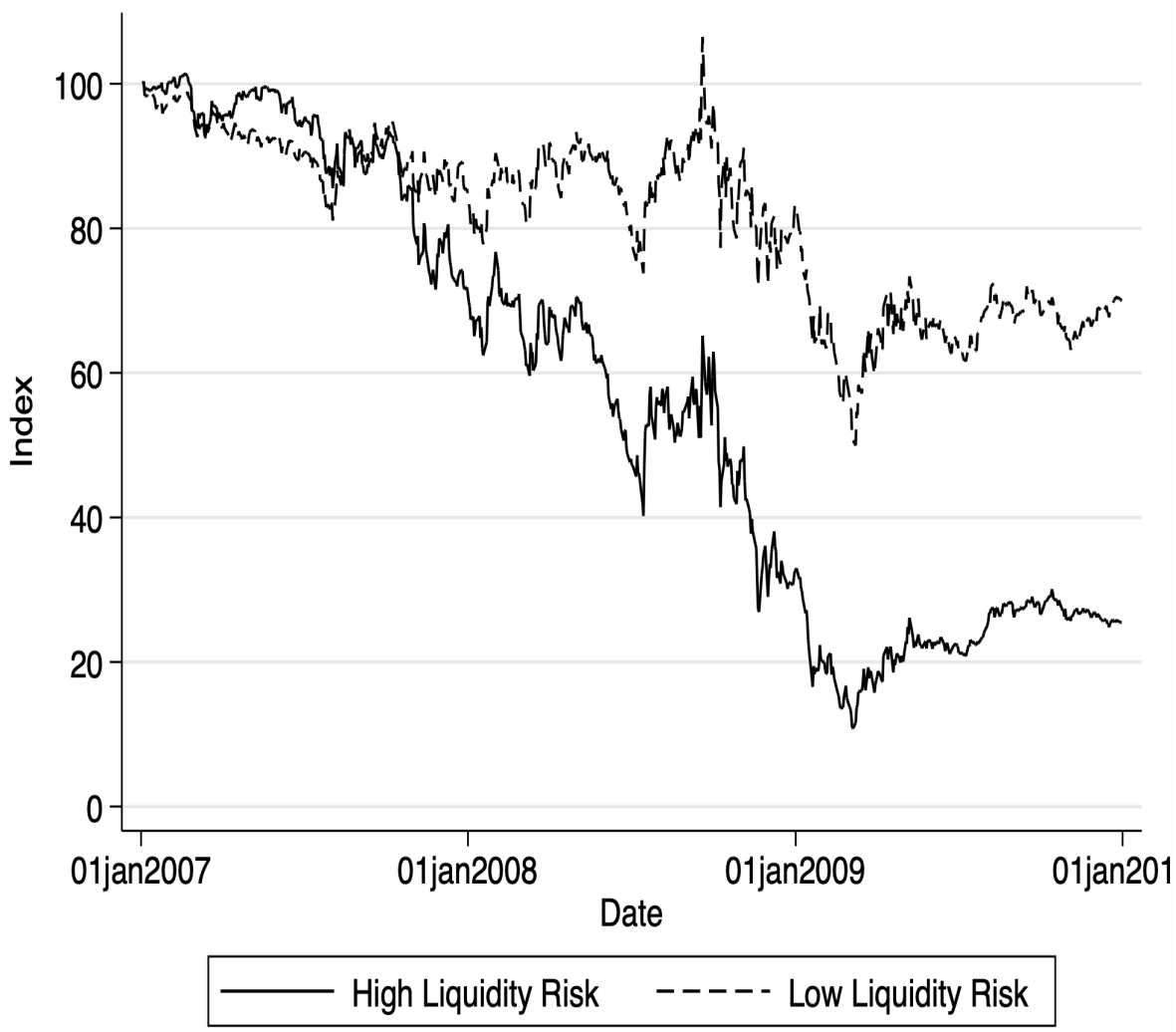


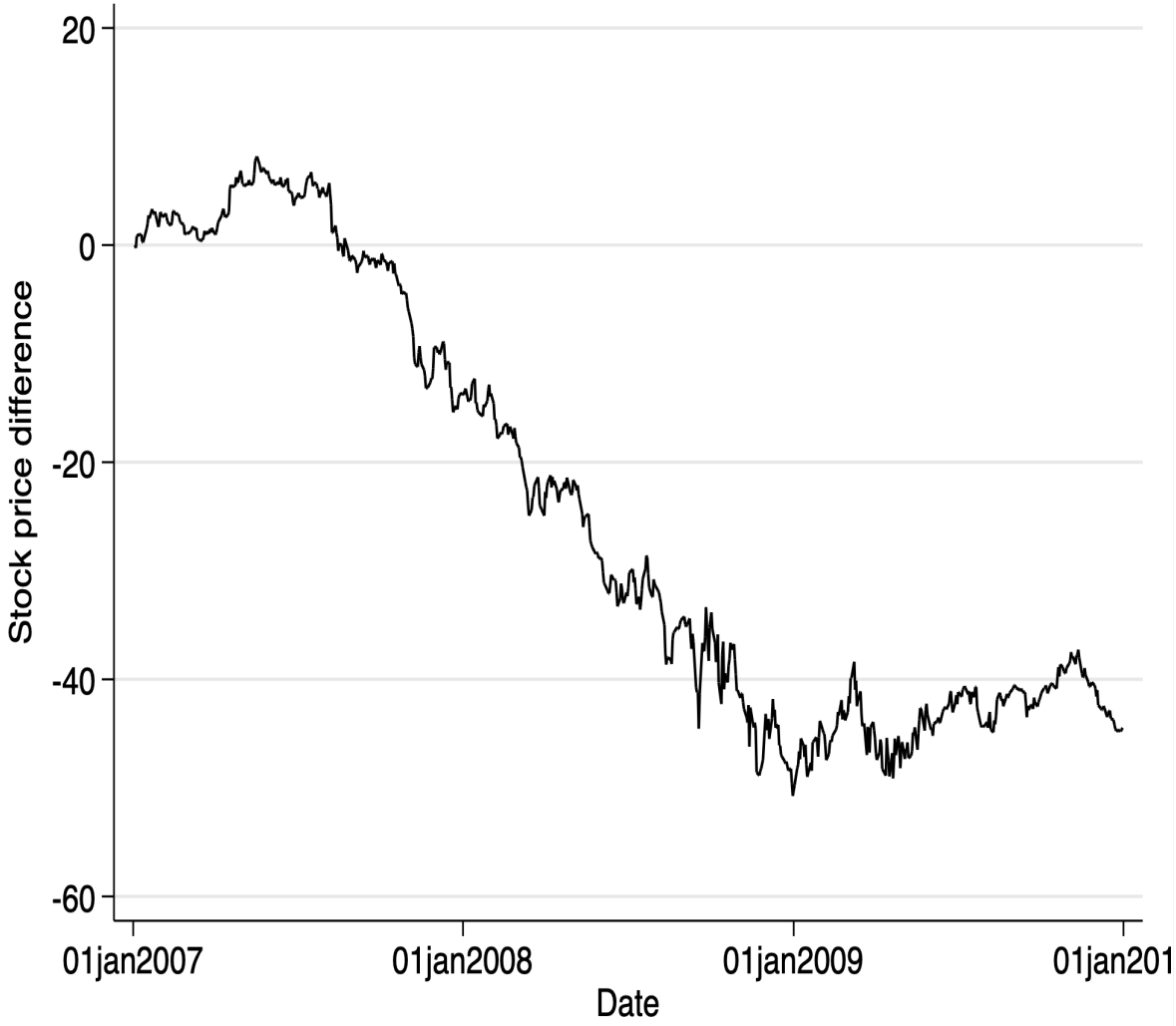


Is This Time Different?

- Our cross-sectional and time-series tests suggest that bank balance-sheet liquidity risk is an episodically priced risk factor...
- ...emerging in an aggregate downturn with an increase in aggregate liquidity demand for credit lines of firms.
- *Is the episodic re-pricing of balance-sheet liquidity risk of banks specific to the pandemic?*
  - We compare COVID-19 pandemic with the global financial crisis 2007-20009

History doesn’t exactly repeat itself, but it often rhymes (for banks)!





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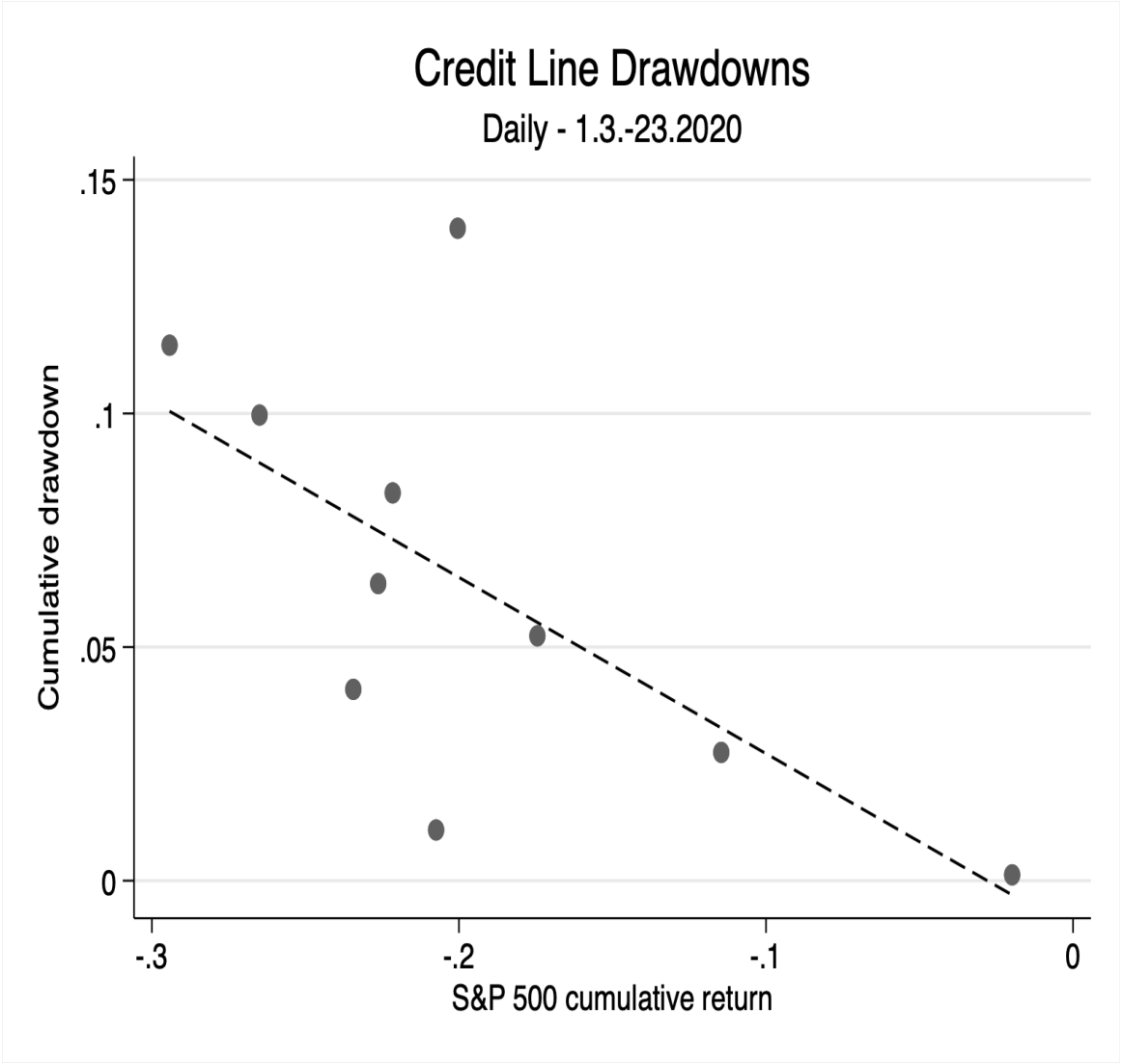
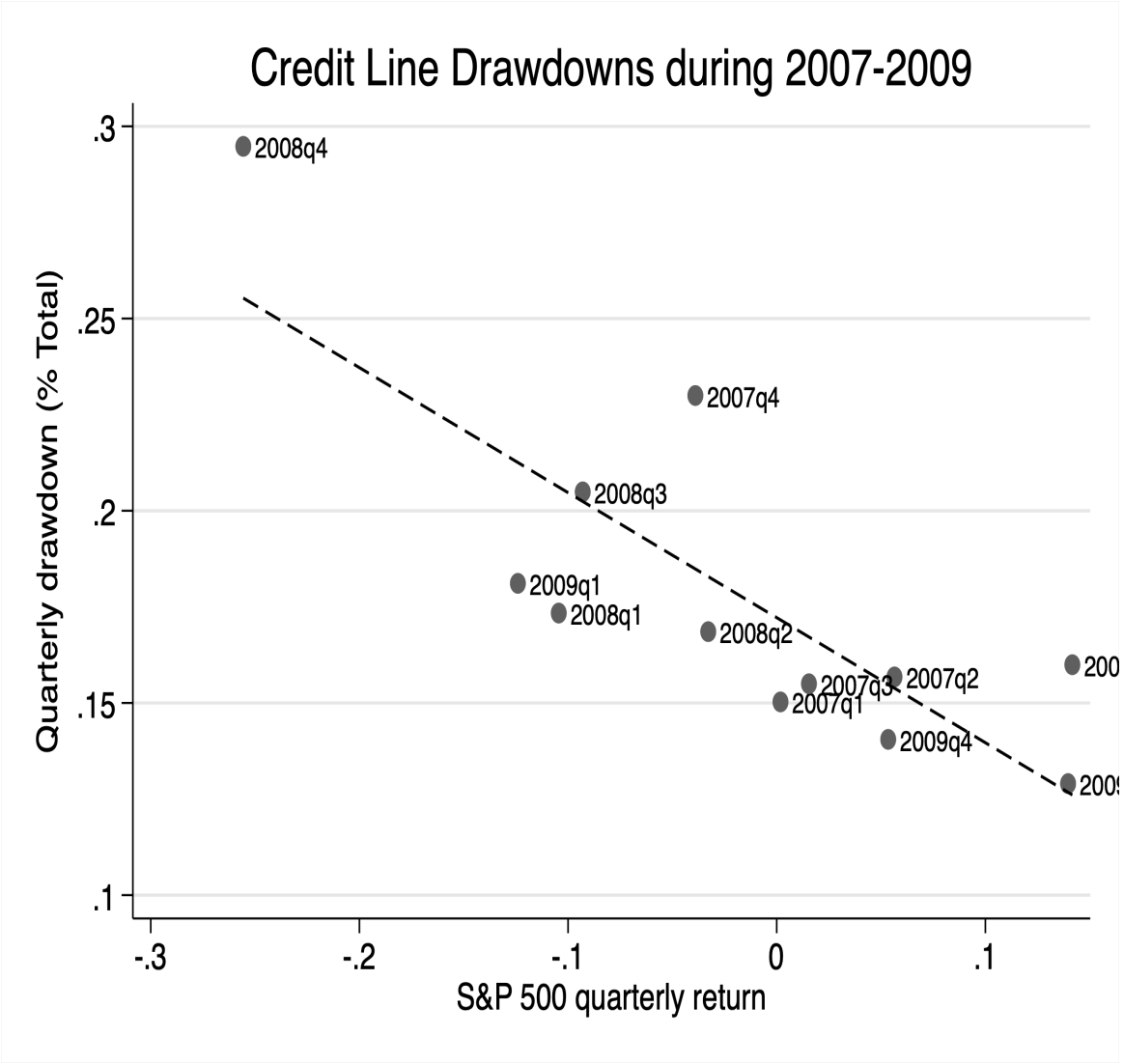




What should be done now? In future?

- Preserve bank capital:
  - Impact of bank capital being locked down in drawdowns will be on new loans
  - Immediately require by regulation that all banks and systemically important financial institutions (SIFIs) suspend ANY payouts

- Raise bank capital: Our `pandemic‘ stress test (see Appendix) suggests
  - Require large banks/SIFIs to raise capital immediately (How much? > $200bln)
    - Not sufficient to nudge them (Neel Kashkari, FT): Debt overhang, signaling problems
  - Fine-tune the additional requirement in future based on a rigorous stress test

- Relax bank capital requirement counter-cyclically:
  - In the recovery phase, the extra capital buffer can be relaxed if necessary

Climate change stress test?

Source: NASA

References

- "Stress Test" for Banks as Liquidity Providers in a time of COVID

(with Sascha Steffen), voxeu.org

- The Risk of Being a Fallen Angel and the Corporate Dash for Cash in the midst of COVID

(with Sascha Steffen), COVI Economics: A Real Time Journal

- What explains the crash of bank stock prices during COVID-19? The role of health, financial and oil price risks

(with Rob Engle and Sascha Steffen), Work in Progress

Appendix

Data

- All publicly listed banks in the U.S. from SNL Financial.
  - Total assets > USD 100 million, match to CRSP/Compustat
- Bank balance-sheet variables (on the holding company level, Y9C) are obtained from SNL Financial.
- LoanConnector & LCD
  - Lan prices and yields for sectors (oil, retail,…), bank loan-level exposures
- Bloomberg: oil volatility (CVOX), VIX, S&P 500 market return

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Return Jan 2020	129	-0.079	0.040	-0.181	0.028
Return Feb 2020	129	-0.136	0.036	-0.218	-0.010
Return March 2020	129	-0.518	0.188	-1.107	-0.168
Liquidity Risk	129	0.204	0.167	-0.616	0.633
NPL / Loans	129	0.007	0.007	0.000	0.044
Equity / Assets	129	0.125	0.024	0.071	0.185
Beta	129	1.132	0.348	0.240	2.320
Non-Interest Income	129	0.233	0.120	0.004	0.729
Log(Assets)	129	16.777	1.259	14.638	21.712
Tier 1/RWA (%)	129	12.581	2.626	9.620	26.870
ROA	129	0.012	0.003	0.003	0.020
Deposits	129	0.237	0.128	0.017	0.547

Episodic Pricing of Liquidity Risk

Cross-sectional and Time-series tests

Methodology – Baseline tests (cross-section)

$$r_i = \alpha_i + \gamma LiquidityRisk_i + \sum \beta\, X_i + \varepsilon_i$$

- *r* is the stock return of bank *i*
- *X:* control variables (market beta, balance-sheet characteristics)
  - Log(Assets), NPL/Loans, E/A, Non-Interest-Income/Income, ROA, Deposit/Loans

- Sample period: Jan 1 – March 23 2020 (before Fed interventions)
- p-values reported in all tables

Baseline results: Jan 1 – March 23, 2020

	(1)	(2)	(3)	(4)	(5)	(6)
Beta	-0.280	-0.268	-0.236	-0.236	-0.248	-0.207
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Liquidity Risk		-0.228	-0.261	-0.260	-0.232	
		(0.020)	(0.005)	(0.004)	(0.026)	
Unused Commitments / Assets						-0.782
						(0.000)
Wholesale Funding / Assets						0.0978
						(0.547)
Liquidity / Assets						0.150
						(0.319)
Controls			NPL/Loans	NPL/Loans , Equity/Assets	All controls	All controls
R-squared	0.212	0.245	0.301	0.301	0.307	0.375
Number obs.	129	129	129	129	129	129

1 std dev increase in Liquidity Risk -> 4% lower returns (6% of uncond. mean return)

1 std dev increase in Unused Comm./Assets -> 6.9% lower returns (10.2% of uncond. mean return)

- Banks with more balance-sheet liquidity risk have lower stock returns (driven by higher unused commitments)

Liquidity risk and bank stock returns

	Stock return: 1.1.-30.1.2020			Stock return: 1.2.-28.2.2020			Stock return: 1.3.-23.3.2020			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	10
Beta	-0.0230	-0.0223	-0.0237	-0.0272	-0.0287	-0.0126	-0.229	-0.217	-0.212	-0.181
	(0.021)	(0.028)	(0.045)	(0.001)	(0.001)	(0.189)	(0.000)	(0.000)	(0.002)	(0.008)
Liquidity Risk		-0.0124	-0.00839		0.0275	0.0293		-0.225	-0.237	
		(0.438)	(0.712)		(0.145)	(0.141)		(0.006)	(0.005)	
Unused Commitments / Assets										-0.684
										(0.001)
R-squared	0.0394	0.0420	0.117	0.0675	0.0833	0.186	0.180	0.220	0.276	0.328
Number obs.	129	129	129	129	129	129	129	129	129	129

1 std dev increase in Liquidity Risk -> 4% lower returns (8% of uncond. mean return)

1 std dev increase in Unused Comm./Assets -> 6% lower returns (12% of uncond. mean return)

- During the March 1st to 23rd period, liquidity risk emerges as a priced risk factor
- ... in an aggregate downturn with an increase in aggregate liquidity demand for credit lines of firms.

Methodology – Cross-sectional tests as before

$$r_i = \alpha_i + \gamma LiquidityRisk_i + \sum \beta\, X_i + \varepsilon_i$$

- *r* is the stock return of bank *i*
- *X* is a vector of control variables (e.g., bank balance-sheet characteristics)
  - Log(Assets, NPL/Loans, E/A, Non-Interest-Income/Income, ROA, Deposit/Loans
- Estimate quarterly over the Q1:2007 to Q1:2009 period.
  - Variables at the end of Q4 2006 for our regressions in 2007 and at the end of Q4 2007 for the regressions in 2008 and 2009

Liquidity risk and bank stock return during the Global Financial Crisis (2007-2009)

	(1) Q1 2007	(2) Q2 2007	(3) Q3 2007	(4) Q4 2007	(1) Q1 2008	(2) Q2 2008	(3) Q3 2008	(4) Q4 2008	(5) Q1 2009
Liquidity Risk	0.0118	-0.00262	**-0.0727**	**-0.153**	**-0.160**	**-0.262**	0.0469	-0.102	-0.00628
	(0.745)	(0.962)	**(0.046)**	**(0.002)**	**(0.017)**	**(0.000)**	(0.644)	(0.386)	(0.956)
Beta	-0.00720	-0.0117	0.0114	-0.0389	0.0377	-0.0707	0.0299	-0.0586	-0.149
	(0.612)	(0.588)	(0.439)	(0.167)	(0.073)	(0.008)	(0.336)	(0.080)	(0.000)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.0303	0.0302	0.0843	0.173	0.0966	0.326	0.338	0.201	0.301
Number obs.	225	225	225	225	237	237	237	237	237

- Liquidity risk for banks ignited in Q3 2007, i.e., when ABCP market froze.
- No pricing of liquidity risk in bank stock returns after Fed measures

Components of *Liquidity Risk*

	(1) Q3 2007	(2) Q4 2007	(3) Q1 2008	(4) Q2 2008
Unused Commitments / Assets	**-0.222**	-0.0263	**-0.360**	-0.188
	(0.013)	(0.864)	**(0.000)**	(0.375)
Wholesale Funding / Assets	-0.0360	**-0.151**	-0.0436	**-0.162**
	(0.519)	**(0.037)**	(0.602)	**(0.077)**
Liquidity / Assets	0.0678	**0.277**	0.171	**0.523**
	(0.363)	**(0.002)**	(0.125)	**(0.000)**
Beta	0.0247	-0.0622	0.0355	-0.0779
	(0.108)	(0.030)	(0.087)	(0.003)
Controls	Yes	Yes	Yes	Yes
R-squared	0.104	0.221	0.123	0.339
Number obs.	225	225	237	237

- Co-movement of the components of *Liquidity Risk* might vary over time
- Holistic *Liquidity Risk* measure is useful -> otherwise force average effect across banks for individual components

Methodology - Time-series evidence

- Time-series regression

$$r_{i,t} = \alpha_i + \gamma LiquidityRisk_i \; x \; Drawdowns_t + \beta \; r_{S\&P,t} + \; \mu_i + \varepsilon_i$$

- Natural log. of the realized daily cumulative credit line drawdowns across all firms (*Log(Cumulative Total Drawdowns*))

- Add daily realized return of the S&P 500 stock index ($r_{S\&P,t}$) as well as a bank fixed effect (μ_i).

Liquidity risk and bank stock return – Time-series evidence

Dependent Variable: Banks' Daily Stock Returns (March 2020)				
	(1)	(2)	(3)	(4)
Liquidity Risk x Log(Cumulative Total Drawdowns)	-0.007			
	(0.031)			
Liquidity Risk x Log(Cumulative BBB Drawdowns)		-0.017		
		(0.002)		
Liquidity Risk x Log(Cumulative NonIG Drawdowns)			-0.0091	
			(0.024)	
Liquidity Risk x Log(Cumulative Not Rated Drawdowns)				-0.014
				(0.010)
S&P 500	1.194	1.203	1.193	1.193
	(0.000)	(0.000)	(0.000)	(0.000)
Bank Fixed Effects	Yes	Yes	Yes	Yes
R-squared	0.632	0.630	0.632	0.630
Number obs.	2595	2465	2595	2465

- Stock returns for banks with greater liquidity risk are lower particularly when drawdowns of riskier firms accelerate

Is oil exposure priced? Time-series evidence

$$r_{i,t} = \alpha_i + \vartheta \left[\frac{Oil\ Exposure}{Tier\ 1\ Capital_i}\ x\ \Delta Oil - Yield_t \right] + \beta\ r_{S\&P,t} + \mu_i + \eta_t + \varepsilon_i$$

- Banks' oil exposure (as % of Tier 1 capital): All outstanding loan exposures to the oil industry (as of Q4 2019)
- Contemporaneous change in the market performance of the oil sector ($\Delta Oil - Yield_t$) based on aggregate secondary market sector yields
- Bank (μ_i) and day (η_t) fixed effects in addition to the market return ($r_{S\&P,t}$).

Oil price risk and bank stock return – Time-series evidence

	Daily stock return		
	(1)	(2)	(3)
Oil Exposure/Tier 1 x Δ Oil-Yield	-4.972	-4.980	-4.980
	(0.000)	(0.000)	(0.000)
S&P 500	1.292		
	(0.000)		
Bank Fixed Effect	Yes	Yes	Yes
Day Fixed Effect		Yes	Yes
Clustered S.E.			Day
R-squared	0.697	0.805	0.805
Number obs.	1911	1911	1911

- Oil price risk has also emerged as a priced (macro) risk factor in banks' stock returns.

(Pandemic) Stress Test

NYU Stern Volatility and Risk Institute's Global Systemic Risk Rankings

Vlab.stern.nyu.edu/welcome/risk

Contingent capital shortfall in a crisis

- Existing measures of stress tests do not account for the impact of banks' contingent liabilities in times of stress.
  - E.g., Acharya et al. (2012), Acharya et al. (2016), Brownlees and Engle (2017)

- Impact can be decomposed into two components.

  1. Off-balance-sheet (i.e., contingent) liabilities enter banks' balance sheets as loans and need to be funded with capital.

  2. Account for the re-pricing of liquidity risk (γ, i.e., loading on *Liquidity Risk*)

Capital shortfall in a systemic crisis (SRISK)

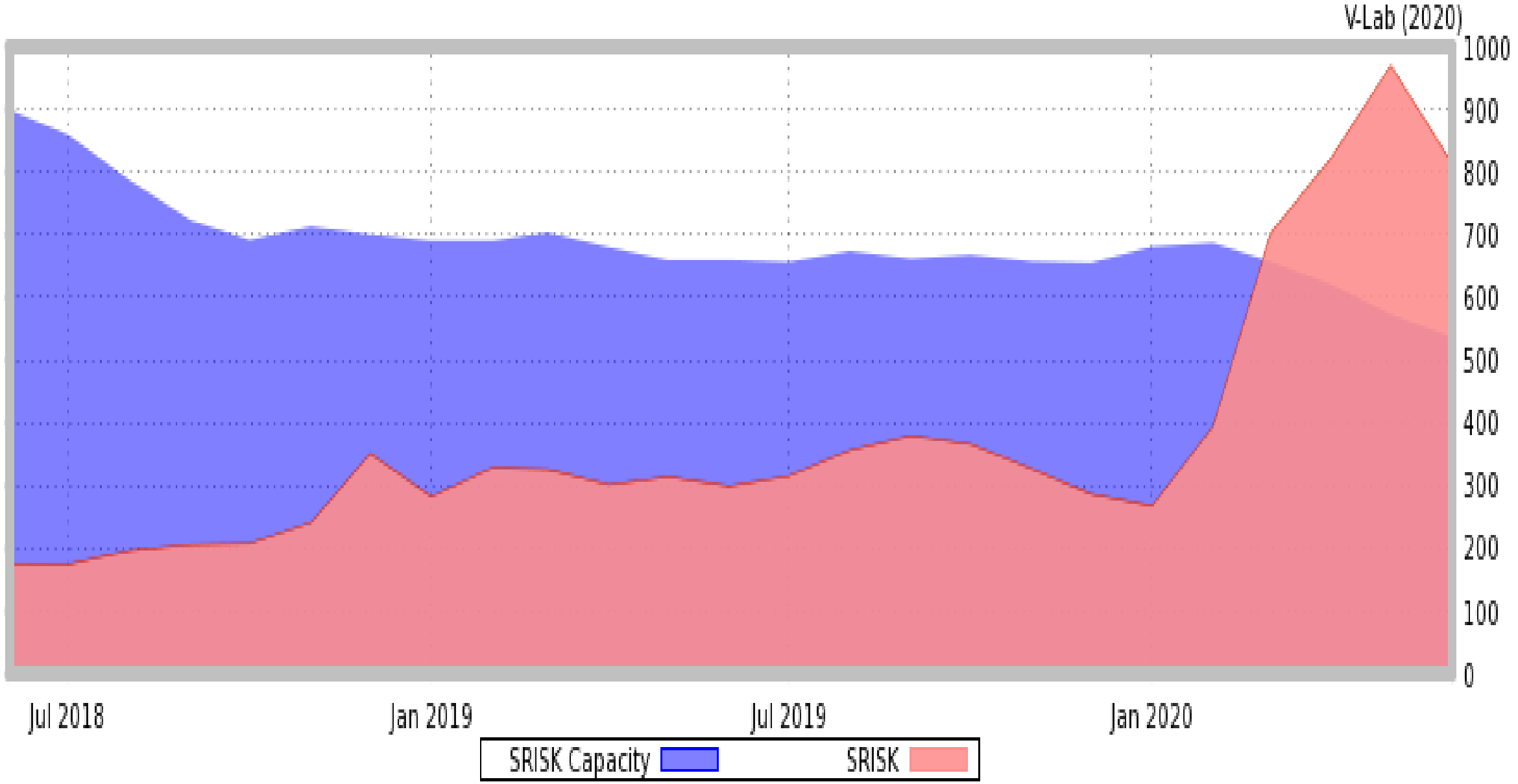
$$SRISK_{i,t} = E_t\left(Capital\ Shortfall_{i,t+h} | Crisis\right)$$

$$SRISK_{i,t} = E_t\left[k\left(Debt_{i,t+h} + Equity_{i,t+h}\right) - Equity_{i,t+h} | Crisis\right]$$

$$= K\ Debt_{i,t} - (1-K)(1 - LRMES_{i,t})Equity_{i,t}$$

- $Debt_{i,t}$ is assumed to be constant over *t* to *t+h*.
- $Equity_{i,t}$ is the market value of equity
- LRMES is the Long Run Marginal Expected Shortfall in a scenario where the broad index falls by 40% over the next 6 months (h=6m).
- K = 8% (prudential capital ratio)

SRISK suggests the US financial sector capital shortfall up by $600 bln



“Contingent” capital shortfall in a systemic crisis (SRISK-C)

- We calculate the capital shortfall of banks in a systemic crisis with contingent liabilities as follows:

$$SRISK - C_{i,t} = SRISK_{i,t} + \ Incremental\ SRISK_{i,t}^{CL} + Incremental\ SRISK_{i,t}^{LRMES-C}$$

"Contingent" capital shortfall in a systemic crisis (SRISK-C)

i. $Incremental\ SRISK_{i,t}^{CL}$ recognizes that drawdowns of credit lines in crisis states represent contingent liabilities of banks $(Debt_{i,t+h}|Crisis\ \neq Debt_{i,t}$):

$$Incremental\ SRISK_{i,t}^{CL} = K\left[E\left[Debt_{i,t+h}|Crisis\right] - Debt_{i,t}\right]$$

$$= K\ \times\ E[Drawdown - rate\mid Crisis] \times Undrawn\ Credit\ Lines_{i,t}$$

- $E[Drawdown - rate\mid Crisis]$ is estimated using past drawdown rates extrapolated for a market index fall of 40%

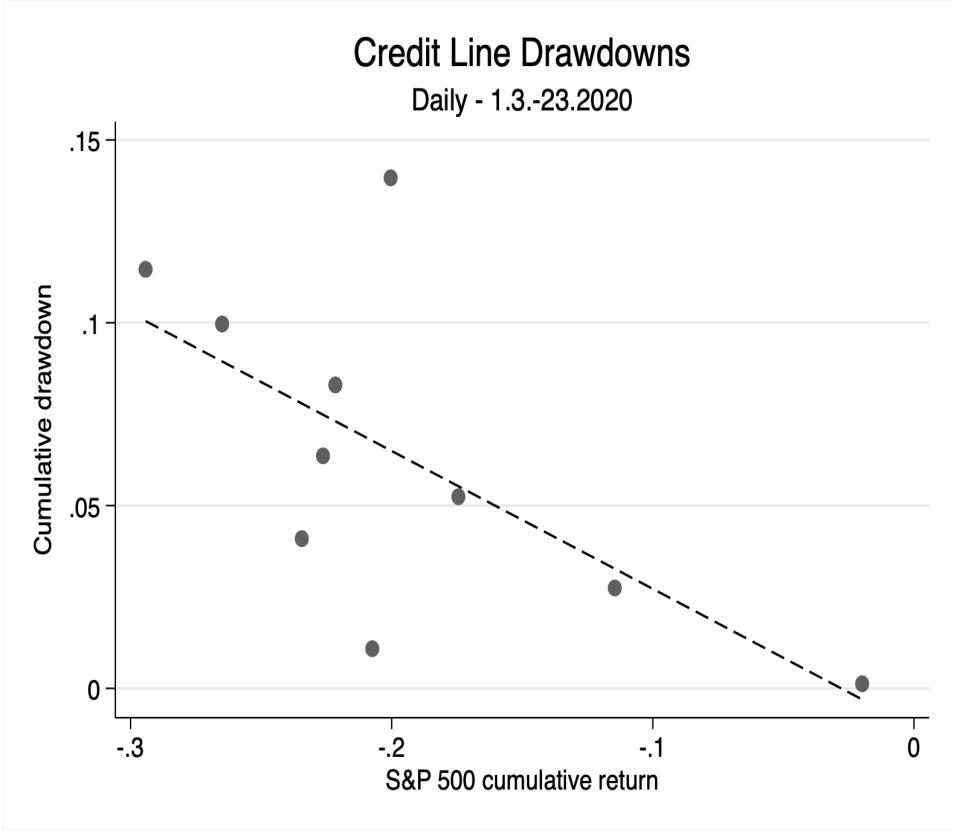
"Contingent" capital shortfall in a systemic crisis (SRISK-C)

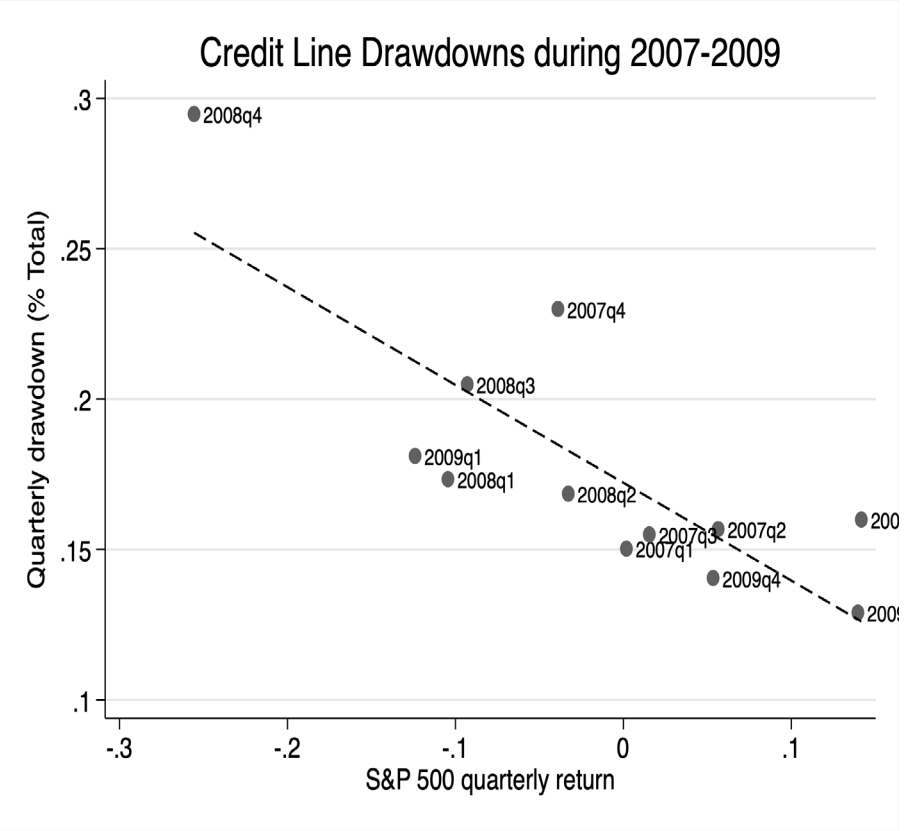
ii. $Incremental\ SRISK_{i,t}^{LRMES-C}$ recognizes that LRMES does not account for the episodic re-pricing of balance-sheet liquidity risk of banks in market returns:

$$Incremental\ SRISK_{i,t}^{LRMES-C} = (1-K) \times \Delta LRMES - C_{i,t} \times Equity_{i,t}$$

- where $\Delta LRMES - C_{i,t} = \hat{\gamma} \times Liquidity\ Risk_{i,t}$ and $\hat{\gamma}$ is the estimated episodic "risk premium" from our tests (see Appendix) on balance-sheet liquidity risk.

Drawdown function





			Drawdown Rate S&P Return -40%	Slope Drawdown Function
Predicted Drawdowns	Quarterly	Q1 2020	42.11%	-0.377
	Quarterly	2007-2009	30.23%	-0.32
	Quarterly	2000-2003	54.44%	-0.325

Incremental $SRISK^{CL}$ Contingent liability

Company	Unused Commitments	Incremental $SRISK^{CL}$ Drawdown rates			Debt
	(USD mn)	30.23%	42.11%	54.44%	
Bank of America Corporation	310,824	7,517	10,471	13,537	2,158,067
JPMorgan Chase & Co.	273,278	6,609	9,206	11,902	2,496,125
Citigroup Inc.	200,912	4,859	6,768	8,750	1,817,838
Wells Fargo & Company	198,316	4,796	6,681	8,637	1,748,234
U.S. Bancorp	96,020	2,322	3,235	4,182	433,158
Truist Financial Corporation	86,995	2,104	2,931	3,789	204,178
PNC Financial Services Group, Inc.	84,238	2,037	2,838	3,669	358,342
Fifth Third Bancorp	39,328	951	1,325	1,713	148,517
Citizens Financial Group, Inc.	33,682	815	1,135	1,467	142,497
KeyCorp	33,070	800	1,114	1,440	129,380
Total (Top 10 Banks)	**1,356,664**	**32,810**	**45,703**	**59,085**	**9,636,336**
Total (Vlab Banks)	**1,521,362**	**36,793**	**51,252**	**66,258**	**10,963,513**
Total (All Sample Banks)	**1,588,080**	**38,406**	**53,499**	**69,164**	

Incremental $SRISK^{LRMES-C}$
Re-pricing of balance-sheet liquidity risk

Panel A. Incremental $SRISK^{MES-C}$

Company	MV	LRMES	Liquidity Risk	γ_{min}	γ_{max}	$MES\text{-}C_{min}$	$MES\text{-}C_{max}$	Incremental $SRISK^{MES-C}$ $MES\text{-}C_{min}$	Incremental $SRISK^{MES-C}$ $MES\text{-}C_{max}$
JPMorgan Chase & Co.	434,745	43.43%	29.03%	-0.217	-0.273	6.30%	7.93%	25,196	31,698
Bank of America Corporation	316,178	45.88%	32.50%	-0.217	-0.273	7.05%	8.87%	20,515	25,809
Citigroup Inc.	170,199	47.31%	49.24%	-0.217	-0.273	10.68%	13.44%	16,731	21,049
Wells Fargo & Company	224,291	44.86%	26.51%	-0.217	-0.273	5.75%	7.24%	11,872	14,936
U.S. Bancorp	91,712	36.61%	38.59%	-0.217	-0.273	8.37%	10.53%	7,065	8,888
PNC Financial Services Group, Inc.	70,116	40.07%	42.58%	-0.217	-0.273	9.24%	11.63%	5,961	7,499
Truist Financial Corporation	75,659	42.53%	37.14%	-0.217	-0.273	8.06%	10.14%	5,610	7,058
KeyCorp	19,916	45.20%	41.58%	-0.217	-0.273	9.02%	11.35%	1,653	2,080
Citizens Financial Group, Inc.	17,576	48.31%	43.50%	-0.217	-0.273	9.44%	11.87%	1,526	1,920
Fifth Third Bancorp	21,680	51.10%	28.84%	-0.217	-0.273	6.26%	7.87%	1,248	1,571
Total (Top 10 Banks)	**1,442,072**							**97,377**	**122,507**
Total (Vlab Banks)	**1,665,275**							**107,999**	**135,870**
Total (All Sample Banks)	**1,837,932**							**112,345**	**141,337**

SRISK-C
Incremental SRISK as of Dec 31, 2019 over $200 bn

Company	Ticker	SRISK (Q4 2019)		SRISK-C_{min}	SRISK-C_{max}
		w/o neg SRISK	w/ neg SRISK		
JPMorgan Chase & Co.	JPM	0	-27,848	31,805	43,599
Bank of America Corporation	BAC	14,898	14,898	28,032	39,346
Citigroup Inc.	C	60,887	60,887	21,590	29,799
Wells Fargo & Company	WFC	24,425	24,425	16,668	23,573
U.S. Bancorp	USB	0	-19,352	9,387	13,070
PNC Financial Services Group, Inc.	PNC	0	-9,895	7,998	11,168
Truist Financial Corporation	TFC	0	-23,608	7,714	10,846
KeyCorp	KEY	299	299	2,453	3,520
Citizens Financial Group, Inc.	CFG	3,005	3,005	2,341	3,387
Fifth Third Bancorp	FITB	2,067	2,067	2,199	3,283
Total (Top 10 Banks)		**105,581**	**24,877**	**130,187**	**181,592**
Total (Vlab Banks)		**111,135**	**13,072**	**144,809**	**202,128**
Total (All Sample Banks)				**151,610**	**211,493**

Related Academic Literature

Related literature (selected)

1. **Role of banks as liquidity providers**
   - Kashyap et al. (2002), Gatev and Strahan (2006), Berger and Bouwman (2009), Ivashina and Scharfstein (2010) , Acharya and Mora (2015), Li et al. (2020) , Acharya and Steffen (2020a)
   - *We explore the implications of banks as liquidity providers for bank asset returns, especially when the realized risk is aggregate in nature.*

2. **Determinants of credit line drawdowns in previous crises**
   - Drawdowns are sensitive to the overall market: Berg et al. (2016, 2017)
   - *We show that pandemic drawdowns have been more intense in magnitude but similar in spirit.*

Related literature (selected)

3. **Methodologically of bank stress tests**
   - Acharya et al. (2012), Acharya et al. (2016) and Brownlees and Engle (2017), Adrian and Brunnermeier (2015), Brunnermeier et al. (2019)
   - *We show how contingent liabilities of banks and conditional or episodic risk premium of balance-sheet liquidity risk can be embedded into stress tests.*

4. **Asset-pricing tests of (bank) equity returns**
   - Amihud and Mendelson (1986), Pastor and Stambaugh (2003), Acharya and Pedersen (2005)
   - Key contribution: *Balance-sheet liquidity risk is also being episodically priced, with implications for capital adequacy during aggregate downturns.*