Why did bank stocks crash during COVID-19?

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Credit Lines, Aggregate Stress, and Banks

- A form of liquidity insurance for firms, provided by banks; firms use as ``last resort"

  - Idiosyncratic problems OR Aggregate stress such as market freeze (COVID) vs banking crisis (GFC)

- Once drawn down, credit lines switch from being an off-balance-sheet liability of banks to being a term loan on asset-side of banks

  - Meeting a drawdown requires liquidity; post-drawdown term loan requires capital

- Aggregate stress -> High illiquidity -> Adverse impact of drawdowns on banks (GFC)

- Aggregate stress -> High shadow cost of capital -> Adverse impact on banks (COVID)

- Firms also have the option to repay as markets normalize

  - Banks repaid but shadow cost of capital low... So banks lose if credit lines are drawn and repaid early
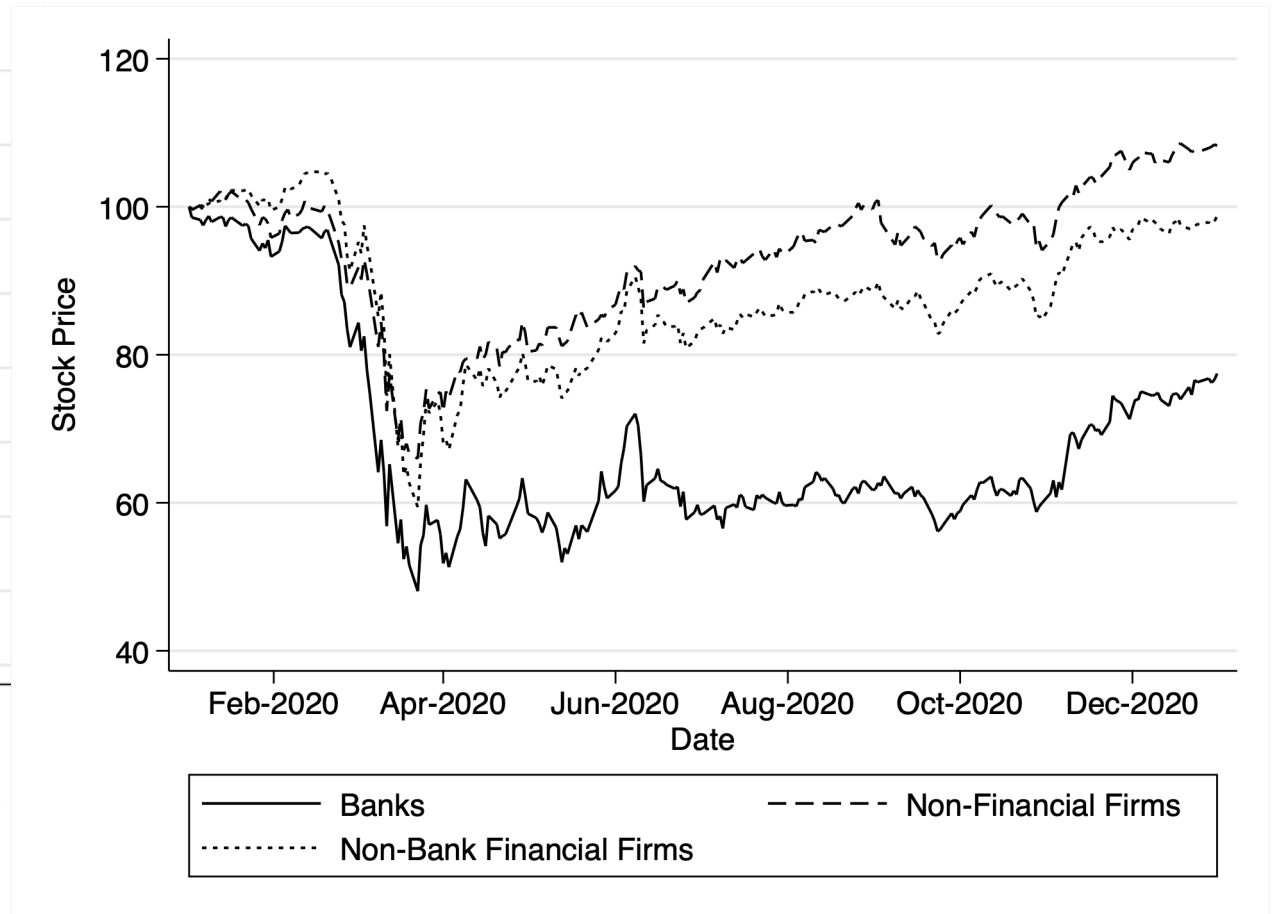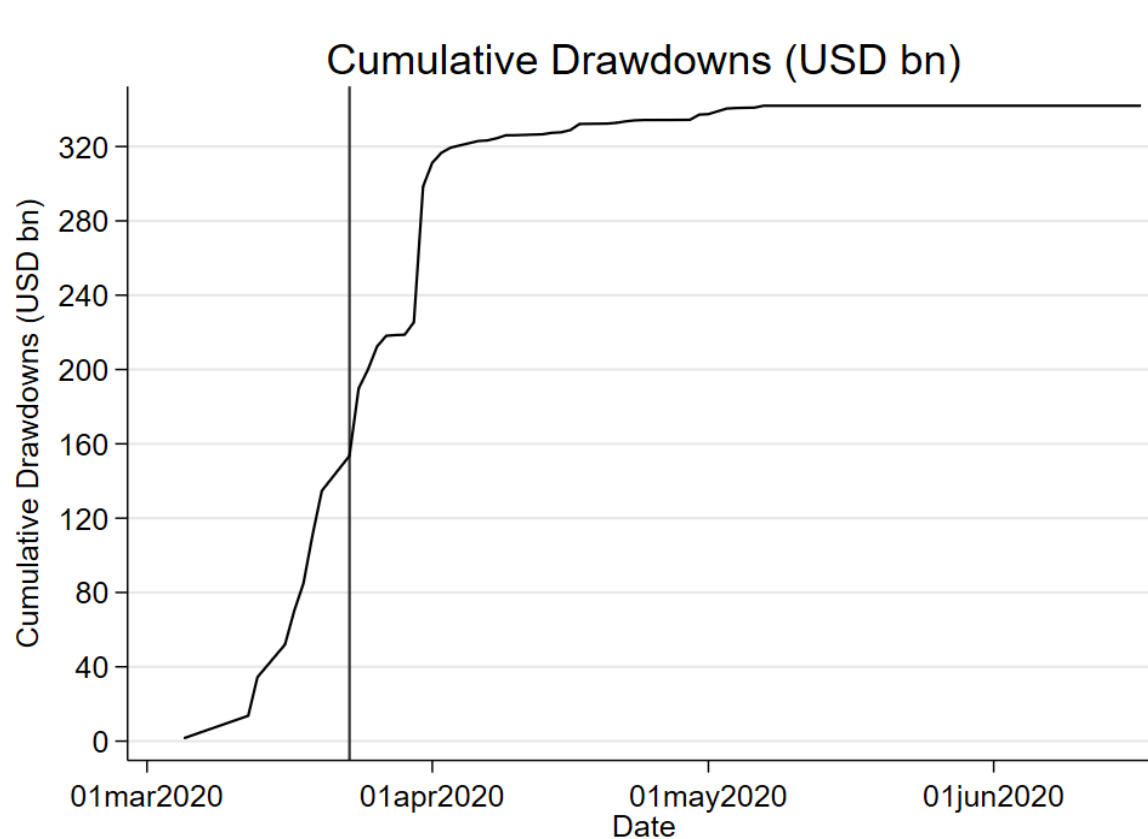
Massive buildup of (aggregate) drawdown risk on bank balance-sheets (2009 – 2019)
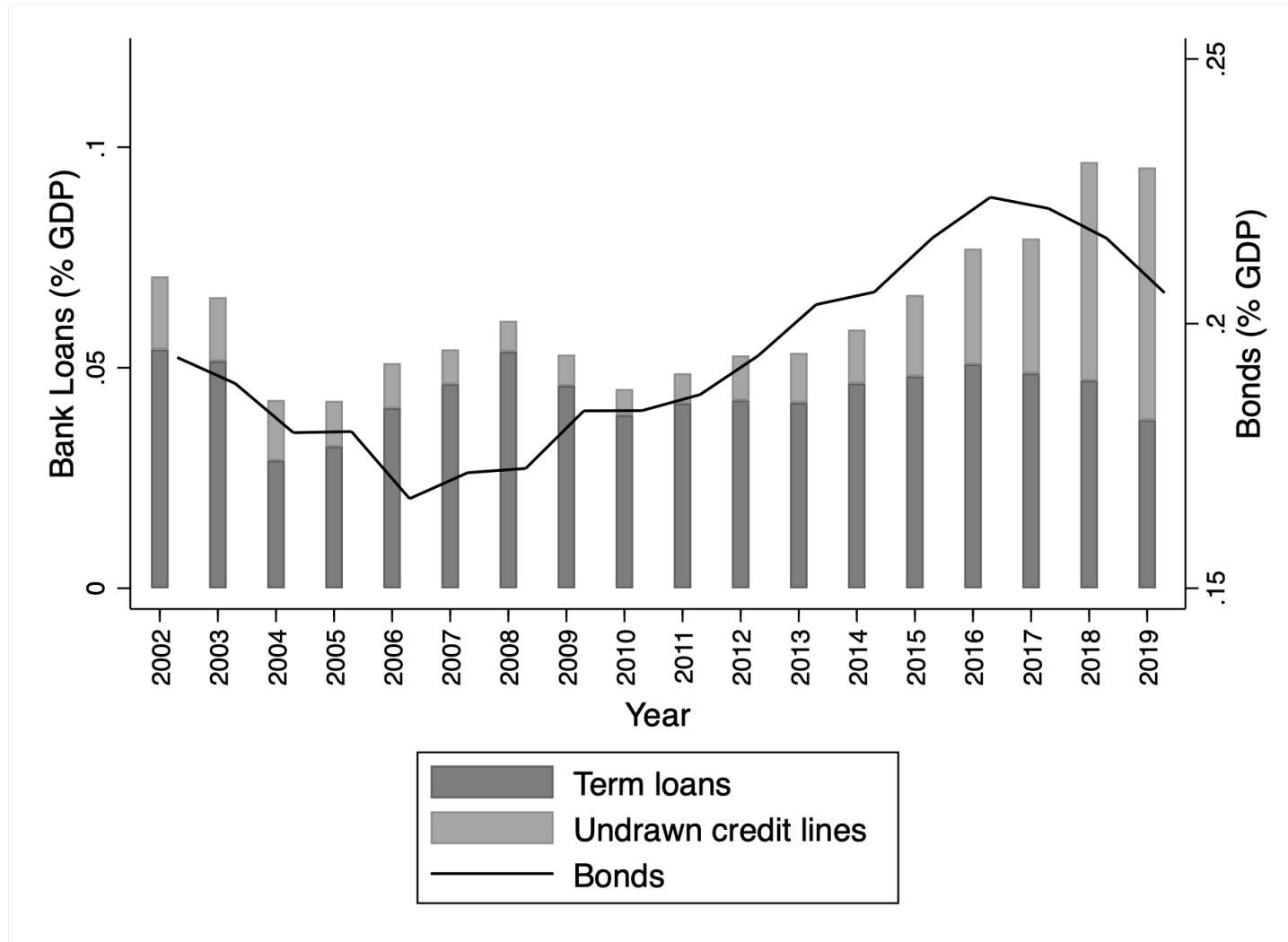
Credit line exposure:

0.7% GDP (2009) -> 5.7% (GDP) (2019)

Drawdown risk materialized in March 2020 amid COVID-19 outbreak

Bond market freeze -> aggregate drawdowns & stock price underperformance
of banks *vis-a-vis* the corporate sector and non-bank financial firms

This paper

- Does credit line exposure help us understand bank stock price performance during the COVID-19 pandemic?

- What are the possible transmission channels through which the drawdowns affect bank stock returns and ultimately banks' intermediation functions for the real economy?

  - Capital vs Liquidity

  - Do these channels relate to the changing nature of bank regulatory standards between the global financial crisis and the pandemic?

- How can regulation incorporate such AGGREGATE RISK to safeguard against them in future?

Key results

- We show that balance sheet liquidity risk of banks episodically explains banks' stock returns (cross-section and time-series)

- We find evidence consistent with a "capital" rather than "funding" channel that adversely impacts the intermediation function of banks

- We confirm that the episodic co-movement of balance-sheet liquidity risk and bank stock returns was also a feature of the global financial crisis (GFC, 2007-2008)

  - Liquidity risk during COVID explained through unused C&I credit lines, during GFC explained mainly through wholesale funding.

- We demonstrate how the episodic nature of credit line drawdowns and re-pricing of balance-sheet liquidity risk can be incorporated into stress tests (SRISK^C).

Data

- All publicly listed BHC in the U.S., total assets > USD 100 million, match to CRSP/Compustat (147 banks, 99% of credit lines)

- Bank balance-sheet variables (on the holding company level, FR-Y9C) are obtained from call reports

- Dealscan loan exposures to COVID-affected industries

- SRISK from NYU vlab

- Bloomberg: stock returns, VIX, S&P 500 market return

$$Liquidity\ Risk = \frac{Unused\ commitments + Wholesale\ Funding - Liquidity}{Total\ Assets}$$
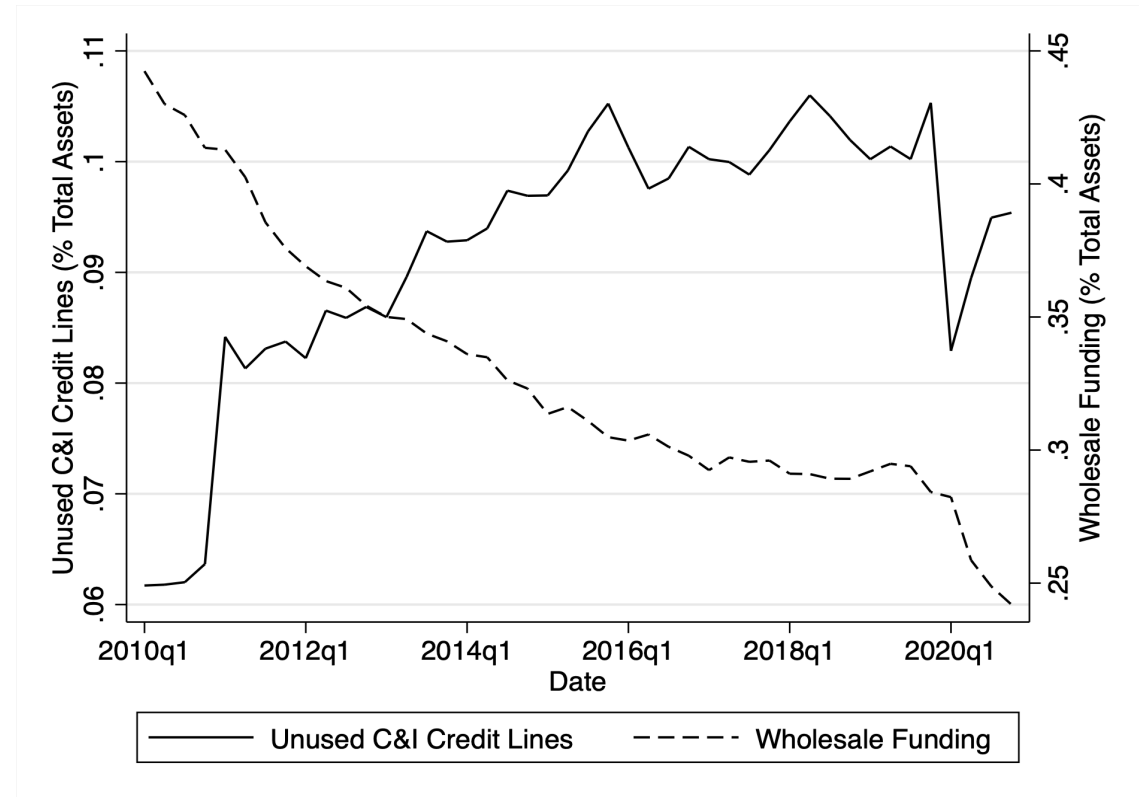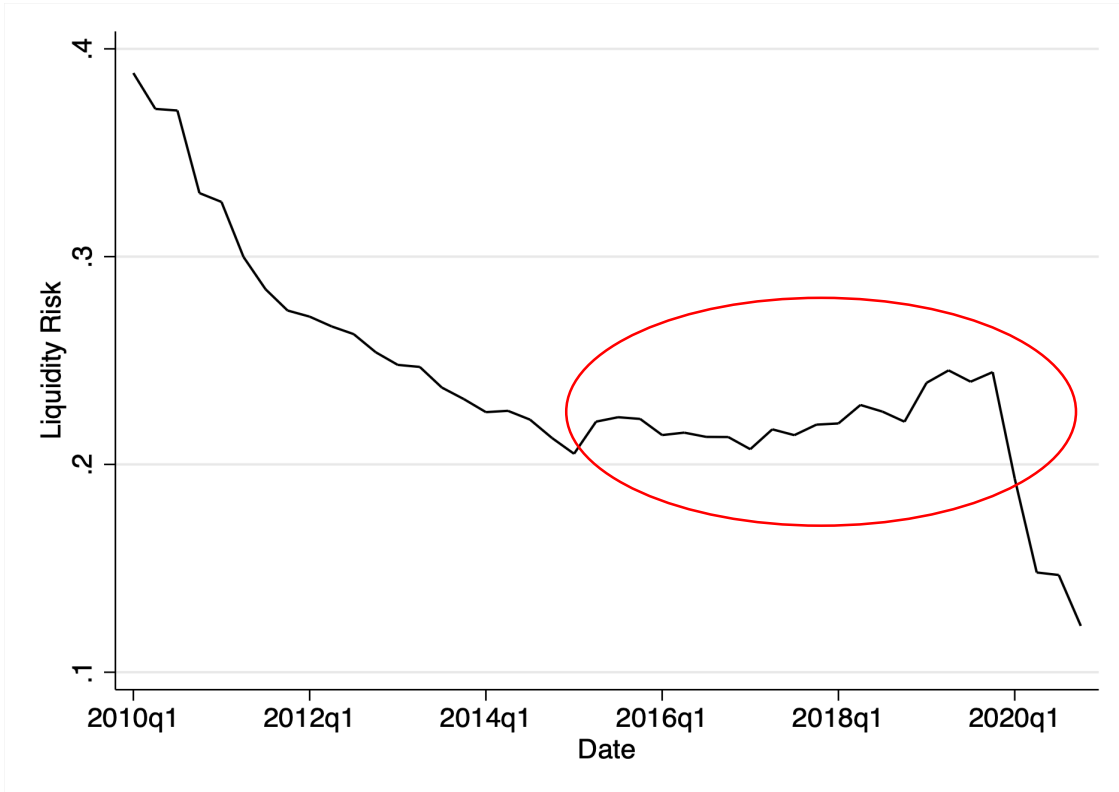
- Liquidity risk ↑ because of unused commitments

Bank stock return crash explained by *ex-ante* liquidity risk
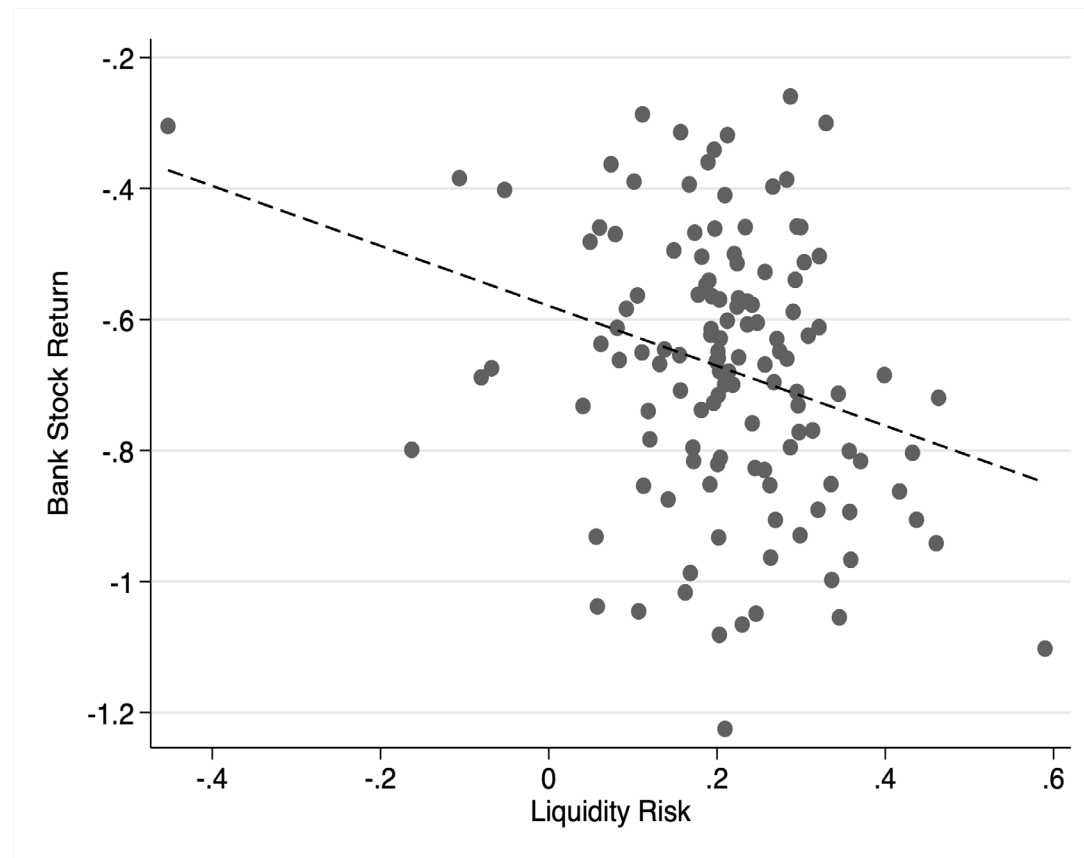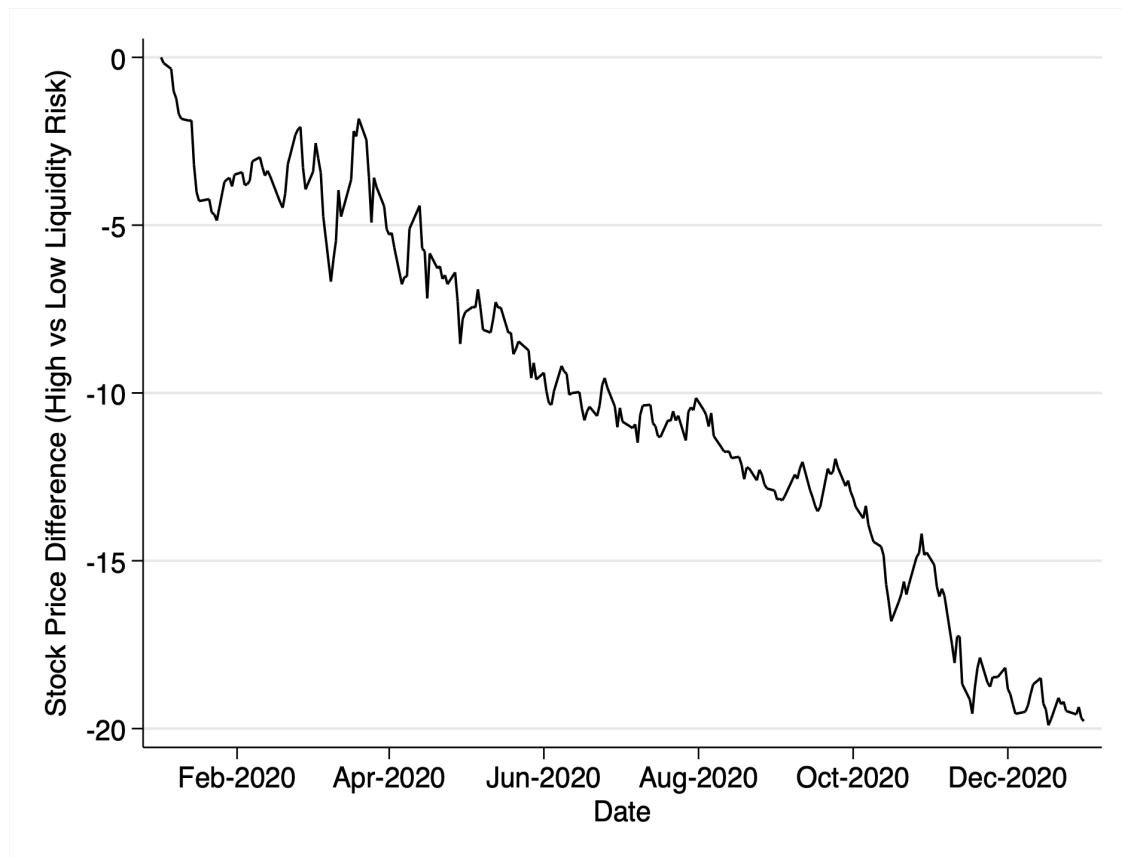
- Banks with high liquidity risk perform worse compared to other banks.

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

	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity Risk	-0.329***	-0.409***	-0.565***	-0.550***	-0.568***	-0.551***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controls	Equity Beta	+ NPL/Loans, Capital, NII, Assets, ROA, Deposits	+ Income Diversity, DtD, Loans, Idiosyncractic vola, Real Estate	+ Primary Dealer, Derivatives	+ Credit Card Commitment, Consumer Loans	+ SRISK
R-squared	0.256	0.354	0.448	0.449	0.462	0.502
Number obs.	147	147	147	147	147	147

- 1 std dev increase in Liquidity Risk -> 8.5% lower returns (12.5% of uncond. mean return)

Robustness

1. **Portfolio risk**: Liquidity risk appears to be orthogonal to traditional measures of bank exposures (COVID-affected sectors) and systemic risk

2. **Aggregate risk**: Liquidity risk of banks episodically (3/1-3/23/20) explains banks' stock returns (cross-section and time-series)

3. **Components**: Undrawn credit lines (but not wholesale funding risk) negatively impacts bank stock returns during COVID

4. **Fed intervention**: Reduction of aggregate drawdown risk post-Fed intervention

5. **Recovery**: Banks only recovered about 35% of market value losses (repayments imply loss of margins for banks as firms exercise interest-rate optionality)

Exposure to COVID-19-affected industries

	(13)	(14)
Liquidity Risk	-0.515***	-0.496***
Affected Industries (β_{COVID})	-0.040**	
		-0.074**
Controls	Yes	Yes
Affected Measure	First Principal Component of exposure betas to affected industries	Average Syndicated Loan Exposure to affected industries
R-squared	0.524	0.478
Number obs.	147	147

- Liquidity risk is orthogonal to bank portfolio risk.

Comparing GFC and COVID-19

	(1)	(2)	(3)	(4)
	Q2 2007 - Q2 2009		3/1-3/23/2020	
Liquidity Risk	-0.0961***		-0.445***	
	(0.000)		(0.000)	
Unused C&I Loans / Assets		-0.133***		-1.084***
		(0.005)		(0.001)
Liquidity / Assets		-0.00562		0.488***
		(0.915)		(0.006)
Wholesale Funding / Assets		-0.144***		-0.279
		(0.008)		(0.107)
Controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes		
Cluster (Bank)	Yes	Yes		
R-squared	0.340	0.341	0.471	0.486
Number obs.	3072	3072	147	147

- Wholesale funding important liquidity risk for banks during the GFC

- Increase liquidity regulation and reduction in wholesale funding exposure post-GFC…

- …but not for credit line exposure

Understanding the mechanisms:
"Funding Channel" versus "Capital Channel"
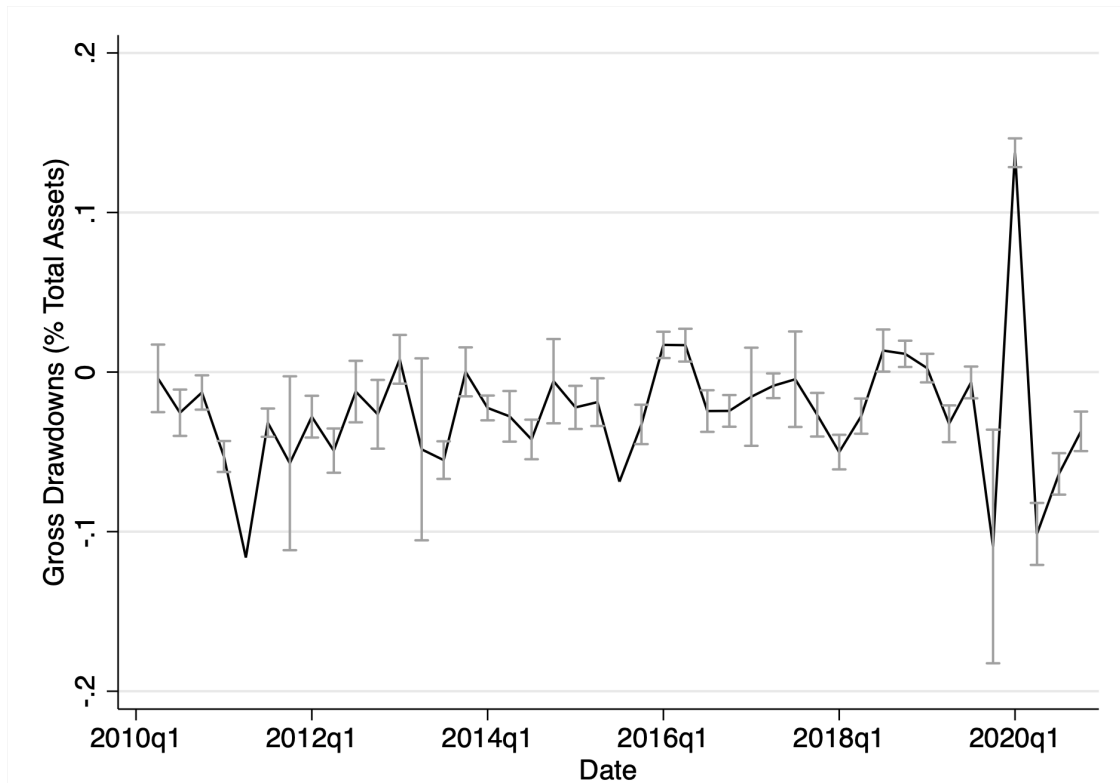
Gross drawdowns (△Unused Commitments as % Assets)
-> leads to bank capital charge against term loans
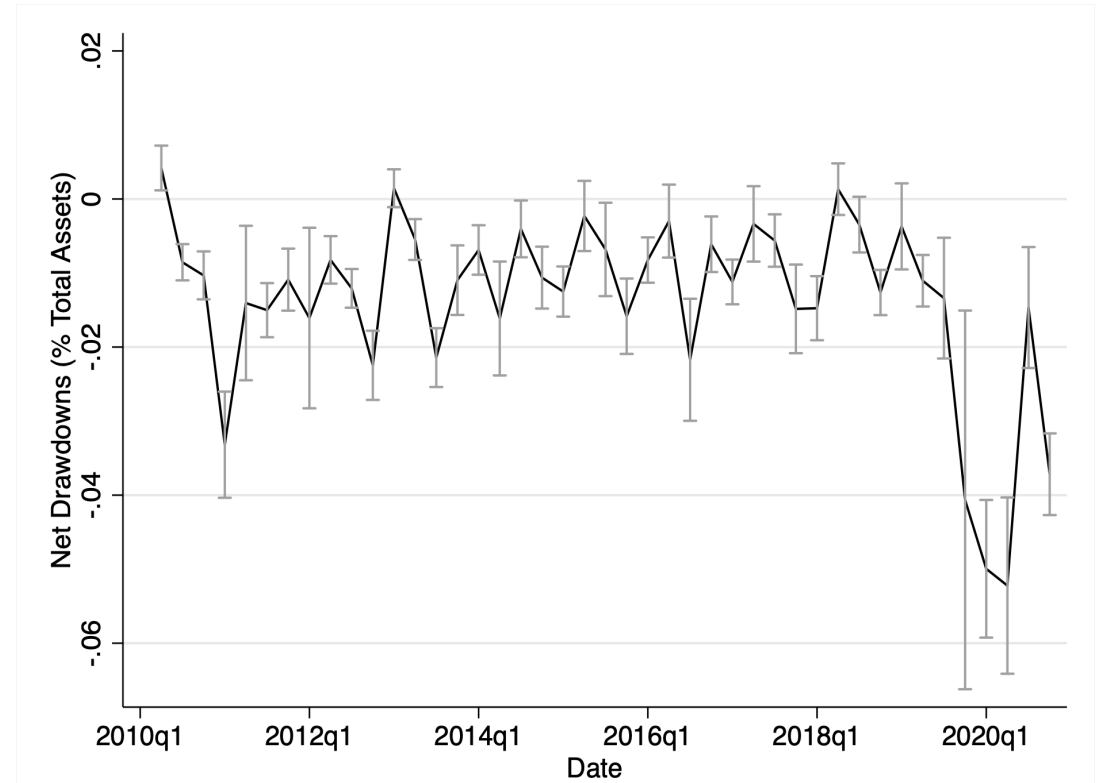
Net drawdowns (△Unused Commitments – △Deposits, both as % Assets)

- Deposit inflows > drawdowns -> funding likely not the binding constraint

Bank capital appears to be the binding constraint

$$r_i = \alpha_i + \gamma\, DD_i + \theta\, DD_i \times Capial\ Buffer_i + \sum \beta\, X_i + \varepsilon_i$$

	(1)	(2)	(3)	(4)	(5)
Gross drawdowns	-5.618***	-9.156***	-5.213***	-9.153***	-5.117***
	(0.003)	(0.001)	(0.005)	(0.001)	(0.006)
Gross drawdowns x High Capital		5.927**		5.913**	
		(0.034)		(0.033)	
Gross drawdowns x Capital Buffer			1.840**		1.909**
			(0.046)		(0.035)
Net drawdowns x High Capital | Capital Buffer				Yes	Yes
...					
R-squared	0.415	0.439	0.435	0.439	0.439
Number obs.	147	147	147	147	147

Methodology – Khwaja and Mian (2008) estimator (within syndicate)

$$Y_{i,b,m,t}$$
$$= \beta_1 \times DD_b \times Post + (\eta_i \times \eta_t \times \eta_m) + (\eta_i \times \eta_b) + X_{b,t-1} + \varepsilon_{i,b,m,t}$$

- $Y_{i,b,m,t:}$ loan amount (number of loans) issued to firm i by bank b as loan-type m in month t.

- DD_b: Gross or net drawdowns by bank b

- $(\eta_i \times \eta_t \times \eta_m)$: firm x time x loan type fixed effect -> loan demand
- $(\eta_i \times \eta_b)$: firm x bank fixed effects -> composition

Results: (1) Lending and (2) Real effects

1. **Lending**: $\beta_1 < 0$ for banks that experience high gross drawdowns:
    Capital constrained banks reduce supply of new loans

2. **Real Effects**: Firms borrowing from banks with high gross drawdowns
    - Reduce investments in working capital
    - Cut R&D spending four times more
    - Cut dividends

Incorporating aggregate drawdown risk in stress tests

- Even if banks price aggregate drawdown risk, they may not factor in the real-sector spillovers such as constrained lending upon drawdowns

- 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 of aggregate drawdown risk can be decomposed:
  1. Off-balance-sheet liabilities enter banks' balance sheets as loans
  2. Account for the impact of liquidity risk on stock prices

"Contingent" capital shortfall in a systemic crisis ($SRISK^{CL}$)

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

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

$$= \textcolor{red}{K \times E[Drawdown\ rate\ |\ Crisis]}$$
$$\textcolor{red}{\times Undrawn\ Credit\ Lines_{i,t}}$$

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

"Contingent" capital shortfall in a systemic crisis ($SRISK^{CL}$)

Credit Line Drawdowns during 2007-2009 & COVID
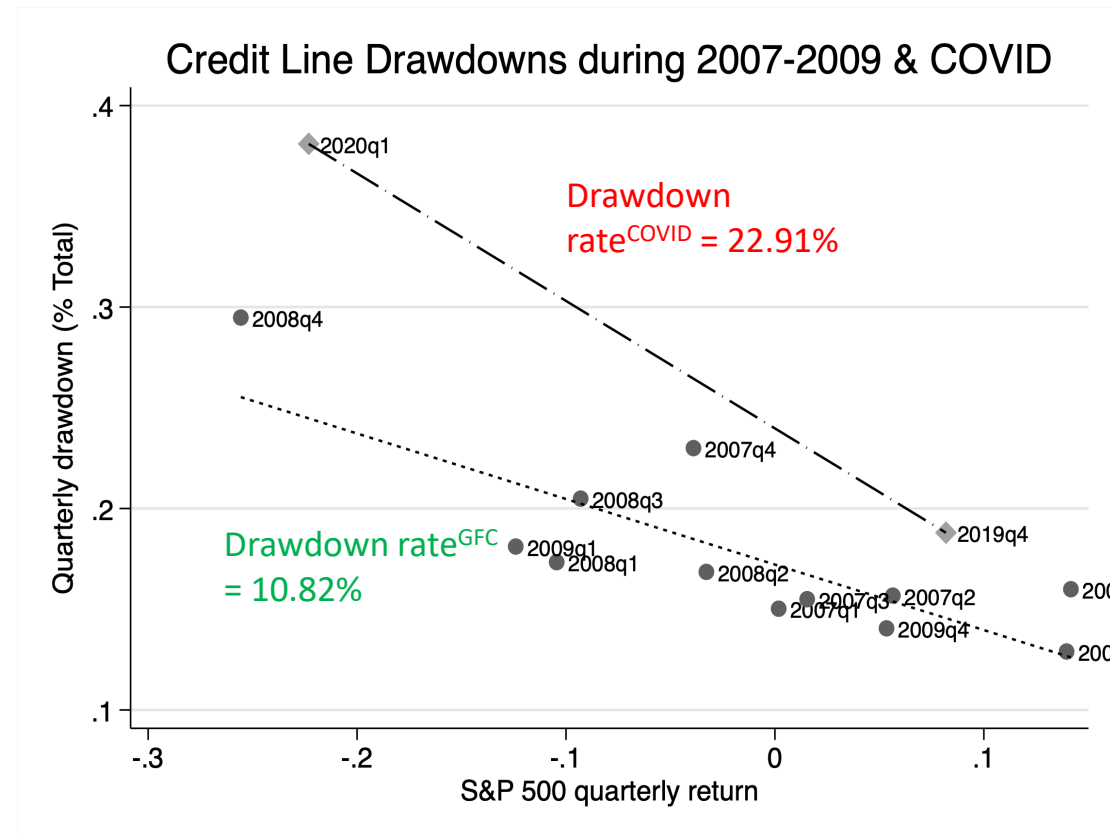
- SRISK^{CL} is between $12bn and $27bn

"Contingent" capital shortfall in a systemic crisis

ii. *Incremental* $SRISK_{i,t}^{LRMES^C}$ recognizes that LRMES does not account for the episodic effect of balance-sheet liquidity risk of banks on stock 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 coefficient from our tests on balance-sheet liquidity risk.

Incremental SRISK^{LRMESC}
Re-pricing of balance-sheet liquidity risk

Name	SRISK (Q4 2019) w/o neg SRISK	SRISK (Q4 2019) w/ neg SRISK	SRISK-C_{min}	SRISK-C_1
JPMORGAN CHASE & CO.	0	-27,848	30,777	54,284
BANK OF AMERICA CORPORATION	14,898	14,898	28,742	50,880
WELLS FARGO & COMPANY	24,425	24,425	19,329	34,181
CITIGROUP INC.	60,887	60,887	22,429	39,566
U.S. BANCORP	0	-35,344	5,685	9,860
PNC FINANCIAL SERVICES GROUP, INC., THE	0	-19,352	14,561	25,573
M&T BANK CORPORATION	28,302	28,302	4,459	7,994
FIFTH THIRD BANCORP	38,774	38,774	8,434	14,997
KEYCORP	0	-23,608	10,696	18,839
CITIZENS FINANCIAL GROUP, INC.	0	-9,895	9,658	17,029
Total (Top 10 Banks)	167,287	51,238	154,769	273,201
Total (Vlab Banks)	195,033	40,994	183,825	324,714
Total (All Sample Banks)			193,315	341,377

- Overall, incremental SRISK as of Dec 31, 2019 is over $341bn.

Conclusion

- Balance-sheet liquidity risk of banks -> underperformance of bank stocks during periods of aggregate risk
  - COVID: driven by unused loan commitments
  - GFC: driven by wholesale funding and rollover risk

- Bank stock returns react adversely to gross drawdowns -> lead to bank capital charge against term loans
  - Implications for (1) loan supply and (2) firm investments

- Implications: bank capital requirement should account for aggregate drawdown risk due to credit line exposure

Appendix

COVID-19 and lockdowns caused bond markets to freeze

- Firms benefited from having access to credit lines during the pandemic when capital market funding froze
  - *E.g.*, Acharya and Steffen, 2020a; Chodorow-Reich et al., 2021; Greenwald et al., 2021

- Banks faced unprecedented aggregate demand for credit-line drawdowns; banks' share prices have persistently underperformed

- This paper: central role played by bank credit line drawdowns in understanding the crash of bank stock prices.

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

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

Methodology – Baseline tests (cross-section)

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

- r_i is the excess return of bank i
- *X:* control variables (market beta, balance-sheet characteristics)
  - Key bank performance measures as to capitalization, asset quality, profitability, liquidity and investments (e.g., Fahlenbrach et al., 2012; Beltratti and Stulz, 2012)

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

Balance-sheet liquidity risk ignites in March 2020

	(1)	(2)	(3)	(4)	(5)	(6)
	January 2020		February 2020		1/3-23/3/2020	
Liquidity Risk	-0.0594**	-0.0625**	-0.0470	-0.0439	-0.462***	-0.445***
	(0.022)	(0.023)	(0.306)	(0.357)	(0.000)	(0.000)
Equity Beta	0.0452	0.0699*	0.0350	0.0197	0.497***	0.386**
	(0.253)	(0.066)	(0.185)	(0.465)	(0.003)	(0.011)
SRISK /Assets		1.317**		-1.122*		-6.604***
		(0.048)		(0.075)		(0.007)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.341	0.387	0.258	0.285	0.413	0.471
Number obs.	147	147	147	147	147	147

- Balance-sheet liquidity risk economically most important in March 2020 (sign increase in R2)

Undrawn credit lines negatively impact banks stock returns...

	(1)	(2) 3/1-3/23/2020	(3)
Unused C&I Loans / Assets	-1.110***	-1.006***	-1.084***
	(0.001)	(0.001)	(0.001)
Liquidity / Assets		0.477***	0.488***
		(0.009)	(0.006)
Wholesale Funding / Assets			-0.279
			(0.107)
Equity Beta	0.595***	0.599***	0.597***
	(0.004)	(0.004)	(0.003)
SRISK /Assets	-6.559**	-6.208**	-5.922**
	(0.015)	(0.014)	(0.018)
Controls	Yes	Yes	Yes
R-squared	0.456	0.479	0.486
Number obs.	147	147	147

- ... but not wholesale funding (which has been subject to regulation post GFC)

Bank portfolio composition

- **Identification challenge**: Liquidity risk through credit line drawdowns is correlated with bank portfolio composition

- Who draws down credit lines? Riskier borrowers

- Banks with large drawdowns may thus be engaged with riskier borrowers

- Need to control for bank portfolio composition (-> omitted variable bias)

Bank portfolio composition: Exposure to COVID-affected industries

COVID-affected industries	Liquidity Risk (Beta)	R-squared
Fahlenbrach et al. (2021) - stock performance	-0.568***	0.505
Moody's (2020) COVID industries	-0.543***	0.475
Koren and Peto (2020) - Customer share	-0.546***	0.475
Dingel and Neiman (2020) - Telework	-0.527***	0.502
Fahlenbrach et al. (2021) - 6 NAIC level COVID industries	-0.481***	0.537
Koren and Peto (2020) - Presence share	-0.530***	0.498
Koren and Peto (2020) - Affected Measure	-0.515***	0.496
Koren and Peto (2020) - Teamwork share	-0.518***	0.519
YoY sales decline	-0.541***	0.476
Chodorow-Reich et al. (2021) - Abnormal employment decline	-0.524***	0.501
ONET - Physical proximity	-0.534***	0.517
ONET - Face to face discussion	-0.521***	0.504
ONET - External customers	-0.515***	0.524
First Principal Component	-0.515***	0.524
Exposure /Assets	-0.496***	0.478

Methodology

Note:

Detailed data describing bank portfolio composition are hardly available to empirical researchers. Our approach to estimate banks' exposure to COVID-19-affected industries is similar to the procedure employed e.g. by Agarwal and Naik (2004) to characterize the exposures of hedge funds or the approach in Acharya and Steffen (2015) in estimating European banks' exposure to sovereign debt. We use multifactor models in which the sensitivities of banks' stock returns to "COVID-19-affected industry" returns are measures of banks' exposure to these industries. We call these sensitivities "*Affected Industries* (β_{COVID})". The lack of micro level portfolio holdings of banks gives these tests more power and increases the efficiency of the estimates.

More precisely, we run the following regression daily over the Jan 1, 2019 to Dec 31, 2019 period <u>for each bank *i*:</u>

$$r_t = \beta_0 + \beta_{COVID} r_{COVID,t} + \beta_m r_{m,t} + \beta_{HML} HML_t + \beta_{SMB} SMB_t + \gamma \sum X_t + \varepsilon_t$$

r_t is the daily bank excess return. $r_{COVID,t}$ is the daily excess return of the COVID-19-affected industry. $r_{m,t}$ is the daily market excess return. HML and SML are the Fama-French factors.

X_t is a vector of control variables: *risk-free interest rate, VIX, term spread, BBB-AAA spread,* and the *CPI.* Because of the co-movement of $r_{m,t}$ and $r_{COVID,t}$, we orthogonalize $r_{m,t}$ to $r_{COVID,t}$.

Exposure to COVID-19-affected industries

β_{COVID}

	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity Risk	-0.568***	-0.543***	-0.546***	-0.527***	-0.481***	-0.530***
Affected Industries	-1.410***	-0.531*	-0.455	-0.526***	-0.635***	-0.493**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Affected Measure	Fahlenbrach *et al.* (2021) – stock performance	Moody's (2020) COVID industries	Koren and Peto (2020) – Customer share	Dingel and Neiman (2020) – Telework	Fahlenbrach *et al.* (2021) – 6 NAIC level COVID industries	Koren and Peto (2020) – Presence share
R-squared	0.505	0.475	0.475	0.502	0.537	0.498
Number obs.	147	147	147	147	147	147

	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity Risk	-0.515***	-0.518***	-0.541***	-0.524***	-0.534***	-0.521***
Affected Industries	-0.541**	-0.709***	-0.221*	-0.910**	-1.528***	-2.090***
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Affected Measure	Koren and Peto (2020) –Teamwork share	YoY sales decline	Chodorow-Reich *et al.* (2021) – Abnormal employment decline	ONET – Physical proximity	ONET – Face-to-face discussion	ONET – External customers
R-squared	0.496	0.519	0.476	0.501	0.517	0.504
Number obs.	147	147	147	147	147	147

Exposure to COVID-19-affected industries

	(13)	(14)
Liquidity Risk	-0.515***	-0.496***
Affected Industries (β_{COVID})	-0.040**	
		-0.074**
Controls	Yes	Yes
Affected Measure	First Principal Component of exposure betas to affected industries	Average Syndicated Loan Exposure to affected industries
R-squared	0.524	0.478
Number obs.	147	147

- Liquidity risk is orthogonal to bank portfolio risk.

Balance-sheet liquidity risk post Fed interventions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Q2 - Q4 2020		Q2 2020	Q3 2020	Q4 2020
Liquidity Risk	0.0104	-0.0406			-0.00979	-0.132*	-0.0368
	(0.856)	(0.446)			(0.931)	(0.073)	(0.714)
Unused C&I Loans / Assets			-0.105	-0.194*			
			(0.481)	(0.094)			
Liquidity / Assets			-0.0726	0.00860			
			(0.352)	(0.901)			
Wholesale Funding / Assets			-0.0845	-0.101			
			(0.268)	(0.148)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE		Yes		Yes			
Cluster	Bank	Bank	Bank	Bank			
R-squared	0.122	0.751	0.123	0.751	0.434	0.380	0.441
Number obs.	435	435	435	435	146	145	144

- Again: balance-sheet liquidity risk only periodically explains bank stock returns (Q3 2020 uncertainty regarding 2nd wave and lockdowns)

Understanding the mechanisms: "funding channel" versus "capital channel"

- Balance-sheet liquidity risk can explain stock returns in periods of aggregate risk.

- What are the mechanisms?
  - "Funding channel" vs. "capital channel"

- *Gross Drawdowns:* % change of unused C&I credit lines Q4'19 –Q1'20

- *Net Drawdowns*: Change in unused C&I commitments minus the change in deposits (all relative to total assets)

Capital constrained banks reduce new loan originations

	New Originations			
	1	2	3	4
Gross Drawdowns x Post	-1.208			
	-0.43			
Net Drawdowns x Post	-0.33			
	-0.104			
High Gross Drawdowns x Post		-0.0455***	-0.0481***	-0.0534**
		-0.005	-0.008	-0.03
High Net Drawdowns x Post		-0.0532**	-0.0590**	-0.0251
		-0.036	-0.036	-0.473
High Gross Drawdowns x Post x Term Loan Indicator			0.0188	0.0413
			-0.556	-0.382
High Net Drawdowns x Post x Term Loan Indicator			0.0361	0.0513
			-0.101	-0.236
Controls				Yes
Borrower x Time FE x Loan Type	Yes	Yes	Yes	Yes
Bank x Borrower FE	Yes	Yes	Yes	Yes

Real effects

- Implications on investment and financing policies of firms borrowing from banks with high gross drawdowns

  - Reduce investments in working capital
  - R&D spending cut four times more
  - Dividends cut

- Compared to firms borrowing from banks with low gross drawdowns.

Discussion

1. **Comparison to the GFC**: Wholesale funding and rollover risk was a substantially larger risk for banks during the GFC compared to the COVID-19 pandemic.

2. **Alternative liquidity measures**: Berger and Bouwman (2009) and Bai et al. (2018) liquidity measure explain bank stock returns, our measure remains sign in horse race

3. **Contract terms**: Neither credit line pricing nor covenants account for aggregate drawdown risk!

4. **Stress tests**: Current Fed stress tests do not account for aggregate drawdown risk

Discussion I: Comparison to GFC

	(1)	(2)
		Q2 2007 - Q2 2009
Liquidity Risk	-0.0961***	
	(0.000)	
Unused C&I Loans / Assets		-0.133***
		(0.005)
Liquidity / Assets		-0.00562
		(0.915)
Wholesale Funding / Assets		-0.144***
		(0.008)
Controls	Yes	Yes
Time FE	Yes	Yes
Cluster (Bank)	Yes	Yes
R-squared	0.340	0.341
Number obs.	3,072	3,072

- Wholesale funding was a substantially larger risk for banks during the GFC compared to the COVID-19 pandemic.

Dicussion II: Liquidity measures

	(1)	(2)	(3)	(4)	(5)
Liquidity Risk	-0.462***				-0.293**
	(0.000)				(0.023)
Unused C&I Loans / Assets		-1.251***			
		(0.000)			
BB			-0.438***		-0.169
			(0.000)		(0.204)
LMI - 2020				0.343***	0.151
				(0.000)	(0.171)
Controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.413	0.408	0.404	0.397	0.429
Number obs.	147	147	147	147	147

- Berger and Bouwman (2009) liquidity measure and Bai et al. (2018) frequently used measures

- Both explain bank stock returns, our measures remains sign in horse race -> additional information in our measure

Discussion III: Accounting for aggregate drawdown risk in loan contract terms

- Do banks account for aggregate drawdown risk, e.g., through loan contract terms that might limit the extent of correlated drawdowns during episodes of aggregate risk.

- We investigate two possible ways banks might do that: (1) the pricing of credit lines, and (2) loan covenants.

- Bottom line: none of these contract terms do account for aggregate drawdown risk!

Do banks or regulators account for aggregate drawdown risk?

- Do banks recognize correlated drawdown risk?
  - Banks account for idiosyncratic and systematic drawdown risk when pricing loans (Acharya et al., 2013; Berg et al., 2016)

Pricing of newly originated loans

Dependent Variable	All-in-spread-drawn					Commitment fee		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Equity Beta	0.0582				0.0161**			
LRMES		1.293**				0.187*		
SRISK / Assets			1.772				0.255	
Liquidity Risk				-0.33				-0.0253
Bank Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.463	0.464	0.463	0.463	0.473	0.473	0.472	0.472
Number obs.	2657	2657	2657	2657	2657	2657	2657	2657

Do banks or regulators account for aggregate drawdown risk?

- Do banks recognize correlated drawdown risk? No!
  - Banks account for idiosyncratic and systematic drawdown risk when pricing loans (Acharya et al., 2013; Berg et al.,2016)

- Covenants also did not constrain firms' credit line drawdowns

- Current Fed stress tests do not account for aggregate drawdown risk

- Can regulators address aggregate drawdown risk in an *ex-ante* manner?

Discussion IV: Accounting for aggregate drawdown risk in current Fed Stress Tests

- Do banks account for aggregate drawdown risk, e.g., through loan contract terms that might limit the extent of correlated drawdowns during episodes of aggregate risk.

- We investigate two possible ways banks might do that: (1) the pricing of credit lines, and (2) loan covenants.

- Bottom line: none of these contract terms do account for aggregate drawdown risk!
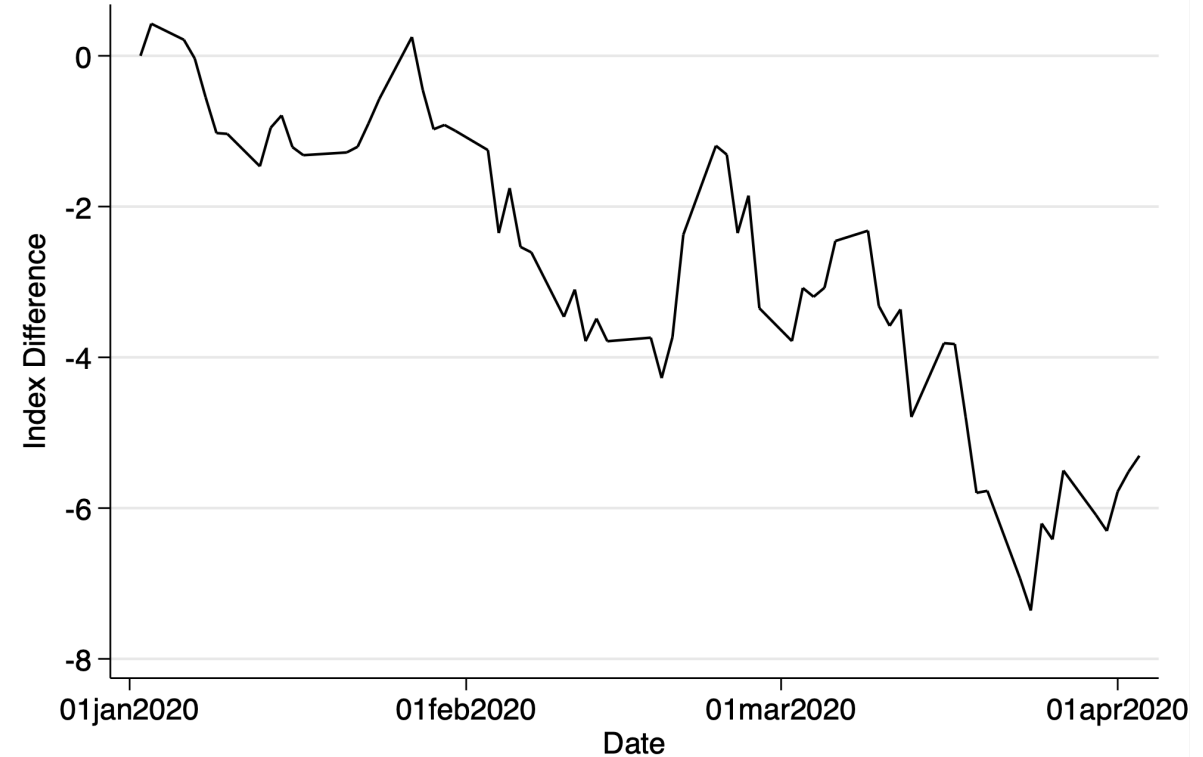
Conclusion

- Balance-sheet liquidity risk of banks episodically explains banks' stock returns.

- This occurs during an aggregate economic downturn when firms' liquidity demand through credit line drawdowns becomes highly correlated.

- Firms with pre-arranged credit lines, however, are rewarded...

Firms with pre-arranged credit lines are rewarded

Stock Price Performance: Low vs. High Liquidity
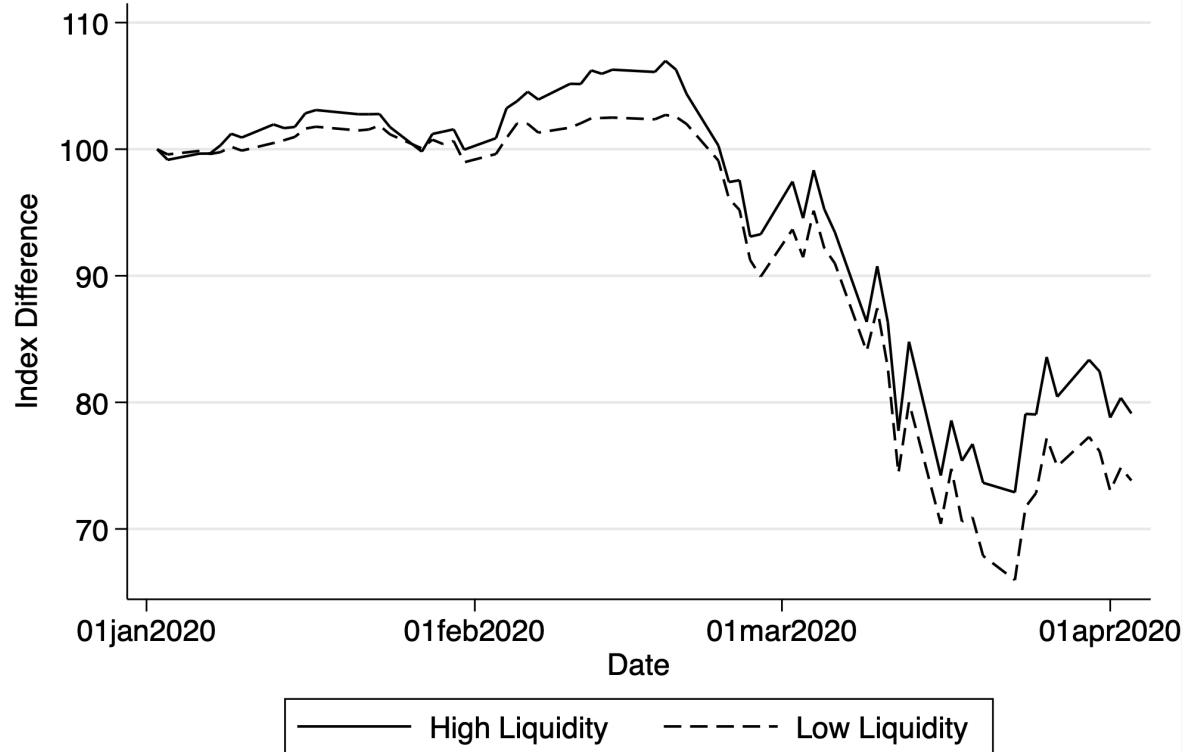
Stock Index Difference: Low vs. High Liquidity

Conclusion (continued)

- Bank stock returns during the pandemic also co-move heavily with bank-level loan exposure to the oil sector & other affected sectors
  - Liquidity risk of banks' balance sheet remains a key factor in explaining bank stock prices

- Bank capital (rather than funding) appears to be the binding constraint.

- The episodic nature of credit line drawdowns and balance-sheet liquidity risk can be incorporated tractably into bank capital stress tests.