Banks' Balance-sheet Costs, Monetary Policy, and the ONRRP

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Bank balance-sheet costs, NBFIs, and the central bank

- What is the effect of bank balance-sheet costs on non-banks?
- What is their effect on the balance sheet of the central bank?

This paper:

- Supplementary Leverage Ratio relief of 2020Q2-2021Q1
- Effect on money market funds (MMFs)
- MMF usage of overnight reverse repo facility (ONRRP) at the Fed

Our Results

1. Bank balance-sheet costs go up $\Rightarrow$ MMF industry grows
   - $\diamond$ Banks shed deposits, which flow into MMF shares

2. Bank balance-sheet costs go up $\Rightarrow$ MMFs tilt portfolios towards ONRRP
   - $\diamond$ Banks reduce their wholesale short-term borrowing

3. Other important drivers of ONRRP take-up:
   - $\diamond$ Higher interest-rate risk
   - $\diamond$ Lower Treasury bill supply

Balance-sheet costs: Supplementary Leverage Ratio (SLR)

- Costs that are proportional to the size of bank balance sheets

- Basel III: SLR$=\dfrac{\text{Tier 1 Capital}}{\text{Assets}} \geq$ minimum requirement
  - ◇ Assets are not risk-weighted
  - ◇ Balance-sheet expansions for safe asset intermediation are more penalized

- Assets of funds affiliated with banks are not included in SLR calculation

The SLR Relief of 2020-2021

- March 2020: severe strains in Treasury and other money markets

- March-April 2020: the Fed increases central bank reserves by $1.6 trillion

- Temporary "SLR relief:"
  - Reserves and Treasuries excluded from SLR denominator
  - Announced in April 2020 & set to expire on March 31, 2021
  - Goal: facilitate bank intermediation in safe-asset markets

Effect of SLR Relief on Bank Balance-Sheet Costs

- SLR of GSIBs from 2016Q3 to 2022Q4
- End of SLR relief: sudden permanent increase in balance-sheet costs

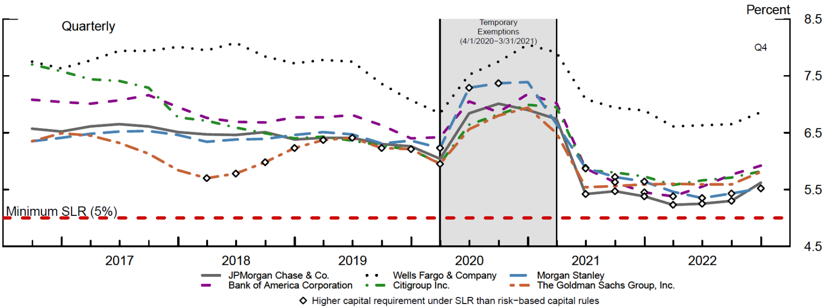


Figure: Supplementary Leverage Ratio for the Largest US Banks

Money Market Funds (MMFs)

- \$5 trillion in assets under management in March 2020
- Two types:
  - ◇ Government: Government debt & repos backed by government debt
  - ◇ Prime: all above + CD, CP, ABCP, FRNs
- Main alternative to bank accounts for depositors
- Main wholesale short-term lenders to banks (especially repos)
- 30% of MMFs are affiliated with bank holding companies

Overnight Reverse Repo facility (ONRRP)

- Eligible institutions invest at the Fed via Treasury-backed repos at fixed rate
  - ONRRP rate is set by the FOMC
  - Floor on money-market rates (outside option for MMFs & other lenders)

- ONRRP is a liability in the Fed balance sheet
  - ONRRP increases $\Rightarrow$ reserves decline (total size remains the same)
  - Trades settle on books of clearing bank (transfer from reserves to ONRRP)

ONRRP Take-up over Time

- MMFs have been main users of ONRRP since its inception (September 2013)

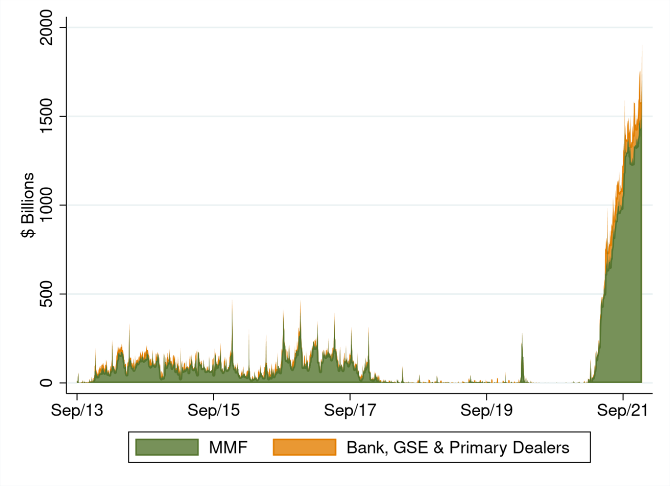
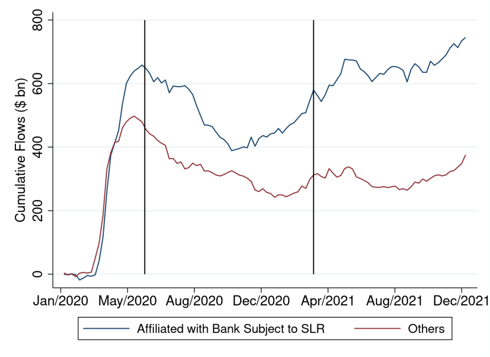


Figure: ON RRP Take-up by Counterparty Type

Effect of Balance-Sheet Costs on MMF Flows

- Increased balance-sheet costs ⇒ banks shed deposits ⇒ MMFs inflows
  - ◇ End of SLR relief (3/31/2021): permanent increase in balance-sheet costs
- Stronger effect in MMFs affiliated with "SLR banks"
  - ◇ Banks retain customers & customers pay lower switching costs



Effect of End of SLR Relief of MMF Flows

$$\text{Flow}_{it} = \beta_1 \, 2021Q1_t \times \text{SLR-Bank MMF}_i + \beta_2 \, 2021Q2_t \times \text{SLR-Bank MMF}_i + \Gamma X_{i,t-1} + \alpha_i + \mu_t + \varepsilon_{it}$$

	Flow$_{it}$				
	(1) MMF	(2) MMF	(3) MMF	(4) Gov MMF	(5) Gov MMF
$2021Q1_t$ × SLR-Bank MMF$_i$	0.034**	0.037**		0.044**	0.048*
	(2.201)	(2.026)		(2.068)	(1.874)
$2021Q2_t$ × SLR-Bank MMF$_i$	0.022	0.022		0.030	0.026
	(1.145)	(1.046)		(1.162)	(0.928)
$2021Q1_t$ × Bank MMF$_i$		-0.004			-0.005
		(-0.624)			(-0.494)
$2021Q2_t$ × Bank MMF$_i$		0.000			0.005
		(0.027)			(0.526)
Linear Trend × SLR-Bank MMF$_i$			0.000		
			(1.616)		
Institution FE	Y	Y	Y	Y	Y
Date FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
R^2	0.02	0.02	0.04	0.03	0.03
Sample	6/20-12/21	6/20-12/21	6/20-12/20	6/20-12/21	6/20-12/21
Observations	78237	78237	30255	57895	57895

Two Ways to Strengthen Identification

1. Effect should be weaker for MMFs affiliated with custodial banks
   - Allowed to permanently exclude reserves from SLR since 4/2020

2. Effect should be stronger when SLR is closer to minimum requirement

	Flow_{it}			
	(1) MMF	(2) Gov MMF	(3) MMF	(4) Gov MMF
$2021Q1_t$ × Non-Custodial SLR-Bank MMF_i	0.050** (2.461)	0.065** (2.226)		
$2021Q2_t$ × Non-Custodial SLR-Bank MMF_i	0.030 (1.180)	0.040 (1.122)		
$2021Q1_t$ × Custodial SLR-Bank MMF_i	0.009 (0.485)	0.014 (0.595)		
$2021Q2_t$ × Custodial SLR-Bank MMF_i	0.008 (0.378)	0.015 (0.546)		
$2021Q1_t$ × $(\text{SLR - SLR Req})_{i2019Q4}$			-0.005** (-2.252)	-0.005** (-2.054)
$2021Q2_t$ × $(\text{SLR - SLR Req})_{i2019Q4}$			-0.002 (-0.855)	-0.002 (-0.624)
Institution FE	Y	Y	Y	Y
Date FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
R^2	0.02	0.03	0.05	0.06
Observations	78237	57895	25110	18361

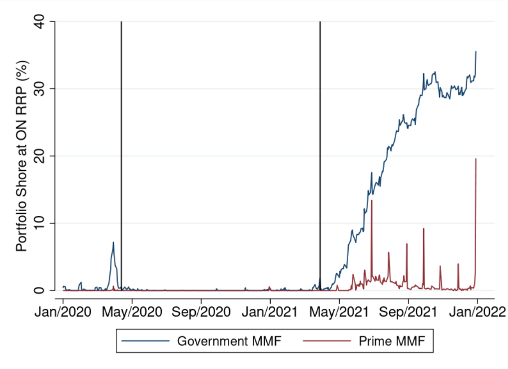
Effect of Balance-Sheet Costs on MMF Portfolio

- Increased balance-sheet costs ⇒ bank borrow less for the same price

  ⇒ MMFs tilt their portfolios towards ONRRP

  ⋄ End of SLR relief (3/31/2021): permanent increase in balance-sheet costs

- Stronger effect for government MMFs: fewer investment options



Effect of End of SLR Relief on MMF Portfolios

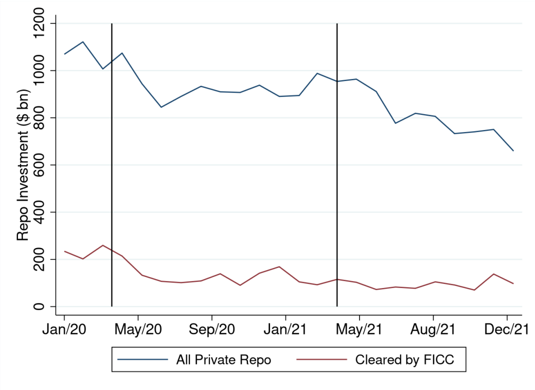
$$\% \text{ ONRRP}_{it} = \beta \text{ Post SLR Relief}_t \times \text{Gov}_i + \text{2021Q1}_t \times \text{Gov}_i + \sum_{m \in \{\text{Month ends}\}} \delta_m \text{Month End}_t^{(m)} \times \text{Gov}_i + \Gamma X_{i,t-1} + \alpha_i + \mu_t + \varepsilon_{it}$$

	% ONRRP$_{it}$		
	(1) MMF	(2) MMF	(3) Gov MMF
Post SLR Relief$_t$ × Gov$_{it}$	19.422***		
	(11.807)		
2021Q1$_t$ × Gov$_{it}$	0.381		
	(1.530)		
Linear Trend × Gov$_{it}$		-0.000	
		(-0.728)	
Post SLR Relief$_t$ × Private Repo Share$_{i2019Q4}$			0.237***
			(10.382)
2021Q1$_t$ × Private Repo Share$_{i2019Q4}$			0.006
			(1.554)
Institution FE	Y	Y	Y
Date FE	Y	Y	Y
Controls	Y	Y	Y
R^2	0.75	0.17	0.81
Sample	4/20-12/21	4/20-12/20	4/20-12/21
Observations	33593	14412	24280

Two Ways to Strengthen Identification

1. Within government MMFs: funds relying on private repo were more exposed
   - ◇ Column (3) previous slide

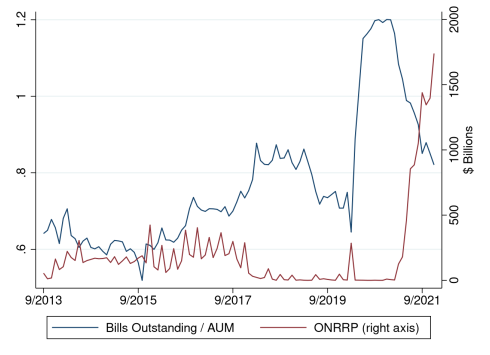
2. Nettable private repos (FICC sponsored repos) should not be affected



Confounding Factors: Interest-Rate Risk & T-Bill Supply

- Higher interest rate risk ⇒ MMFs reduce portfolio duration ⇒ More ONRRP

- Lower T-bill supply ⇒ MMFs reduce Treasury investment ⇒ More ONRRP



- Both effects are stronger for government MMFs: fewer investment options

Putting All Together

	% ONRRP$_{it}$ (1) MMF	% ONRRP$_{it}$ (2) MMF
Post SLR Relief$_t$ $\times$ Gov$_{it}$	14.326***	13.558***
	(7.283)	(6.734)
2021Q1$_t$ $\times$ Gov$_{it}$	-2.256**	-0.017
	(-2.305)	(-0.021)
MOVE$_{t-1}$ $\times$ Gov$_{it}$	0.238***	0.246***
	(4.858)	(5.608)
T-Bills Issuance$_{t-30}$ $\times$ Gov$_{it}$	-4.101***	
	(-3.452)	
$\frac{\text{T-Bills Outstanding}_{t-30}}{\text{Avg Total AUM}_{t-30}}$ $\times$ Gov$_{it}$		-15.893***
		(-5.378)
Institution FE	Y	Y
Date FE	Y	Y
Controls	Y	Y
R^2	0.76	0.76
Observations	33593	33593

Conclusions

- We use SLR relief of 2020-21 to study effects of banks' balance-sheet costs on non-banks with similar functions and on the central bank balance-sheet
- Higher balance-sheet costs have two effects:
  1. Banks shed deposits $\Rightarrow$ MMF industry grows
  2. Banks reduce wholesale borrowing $\Rightarrow$ MMF portfolio shifts toward ONRRP
- ONRRP allows banks to also drain reserves from system when reducing leverage
- Interest-rate risk & T-bill supply: other important drivers of ONRRP take-up