

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

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

- ▶ Monetary policy can interact with bank regulation

- ◇ QE/QT can affect banks' balance-sheet costs

1. What are the effects on non-bank financial institutions (NBFIs)?
2. What are the effects on the composition of the central bank balance sheet?

This paper

- ▶ Sample period: 2020-2021 (large QE operations)
- ▶ Exogenous variation in balance-sheet costs: SLR relief of 2020Q2-2021Q1
- ▶ Effect on money market funds (MMFs):
 - ◇ MMF size
 - ◇ MMF investment at overnight reverse repo facility (ONRRP) with the Fed

Our Results

1. Bank balance-sheet costs go up \Rightarrow MMF industry grows
 - ◇ Banks shed deposits, which flow into MMF shares
2. Bank balance-sheet costs go up \Rightarrow MMFs tilt portfolios towards ONRRP
 - ◇ Banks reduce their wholesale short-term borrowing
3. Other important drivers of ONRRP take-up:
 - ◇ Higher interest-rate risk
 - ◇ Lower Treasury bill supply

Balance-sheet costs: Supplementary Leverage Ratio (SLR)

- ▶ Costs that are proportional to the size of bank balance sheets
- ▶ Basel III: $SLR = \frac{\text{Tier 1 Capital}}{\text{Assets}} \geq \text{minimum requirement}$
 - ◊ 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
 - ◇ Announcement: April 2020. Expiration (scheduled): March 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

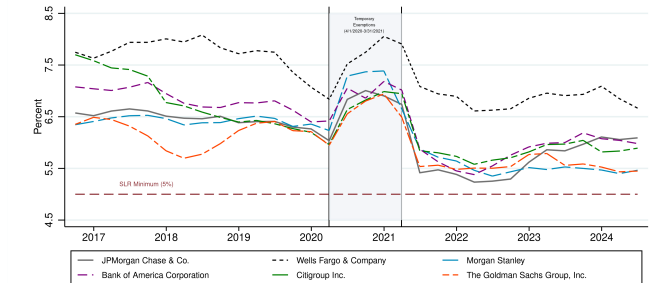


Figure: Supplementary Leverage Ratio for the Largest US Banks

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 overnight Treasury-backed repos
 - ◇ 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)

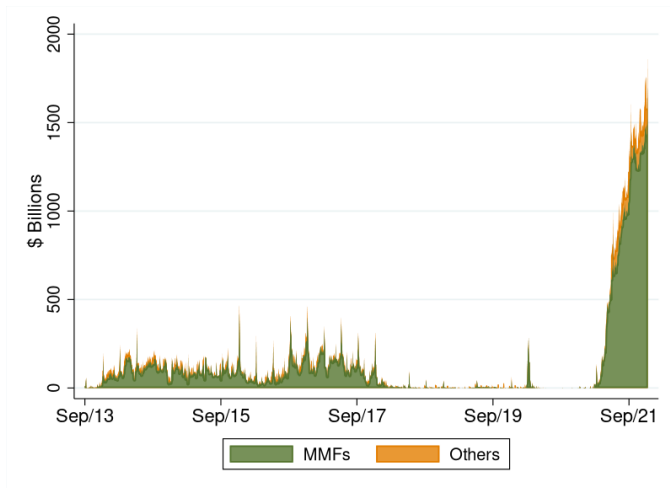


Figure: ON RRP Take-up by Counterparty Type

Effect of Balance-Sheet Costs on MMF Flows

- ▶ Increased balance-sheet costs \Rightarrow banks shed deposits \Rightarrow MMF 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

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

	(1) MMF	(2) MMF	Flow _{it} (3) MMF	(4) Gov MMF	(5) Gov MMF
2021Q1 _t × SLR-Bank MMF _i	0.033** (2.199)	0.037** (1.991)		0.043** (2.014)	0.048* (1.855)
2021Q2 _t × SLR-Bank MMF _i	0.022 (1.110)	0.021 (0.979)		0.028 (1.080)	0.024 (0.868)
2021Q1 _t × Bank MMF _i		-0.004 (-0.528)			-0.005 (-0.588)
2021Q2 _t × Bank MMF _i		0.001 (0.146)			0.004 (0.461)
Linear Trend × SLR-Bank MMF _i			0.000 (0.119)		
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	1/20-12/20	6/20-12/21	6/20-12/21
Observations	78219	78219	52125	57890	57890

Two Ways to Strengthen Identification

1. Weaker effect for MMFs affiliated with custodial SLR banks

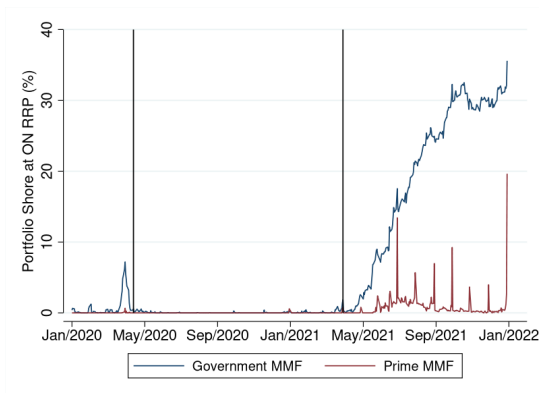
- ◇ Custodial banks can permanently exclude reserves from SLR since 4/2020

2. Stronger effect when SLR is closer to minimum requirement

	(1) MMF	(2) Gov MMF	Flow _{it} (3) MMF	(4) Gov MMF
2021Q1 _t × Non-Custodial SLR-Bank MMF _i	0.049** (2.448)	0.064** (2.197)		
2021Q2 _t × Non-Custodial SLR-Bank MMF _i	0.029 (1.150)	0.038 (1.074)		
2021Q1 _t × Custodial SLR-Bank MMF _i	0.009 (0.501)	0.012 (0.518)		
2021Q2 _t × Custodial SLR-Bank MMF _i	0.008 (0.353)	0.012 (0.432)		
2021Q1 _t × (SLR - SLR Req) _{i2019Q4}			-0.005** (-2.375)	-0.005** (-1.989)
2021Q2 _t × (SLR - SLR Req) _{i2019Q4}			-0.002 (-0.951)	-0.001 (-0.500)
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	78219	57890	25100	18358

Effect of Balance-Sheet Costs on MMF Portfolio

- ▶ Balance-sheet costs $\uparrow \Rightarrow$ bank debt supply $\downarrow \Rightarrow$ MMFs tilt portfolios to ONRRP
 - ◇ End of SLR relief: permanent increase in balance-sheet costs
- ▶ Stronger effect for government MMFs:
 - ◇ Fewer investment options & SLR more costly for repo intermediation



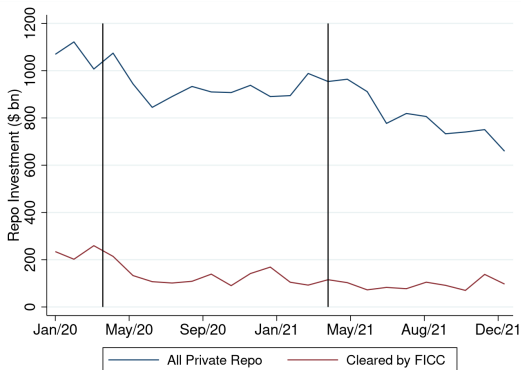
Effect of End of SLR Relief on MMF Portfolios

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

	(1) MMF	% ONRRP _{it} (2) MMF	(3) Gov MMF
Post SLR Relief _t × Gov _{it}	19.364*** (11.609)		
2021Q1 _t × Gov _{it}	0.335 (1.334)		
Linear Trend × Gov _{it}		0.000 (0.102)	
Post SLR Relief _t × Private Repo Share _{i2019Q4}			0.236*** (10.354)
2021Q1 _t × Private Repo Share _{i2019Q4}			0.006 (1.515)
Institution FE	Y	Y	Y
Date FE	Y	Y	Y
Controls	Y	Y	Y
R ²	0.75	0.23	0.81
Sample	4/20-12/21	1/20-12/20	4/20-12/21
Observations	33589	20212	24278

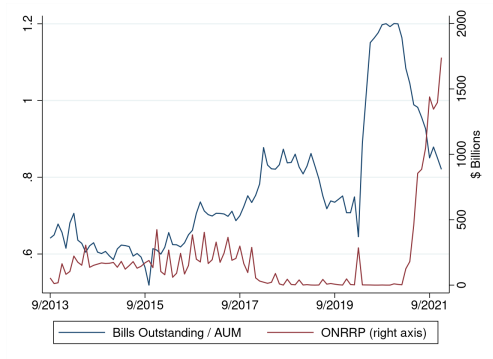
Two Ways to Strengthen Identification

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 \Rightarrow MMFs reduce portfolio duration \Rightarrow More ONRRP
- ▶ Lower T-bill supply \Rightarrow MMFs reduce Treasury investment \Rightarrow More ONRRP



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

Controlling for interest-rate risk and T-bill supply

- ▶ Interest-rate risk: MOVE index
- ▶ T-bill supply: (i) issuance; (ii) value outstanding/MMF industry size

	% ONRRP _{it}	
	(1) MMF	(2) MMF
Post SLR Relief _t × Gov _{it}	11.897*** (5.593)	11.705*** (5.574)
2021Q1 _t × Gov _{it}	-3.602*** (-2.744)	-0.584 (-0.613)
MOVE _{t-1} × Gov _{it}	0.317*** (5.888)	0.307*** (7.124)
T-Bills Issuance _{t-30} × Gov _{it}	-7.575*** (-5.345)	
$\frac{\text{T-Bills Outstanding}_{t-30}}{\text{Avg Total AUM}_{t-30}} \times \text{Gov}_{it}$		-19.065*** (-6.237)
Institution FE	Y	Y
Date FE	Y	Y
Controls	Y	Y
R ²	0.76	0.76
Observations	33589	33589

Dollar investment at ONRRP by all channels

	\$ONRRP _{it}			
	(1) MMF	(2) MMF	(3) MMF	(4) MMF
Post SLR Relief _t × SLR-Bank MMF _i	1.192*** (6.532)	1.267*** (6.713)	4.039*** (11.719)	4.125*** (11.647)
2021Q1 _t × SLR-Bank MMF _i	-0.058*** (-2.205)	-0.025 (-0.786)	-0.009 (-0.242)	0.016 (0.344)
Post SLR Relief _t × SLR-Bank MMF _i × (SLR - SLR Req) _{i2019Q4}			-1.155*** (-14.389)	-1.160*** (-13.426)
2021Q1 _t × SLR-Bank MMF _i × (SLR - SLR Req) _{i2019Q4}			-0.018* (-1.908)	-0.016* (-1.720)
Post SLR Relief _t × Gov _i	7.817*** (6.188)	8.105*** (6.092)	8.097*** (6.378)	8.370*** (6.247)
2021Q1 _t × Gov _i	-2.300* (-2.537)	-0.439 (-0.653)	-2.306** (-2.547)	-0.449 (-0.665)
MOVE _{t-1} × Gov _i	0.239*** (6.667)	0.225*** (7.563)	0.239*** (6.663)	0.225*** (7.575)
T-bill Issuance _{t-30} × Gov _i	-4.992*** (-5.404)		-4.975*** (-5.379)	
$\frac{\text{T-bill Outstanding}_{t-30}}{\text{Avg Total AUM}_{t-30}} \times \text{Gov}_i$		-10.438*** (-4.975)		-10.478*** (-4.997)
Fund FE	Y	Y	Y	Y
Date FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
$\sum_{m \in \{\text{Month ends}\}} \text{Month End}_t^{(m)} \times \text{Gov}_i$	Y	Y	Y	Y
R ²	0.52	0.53	0.53	0.53
Sample Period	4/20-12/21	4/20-12/21	4/20-12/21	4/20-12/21
Observations	33589	33589	33589	33589

Conclusions

- ▶ Bank balance-sheet costs affect NBFIs & central bank balance sheet
- ▶ Higher balance-sheet costs:
 1. Banks shed deposits \Rightarrow MMFs grow (\Rightarrow more ONRRP ceteris paribus)
 2. Banks reduce wholesale funding \Rightarrow MMF portfolios shift to ONRRP
- ◊ QE/QT interact with bank regulation affecting size and portfolios of NBFIs
- ◊ NBFIs access to central bank balance sheet \Rightarrow banks can drain reserves

Open question: does this limit effectiveness of QE?