

# Liquidity Restrictions, Runs, and Central Bank Interventions: Evidence from Money Market Funds

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The views expressed in this presentation are those of the authors and do not necessarily represent those of the Federal Reserve System, or any of its staff.

In the aftermath of the 2008 financial crisis, the SEC adopted two sets of money market fund (MMF) reforms

- 2010 MMF reforms introduced minimum liquidity requirements
  - 10% daily liquid assets (DLA)
  - 30% weekly liquid assets (WLA)
- 2014 MMF reforms made additional changes (effective Oct 2016)
  - floating NAV for institutional non-government MMFs
  - possibility of redemption **gates & fees** for non-government MMFs if **WLA < 30%**

Goal of MMF reforms: make MMFs more liquid and less prone to runs

Overarching theme: make fin inst capable to withstand stress without need for emergency interventions

Goal of MMF reforms: make MMFs more liquid and less prone to runs

This paper addresses two questions:

1. How did option to impose gates & fees affect MMF flows in March 2020?
  - redemptions accelerated as fund WLAs fell close to 30%
  - this feature was not present in two major pre-2014 reform runs
  - rule out alternatives (e.g. reverse causality, floating NAV)
2. Fed intervention via Money Market Fund Liquidity Facility (MMLF)
  - stopped the run on prime funds
  - by providing liquidity of last resort

## iMoneyNet:

- daily data on assets under management (AUM), WLA, DLA, floating NAV
- weekly data on fund yields, expense ratio, portfolio composition

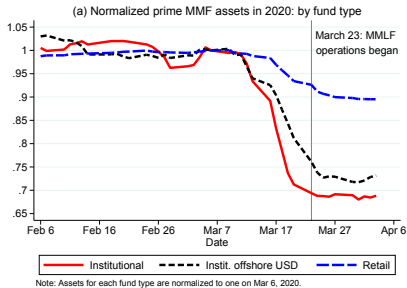
## N-MFP Reports:

- month-end data on all securities held by each MMF (MMF id, CUSIP, amount held)

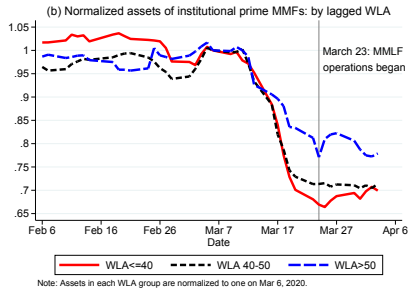
## MMLF confidential microdata:

- daily data on each security pledged at the MMLF (MMF id, CUSIP, amount pledged)

# The March 2020 Run



(a) Figure 1



(b) Figure 2

Fig 1. Run on institutional prime funds

Fig 2. Heavier outflows among less liquid institutional prime funds

# Results: Liquidity restrictions and runs

**Hypothesis 1:** WLA-contingent gates & fees make MMF flows more sensitive to WLA during a crisis.

$$Flow_{i,t} = \beta_1 WLA_{i,t-1} + \beta_2 Crisis \times WLA_{i,t-1} + \gamma X_{i,t-1} + \mu_i + \mu_t + \varepsilon_{i,t}$$

	(1)	(2)	(3)	(4)
Dep. var.:				
				Flows
Precrisis (-3) $\times$ WLA		0.012		-0.001
Precrisis (-2) $\times$ WLA		0.030		0.025
Crisis $\times$ WLA	0.123***	0.133**	0.187***	0.193***
Obs.	1018	1018	1018	1018
Controls	✓	✓	✓	✓
Day FE	✓	✓	✓	✓
Fund FE			✓	✓

Controls (lagged): flows, yield, safe (risky) assets, size, age, expense ratio, bank affiliation.

# Results: Liquidity restrictions and runs

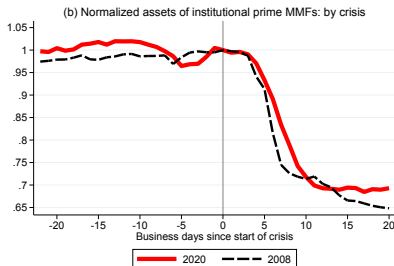
**Hypothesis 2:** Outflows accelerate as WLA approaches the 30% regulatory threshold.

Dep. var.:	(1)	(2)	(3)	(4)
	Flows			
Crisis $\times$ WLA ( $\leq 40$ )	0.297***	0.290***	0.398***	0.399***
Crisis $\times$ WLA (40 – 50)	0.258***	0.254***	0.356***	0.357***
Crisis $\times$ WLA ( $> 50$ )	0.228***	0.229***	0.312***	0.315***
Obs.	1018	1018	1018	1018
Controls	✓	✓	✓	✓
Day FE	✓	✓	✓	✓
Fund FE			✓	✓
Parallel trend		✓		✓
p-val ( $\leq 40$ )=(40-50)	0.03	0.05	0.04	0.03
p-val ( $\leq 40$ )=( $> 50$ )	0.02	0.02	0.02	0.02

- suggestive of pre-emptive runs on less liquid funds

# Results: Liquidity restrictions and runs

**Hypothesis 3:** Flows-WLA sensitivity not present in pre-2014 reform runs.



Note: AUMs are normalized to one for Sep 9, 2008 and Mar 6, 2020.

	(1)	(2)
Sample:	2008	2008
Dep. var.:	Flows	
Crisis $\times$ WLA	0.022**	
Crisis $\times$ WLA ( $\leq 40$ )		-0.027
Crisis $\times$ WLA (40-50)		0.019
Crisis $\times$ WLA ( $> 50$ )		0.008
Controls	✓	✓
Day FE	✓	✓
Fund FE	✓	✓

- 10x smaller sensitivity and lack of acceleration in 2008
- similar results during 2011 European sovereign debt crisis run



# Results: Liquidity restrictions and runs—robustness

**Hypothesis 4:** Flow sensitivity to WLA not driven by general fund liquidity or other factors that matter more during crisis

Alternative channels: floating NAV, long-term unsecured debt, long-term non-fin debt, expense ratio (investor sophistication), bank affiliation, daily liquidity.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.:	Flows					
Alt. Channel:	NAV	LTD	LTNF	Exp Ratio	Bank Aff	DLA
Crisis $\times$ Alt Channel	-0.91	-0.077	0.178	10.512***	-1.021*	0.007
Crisis $\times$ WLA	0.124***	0.104*	0.156***	0.148***	0.096**	0.118*
Controls	✓	✓	✓	✓	✓	✓
Day FE	✓	✓	✓	✓	✓	✓

## Hypothesis 5: Flow sensitivity to WLA not driven by reverse causality

- flows can also affect WLAs (accommodating outflows by reducing WLA)
- use February assets that mature during crisis as exogenous variation to WLA
- Maturing = cumulative share of assets maturing during the crisis

1 <sup>st</sup> Stage	
Dep. var.:	WLA
Maturing	0.573***
2 <sup>nd</sup> Stage	
Dep. var.:	Flows
WLA	0.377***
Controls	✓
Day FE	✓
1 <sup>st</sup> Stage F-Stat	40

# Money Market Mutual Fund Liquidity Facility (MMLF)

On March 18, 2020, the Federal Reserve announced the MMLF, which became operational on March 23.

MMFs can sell assets (for prime funds, mostly ABCP, CP, CDs) to banks, who then pledge them to the Fed.

Fed Actions

Next, we study the effectiveness of the MMLF

- a) Did it stop the run on prime MMFs?
- b) How was it used by MMFs?

# Stabilizing Effects of the MMLF

## a) Did the MMLF stop the run on prime MMFs?

Domestic vs Offshore Institutional Prime	
Dep. var.:	Flows
MMLF $\times$ Domestic	0.941*
MMLF(week1) $\times$ Domestic	1.324**
MMLF(week2) $\times$ Domestic	0.558

- helped domestic funds (with access to MMLF) more than otherwise similar funds

# Stabilizing Effects of the MMLF

b) How was the MMLF used? (fund-CUSIP sample)

Domestic Institutional Prime			
Dep. var:	Share of a CUSIP sold at MMLF		
Log(time to mat)	6.605***	6.498***	6.337***
Crisis $\Delta$ WLA	-1.010***	-1.290***	
Crisis Flow		0.136	
Security Controls	✓	✓	✓
Security Type FE	✓	✓	✓
Fund Controls	✓	✓	
Fund FE			✓

- used more by funds that saw larger drops in WLA during crisis
- funds sold more assets with longer time to maturity (less liquid)

In this paper, we

- find evidence of pre-emptive runs on less liquid funds
- this appears to be a unique feature of the 2020 run
- likely due to liquidity restrictions

Amid frozen short-term funding markets, the MMLF

- provided liquidity of last resort
- ending the runs on prime MMFs

How should we design liquidity restriction on MMFs?

# Timeline of Selected Federal Reserve Actions

Date	Federal Reserve Actions & Announcements
March 3, 2020	Cut interest rate by 50 bps
March 15, 2020	Cut interest rates by another 100 bps to [0, 25] bps
March 15, 2020	Asset purchases resumed
March 15, 2020	Primary credit rate (discount window) to 25 bps
March 15, 2020	US dollar liquidity swap lines with CBs
March 17, 2020	Announce CPFF (operational April 14)
March 17, 2020	Announce PDCF (operational March 20)
March 18, 2020	Announce MMLF (operational March 23)
March 20, 2020	MMLF expanded to accept muni debt
March 23, 2020	FOMC removes upper limit on asset purchases
March 23, 2020	MMLF became operational
March 23, 2020	MMLF expanded to accept VRDNs and CDs
March 23, 2020	Announcement of PMCCF & SMCCF & TALF

Back