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## OUTLINE

Liquidity Transformation and Fragility

- Early Evidence from Mutual Funds
- The Covid-19 Episode
- Policy Response and Implications





## LIQUIDITY TRANSFORMATION AND FRAGILITY

## LIQUIDITY TRANSFORMATION AND FRACILITY



A run on American Union Bank, 1931



### LIQUIDITY TRANSFORMATION AND FRAGILITY

- Liquidity transformation is at the core of financial services
  - Banks provide liquidity to their depositors and invest in illiquid assets
  - They create liquidity, but end up with liquidity mismatch
- Liquidity mismatch renders banks vulnerable to panicbased runs (Diamond and Dybvig, 1983)
  - Depositors rush to withdraw deposits expecting that others will do so
- Many government policies are enacted to alleviate panicbased runs
  - Deposit insurance, lender of last resort, etc.



### HOW DOES IT WORK IN MUTUAL FUNDS?

- Open-end mutual funds are different from banks
  - They do not promise a fixed return, but rather pay according to a floating-NAV model
- Does this eliminate first-mover advantage and strategic complementarities?
- No!
  - In a floating-NAV environment, investors can redeem shares and get the NAV as of the day of redemption
  - But, their redemptions will affect fund trading going forward, hurting remaining investors in illiquid funds



### **MUTUAL FUNDS REDEMPTIONS**



• Key point: redemptions impose costs – commissions, bid-ask spread, price impact, forced deviation from desired portfolio, liquidity-based trading – on remaining investors

## EMPIRICAL CHALLENGES

- Fundamental-based vs. panic-based runs:
  - Fundamental-based runs happen when investors withdraw just because of unfavorable news about fundamentals
    - Chari and Jagannathan, 1988; Jacklin and Bhattacharya, 1988; Allen and Gale, 1998
  - Panic-based runs happen when investors withdraw because they believe others will withdraw
    - The belief can be self-fulfilling because of strategic complementarity among investors (Diamond and Dybvig, 1983)
- Separating panic-based run from fundamental based run is important from a policy perspective
  - Many policies, such as deposit insurance, lender of last resort, suspension of convertibility, are premised on the idea that some runs are driven by panics
  - Many believe these policies distort incentives and create more problems than they solve



### EMPIRICALLY TESTING FOR PANIC-BASED RUNS

- Early evidence find strong association between bank runs and bank fundamentals (e.g., Gorton, 1988)
  - Such evidence is often interpreted as supporting fundamental based runs and against panic-based runs
- However, this interpretation is incorrect (e.g., Goldstein, 2013):
  - A pre-requisite for panic-based run is weaker fundamentals
  - Strategic complementarity among depositors can exacerbate/magnify the effect of fundamentals
  - Association between run and bad fundamental does not rule out the existence of panic-based behaviors



### ILLUSTRATION: BASIC MODEL OF BANK RUNS



- Diamond and Dybvig (1983): depositors observe common, perfect signal about bank fundamental  $\theta$
- Without strategic complementarity among depositors, only insolvent banks with  $\theta < \underline{\theta}$  should experience run
- With strategic complementarity, self-fulfilling panic-based run can take place (or not) for any solvent bank with  $\theta \in [\underline{\theta}, \overline{\theta}]$ 
  - Multiple equilibria render the model empirically vacuous and untestable (Gorton, 1988)



## ILLUSTRATION: UPDATED MODEL OF BANK RUNS



- Goldstein and Pauzner (2005): relax the assumption of common knowledge about fundamental
  - Generate unique equilibrium where runs happen for fundamental below a threshold level of  $\theta^{\,*}$
  - Runs when the fundamental is between  $(\underline{\theta}, \theta^*)$  are considered panic-based, because they would not occur in the absence of coordination failure
  - But, they are still linked to fundamentals
- Theory is testable. Comparative statics: panic-run region is larger for banks with greater liquidity mismatch



## EMPIRICAL PREDICTIONS AND TESTS

- For the same decline in fundamental, higher liquidity mismatch will generate more outflows
  - Testable implication: stronger sensitivity of outflows to performance when liquidity mismatch is higher
- Two papers tested this theory for mutual funds:
  - Chen, Goldstein, and Jiang (2010): Stronger sensitivity of outflows to negative performance in illiquid equity funds than in liquid equity funds
  - Goldstein, Jiang, and Ng (2017): Effect is much stronger in corporatebond funds, where illiquidity of assets is a much bigger problem





## EARLY EVIDENCE FROM MUTUAL FUNDS

### EMPIRICAL ANALYSIS OF FLOWS IN EQUITY MUTUAL FUNDS

- Chen, Goldstein and Jiang (2010)
  - Study flows in 4,393 actively-managed equity funds from 1995-2005
  - Find stronger sensitivity of outflows to negative performance in illiquid funds
    - These funds generate stronger complementarities
    - Illiquid funds are: small-cap & mid-cap equity funds (domestic or international), or single-country funds excluding US, UK, Japan and Canada.
      - Or continuous measure of liquidity of portfolio



#### EVIDENCE FROM CHEN, GOLDSTEIN, AND JIANG (2010)



Flow Sensitivity by Assets Liquidity

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### CORPORATE BOND FUNDS: GOLDSTEIN, JIANG, AND NG (2017)

- Following the crisis, massive inflows into corporate bond funds
  - Largely as a response to changes in investment opportunities and regulation elsewhere in the financial system
- Concerns mentioned about potential fragility mounting in the corporate bond funds sector, e.g., Feroli, Kashyap, Schoenholtz, and Shin (2014)
  - Concerns are stronger due to greater illiquidity of underlying asset



### EMPIRICAL ANALYSIS OF FLOWS IN CORPORATE BOND MUTUAL FUNDS

- Goldstein, Jiang and Ng (2017) study flows in 1,660 activelymanaged corporate bond funds from 1992-2014
- Large literature on the flow-to-performance relation in equity funds, finding convex relation
- We find that corporate bond funds are different:
  - Flow-to-performance relation tends to be concave
  - Pattern strengthens with illiquidity across funds and over time



# FLOW PERFORMANCE RELATION OF CORPORATE BOND FUNDS VS. EQUITY FUNDS



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#### EMPIRICAL RESULTS: CORPORATE BOND VS. STOCK FUNDS

	(1)	(2)
	Corporate Bond Funds	Stock Funds
Alpha	0.238***	0.994***
	(2.71)	(34.23)
Alpha× (Alpha<0)	0.621***	-0.575***
	(4.34)	(-14.70)
Alpha<0	-0.00979***	-0.00723***
	(-18.45)	(-25.06)
Lagged Flow	0.152***	0.118***
	(21.47)	(29.90)
Log(TNA)	0.000728***	0.000459***
	(5.74)	(5.46)
Log(Age)	-0.0157***	-0.0183***
	(-32.08)	(-70.95)
Expense	-0.200***	-0.0522
	(-2.59)	(-0.77)
Rear Load	-0.00280***	-0.134***
	(-3.68)	(-5.51)
Observations	307,242	1,578,506
Adj. R2	0.0646	0.0583

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# FLOW-PERFORMANCE IN UNDERPERFORMING FUNDS IN ILLIQUID TIMES

	(1) VIX	(2) TED	(3) DFL	(4) MOVE
Alpha	-0.131	-0.121	-0.746***	-0.0909
	(-0.77)	(-1.11)	(-3.22)	(-0.73)
Alpha*IlliqPeriod	0.753***	0.749***	1.412***	0.639***
	(3.89)	(5.37)	(5.21)	(4.58)
IlliqPeriod	0.00690***	0.00148***	0.00745***	0.00252***
	(9.81)	(2.44)	(8.11)	(4.19)
Lagged Flow	0.121***	0.123****	0.152***	0.123***
	(15.37)	(15.47)	(14.90)	(15.50)
Log(TNA)	0.000552****	0.000558***	0.000533***	0.000544***
	(3.78)	(3.82)	(2.98)	(3.75)
Log(Age)	-0.0134***	-0.0136****	-0.0124****	-0.0135****
	(-26.78)	(-26.70)	(-17.88)	(-26.70)
Expense	-0.175***	-0.185**	-0.284**	-0.183**
	(-1.98)	(-2.10)	(-2.45)	(-2.08)
Rear Load	-0.00294***	-0.00285***	-0.00611***	-0.00291****
	(-3.40)	(-3.29)	(-5.87)	(-3.36)
Observations	171,006	171,006	100,215	171,006
Adj. R <sup>2</sup>	0.0339	0.0330	0.0429	0.0329

### ASSET LIQUIDITY AND FLOW-PERFORMANCE RELATION

Alpha<0	Low Cash	Low (Cash + Government Bonds)	Low NSAR Cash	Illiquid Corporate Bond Holdings 1	Illiquid Corporate Bond Holdings 2
Alpha	0.554***	0.567***	0.631***	0.688***	0.662***
	(6.42)	(6.17)	(6.09)	(3.20)	(3.16)
Alpha×IlliqFund	0.814***	0.647***	0.767***	1.305***	1.174***
	(3.21)	(2.74)	(3.82)	(3.02)	(2.82)
IlliqFund	-0.000288	0.00113	0.00211*	0.00472***	0.00435***
	(-0.38)	(1.51)	(1.73)	(2.89)	(2.74)
Lagged Flow	0.131***	0.132***	0.121***	0.180***	0.179***
	(12.50)	(12.52)	(7.15)	(10.67)	(11.11)
Log(TNA)	0.000561***	0.000555***	0.000470*	0.000831***	0.000928***
	(3.18)	(3.15)	(1.80)	(2.58)	(2.86)
Log(Age)	-0.0140***	-0.0140***	-0.0142***	-0.0153***	-0.0157***
	(-20.26)	(-20.22)	(-14.61)	(-12.59)	(-12.95)
Expense	-0.443***	-0.449***	-0.521***	-0.0281	-0.0158
	(-3.99)	(-4.02)	(-3.10)	(-0.14)	(-0.08)
Rear Load	-0.00485***	-0.00482***	-0.00221	-0.00474**	-0.00482**
	(-4.78)	(-4.74)	(-1.45)	(-2.49)	(-2.50)
Observations	108,745	108,745	49,759	25,389	25,370
Adj. R <sup>2</sup>	0.0500	0.0498	0.0473	0.0732	0.0750



## THE COVID-19 EPISODE



#### THE GROWING IMPORTANCE OF INVESTMENT FUNDS IN THE CORPORATE BOND MARKET







## OUTFLOWS IN COVID-19 CRISIS IN PERSPECTIVE OF RECENT DECADE

Mutual funds in corporate bond markets saw massive outflows during the COVID-19 crisis





#### THE COVID-19 SHOCK HIT ACROSS THE BOARD

In mid-March, more than a third of the bond funds experienced large daily





### FUNDS FACED SUSTAINED OUTFLOWS

In mid-March, more than a quarter of the bond funds experienced <u>sustained</u> large daily outflows (also, many funds experienced <u>correlated</u> large daily



Daily Net Fraction of Funds with Large (top decile) Outflows (vs. inflows) in Two Consecutive Days



## SIGNS OF STRESS IN CORPORATE BOND MARKET OVER THE CRISIS PERIOD



Panel A: Investment-Grade Bond Spreads

Panel B: High-Yield Bond Spreads



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### **EVOLUTION OF FLOWS OVER THE CRISIS**

Daily outflows started in the last week of February and accelerated in the second and third weeks of March, peaking at almost 1% of net assets



Daily Aggregate Net Fund Flows (Fraction of Lagged Net Asset)



## SOURCES OF FRAGILITY

- Liquidity mismatch: holding illiquid assets, but providing high level of liquidity to their investors – can lead to "run" type behavior from their investors
  - Chen, Goldstein, and Jiang (2010); Goldstein, Jiang, and Ng (2017)
- <u>Fire-sale vulnerability</u>: forced asset sales have spillovers on peer funds that can lead to outflows
  - Falato, Hortacsu, Li, and Shin (2020)
- What happened in Covid-19 crisis? Did these fragilities play a role?
  - Analyzed in Falato, Goldstein, and Hortacsu (2021)



## TRACKING THE EVOLUTION OF FLOWS ACROSS ILLIQUID VS. LIQUID FUNDS

Panel A: Evolution of the Crisis by Fund Liquidity								
	Ro	oll	Bid-	Ask	Rati	Ratings		
	Illiq	Liq	Illiq	Liq	Illiq	Liq		
	(1)	(2)	(3)	(4)	(5)	(6)		
			<b>-</b>					
Buildup (Feb 2020)	-0.03	$0.25^{***}$	-0.07	$0.27^{***}$	-0.15**	$0.20^{***}$		
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)		
Outbreak (Mar 1-13, 2020)	-0.27***	$0.34^{***}$	-0.31***	0.43***	-0.68***	$0.54^{***}$		
	(0.07)	(0.10)	(0.08)	(0.10)	(0.07)	(0.11)		
Peak (Mar 13-23, 2020)	-1.28***	-0.67***	-1.35***	-0.45***	-1.72***	-0.02		
	(0.10)	(0.16)	(0.11)	(0.15)	(0.10)	(0.16)		
Month, Fund FE	Yes	Yes	Yes	Yes	Yes	Yes		
N obs	86,954	87,134	88,600	86,599	100,923	86,795		
$R^{2}(\%)$	14.2	8.6	12.4	7.4	14.3	8.0		



#### TRACKING THE EVOLUTION OF FLOWS ACROSS VULNERABLE AND OTHER TYPES OF FUNDS

· · ·								
Panel C: Evolution of the Crisis and Policy Response by Fund Fire-Sale Vulnerability								
	Vulner	rability	А	ge	Maturity			
	Low	High	Young	Old	Short	Long		
	(1)	(2)	(3)	(4)	(5)	(6)		
Peak (Mar 13-23, 2020)	-0.65***	-1.09***	-0.79***	-0.64***	-0.56**	-0.75***		
	(0.06)	(0.08)	(0.11)	(0.07)	(0.24)	(0.16)		
First Response (Mar 23-Apr 9, 2020)	-0.54***	-0.58***	-0.54***	-0.31***	-0.59***	-0.59***		
	(0.03)	(0.05)	(0.07)	(0.05)	(0.14)	(0.10)		
Second Response (Apr 9-17, 2020)	-0.04	-0.12*	-0.22**	0.10	0.13	-0.14		
	(0.05)	(0.07)	(0.10)	(0.08)	(0.18)	(0.20)		
Month Fund FF	Yes	Yes	Yes	Yes	Ves	Ves		
N obs	165.403	177.561	169.086	182,969	32,973	33.710		
$R^{2}(\%)$	13.6	13.9	15.1	9.7	6.4	10.3		

### MATCHED-SAMPLE ANALYSIS OF ETFS

- ETFs were more resilient during the crisis relative to similar funds (matched on size, age, and performance)
- Consistent with their redemptions being less prone to liquidity mismatch

Panel A: Crisis								
	Flows (%)	Large	2-Day Large	2+SC Large				
	$\mathbf{FE}$	Outflows	Outflows	Outflows				
	(1)	(2)	(3)	(4)				
Crisis (Feb-April 2020)	0.16 <sup>***</sup> (0.06)	-0.07*** (0.01)	-0.05*** (0.01)	-0.16 <sup>***</sup> (0.00)				
FE N obs	Month, Fund 93,654	Month, Fund 93,654	Month, Fund 93,654	Month, Fund 93,654				
$R^{2}(\%)$	10.6	10.2	7.9	33.0				



# TRACKING THE EVOLUTION OF FLOWS ACROSS HIGH VS. LOW COVID-19 EXPOSURE FUNDS

Panel A: An	alysis by Fund	Sector Exposure	2		
	Cr	isis	Crisis and Policy Response		
	OLS	FE	OLS	FE	
	(1)	(2)	(3)	(4)	
Crisis (Feb-April 2020)	-0.15***	-0.19***			
1	(0.05)	(0.05)			
Peak (Mar 13-23, 2020)			-0.78***	-0.81***	
			(0.12)	(0.12)	
First Response (Mar 23-Apr 9, 2020)			-0.51***	-0.53***	
			(0.07)	(0.07)	
Second Response (Apr 9-17, 2020)			-0.13	-0.16	
			(0.13)	(0.13)	
High Exposure Fund	-0.01		-0.01		
	(0.03)		(0.03)		
High Exposure Fund*Crisis	-0.27***	-0.22***			
	(0.06)	(0.06)			
High Exposure Fund*Peak			-0.76***	-0.71***	
0 1			(0.18)	(0.18)	
High Exposure Fund*First Response			-0.01	0.05	
			(0.10)	(0.10)	
High Exposure Fund*Second Response			0.32*	0.37**	
			(0.17)	(0.17)	
Month FE	Yes	Yes	Yes	Yes	
Fund FE	No	Yes	No	Yes	
N obs	183,331	183,331	183,331	183,331	
$R^{2}(\%)$	1.2	11.5	2.1	12.0	

 Exposed funds saw greater outflows in the crisis and stronger recovery after policy announcemen ts



# DECOMPOSING FLOWS BASED ON SOURCES OF FRAGILITY

Panel A: Cumulative Flows in the Crisis							
	Feb-Mar, 2020	Mar-Apr, 2020					
	(1)	(2)					
Cumulative Flows	-10.2%	-6.7%					
Cumulative Flows, Illiquid Funds (Roll)	-18.7%	-14.8%					
Cumulative Flows, Fire-Sale Vulnerable Funds	-16.5%	-11.4%					
Cumulative Flows, High Sector Exposure Funds	-21.4%	-16.6%					
Share Explained (Fund Liquidity (Roll))	40.1%	27.6%					
Share Explained (Fund Fire-Sale Vulnerability)	55.7%	37.3%					
Share Explained (Fund Sector Exposure)	63.8%	55.4%					
Aggregating Across Proxies: Fragility Factor	Feb-Mar, 2020	Mar-Apr, 2020					
Cumulative Flows	-23.2%	-17.7%					
Historical Comparison: Taper Tantrum	May-Jun, 2013	Jun-Jul, 2013					
Cumulative Flows	-2.2%	-2.4%					



### **OTHER OBSERVATIONS**

- ETFs showed much greater resilience during crisis period than mutual funds
  - Payoff structure does not create as much liquidity transformation, and so less prone to fragility
- Equity mutual funds also showed resilience, according to Pastor and Vorsatz (2020)
  - They also provide lower liquidity transformation
- Stress in corporate bond markets had peculiar features, whereby more liquid securities experienced greater dislocations, as documented by Haddad, Moreira, and Muir (2021)
  - Evidence by Ma, Xiao, and Zeng (2021) ties this to mutual funds following a pecking order and selling liquid securities in response to flows
- Mutual fund outflows interacted with constraints on dealers to aggravate illiquidity in corporate bond market
  - Evidence and quantification in Kargar, Lester, Lindsay, Liu, Weil, and Zuniga (2021)





## POLICY RESPONSE AND IMPLICATIONS

## IMPACT OF FED PURCHASE ELIGIBILITY ON FUNDS IN THE POST-CRISIS PERIOD (THROUGH AUGUST 2020)

- Evidence so far indicates that the two Fed announcements helped to stop the panic and reverse outflows
- But how sustained was the rebound over the post-crisis months and did the Fed actions continue to help over the longer run?
- Falato, Goldstein and Hortacsu (2021) examine the cross-sectional relation between cumulative fund flows over the post-crisis period (through August 2020) and a measure of fund exposure to the Fed facilities
- Specifically, we construct a measure, SMCCF Share, that ranks funds based on how many of their bonds are eligible to be purchased by the SMCCF
  - For each fund, we take the sum over the fund's securities holdings (as of February 2020) of the percentage portfolio share holdings of each eligible security
  - The eligibility criteria are: maturity of under 5 years, domiciled in the US, not an insured depository institution, and rated investment grade as of March 22, 2020 and not lower than BB+ afterwards ("fallen angels")



## IMPACT OF FED PURCHASE ELIGIBILITY ON FUNDS IN THE POST-CRISIS PERIOD (THROUGH AUGUST 2020)

- By providing a liquidity backstop for bonds, the Fed bond purchase program helped to reverse outflows
- Effects of exposure to SMCCF were economically large: 1-st dev increase in exposure corresponds to about 1/3 of mean rebound in the post-crisis period
- Larger benefits of the facilities for the most fragile funds
- Important implications
  - Helps explain big speedy rally without the need for the Fed to take on credit risk

Panel A: Fund Impact									
	Cun	nulative Flow	vs (%)	Ι	Large Outflo	WS			
	All	Illiquid	Vulnerable	All	Illiquid	Vulnerable			
	(1)	(2)	(3)	(4)	(5)	(6)			
SMCCF Share <sub>i</sub>	2.76*** (0.82)	5.39*** (1.16)	7.69*** (2.69)	-0.02*** (0.00)	-0.02*** (0.01)	-0.04*** (0.01)			
N obs.	2,441	324	346	2,441	324	346			
$R^{2}(\%)$	0.70	1.87	2.45	2.27	4.07	10.20			
Mean LHS	9.33	-2.32	3.62	0.10	0.13	0.12			



#### THE FRAGILITY CHANNEL OF THE SMCCF: SPILLOVER EFFECTS OF FED PURCHASE ELIGIBILITY OVER THE POST-CRISIS PERIOD (THROUGH AUGUST 2020)

Panel B: Bond Spillover							
		All		]	Illiquid Holders		
-	Issuance	Pr. Spreads	Sec. Spreads	Issuance	Pr. Spreads	Sec. Spreads	
	(1)	(2)	(3)	(4)	(5)	(6)	
SMCCF Share <sub>b</sub>	$0.46^{***}$	-0.16***	-0.10***	$0.48^{***}$	-0.39***	-0.22***	
	(0.05)	(0.04)	(0.02)	(0.09)	(0.09)	(0.03)	
N obs.	116	483	5,602	41	82	858	
$R^{2}(\%)$	5.03	22.76	3.61	15.25	28.92	10.12	
Mean LHS	1.57	1.99	-0.82	1.57	2.59	-0.82	
		Panel C	: Fund Spillover	•			
	Cui	nulative Flov	vs (%)	-	Large Outflow	WS	
-	All	Illiquid	Vulnerable	All	Illiquid	Vulnerable	
	(1)	(2)	(3)	(4)	(5)	(6)	
Peer SMCCF Share <sub>i</sub>	0.12	0.26	0.44	-0.02***	-0.03***	-0.03***	
	(0.97)	(1.68)	(2.34)	(0.00)	(0.01)	(0.01)	
N obs.	2,441	324	346	2,441	324	346	
$R^{2}(\%)$	0.94	1.86	5.44	2.42	6.63	11.30	



#### THE FRAGILITY CHANNEL OF THE SMCCF: IMPACT OF FED PURCHASE ELIGIBILITY THRESHOLD ON FUNDS (THROUGH AUGUST 2020)

- Impact of Fed bond purchase facilities is robust to addressing endogeneity
- Exploit 5-year maturity threshold to compare funds that hold eligible bonds with 5-year maturity ("treated") to those that hold otherwise eligible bonds with 6-year maturity ("control")

Panel A: Fund Impact								
	Cur	nulative Flow	ws (%)	Large Outflows				
	All	Illiquid	Vulnerable	All	Illiquid	Vulnerable		
	(1)	(2)	(3)	(4)	(5)	(6)		
SMCCF Treated <sub>i</sub>	7.35**	7.85**	$7.47^{**}$	-0.04***	-0.05***	-0.04***		
	(3.33)	(3.75)	(3.33)	(0.01)	(0.02)	(0.01)		
N obs.	1,412	254	215	1,412	254	215		
$R^{2}(\%)$	0.40	4.01	0.66	2.61	9.57	14.41		



#### THE FRAGILITY CHANNEL OF THE SMCCF: SPILLOVER EFFECTS OF FED PURCHASE ELIGIBILITY THRESHOLD OVER THE POST-CRISIS PERIOD (THROUGH AUGUST 2020)

Panel B: Bond Spillover								
		All		Ι	Illiquid Holders			
-	Issuance	Pr. Spreads	Sec. Spreads	Issuance	Pr. Spreads	Sec. Spreads		
	(1)	(2)	(3)	(4)	(5)	(6)		
SMCFF Treated <sub>b</sub>	0.30***	-0.09**	-0.16***	0.56***	-0.25***	-0.28**		
	(0.04)	(0.04)	(0.04)	(0.14)	(0.08)	(0.11)		
N obs.	116	483	1,669	41	82	341		
$R^{2}(\%)$	4.71	16.32	4.72	15.61	23.08	13.28		
		Panel C:	Fund Spillover					
	Cui	nulative Flow	vs (%)	1	Large Outflows			
-	All	Illiquid	Vulnerable	All	Illiquid	Vulnerable		
	(1)	(2)	(3)	(4)	(5)	(6)		
Peer SMCFF Treated <sub>i</sub>	4.18	5.27	4.31	-0.02***	-0.03**	-0.03**		
	(3.16)	(4.94)	(5.89)	(0.01)	(0.01)	(0.01)		
N obs.	1,413	222	195	1,413	222	195		
$R^{2}(\%)$	1.26	3.55	8.80	1.43	8.40	11.12		



## POLICY LESSONS GOING FORWARD

- The Federal Reserve interventions were crucial for alleviating the stress
  - Quick reversal of outflows after two announcements (March 23: PMCCF and SMCCF to purchase investment-grade bonds; April 9: Extend facilities to \$850bn and to purchase high-yield bonds if they were IG as of March 22)
  - Sustained recovery of flows over the post-crisis period (through August 2020) for funds that held more bonds eligible for purchase by the Fed facilities
- Relying on such interventions in the future might not be sustainable
  - Moral hazard problem with funds taking excessive risks as they expect outside intervention
  - If government provides a safety net, then other regulatory measures should be in place to promote resilience, like in banks



## POLICY LESSONS GOING FORWARD - CONT'D

- Going forward, underlying vulnerabilities should be assessed and potentially addressed:
  - Improving liquidity of underlying corporate bond assets
    - These are difficult reforms to enact
  - Requiring funds to hold more liquid securities
    - Might defeat the purpose of having corporate-bond funds
  - Reducing liquidity available to investors
    - Swing pricing is a solution that is directly targeted to the problem
    - It has only recently been introduced in the U.S. but has not been adopted yet
    - Evidence from other countries before the Covid episode suggests it has been quite effective: Jin, Kacperczyk, Kahraman, and Suntheim (2020)
    - ETF structure acts as natural swing pricing

