

# Fragility of Safe Asset Markets

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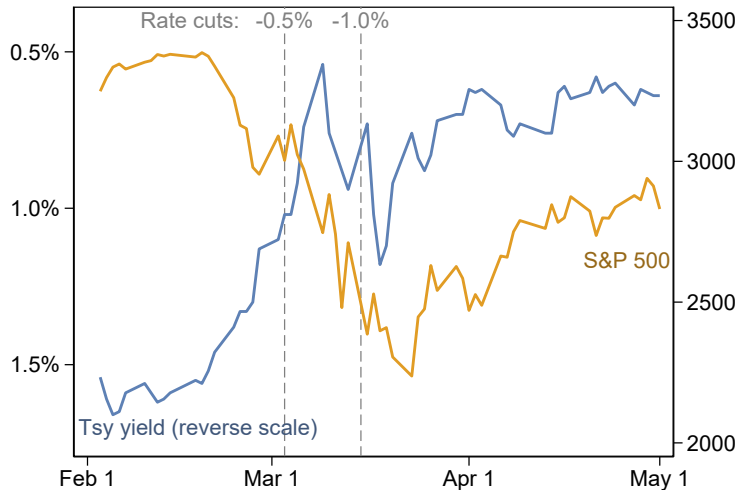
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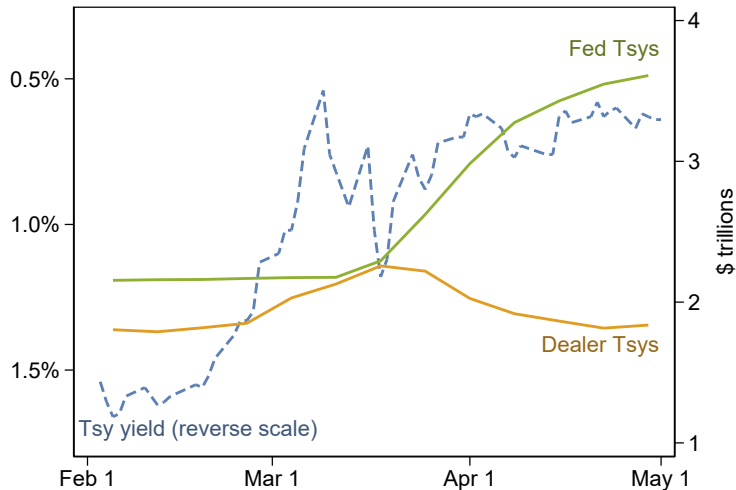
# Motivation (1 of 3)

March 2020: “flight to safety” turns into “dash for cash”



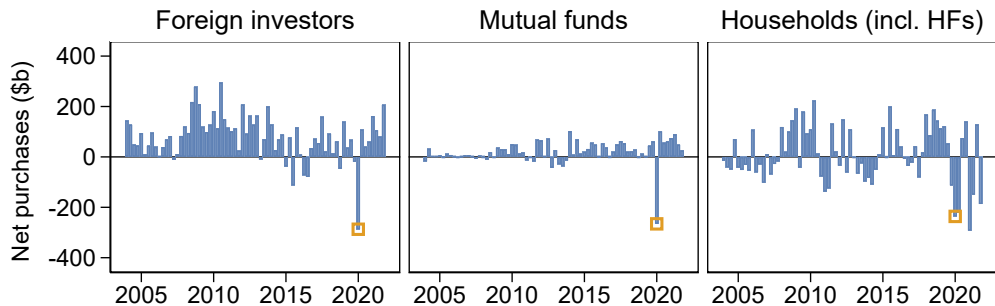
# Motivation (2 of 3)

Dealer balance sheets fill up during run-up and crash



# Motivation (3 of 3)

Who is selling and why?



- Sales in excess of liquidity needs (Vissing-Jørgensen, 2021)
  - Foreign officials “consume” only ~25% of sales
  - Mutual funds pay out only ~65% of sales
- Diamond-Dybvig late consumers withdrawing early?

# This paper

## In a nutshell

- Main modeling ingredients
  - Two fundamental characteristics of safe assets
    1. Safety — low credit risk, low (or negative) beta
    2. Liquidity — easy to sell, “money-like”
  - Dealer constraints (or limits to arbitrage more generally)
    - Net sales can lead to **persistent price dislocations**
- Strategic interaction among “liquidity investors”
  - Choice: sell preemptively today **or** risk having to sell tomorrow
  - Fragility with **“market run”** in times of stress (cf. BernardoWelch2004, MorrisShin2004)
- Interaction with demand from “safety investors”
  - Flight to safety can trigger dash for cash

# This paper

## Preview of results

- Usually: investors face strategic substitutability
    - Other investors sell → price decreases → I want to buy (all else equal)
  - Here: investors can face strategic complementarity
    - Investors hold safe assets as insurance against liquidity shocks (cf. DiamondDybvig1983)
    - Other investors sell → price decreases today **and** tomorrow (dealer inventory)  
→ I want to **sell** (try to get out today rather than risk worse price tomorrow)
- Self-fulfilling equilibria
- Hold equilibrium: everyone holds because everyone holds
  - Sell equilibrium: everyone sells because everyone sells

# This paper

## Preview of results

- Global game with threshold equilibrium
  - Low prob. of liquidity shock → market is stable, only **fundamental sales**
  - High prob. of liquidity shock → market collapses, flooded with **panic sales**
- Discontinuous equilibrium price
  - Price suddenly drops when equilibrium switches from hold to sell
  - Policy announcements can have large effects by switching equilibrium
- Increase in dealer balance sheet costs
  - Reduces market stability (lower threshold)
  - Increases price discontinuity (larger crash)

# This paper

## Preview of results

- What if safety investors buy in times of stress?
    - Effect on prices today **and** tomorrow (through dealer inventory)
  - Demand from safety investors generates feedback
    - Market relatively **stable** → safety investor demand **stabilizing**
    - Market relatively **unstable** → safety investor demand **destabilizing**
- Flight to safety can trigger dash for cash



# Model setup

- Two periods  $t = 0, 1$
- Two assets: risky and safe
- Three types of agents:
  - **Safety investors:** Risk averse  $\rightarrow$  hold portfolio of risky and safe asset
  - **Liquidity investors:** Risk neutral but liquidity shocks  $\rightarrow$  hold safe asset as insurance
  - **Dealers:** Risk neutral but balance sheet costs  $\rightarrow$  residual demand for safe asset

Measure 1 of each, act competitively, discount rate 0

# Dealers

- Value safe asset at fundamental value of 1 (par)
- Convex balance sheet costs  $cq^2$  for inventory  $q$  with  $c > 0$
- Compete for sales  $\rightarrow$  demand given by zero-profit condition  
 $\rightarrow$  prices linear in total sales/inventory

$$p_0(q_0) = 1 - cq_0 \quad \text{and} \quad p_1(q_0, q_1) = 1 - 2cq_0 - cq_1$$

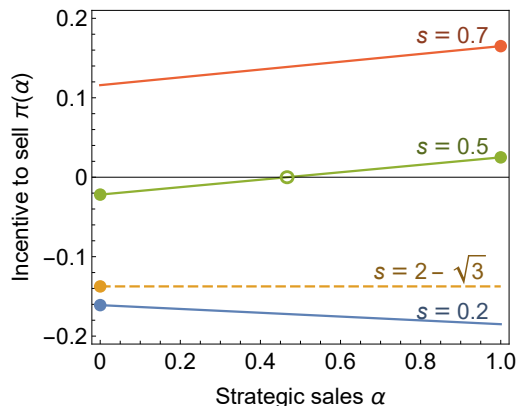
$\rightarrow$  Sales today affect prices tomorrow through inventory

# Liquidity investors

- Endowed with one unit of the safe asset
- Face i.i.d. liquidity shocks with prob.  $s \in (0, 1)$
- Investors not shocked at  $t = 0$  act **strategically**
  - Sell preemptively at  $t = 0 \rightarrow$  expected payoff  $p_0^e$
  - Hold and risk a shock at  $t = 1 \rightarrow$  expected payoff  $sp_1^e + (1 - s)v$
- My incentive to sell, given fraction  $\alpha \in (0, 1)$  of others selling:

$$\pi(\alpha) = p_0^e(\alpha) - (sp_1^e(\alpha) + (1 - s)v)$$

# Incentive to sell and equilibria



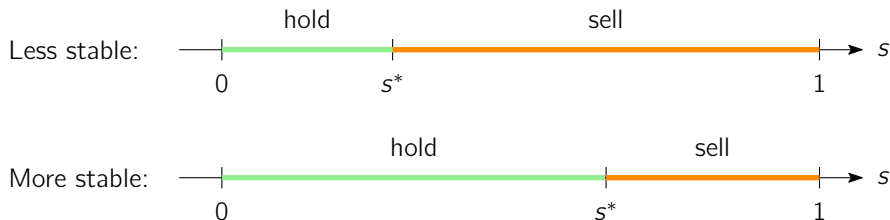
- Payoff gain depends on  $s$ :

$$\pi(\alpha) = p_0^e(\alpha) - (s p_1^e(\alpha) + (1 - s) v)$$

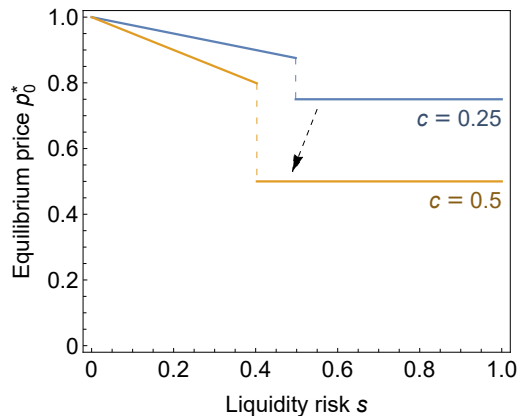
- Higher liquidity risk  $s$  ...
  - Increases level: shift from  $v$  to  $p_1^e$
  - Increases slope: relative effect of  $\alpha$  on  $p_0^e$  vs.  $p_1^e$

# Global game equilibrium

- Prob.  $s$  of i.i.d. liquidity shocks observed with noise, take zero-noise limit
- Unique equilibrium is in switching strategies around threshold  $s^*$ 
  - Low liquidity risk,  $s < s^*$ , all strategic investors **hold** on to their safe assets
  - High liquidity risk,  $s > s^*$ , all strategic investors **sell** their safe assets
- Switching point  $s^*$  is a proxy for **market stability**:



# Price crash and balance sheet costs



- Price drops discontinuously at  $s^*$
- Higher balance sheet cost  $c$  ...
  1. Reduces  $s^* \rightarrow$  lower stability
  2. Increases discontinuity  $\rightarrow$  bigger crash

$$\Delta p_0^* = c(1 - s^*)$$

# Safety investors

- Risk averse, portfolio of safe asset and risky asset with  $E[z] = \mu$
  - Lower expected payoff  $\mu \rightarrow$  flight-to-safety demand  $a$  at  $t = 0$ 
    - Increases  $p_0^e$  (offsets some sales)  $\rightarrow$  destabilizing
    - Increases  $p_1^e$  (lower dealer inventory)  $\rightarrow$  stabilizing
  - Payoff gain:  $\pi(\alpha) = p_0^e(\alpha) - (s p_1^e(\alpha) + (1 - s) v)$ 
    - Low liquidity risk  $s$ : destabilizing effect dominates
    - High liquidity risk  $s$ : stabilizing effect dominates
- $\rightarrow$  Flight to safety interacts with dash for cash

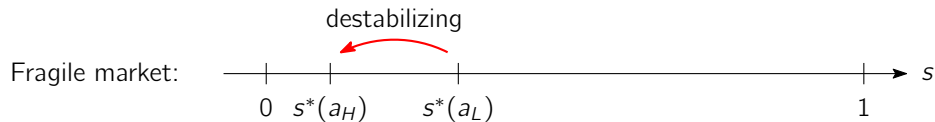
# Interaction flight to safety and dash for cash

- Low balance sheet costs (pre-2008)



→ Flight to safety **attenuates** dash for cash

- High balance sheet costs (post-2008)

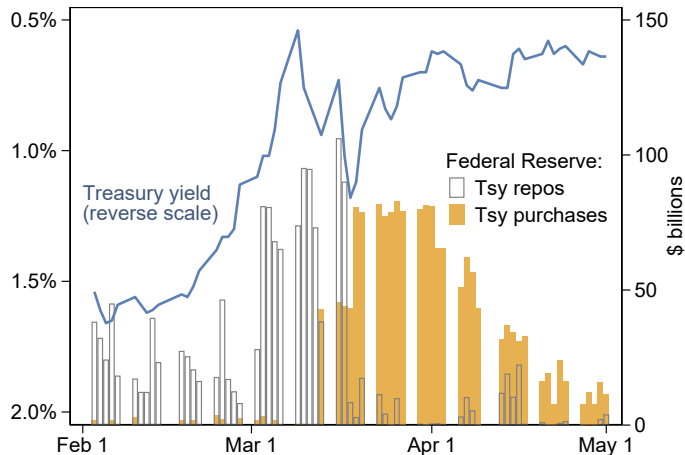


→ Flight to safety **amplifies** dash for cash



# Policy 1: Dealer constraints

- SLR constrains dealer Treasury holdings, not relaxed until April 1

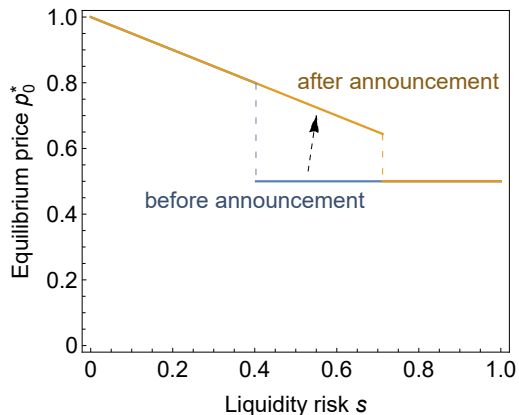


- Repo funding doesn't help
- Purchases do help

# Policy 2: Asset purchases

## Announcement effects

- Fed announces at  $t = 0$  asset purchases at  $t = 1$

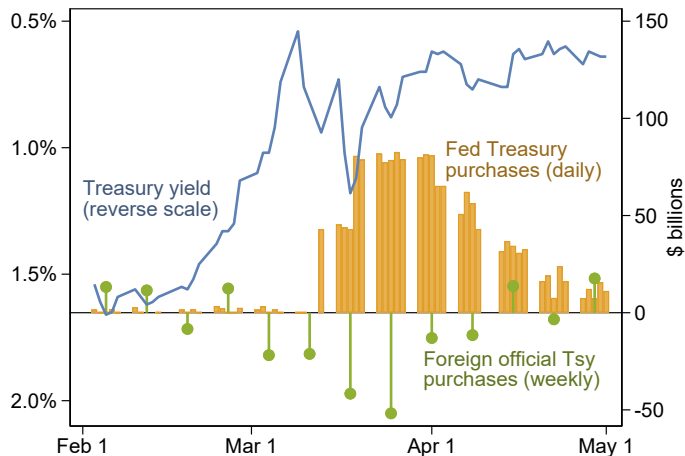


- Announcement shifts  $s_{pre}^* \nearrow s_{post}^*$
  - Switch from sell to hold equilibrium for  $s \in [s_{pre}^*, s_{post}^*]$ 
    - Price jumps on announcement at  $t = 0$
    - No large effect of purchases at  $t = 1$
- As happened for corporate bonds (cf. HaddadMoreiraMuir2021)

# Policy 2: Asset purchases

But have to be careful

- Treasury purchases start small, without clear commitment



- Foreign sales initially increase
  - Consistent with initial purchases **destabilizing**
- Foreign sales stop after “whatever it takes”
  - Consistent with switch to hold equilibrium

# Conclusion

- Safe assets held for different reasons (safety vs. liquidity)
  - Potentially symbiotic relationship → markets generally stable
- Strategic interaction of liquidity investors
  - Potential for fragility
  - Worse when dealers face tighter constraints
  - Potentially amplified by safety investors
- Perfect storm in March 2020
  - Low market depth post-GFC
  - Unusually large liquidity shock **and** risk asset shock
  - Flight to safety turns into dash for cash

Thank you!