What quantity of reserves is sufficient?

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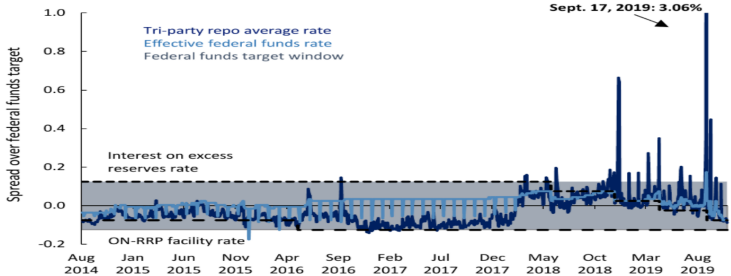
Disclaimer: The views expressed in this presentation are those of the speaker and do not necessarily represent the views of the Board of Governors of the Federal Reserve System.

Q: What level of reserves is necessary to prevent money market spikes?

Major concern for central bankers since 2016.



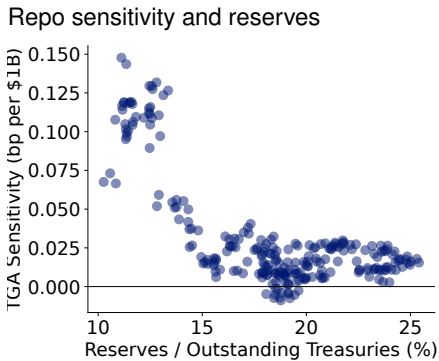
This paper: global-games model of interbank payment coordination.

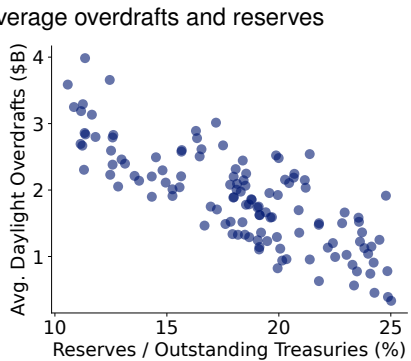
- When reserves fall below threshold, banks delay payments $\Rightarrow$ repo rates spike.
- Calibrated pre-2019; September 2019 spike as a *semi* out-of-sample test.
- Inverts the model to ask what reserve level would prevent spikes.

Part of an influential series on September 2019.

- **Today:** explain model, discuss what we've learned from the last round of tightening.

The run-up to the 2019 spike affected reserves, repo and payments

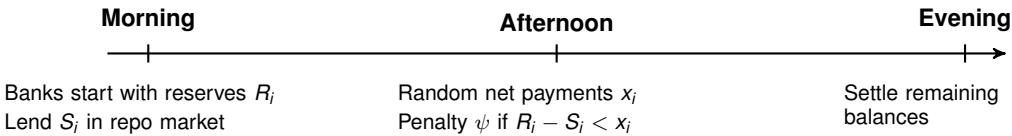




Basic insight of the empirical companion, Copeland, Duffie and Yang (2025).

A natural model that links reserves, payments and money market rates

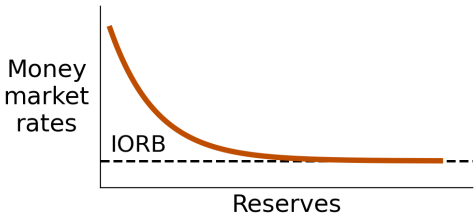
Following Poole (1968):



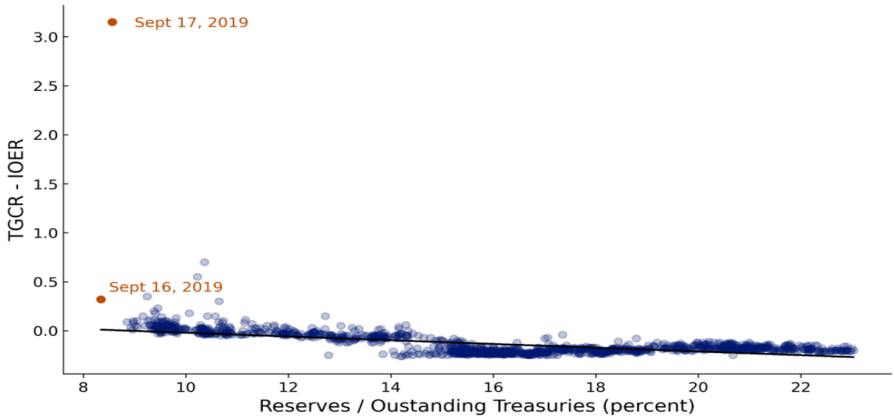
Equilibrium: $r - \text{IOR} = \psi \, \mathbb{P}(R_i - S_i < x_i)$

Two problems:

1. Curvature not really economically motivated.
2. As reserves fall, spreads rise — but *smoothly*.



Baseline can't really fit September 2019!



This is what *truly* motivates this paper's model!

What this paper adds: net payments become *strategic*

Morning — Banks start with reserves R_i; Lend S_i in repo market

Afternoon — **Endogenous** payments $a_i - a_j$; Penalty ψ if $R_i - S_i < a_i - a_j$

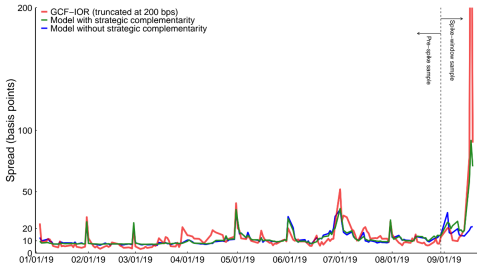
Evening — Settle remaining balances at a cost c

Out-bound payment a_i **is a choice**

Moreover, a_i and a_j **are strategic complements**.

- If bank i doubts bank j will pay, it delays a_i.
- Bank j delays too.

A vicious circle — rates spike *discontinuously*!



How big a spike does this generate on Sep. 17?

- $\sim$90 bps on Sep. 17. Realized: 300+.
- **But:** *without* complementarity, barely moves.

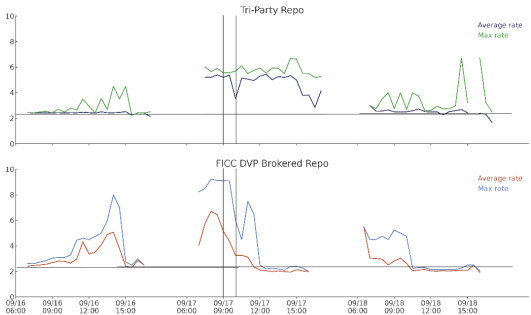
Should we be worried about the missing 200 bps?

Maybe not:

- **Kahn et al. (2023)** argue opacity *within* repo market contributed to size of spike.
  - **Sep. 16:** spike in interdealer DVP. MMF lenders *didn't know*.
  - **Sep. 17:** Fed intervenes, DVP rates fell. MMF rates *stayed high*.

Gap may be segmentation + information.

- Payment channel may interact with opacity in repo market itself.

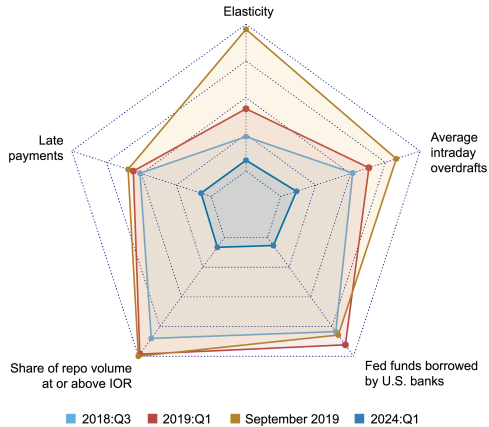


This research program has been very influential

For instance, Afonso et al. (2024) dashboard:

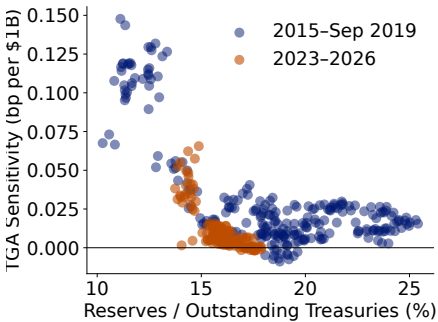
- **Rate indicators:** repo volume at/above IORB, fed funds elasticity.
- **Payment indicators:** late Fedwire payments, daylight overdrafts.

How did these indicators fare in the last balance-sheet reduction?

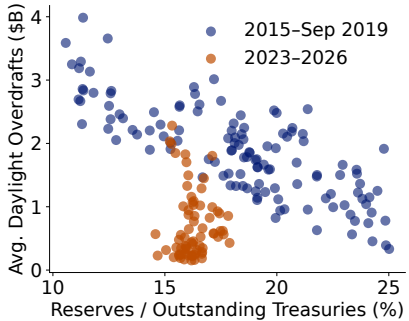


Source: Logan (2024). Reserve demand framework: rate and payment indicators.

Repo sensitivity rose again — but overdrafts didn't follow



Orange (2023–26): repo sensitivity followed a similar pattern.



Orange (2023–26): overdrafts did not increase at comparable reserve ratios.

Repo sensitivity came back. Overdrafts didn't.

Did something change?

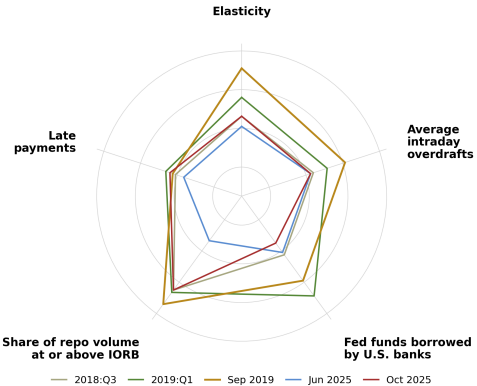
FRBNY dashboard clearly illustrates the disconnect.

- Repo rates moved toward Sep. 2019 levels.
- Payment indicators stayed well inside the 2019 polygon.

The two channels that moved together in 2019 decoupled.

What changed?

- Balance sheet frictions (Perli, 2024)?
- Growth of outstanding Treasuries?
- . . . ?



Conclusion

Important and influential paper.

- Takes Poole (1968) framework seriously and extends in economically meaningful ways.
- Strategic complementarity $\Rightarrow$ additional nonlinear amplification.
- 90 vs. 300+ bps gap is informative — repo frictions may explain the rest.

Tackling these two channels decoupling in 2025 a great next step for this framework!