Bank Debt versus Mutual Fund Equity in Liquidity Provision

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Motivation

- Debt-issuing intermediaries, e.g. banks
  - Issue demandable deposits
  - Invest in illiquid assets like corporate loans
  - Provide liquidity insurance against idiosyncratic liquidity risks (Diamond and Dybvig 83)

$$\text{Deposit payment value} > \begin{array}{c}\text{Liquidation value}\\ \text{of underlying portfolio}\end{array}$$

- Equity-issuing intermediaries, e.g. open-end mutual funds
  - Are becoming more important (Goldstein et al. 17, Zeng 19)
  - Issue shares redeemable at short notice
  - Invest in illiquid assets like corporate bonds and loans
  - **Do they also provide liquidity?**

Research Questions

1. Does demandable fund equity also provide liquidity?
2. If so, how does liquidity provision by equity differ?
3. How much liquidity do debt- and equity-issuing intermediaries provide empirically?

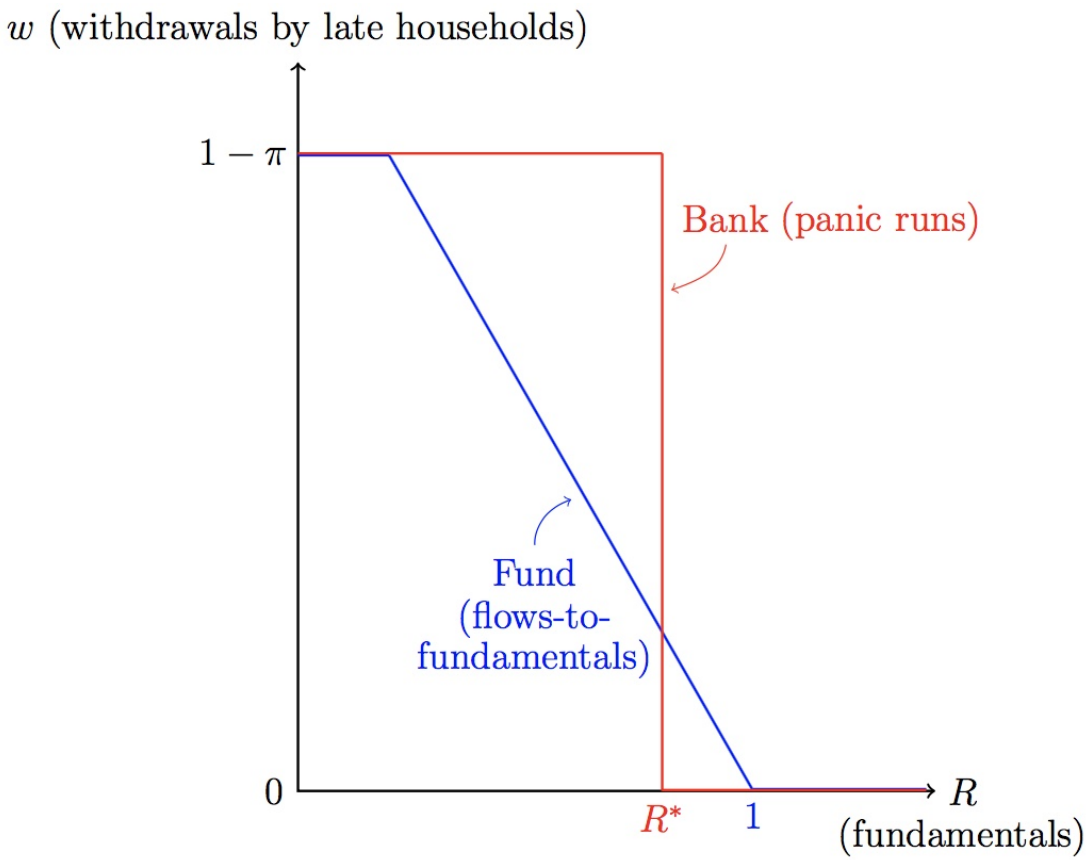
1. Does demandable fund equity also provide liquidity?

Yes!

- Investors subject to idiosyncratic liquidity risks as in Diamond and Dybvig (1983)
- Liquidity is created when idiosyncratic liquidity risks are shared and more long term projects can be held to maturity
- Two requirements:
  1. Resources are pooled at the intermediary level
  2. More liquid assets are used to meet redemptions first
- Satisfied by both banks and mutual funds

2. How does liquidity provision by equity differ?

- Bank debt: panic runs
- Fund equity: no panic runs but flows to fundamentals



- Expected contract payment by bank debt versus fund equity depends on the distribution of fundamentals R

3. Liquidity Provision Index (LPI)

Liquidity Provision:

- Expected contract payment by intermediary minus direct payoff from liquidating underlying portfolio at short notice

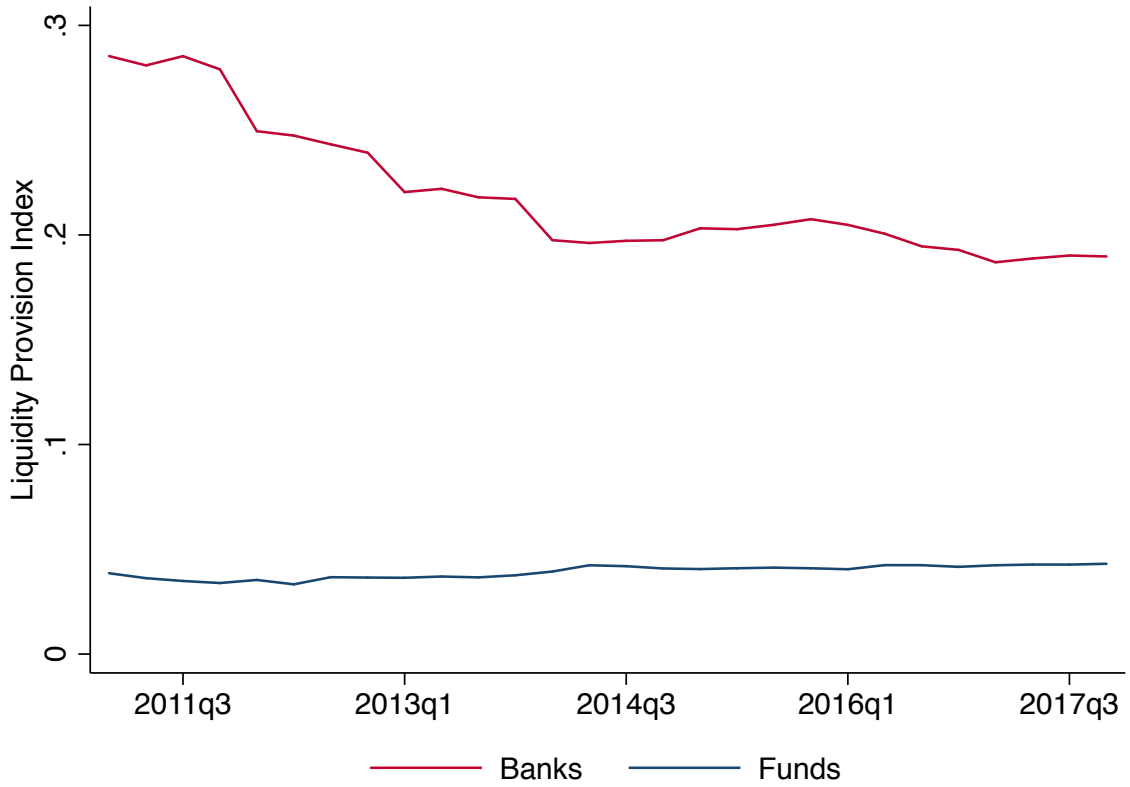
Cross-sectional Variation in LPI:

- \$1 invested in bond mutual fund shares provides one quarter of the liquidity provided by \$1 invested in uninsured bank deposits in 2017
  - Funds with less volatile flows $\rightarrow \uparrow$ LPI
  - Banks with more insured deposits $\rightarrow \uparrow$ LPI

3. Liquidity Provision Index (LPI)

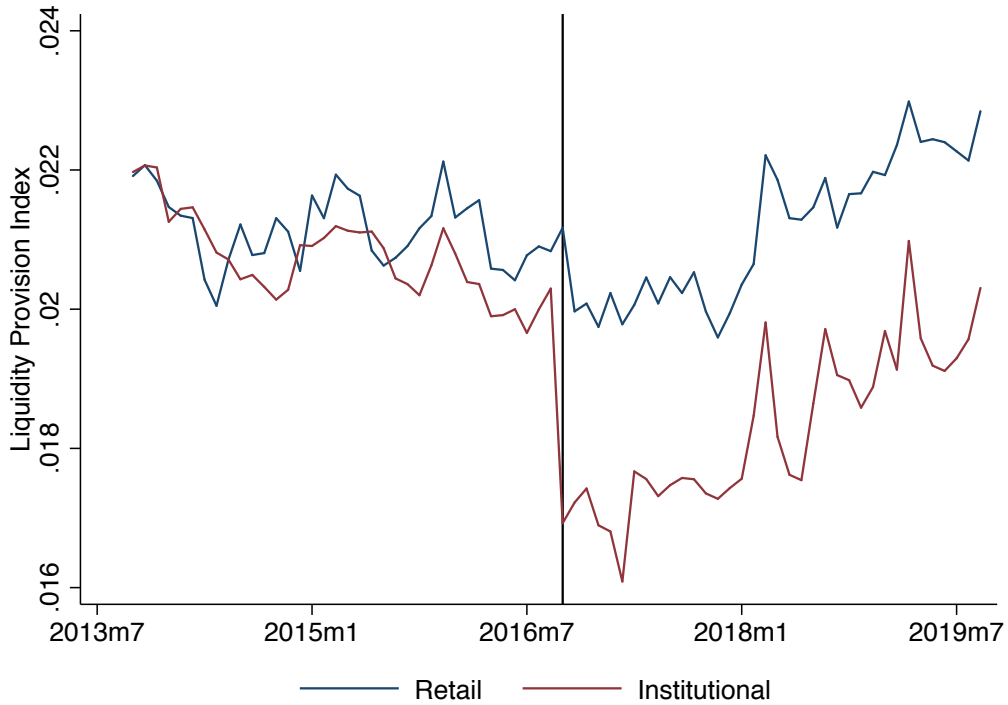
Time-series Variation in LPI:

- Gap narrowing ← QE / Liquidity Regulation (LCR)



3. Liquidity Provision Index (LPI)

- Apply LPI to shadow banks: money market funds (MMFs)
  - Diff-in-diffs around MMMF Reform to identify a pure debt-vs-equity effect



- Institutional prime MMFs provide significant but 20% less liquidity per $1 due to change from debt to equity funding

Contribution

1. Mutual Funds issuing demandable equity also provide liquidity
   - Liqudity provision by banks: Diamond and Dybvig 83, Diamond and Rajan 01, Kashyap, Rajan and Stein 02, Goldstein and Pauzner 05
2. Mutual funds suffer more volatile flows to fundamentals but are less prone to panic runs than banks
   - Mutual funds and financial stability: Chen, Goldstein and Jiang 10, Goldstein, Jiang and Ng 17, Chernenko and Sunderam 17, Zeng 19
3. Bond fund shares provides one quarter of the liquidity by uninsured bank deposits per \$1
   - Measuring bank liquidity provision: Berger and Bouwman 09, Brunnermeier, Gorton and Krishnamurthy 12, Bai, Krishnamurthy and Weymuller 18

Model

Set-Up

Static Diamond-Dybvig framework with aggregate risks:

- Households face idiosyncratic liquidity risks - do not know whether they will need to consume early $(t = 1)$ at $t = 0$

Set-Up

Two ways to invest:

1. Project is long term, risky and illiquid
   - Invest at $t = 0$, matures at $t = 2$ to yield (random variable) R
   - At $t = 1$: not yet matured and thus only valued at 1
   - At $t = 1$: premature liquidation subject to firesale discount
2. Storage is short term and liquid
   - Invest at $t = 0$ or $t = 1$ to obtain $\gamma \leq 1$ next period
   - Intermediaries can obtain 1 next period (not essential for liquidity provision)

Set-Up

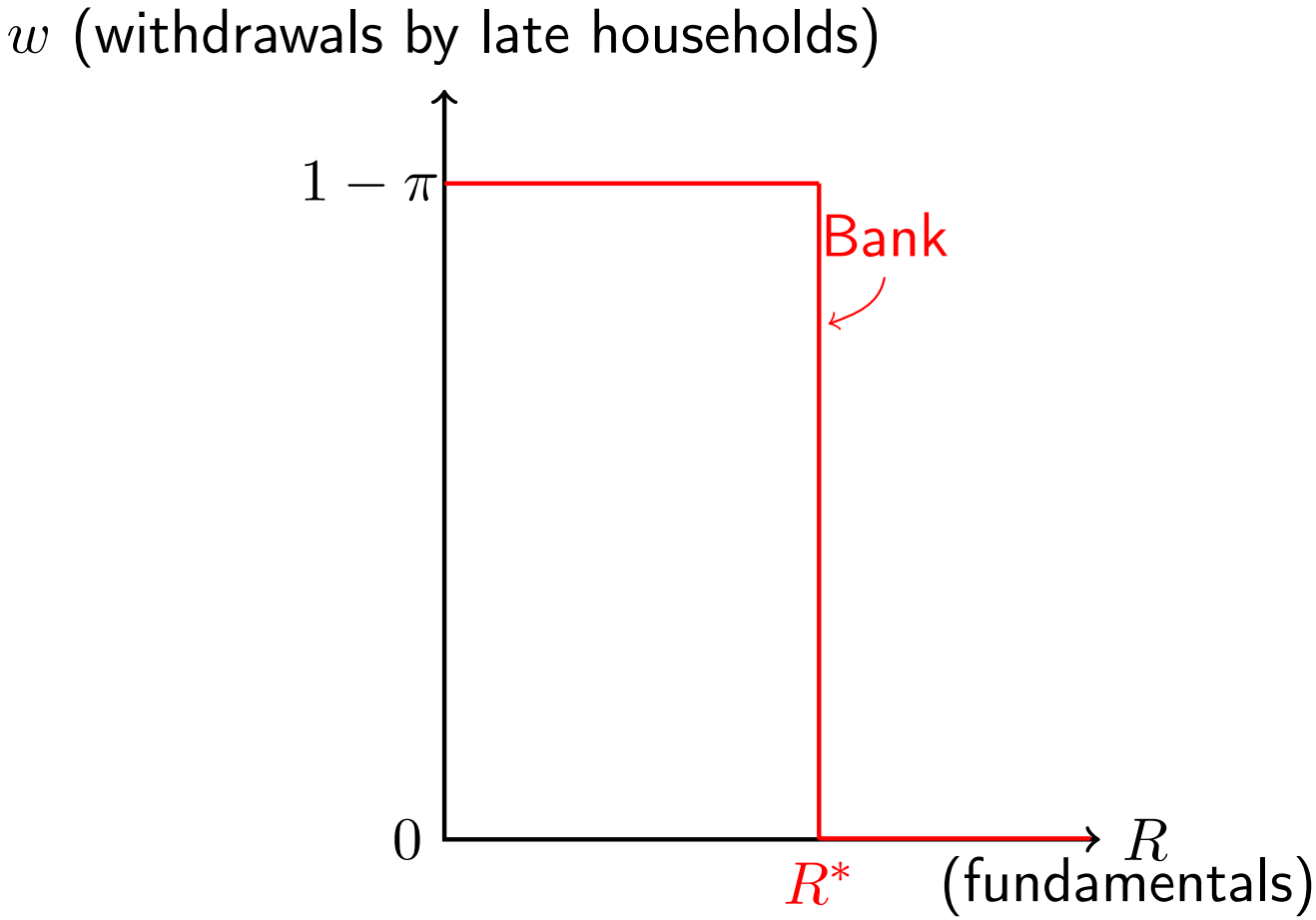
At $t = 0$

- Households collectively form an intermediary who chooses asset portfolios and contract payments to maximize their ex-ante utility
  1. Bank debt - promises fixed payment
  2. Fund equity - pays flexible NAV depending on investor outflows

At $t = 1$

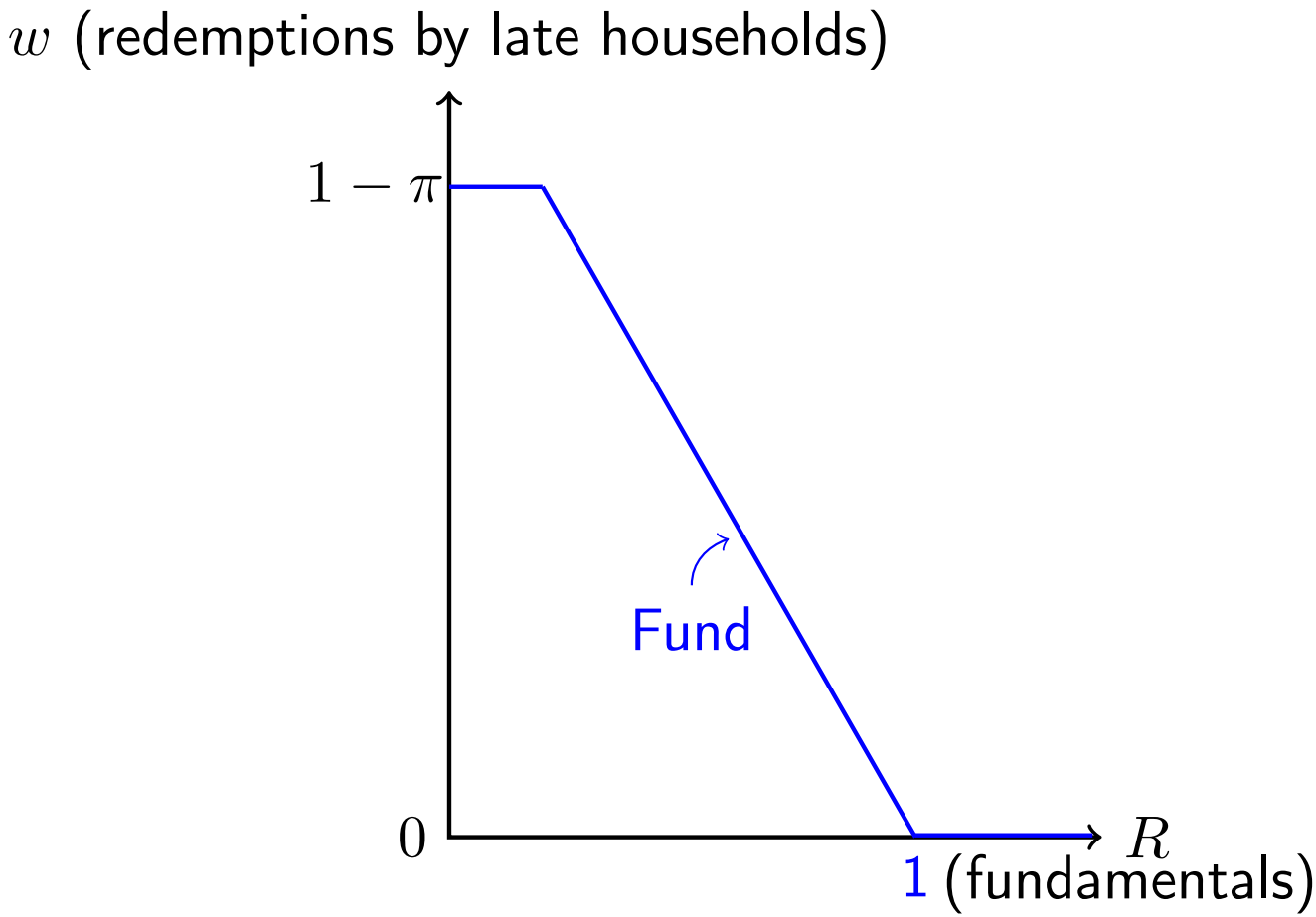
- households receive an almost perfect private signal about long run project return R as in Goldstein and Pauzner (2005)
- Early consumers always withdraw whereas late consumers choose to withdraw strategically
- Intermediary liquidates assets (prematurely) to meet investor redemptions

Bank Debt and Panic Runs



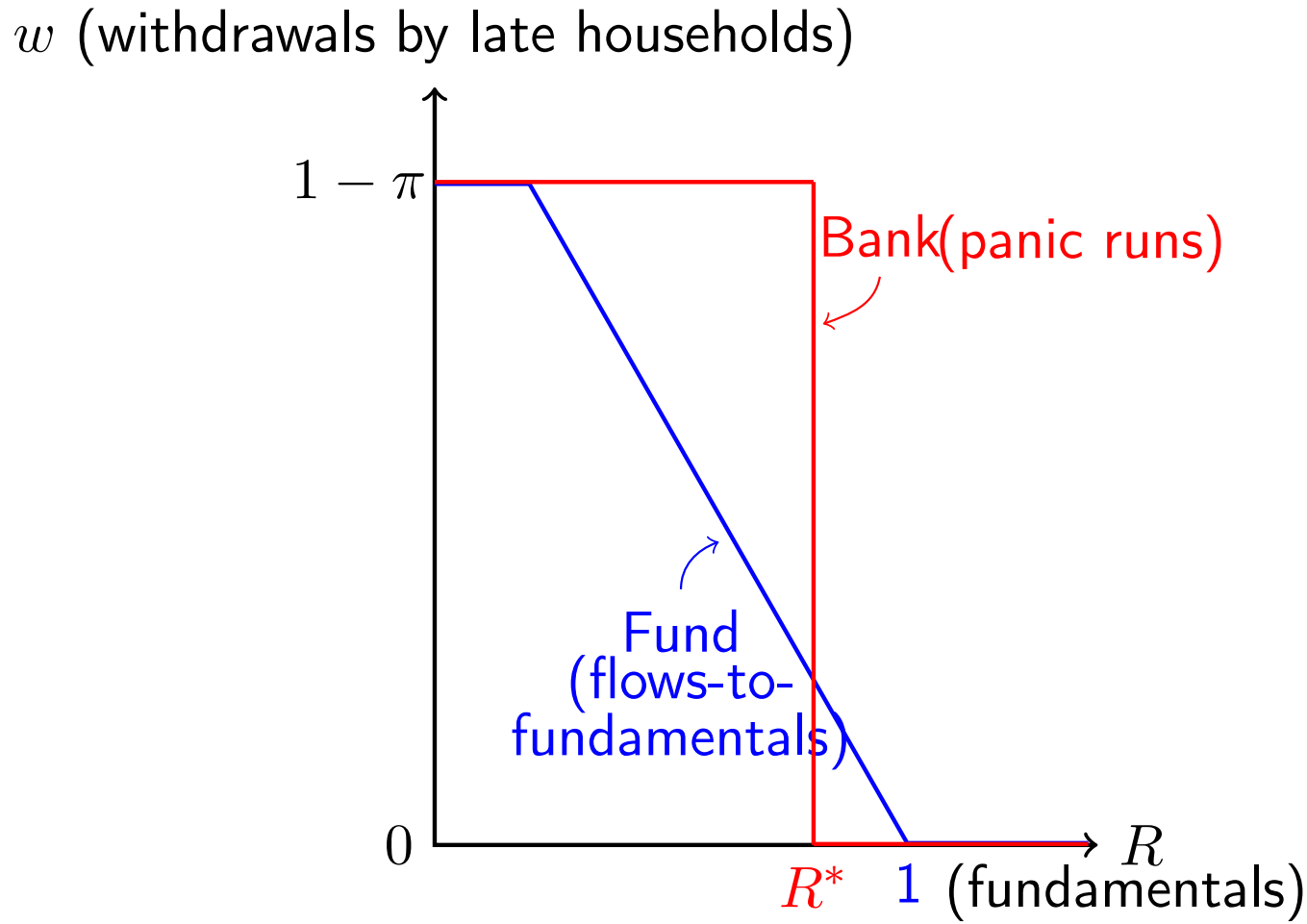
- Fixed contract payment induces runs

Fund Equity and Flows to Fundamentals



- Flexible NAV prevents runs but induces (continuous) flows to fundamentals

Bank Debt versus Fund Equity



- Expected contract payment by bank debt versus fund equity depends on the distribution of fundamentals R.

Liquidity Provision Index

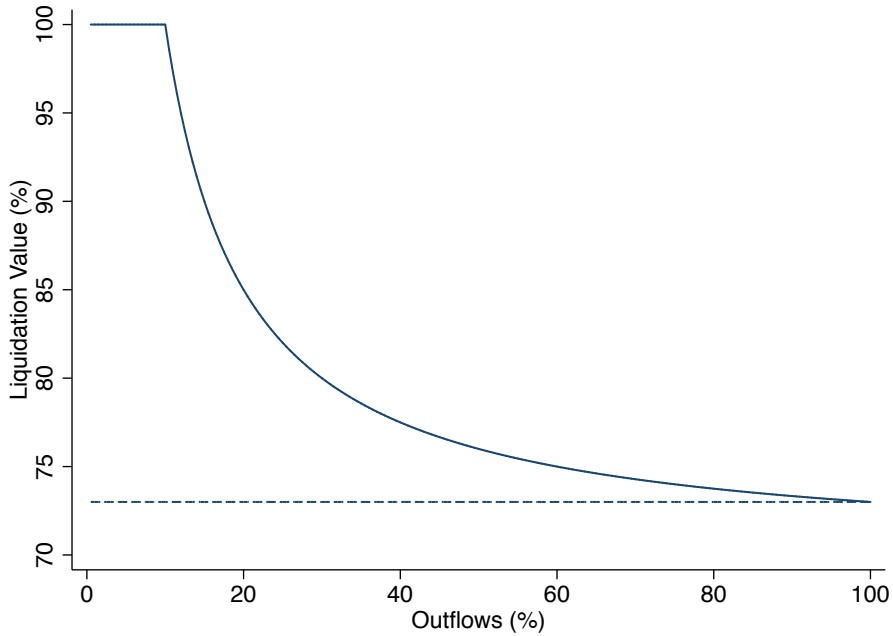
Liquidity Provision Index - Construction

LPI: expected contract payment minus liquidation value of underlying portfolio at short notice per dollar investment

- Challenge: distribution of fundamentals R is not observable
  - $R \rightarrow$ outflows $\rightarrow$ intermediary liquidations $\rightarrow$ contract payment
- Solution: change state variable to bank/fund outflows
  - outflows $\rightarrow$ intermediary liquidations $\rightarrow$ contract payment
- Data:
  - Bank and fund level portfolio holdings
  - Bank and fund level equilibrium flows
  - Haircut by asset category

Liquidity Provision Index - Construction

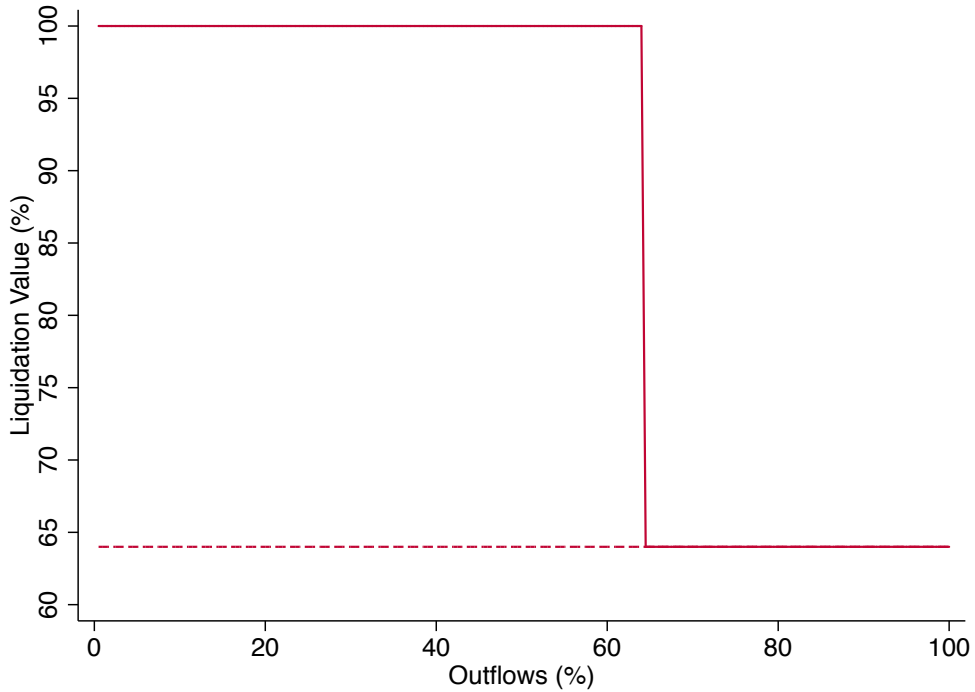
1. Find portfolio and haircuts:
   e.g. fund with \$0.1 cash and \$0.9 bonds @ 30% haircut
2. Calculate equity contract payment given outflows



3. Empirical distribution of outflows ← flows to fundamentals
4. **Liquidity Provision Index:**
   E[**contract payment** − **Liq. value of underlying assets**]

Liquidity Provision Index - Construction

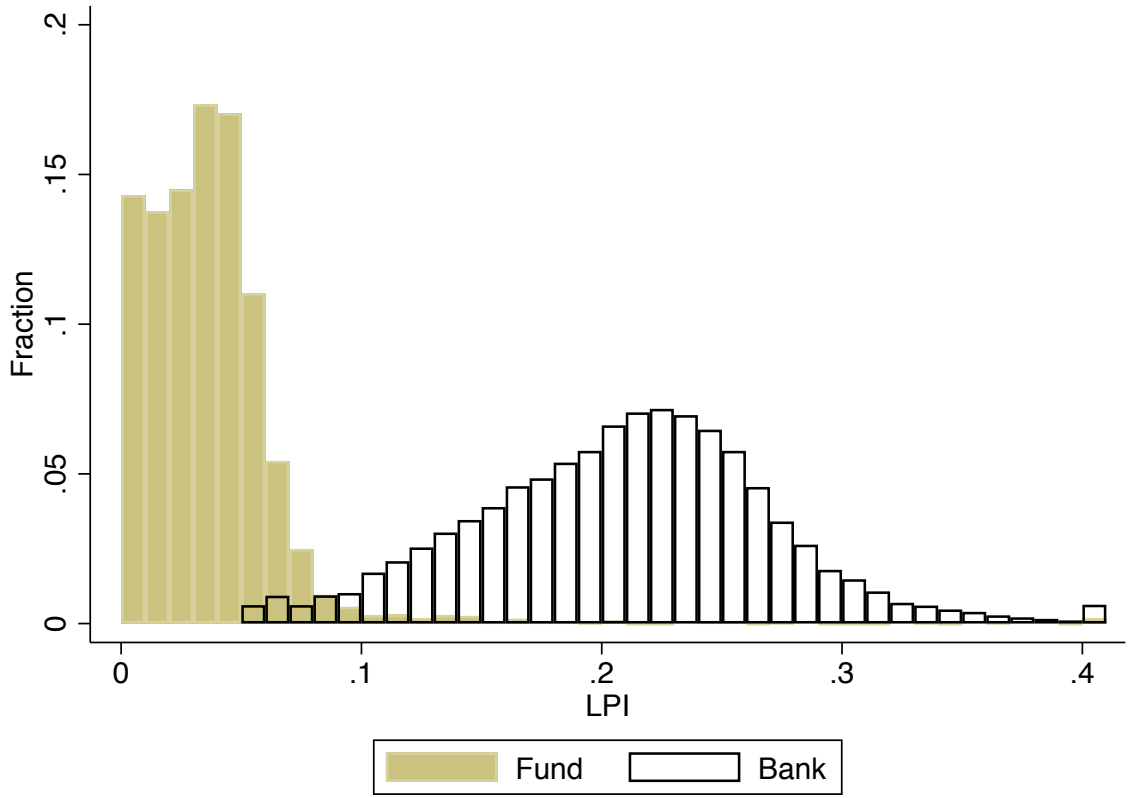
1. Find portfolio and haircuts
   e.g. bank with \$0.1 cash and \$0.9 loans @ 40% haircut
2. Calculate debt contract payment (uninsured) given outflows



3. Empirical distribution of outflows ← panic runs
4. **Liquidity Provision Index:**
   E[**contract payment** − **Liq. value of underlying assets**]

Liquidity Provision Index - Results

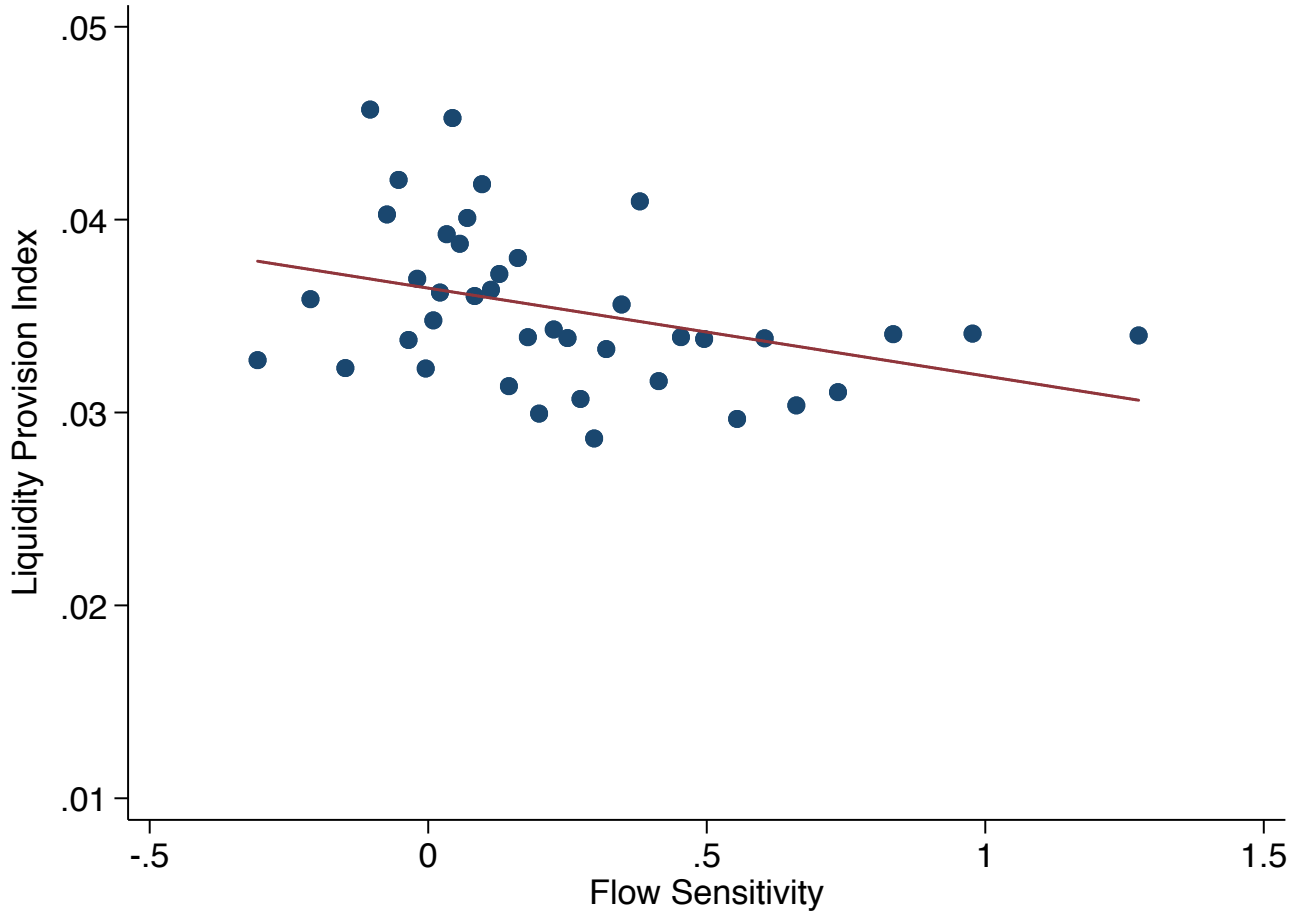
Cross-sectional Distribution of Fund and Bank LPIs (2011-2017)



Bank average 0.22 cents versus fund average of 0.04 cents per $1

Liquidity Provision Index: Fund LPI in the Cross-section

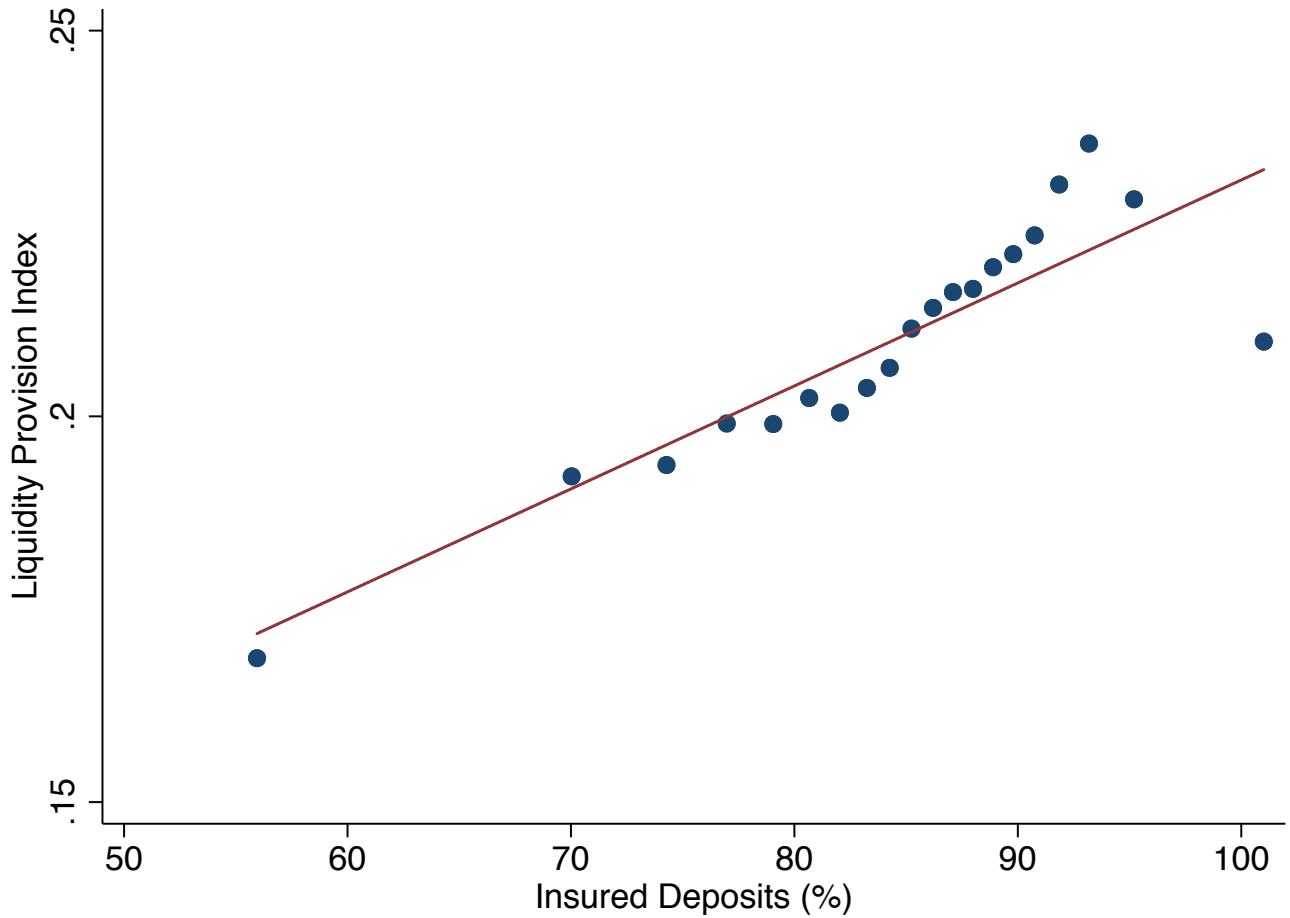
- Fund LPI decreases when fund flow is more volatile ▸ Regressions



Liquidity Provision Index: Bank LPI in the Cross-section

- Bank LPI increases with the proportion of insured deposits

▸ Regressions



Liquidity Provision Index: Results

- The bulk of LPI difference arises from differences in contracts, but not from indirect effects of other institutional or regulatory features

	(1) LPI	(2) LPI	(3) LPI
Insured Deposits Ratio	0.055***	0.064***	0.144***
	[0.006]	[0.006]	[0.006]
Non-deposits Ratio		0.052***	0.034***
		[0.008]	[0.008]
Log(assets)			0.017***
			[0.001]
Constant	0.164***	0.147***	-0.127***
	[0.005]	[0.006]	[0.010]
Observations	7535	7535	7535

Liquidity Provision Index: Money Market Funds

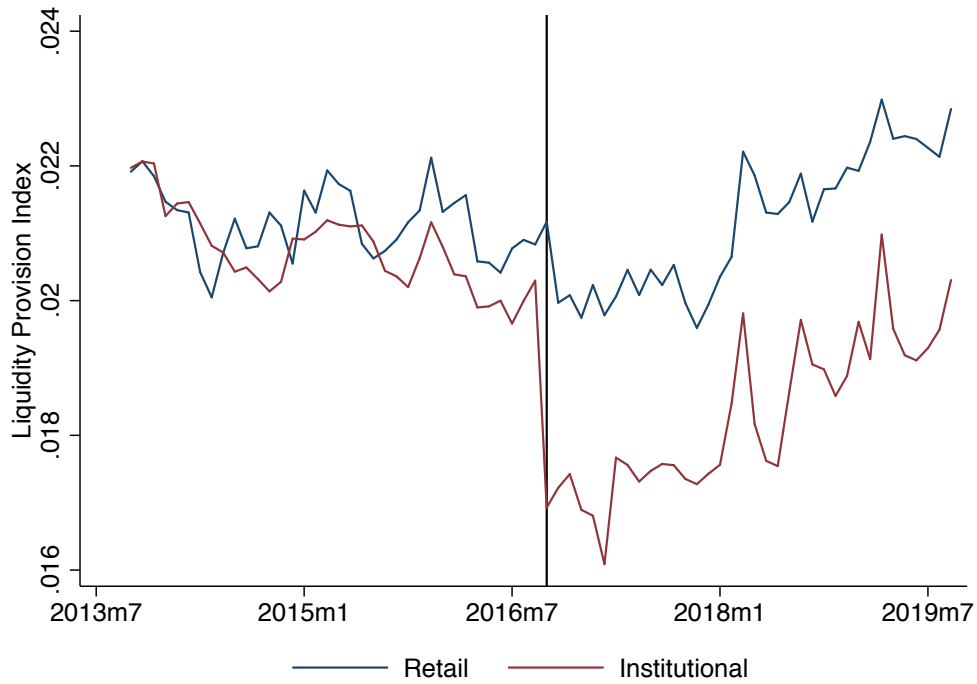
- Theory and empirical framework apply to any intermediaries issuing demandable claims
- A diff-in-diffs identification of the pure effect arising from debt versus equity, using the money market funds (MMFs) reform

	Oct 2016	
	Before	After
Institutional Prime	Fixed NAV	Floating NAV
Retail Prime	Fixed NAV	Fixed NAV

- Debt (fixed NAV) $\rightarrow$ equity (floating NAV)

Liquidity Provision Index: Money Market Funds

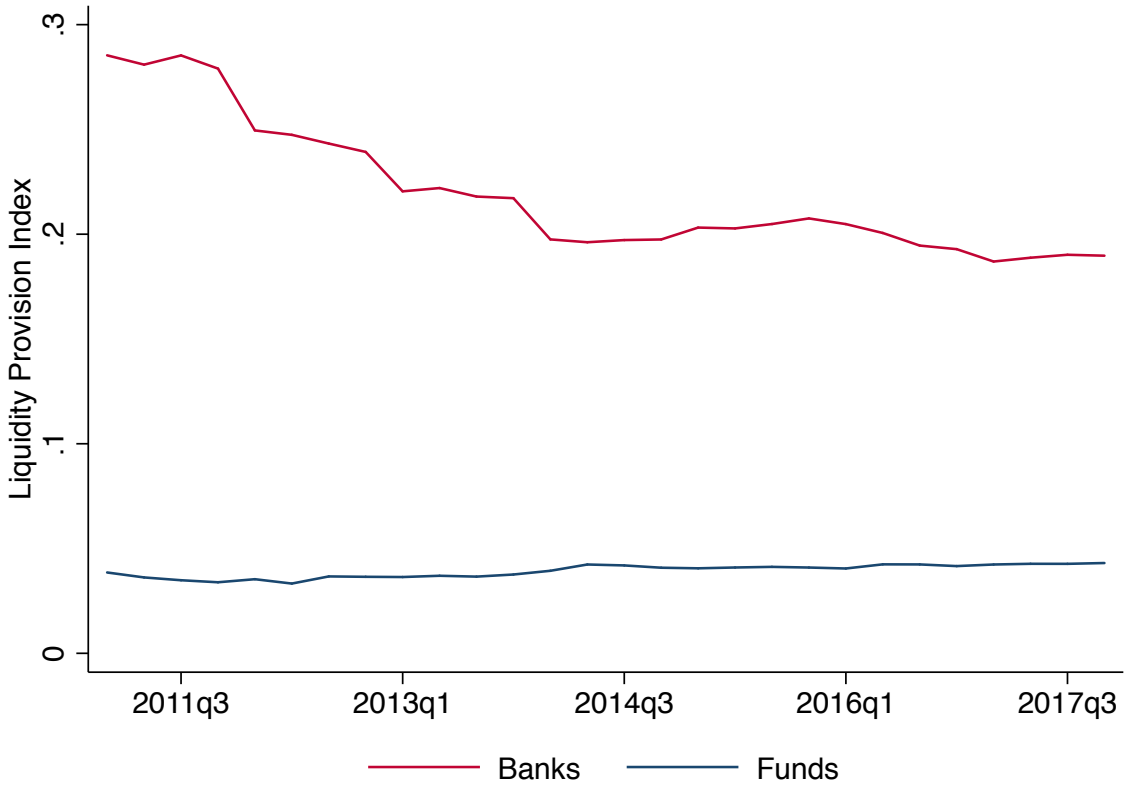
- Using iMoneyNet data, construct LPIs for each MMF-month three years before and after the Reform



- Diff-in-diff result: Institutional Prime MMMF decreases liquidity provision by 20%

Liquidity Provision Index in the Time-series

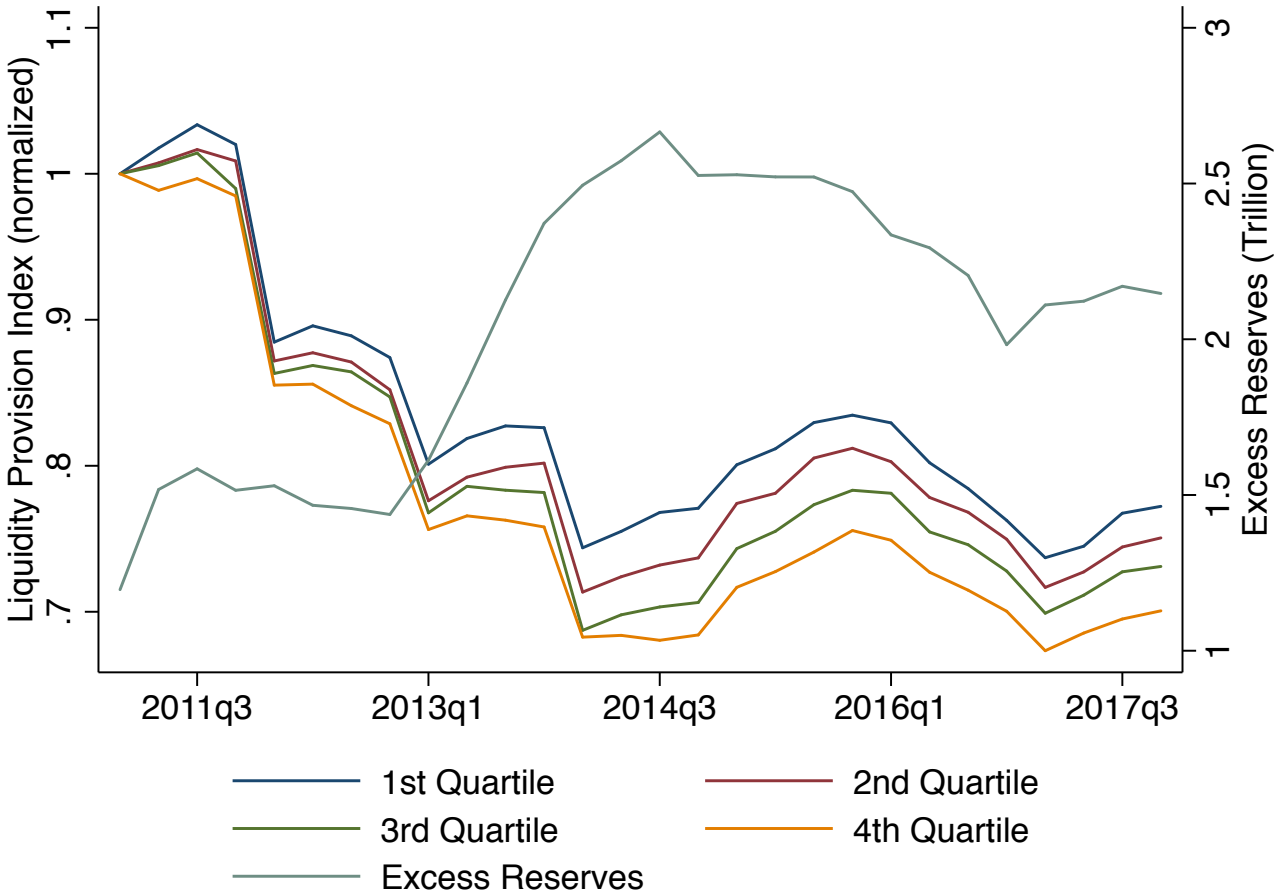
- In 2011, fund LPI is about one seventh of bank LPI
- in 2017, fund LPI is about one quarter of bank LPI



- Why decline in bank LPI?

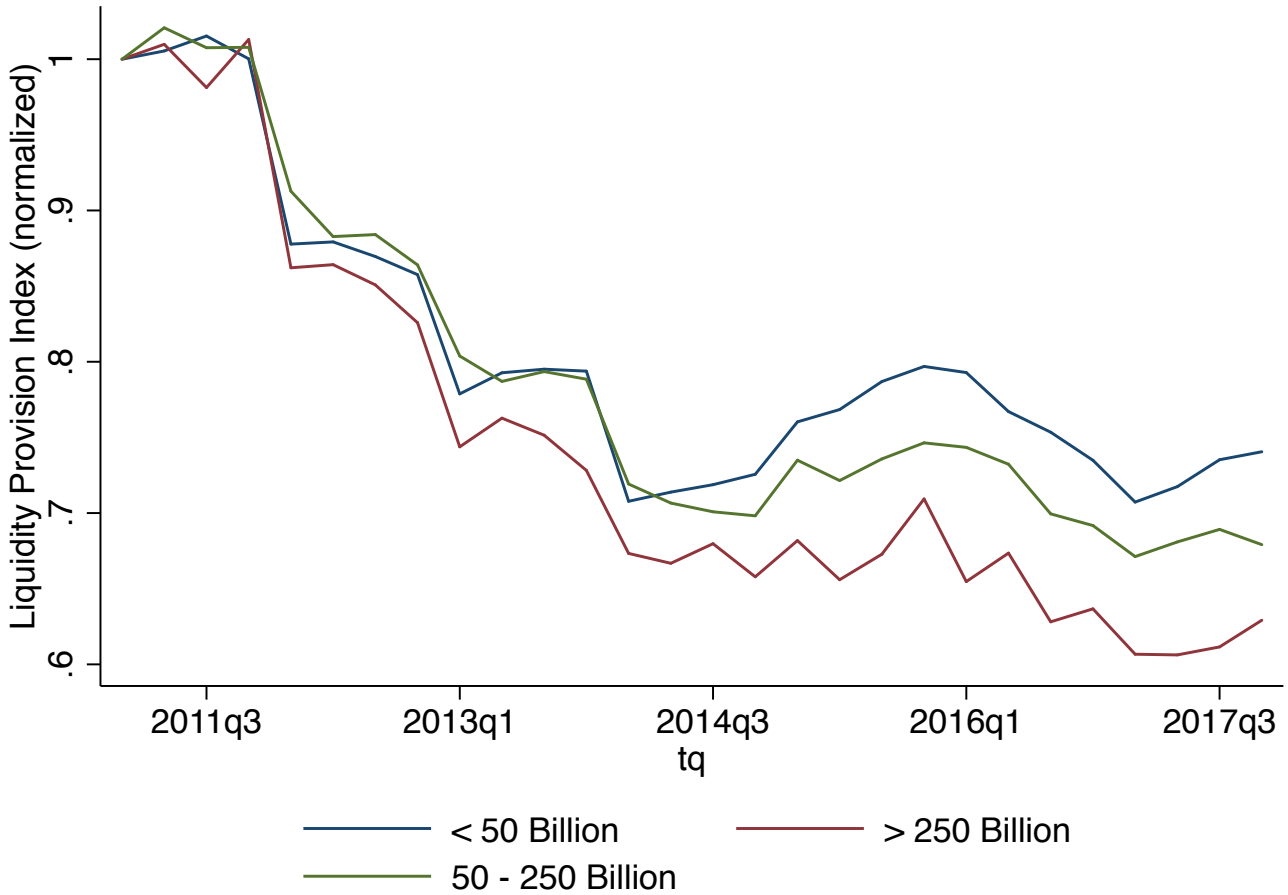
Liquidity Provision Index: Quantitative Easing

- Bank LPI and Quantitative Easing ▸ Underlying theory



Liquidity Provision Index: Liquidity Coverage Ratio

- Bank LPI and Liquidity Coverage Ratio ▸ Underlying theory



Conclusion

This paper:

1. Shows that demandable equity with fully flexible NAV provides liquidity just like demandable debt
   - 1.1 Resources are pooled at the intermediary level
   - 1.2 More liquid assets are used to meet redemptions first
2. Contrasts the frictions of debt versus equity in liquidity provision
   - Bank debt: panic runs
   - Fund equity: flows to fundamentals
3. First empirical measure of liquidity provision for both debt- and equity-issuing intermediaries: Liquidity Provision Index (LPI)

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Going Forward:

- Financial intermediation moving beyond traditional banks has many far-reaching implications
- E.g., asset market implications consistent with observations during Covid-19 (Ma, Xiao and Zeng 2020)