Market Power in Wholesale Funding: A Structural Perspective from the Triparty Repo Market

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Research question

- Price allocates resources.
- Yet the price of many securities implies a financing rate that's higher than the observed wholesale funding rate.
  - Examples of funding spreads: Treasury cash-futures basis, Treasury swap spread.
- Possible friction: intermediary's market power in wholesale funding.
- Key wholesale funding market: the Triparty repo market.
- **What is the degree of competition in the Triparty market?**

The Triparty market and this paper

- Triparty: cash-lenders (e.g., MMFs) lend to dealers using repo.
  - Funding: $2 trillion for Treasury and Agency MBS.
  - Fed policy implementation: the Overnight Reverse Repo Facility (RRP).
  - Rate: part of the new dollar interest rate benchmark (LIBOR replacement).

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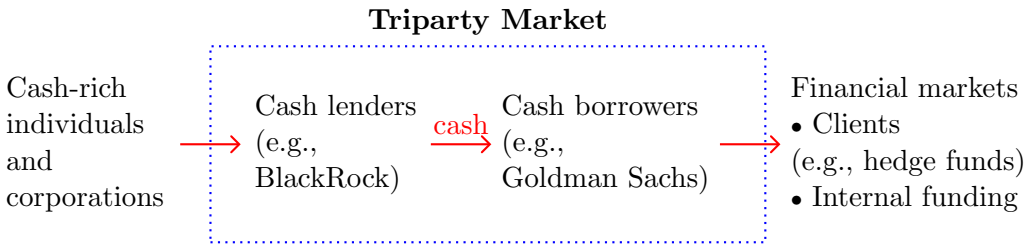
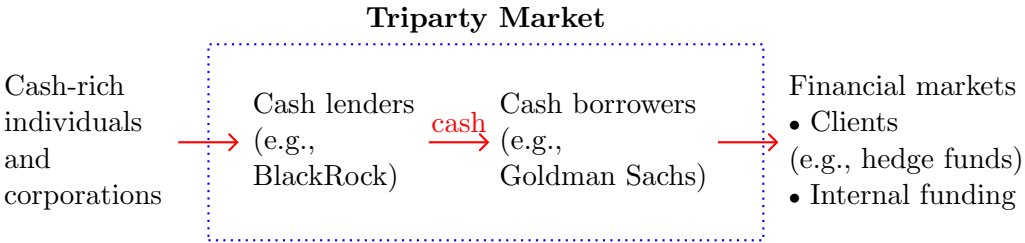
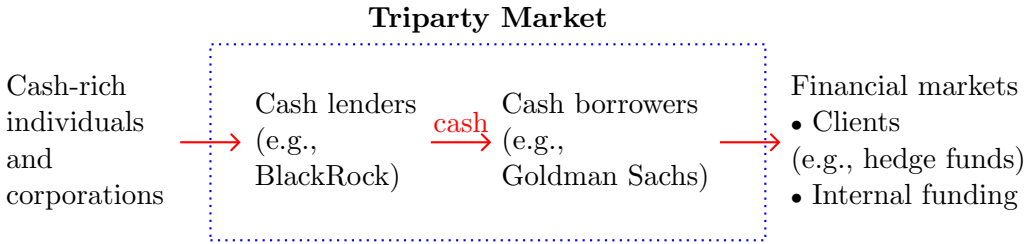
  - Develop and structurally estimate the first equilibrium model of Triparty.
- Findings:
  - Triparty dealer's markdown averages to 21 bps, or 78% of the 26-bps surplus.
  - Dealer's market power partially explains (Treasury) funding spreads.
  - Policy, e.g., the RRP rate, can be used to shape intermediary competition.


Triparty Market
Cash-rich individuals and corporations
Cash lenders (e.g., BlackRock)
cash
Cash borrowers (e.g., Goldman Sachs)
Financial markets
• Clients (e.g., hedge funds)
• Internal funding



- Clearing bank: posts collateral and monitors value.
- Collateral: specified not by CUSIP but by class, e.g., Treasurys.

  $\longrightarrow$ Uniform contracts across borrowers within a collateral class.



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  $\longrightarrow$ Uniform contracts across borrowers within a collateral class.
- Data: MMF's 2011-2017 N-MFP filings.
  - 18 MMFs and 20 dealers who do 85% of activities.
  - MMFs on average lend to 10 dealers at a time.

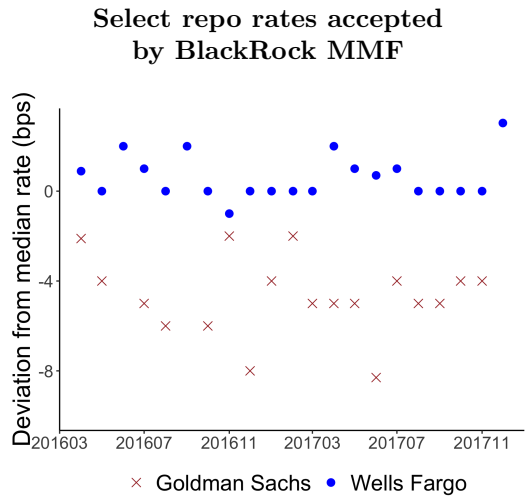
Fact 1: MMFs simultaneously and consistently accept different repo rates from different dealers

Sub-sample:

- Overnight repo collateralized by Treasury only.
- Haircut restricted to 2% (84% retained).

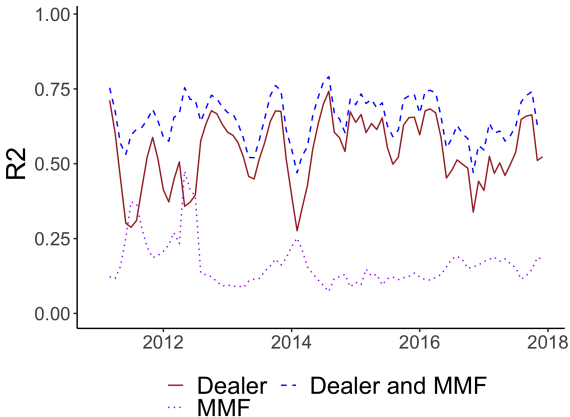
Measurement:

- Deviation from volume-weighted median.



Fact 2: Dealer identity drives repo rate dispersion

Cross-sectional regressions of deviations from median on FEs



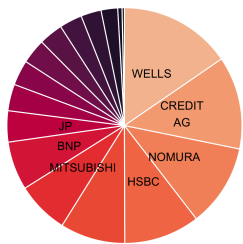
- Cross-section: dealer FE explain most of variation.
- Within-dealer: pair or MMF characteristics are not significant predictors of rate.
- Time-series: dealer FE just as powerful as pair FE.

Fact 3: Larger MMFs connect to more dealers to spread out lending

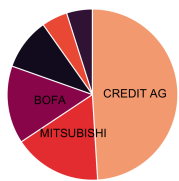
- MMFs connected to more dealers do NOT re-balance their portfolio more frequently.
- MMFs DO reduce the max, median, min shares of the portfolio lent as they get larger.

Select MMFs' lending to dealers on 2016-10-31

BLACKROCK: $65B portfolio



LEGG MASON: $9B portfolio



Discussion of empirical facts

MMFs simultaneously and consistently accept different repo rates from different dealers. (Fact 1)

Larger MMFs connect to more dealers to spread out lending. (Fact 3)

Dealer identity drives repo rate dispersion. (Fact 2)

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- Dealers borrow at the same, dealer-specific rate from all MMFs.

Model overview

Lenders supply and borrowers demand repo funding.

Agent	Action	Motivating fact
Lender (MMF)	Harbors non-pecuniary preferences.	Fact 1: simultaneous lending at persistently different rates.
	Exhibits aversion to concentration.	Fact 3: portfolio spread out among borrowers.
Borrower (dealer)	Sets borrower-specific repo rate for all lenders.	Fact 2: borrower identity explains dispersion.

The lender's problem

Lender i allocates overnight cash among J repo borrowers and his outside option z at each t:

$$U(\mathbf{x_{it}};\omega,\alpha) = \max_{\mathbf{x_{it}}} \sum_{j=1}^{J} \frac{\omega_{ijt} R_{jt}}{\alpha_{it}} \{\exp(\alpha_{it} x_{ijt}) - 1\} + R_{zt} x_{izt},$$

$$\text{s.t.} \sum_{j=1}^{J} x_{ijt} + x_{izt} = 1, x_{i1t}, ..., x_{iJt} \geq 0.$$

- x_{ijt}: share of i's portfolio lent to j.
- R_{jt}: gross repo rate offered by j.
- R_{zt}: gross return from outside option, e.g., RRP rate, 1-day Treasury.
- α_{it}: i's aversion to portfolio concentration; $\alpha \leq 0$.
- ω_{ijt}: i's non-pecuniary preference for j; $\omega \geq 0$.
- FOC w.r.t. x: $x^*_{ijt} = \frac{\log(R_{jt}) + \log(\omega_{ijt}) - \log(R_{zt})}{-\alpha_{it}}$.

The borrower's problem

Borrower j maximizes her profit by choosing her gross repo rate R_{jt} at each t:

$$\max_{R_{jt}} \left[S_{jt}(Q_{jt}) - R_{jt}\right] \cdot Q_{jt}(R_{jt}).$$

- $Q_{jt}(R_{jt}) = \sum_i \mathbf{E}[x_{ijt}(R_{jt})] \cdot y_{it}$.
- $S_{jt}(Q_{jt})$ is the average value of intermediation, net of regulatory cost.
- Borrower's FOC:

$$R^*_{jt} = \underbrace{S'_{jt} \cdot Q_{jt} + S_{jt}}_{\substack{\text{marginal value of} \\ \text{intermediation at Q}}} - \underbrace{\frac{Q_{jt}}{Q'_{jt}}}_{\text{markdown}}$$

Step 1: Parameterization to bridge model to data

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$$\alpha = \beta_0 + \beta_1 \cdot \sqrt{y_{it}}, \text{ where } y_{it} \text{ is lender's exogenous portfolio size;}$$

$$\omega_{ijt} = \underbrace{\chi_{ijt}}_{\text{extensive margin}} \cdot \underbrace{(\nu_{ijt} + \epsilon_{jt})}_{\text{intensive margin}};$$

$$\chi_{ijt} \sim Bernoulli(Logistic(\rho_{ij} + \delta \log(y_{it}))) \in \{0, 1\},$$

$$\nu_{ijt} \sim 1 + Gamma(shape = k, scale = \psi_j / k) \in (1, \infty),$$

$$\epsilon_{jt} \sim LogNormal(\frac{-\sigma^2}{2}, \sigma^2) \in (0, \infty).$$

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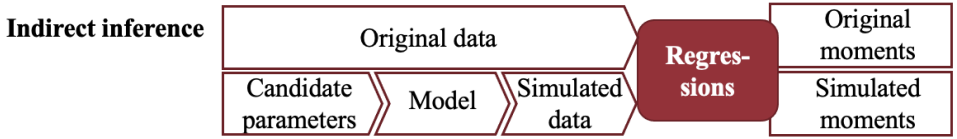
Step 2: Identification through Treasury auction IV

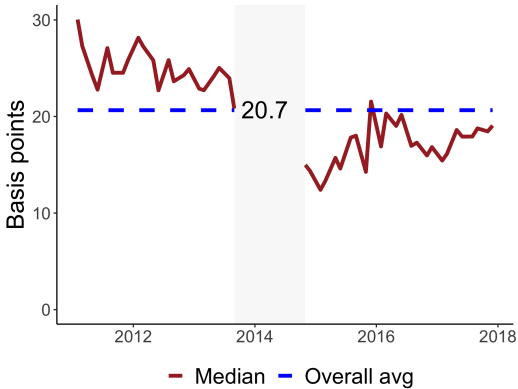
- Objective: to estimate lenders' volume response to borrowers' rate change because $\frac{dx^*_{ijt}}{d\log(R_{jt})} = -\frac{1}{\alpha_{it}}$.
- Possible endogeneity: preference shocks ϵ_{jt}.
  - E.g., negative shock: high R_{jt} but low x_{ijt}, biases OLS estimate to 0.
- Identification: shocks to borrowers' repo needs.
  - **Instrument**: Amount of non-Bill Treasury securities offered to be auctioned and whose settlements occur on MMF N-MFP reporting dates.
  - **Exclusion**: (1) Offer amount dictated by fiscal needs not preference shocks; (2) Non-Bill Treasury securities auctions do not affect MMFs.
- Result: to raise $1b in funding, borrowers need to raise their rate by 1.6 bps.

Step 3: Estimation using indirect inference



- α_{it}: size-dependent concentration aversion.
  - Moment 1: β_{IV} from IV regression.
  - Moment 2: β_{median} from MMF size and median portfolio share.
- ψ_j (capturing ω_{ijt}): borrower-specific preference.
  - Moment 1: each borrower's average conditional share.
  - Moment 2: each borrower's average unconditional probability to borrow.
- Weighting: inverse variance-covariance matrix of moments.

Dealer's markdown



$$R^*_{jt} = \underbrace{S'_{jt} \cdot Q_{jt} + S_{jt}}_{\text{marginal value of intermediation at Q}} - \underbrace{\frac{Q_{jt}}{Q'_{jt}}}_{\text{markdown}}$$

- Dealers take 78% of surplus.
  - $\overline{R_{jt} - R_{zt}}$: 5.7 bps.
  - Total surplus: 26 bps.
- First quantification of market power in wholesale funding markets.

Markdown and funding spreads

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	Measure of market power	Measures of balance sheet cost	Measures of funding spread
Triparty dealer markdown	20.65		
IOER-EFFR spread		12.79	
USD-EUR 3M CIP basis		12.16	
Treasury swap spread			32.65
Treasury cash-futures basis			47.63

Policy and competition: counterfactual

- Scenario: return on lenders' outside option changes from the RRP rate to 1-day Treasury yield.
- New equilibrium:
  - Triparty repo rate: 8 bps ↓; 3 bps below lower bound of policy target.
  - Dealer's markdown: 4 bps ↑.
  - Dealer's borrowing volume: \$48b ↑.
- Policies that change the lender's outside option materially alter the competitive landscape in the Triparty market.

Conclusions

- The Triparty repo market is a key wholesale funding market.
- New empirical facts motivate modeling the Triparty as lenders allocating their portfolios among differentiated borrowers who set repo rates.
- Estimated model reveals signficant dealer market power.
  - Dealers extract 78% of the 26-bps surplus.
  - Dealer's market power offers novel explanation for funding spreads.
  - Policy intervention can shape competition.
- Impact of intermediary competition points to the central role for intermediaries in asset pricing.