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.
  - Rate: part of the new dollar interest rate benchmark (LIBOR replacement).
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- This paper:
  - Document new facts that shed light on the nature of competition.
  - Develop and structurally estimate the first equilibrium model of Triparty.
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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.
Cash-rich individuals and corporations → Cash lenders (e.g., BlackRock) → Cash borrowers (e.g., Goldman Sachs) → Financial markets
- Clients (e.g., hedge funds)
- Internal funding

Triparty Market

Cash lenders
Cash borrowers

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

Select repo rates accepted by BlackRock MMF

![Graph showing deviation from median rate with data points for Goldman Sachs and Wells Fargo]
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
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)
Discussion of empirical facts

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- Rate is not MMFs’ only consideration.
- Possibility: MMFs value stable investment opportunities, and dealers differ in how consistently they take on repo loans.

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- Possibility: minimize exposure to operational risks that can lead to fire sales.

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- Dealers borrow at the same, dealer-specific rate from all MMFs.
Lenders supply and borrowers demand repo funding.

<table>
<thead>
<tr>
<th>Agent</th>
<th>Action</th>
<th>Motivating fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lender (MMF)</td>
<td>Harbors non-pecuniary preferences.</td>
<td>Fact 1: simultaneous lending at persistently different rates.</td>
</tr>
<tr>
<td></td>
<td>Exhibits aversion to concentration.</td>
<td>Fact 3: portfolio spread out among borrowers.</td>
</tr>
</tbody>
</table>
Lender $i$ allocates overnight cash among $J$ repo borrowers and his outside option $z$ at each $t$:

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

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

- $x_{ijt}$: 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.
- $\alpha_{it}$: $i$'s aversion to portfolio concentration; $\alpha \leq 0$.
- $\omega_{ijt}$: $i$'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 $t$: 

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

- $Q_{jt}(R_{jt}) = \sum_i E[x_{ijt}(R_{jt})] \cdot y_{it}$.

- $S_{jt}(Q_{jt})$ is the average value of intermediation, net of regulatory cost.

- Borrower’s FOC:

$$R_{jt}^* = \left. \frac{S'_{jt} \cdot Q_{jt} + S_{jt}}{Q'_{jt}} \right|_{\text{markdown}}$$
**Step 1: Parameterization to Bridge Model to Data**

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

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

\[ \omega_{ijt} = \chi_{ijt} \cdot (\nu_{ijt} + \epsilon_{jt}); \]

extensive margin 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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\[ \epsilon_{jt} \sim LogNormal(\frac{-\sigma^2}{2}, \sigma^2) \in (0, \infty). \]
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 \( \epsilon_{jt} \).
  - 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

- $\alpha_{it}$: size-dependent concentration aversion.
  - Moment 1: $\beta_{IV}$ from IV regression.
  - Moment 2: $\beta_{\text{median}}$ from MMF size and median portfolio share.

- $\psi_j$ (capturing $\omega_{ijt}$): 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.
$R^*_jt = S'_jt \cdot Qjt + Sjt - \frac{Qjt}{Q'_jt}$

- Dealers take 78% of surplus.
  - $R_{jt} - R_{zt}$: 5.7 bps.
  - Total surplus: 26 bps.

- First quantification of market power in wholesale funding markets.
Markdown and funding spreads

- Funding spreads: $R_{\text{dealer-intermediated funds}} > R_{\text{wholesale funds}}$.
  - $\implies$ intermediation frictions.
Markdown and Funding Spreads

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  - \( \Rightarrow \) intermediation frictions.
- All dealer-intermediated funds face balance-sheet cost.
- Dealer-intermediated repo funds moreover build in dealer’s markdown.
  - Treasury funding spreads = balance-sheet cost + dealer market power.
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<th>Measures of balance sheet cost</th>
<th>Measures of funding spread</th>
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<tr>
<td>Triparty dealer markdown</td>
<td>20.65</td>
<td></td>
</tr>
<tr>
<td>IOER-EFFR spread</td>
<td>12.79</td>
<td></td>
</tr>
<tr>
<td>USD-EUR 3M CIP basis</td>
<td>12.16</td>
<td></td>
</tr>
<tr>
<td>Treasury swap spread</td>
<td></td>
<td>32.65</td>
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<td>Treasury cash-futures basis</td>
<td></td>
<td>47.63</td>
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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 significant 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.