Mutual Fund Flows and Capital Supply in Municipal Financing

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Overview

- Municipal bond market crucial in state and local government financing
  - Infrastructure building and maintenance, day-to-day government operation
  - 4-trillion-dollar market as of 2021

- Who are the capital suppliers in the municipal bond market
  - Individual investors
  - Mutual funds (money market funds, closed end funds, and ETFs)
  - Banks and insurance companies

- How would capital supply affect municipal financing
  - Compared to other markets (equity and corporate bonds), the supply side effect on municipal financing is not well understood
  - Important to understand its effect on local infrastructure investment
Who Holds Municipal Bonds?

MUNICIPAL BOND HOLDINGS AS OF 2020Q3

- Households: 45.2%
- Mutual funds: 26.5%
- Banks and depository institutions: 12.2%
- Insurance: 12.1%
- Others: 4.0%
Municipal Funds as Capital Supplier

- Municipal financing is mainly through the bond market
  - Bank direct lending accounts only for a small fraction of total municipal lending (less than 10% of total municipal lending as of 2020)
- More supply of capital to funds should lead to more bond issuance
- Demand-side frictions, however, can lead to a muted response of issuance to fund flows
  - Institutional and political constraints
  - e.g., GO vs. REV bonds; voting requirements; new issuance vs. refinance
Financing, Fund Flows, and Municipal Bond Issuance

- Primary market is fragmented, so issuers-underwriter relationship likely to matter
  - Bond financing is technically arm’s length lending, but relationship is important
  - Switching lenders is costly for issuers because relationships are sticky
- Mutual funds also maintain on-going relationships with underwriters
  - In the primary market, obtain desired allocations in initial offerings of bonds
  - Need to trade with the same underwriters who are also secondary market dealers
- Shocks to fund flows should affect relationship borrowers
- Economic channel unique to the municipal bond market
  - In stocks and bonds, noise in market prices from fire sales and purchases affects corporate financing (e.g., Edmans, Goldstein, and Jiang 2012; Zhu, 2021)
  - In municipal bonds, this feedback effect of market prices is non-existent as muni bond prices are almost unobservable (trade only a few times per year)
What We Do

- Examine the extent to which investor flows drive municipal bond issuance
  - Both the likelihood and size of bond issuance
  - Do issuer-underwriter-fund relationships matter in municipal bond financing?

- Where do fund flows end up?
  - New projects / infrastructure vs. refinancing of existing projects
  - General obligation (GO) vs. revenue bonds
  - Does voting requirement matter for GO vs. revenue decision?
Identifying the Supply Side Effect

- Two distinct approaches to identify the supply side effect

- Exploit mechanical changes in Morningstar overall star rating at the 5-year mark
  - Morningstar overall star rating changes when funds turn 5-years old because five-year star rating suddenly becomes available
  - Flows respond to this change in overall rating

- Exploit within-issuer variation in funds’ participation in the primary market
  - Which funds participate in new bond purchase of the same issuer?
  - Use issuer-times-time fixed effects to purge out any unobservable demand side effects
Results (1)

- Municipalities are 5% more likely to issue bonds when fund flows increase by one standard deviation (7% of AUMs)
  - Bond issuance size also increases with fund flows

- Document a causal link between flows and issuance using our identification strategies
  - When Morningstar star ratings are upgraded because of a mechanical change in the rating for five-year-old funds, flows respond positively
  - Municipalities issue more and in larger amounts in response to this upgrade-driven fund flows, establishing a causal link
Results (2)

- Funds participate in bond issuance from their relationship municipal issuers
  - Obtain these results after purging out any demand-side effects, exploiting within-issuer participation in new bond purchases
- Fund flows used to finance bonds with lower administrative burden
  - Capital flows are but mostly refunding existing bonds
  - Revenue bonds more common than GO bonds (which require voter approval), particularly in states that require supermajority approval
- Overall, municipalities opt for issuances with less administrative burden and faster response time to take advantage of favorable capital supply conditions
Data

- Issuer information:
  - Municipal issuer information in Bloomberg
  - Geographic information + county-level macro variables (BLS/BEA)
  - Individual municipal bond issuance information (Mergent Municipal)

- Fund information:
  - Municipal bond fund holdings (CRSP MF), quarterly
  - Fund characteristics e.g., TNA, age, returns (CRSP MF)
  - Morningstar star rating and risk-adjusted return

- Final sample: 20,502 issuers and 1,010 funds between 2000Q1 and 2020Q3
Investors respond to discrete changes in Morningstar star ratings

- Morningstar risk-adjusted return (MRAR):

\[
MRAR_{i,t}(T) = \left[ \frac{1}{T} \sum_{j=0}^{T-1} \left( 1 + \text{Excess Return}_{i,t-j} \right) \right]^{-\frac{12}{2}} - 1
\]

- Within-category rankings are calculated based on MRAR over past 3-, 5-, and 10-year horizons
- Top 10% awarded 5 stars, next 22.5% 4 stars, next 35% 3 stars, etc
- Overall star ratings calculated by averaging 3-, 5-, and 10-year star ratings
- Investors respond strongly to star rating change, controlling for fund performance (Ben-David et al., 2021; Evans and Sun, 2021; Reuter and Zitzewitz, 2021)
Identification: 5-Year Rating Introduction

- Funds younger than 5 years, overall star rating = 3-year rating
- But on the 5-year mark, the 5-year rating suddenly enters
  - Overall rating now becomes a rounded integer of $60\% \times 5$-year + $40\% \times 3$-year ratings
  - This 5-year rating is based on relatively “stale” information
  - Treated: 60-month-old funds that have just been upgraded
  - Control: those reaching 60 months old and remaining at the old rating
- Diff-in-diff (1): This upgrade is not driven by recent fund performance. Do fund flows still respond to it?
- Diff-in-diff (2): Do the municipalities held by treated funds issue more than those held by control funds?
Fund Flows at the 5-Year Mark

Difference in flows between upgraded vs. remaining funds at 5-year mark
Bond Issuance at the 5-Year Mark

Difference in bond issuance between upgraded-held vs. remaining-held issuers at 5-year mark

Likelihood of new issuance around rating upgrades at the 5-year mark
### Morningstar rating changes and issuance: 5-year mark

<table>
<thead>
<tr>
<th></th>
<th>Dependent variable</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New issuance dummy</td>
<td>Log new issuance amount</td>
<td></td>
</tr>
<tr>
<td>Post 5-year</td>
<td>0.002</td>
<td>-0.002</td>
<td>(0.335)</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated × Post 5-year</td>
<td>0.013***</td>
<td>0.266***</td>
<td>(2.834)</td>
</tr>
<tr>
<td></td>
<td>(3.241)</td>
<td></td>
<td></td>
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<tr>
<td>MRAR</td>
<td>0.000</td>
<td>0.013</td>
<td>(0.292)</td>
</tr>
<tr>
<td></td>
<td>(0.497)</td>
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<td></td>
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<tr>
<td>No. of observations</td>
<td>250,148</td>
<td>250,148</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.435</td>
<td>0.463</td>
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<td>Share class FE</td>
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<td>YES</td>
<td></td>
</tr>
<tr>
<td>Issuer FE</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>State-by-quarter FE</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Significance levels: ***p < 0.001**
- Standard errors in parentheses.
Fund Flow and Issuance: Role of Relationship

- Municipal bond market is heavily fragmented
  - > 2,000 underwriters, more than double those in corporate bond market
  - “Municipal bonds are not bought but sold”: underwriters approach their established customers for potential new issuances
  - Relationship is likely to matter a lot

- Exploit within-issuer variation in fund relationship
  - Issuer-times-time fixed effects
  - Can purge out any demand-side effects on bond issuance

- We examine three different kinds of relationship
  - Fund-issuer
  - Fund-underwriter
  - Fund-underwriter-issuer
Issuer, fund, and underwriter relationship

<table>
<thead>
<tr>
<th>Relationship level</th>
<th>Fund-issuer</th>
<th>Fund-underwriter</th>
<th>Fund-underwriter-issuer</th>
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</thead>
<tbody>
<tr>
<td><strong>Fund flow × Prev. relationship dummy</strong></td>
<td>0.036***</td>
<td>0.030***</td>
<td>0.058***</td>
</tr>
<tr>
<td></td>
<td>(9.335)</td>
<td>(9.334)</td>
<td>(9.704)</td>
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<tr>
<td><strong>Fund flow × No prev. relationship dummy</strong></td>
<td>0.010***</td>
<td>-0.001</td>
<td>0.008***</td>
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<tr>
<td></td>
<td>(7.292)</td>
<td>(-0.944)</td>
<td>(6.354)</td>
</tr>
</tbody>
</table>

| No. of observations | 15,856,904 | 15,856,904 | 15,856,904 |
| Adjusted R-squared  | 0.398      | 0.398      | 0.398      |
| Issuer-by-quarter FE | YES        | YES        | YES        |
| Share class FE      | NO         | NO         | NO         |

- Similar patterns hold in our identification settings
Method of Offering

- These relationships should matter more when an issuer approaches the underwriter for negotiated sale rather than call for competitive auction bids

<table>
<thead>
<tr>
<th></th>
<th>Dependent variable: New issuance dummy</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>(1)</td>
</tr>
<tr>
<td>At least one competitive bids</td>
<td>0.004*</td>
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<tr>
<td>(1.884)</td>
<td>(1.870)</td>
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<tr>
<td>Negotiated sales (no competitive bids)</td>
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<td>Rating upgrade at 5-year × Post 5-year</td>
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<td>No. of observations</td>
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<tr>
<td>State-by-quarter FE</td>
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</tbody>
</table>

- Economic significance more than doubles for negotiated sales
Source of Repayment and Capital Purpose

- When capital supply increases, which bonds do municipalities issue?
- General obligation (GO) vs. non-GO bonds
  - GO bonds are backed by tax-payers’ money and costlier to issue because voter approval is usually required at the ballot box
  - Particularly difficult in states that require supermajority approval
  - Non-GO bonds are easier and quicker to issuer without requiring voter approval
- New filing vs. refinancing bonds
  - New filings are issued for new projects
  - Refinancing bonds replace existing bonds and are easier to issue with lower transaction costs
## Source of Repayment and Capital Purpose

<table>
<thead>
<tr>
<th>Rating upgrade at 5-year × Post 5-year</th>
<th>(1) At least one GO issuance</th>
<th>(2) No GO issuance</th>
<th>(1) New filing issuance only</th>
<th>(2) Refunding issuance only</th>
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</thead>
<tbody>
<tr>
<td>Rating upgrade at 5-year × Post 5-year</td>
<td>0.003 (1.607)</td>
<td>0.010** (2.513)</td>
<td>0.004 (1.036)</td>
<td>0.009** (2.225)</td>
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<td>250,148</td>
<td>250,148</td>
<td>250,148</td>
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<tr>
<td>Adjusted R-squared</td>
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<td>0.261</td>
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<tr>
<td>State-by-quarter FE</td>
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</table>
Political Obstacles and GO vs. Rev Bond Issuance

<table>
<thead>
<tr>
<th></th>
<th>Dependent variable: New issuance dummy</th>
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<tbody>
<tr>
<td></td>
<td>Supermajority states</td>
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<td></td>
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<td>At least one GO issuance</td>
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<td>State-by-quarter FE</td>
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</tr>
</tbody>
</table>

- The difference in GO vs. revenue issuance likelihood is much more pronounced in states that require supermajority approval for GO bond issuance.
Conclusion

▪ Capital flows from bond funds play an important role in municipal bond financing

▪ We show a causal effect of fund flows on bond issuance using
  • Quasi-natural experiments based on Morningstar rating introduction and
  • Relationship through underwriters is the channel through which shocks to fund flows affect municipal financing

▪ Evidence suggests that capital inflows do not finance new investments
  • Municipalities use the funds on refinancing of existing projects
  • Easy-to-issue bonds (e.g., revenue bonds)
  • Fiscal policymakers should be aware of this implication of capital supply shock