From Arm's Length to Arm in Arm: Banks and Municipal Bond Financing

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Disclaimer

*The views expressed in this paper are those of the authors, and **do not** necessarily represent the views of the Federal Reserve Board or the Federal Reserve System.*

Motivation

- Banks exert considerable influence in the municipal bond market
  - They hold a substantial share of outstanding municipal bonds in their investment portfolios
  - In the last two decades: $\sim$20% of total muni holdings (Fed Flow of Funds)
- A growing literature has unveiled a compelling connection between banks' demand for municipal bonds and a range of consequential outcomes
- Existing studies lack precise information on the specific bonds banks hold
  - These papers rely on analyzing municipal bonds that banks are allowed to hold *vs.* those they are constrained from holding due to regulatory guidelines
  - This approach falls short in identifying which characteristics of municipal bonds or issuers influence banks' decisions to hold munis

This Paper

- We use unique and comprehensive regulatory data: Fed's Y-14Q Collection
- What factors do banks use in their municipal bonds investment decision?
- Allow us to explore the channels that mediate the effects of bank demand on municipal bond issuers.
- How does bank demand affect both banks and bond issuers?

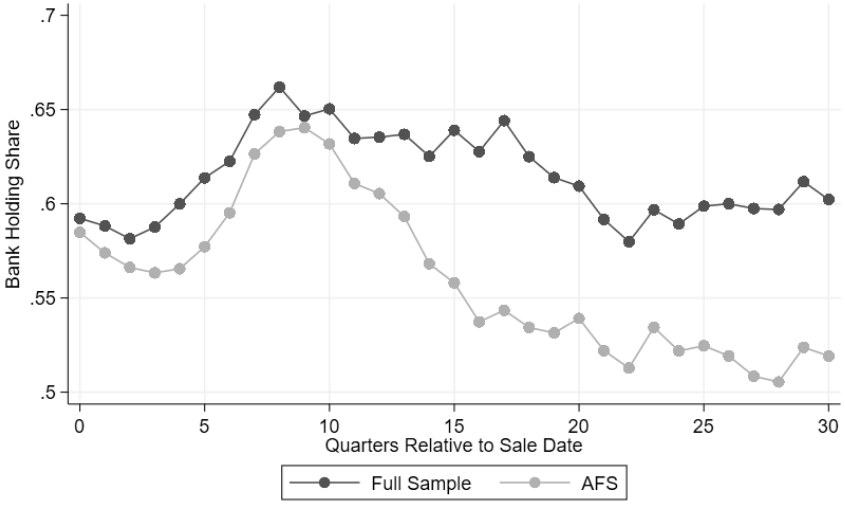
Summary of Results

- Relationships play an important role in the banks' decisions to hold a bond.
- Banks prefer Larger, Long-Maturity, Insured, with a High Credit rating that complies with liquidity regulations...
- ... but they are *less sensitive* to these characteristics when picking a bond from a connected issuer!
- We employ a Khwaja and Mian (2008) DID design to causally estimate how bank–issuer relationships affect a bank's decisions to hold a bond.
- Banks benefit from the relationship with information advantage, leading to superior investment performance.
- Bank Relationships enhance bond issuance characteristics in **good times** and act as a stabilizer during **adverse times**

Contribution

- The effects of bank holdings' on municipal financing
  [Bergstresser & Orr (2014), Garrett (2021), Ivanov & Zimmermann (2021), Yi (2021), Dagostino (2022), Garrett & Ivanov (2022), Cortes *et al.* (2023)]
  - We introduce a novel dataset that provides unprecedented granularity regarding banks' holdings of municipal bonds ("black box")
  - We shed light on the influence of banking relationships in a bank's decision to hold a bond
  - Our findings show that banking relationships serve as an important channel through which bank demand influences municipal bond issuers.
- The effects of banking relationships in alleviating financial constraints
  [Berger & Udell (1992, 1995), Petersen & Rajan (1994, 1995), Butler (2008), Bolton *et al.* (2016)]
  - Adelino *et al.* (2021): relationships between the issuer, underwriter, and mutual fund affect mutual funds' demand for municipal bonds.
  - We reveal the surprising importance of relationships in muni issuances, traditionally characterized by large-scale issuers with strong market reputations
  - We break away from the prevailing focus on bank loans, exploring the impact of relationships on bond issuances

Banks Hold a Large Fraction of Total Issuance



Banking Relationships

- We draw lessons from a substantial body of literature examining bank-firm relationships.
- Large body of evidence showing that banks can reduce lending cost leveraging their superior information gathering and processing capabilities (e.g., Diamond (1991); Berger and Udell (1992, 1995, 2006), Petersen and Rajan (1994, 1995))
- It is premature to assume these findings translate seamlessly to bank relationships in the municipal bond market.
  - Municipal bonds are publicly traded
  - Large issuers with stable revenue streams and implicit guarantees from higher levels of government.

Characteristics of Bonds Purchased: Bank Relationships

	Dependent Variable: $\mathbb{1}\{Purchase\}$				
	(1)	(2)	(3)	(4)	(5)
Bank Relationships					
Underwriter	0.385***	0.394***	0.385***	0.386***	0.380***
	(0.033)	(0.032)	(0.033)	(0.033)	(0.032)
Credit Relationship	-0.001*	-0.002***	-0.001**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Repeat-Holder	0.934***	0.927***	0.932***	0.931***	0.931***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Continues in next slide...					
Year-Quarter FE	Y	N	N	N	N
Issuer Type FE	Y	N	Y	Y	N
State FE	N	N	N	Y	N
Rating × Year-Quarter FE	N	Y	Y	Y	Y
State × Year-Quarter × Issuer Type FE	N	N	N	N	Y
R^2	0.408	0.403	0.410	0.411	0.440
N	1,086,608	1,185,852	1,086,593	1,086,593	1,086,391

Characteristics of Bonds Purchased: Regulation-Compliant and Relationship

	Dependent Variable: $\mathbb{1}\{Purchase\}$				
	(1)	(2)	(3)	(4)	(5)
... Continued from last slide					
Bond Characteristics					
Term Amount	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Maturity	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yield	-0.001	0.000	0.001	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Insured	0.002**	0.005***	0.003***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
High Credit Rating	0.008***	0.011***	0.007***	0.006**	
	(0.001)	(0.003)	(0.003)	(0.003)	
Regulation					
HQLA	0.005***	0.007***	0.005***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank-Qualified	0.016***	0.017***	0.016***	0.016***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year-Quarter FE	Y	N	N	N	N
Issuer Type FE	Y	N	Y	Y	N
State FE	N	N	N	Y	N
Rating × Year-Quarter FE	N	Y	Y	Y	Y
State × Year-Quarter × Issuer Type FE	N	N	N	N	Y
R^2	0.408	0.403	0.410	0.411	0.440
N	1,086,608	1,185,852	1,086,593	1,086,593	1,086,391

Bank Relationship and The Characteristics of Bonds Held

Relationship Type:	Dependent Variable: $\mathbb{1}\{Purchase\}$								
	Underwriter			*Credit Relationship*			*Repeat Holder*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relationship	0.998***	0.987***	0.994***	-0.007***	-0.009***	-0.005***	0.996***	0.988***	0.983***
	(0.003)	(0.004)	(0.020)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.004)
Bond Characteristics									
Large Bond	0.008***	0.005***	0.005***	0.004***	0.001	0.001	0.004***	0.001	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relationship × *Large Bond*	-0.026***	-0.024***	-0.037*	0.016***	0.015***	0.016***	-0.013***	-0.007***	-0.002
	(0.003)	(0.004)	(0.020)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.004)
High Credit Rating	0.007***	0.007***		0.005***	0.004***		0.003***	0.004***	
	(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)	
Relationship × *High Credit Rating*	-0.015***	-0.014***	-0.017**	0.007***	0.009***	0.006***	-0.007***	-0.007***	-0.009***
	(0.002)	(0.003)	(0.008)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Regulation									
HQLA	-0.001	-0.003	-0.004	-0.001	-0.004	-0.002	0.001	-0.001	-0.002
	(0.003)	(0.003)	(0.009)	(0.003)	(0.004)	(0.009)	(0.002)	(0.002)	(0.007)
Relationship × *HQLA*	-0.001	-0.003	-0.017*	0.001	0.002	-0.001	-0.003***	-0.002*	-0.004*
	(0.003)	(0.003)	(0.010)	(0.002)	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)
Bank-Qualified	0.012***	0.012***	0.012***	0.013***	0.011***	0.012***	0.010***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relationship × *Bank-Qualified*	-0.013***	-0.016***	-0.005	-0.004	-0.002	-0.002	-0.009***	-0.010***	-0.015***
	(0.003)	(0.005)	(0.016)	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)	(0.006)
Year-Quarter FE	Y	N	N	Y	N	N	Y	N	N
Issuer Type FE	Y	Y	N	Y	Y	N	Y	Y	N
State FE	N	Y	N	N	Y	N	N	Y	N
State × Year-Quarter × Issuer Type FE	N	N	Y	N	N	Y	N	N	Y
Rating x Year-Quarter FE	N	Y	Y	N	Y	Y	N	Y	Y
R^2	0.072	0.077	0.128	0.018	0.026	0.081	0.018	0.026	0.430
N	1,185,863	1,086,608	1,086,391	1,185,863	1,086,608	1,086,391	1,086,606	1,086,603	1,086,391

Relationships and Holdings

- While these findings offer valuable insights into the role of relationships in banks' decisions to hold municipal bonds, they rely on cross-sectional variation, raising potential endogeneity concerns.
- We leveraged changes in liquidity regulations and the reclassification of municipal bonds as high-quality liquid assets (HQLA), which increased banks' demand for municipal bonds.
- Endogenous matching process between banks and issuers. For causal evidence, we need a Khwaja and Mian (2008) strategy:
  - Our approach introduces issuer-year-specific fixed effects into our regressions
  - If the sole determinant of the decision to hold a bond is the issuer's quality, we anticipate both banks to exhibit identical decisions
  - Otherwise, a different likelihood to hold would suggest that banking relationships play a substantive role in these choices

Relationship Lending and the effects of HQLA eligibility using Khwaja–Mian (2008)

Relationship Type:	Dependent Variable: log(*Bank Holdings*)								
	Underwriter			*Credit Relationship*			*Repeat Holder*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relationship × *HQLA*	0.406**	0.411**	0.410**	0.711**	0.696**	0.613*	-0.331	-0.337	-0.335
	(0.202)	(0.203)	(0.196)	(0.295)	(0.295)	(0.336)	-0.22	(0.222)	(0.223)
Relationship	0.105	0.0933	0.0668	0.0281	0.0264	0.0632	0.519***	0.527***	0.501***
	(0.148)	(0.150)	(0.143)	(0.185)	(0.184)	(0.190)	-0.131	(0.129)	(0.128)
Maturity	0.080***	0.090***	0.090***	0.073***	0.087***	0.086***	0.076***	0.086***	0.087***
	(0.007)	(0.010)	(0.010)	(0.010)	(0.011)	(0.008)	-0.008	(0.010)	(0.010)
Yield		-0.109*	-0.143**		-0.148**	-0.160***		-0.114*	-0.147**
		(0.065)	(0.062)		(0.069)	(0.060)		(0.064)	(0.061)
log(*Amount*)			0.345***			0.311***			0.342***
			(0.051)			(0.060)			(0.050)
Issuer-Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
R^2	0.767	0.766	0.774	0.802	0.803	0.810	0.768	0.767	0.776
N	2,698	2,686	2,686	2,110	2,101	2,101	2,698	2,686	2,686

The Information Channel of Bank Relationship: Future Returns

Relationship Type:	Dependent Variable: *Bond Return*$_{b,t}$								
	Underwriter			*Credit Relationship*			*Repeat Holder*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relationship	-0.110	-0.121	-0.282	0.421***	0.327**	0.281*	0.337**	0.420**	0.268
	(0.502)	(0.593)	(0.585)	(0.144)	(0.166)	(0.166)	(0.142)	(0.178)	(0.178)
Bond Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Issuer Type × Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE	Y	N	N	Y	N	N	Y	N	N
Rating FE	N	Y	N	N	Y	N	N	Y	N
Rating × Year-Quarter FE	N	N	Y	N	N	Y	N	N	Y
R^2	0.025	0.026	0.048	0.025	0.026	0.049	0.025	0.027	0.049
N	115,537	79,494	79,488	115,537	79,494	79,488	115,537	79,494	79,488

Bank Relationships in Good Times

	Offer Yield		*Purchase*	
	(1)	(2)	(3)	(4)
A. Underwriting Relationship				
Underwriter	0.110**	0.130***	0.857***	0.855***
	(0.044)	(0.042)	(0.026)	(0.026)
Underwriter × Post HQLA	-0.236***	-0.251***	0.339***	0.339***
	(0.056)	(0.055)	(0.055)	(0.056)
R^2	0.758	0.763	0.088	0.090
N	1,086,606	1,086,603	1,100,406	1,100,403
B. Credit Relationship				
Credit Relationship	0.025***	0.030***	0.003**	0.003**
	(0.007)	(0.007)	(0.001)	(0.001)
Credit Relationship × Post HQLA	-0.031***	-0.037***	0.002	0.002
	(0.011)	(0.011)	(0.002)	(0.002)
R^2	0.758	0.763	0.036	0.039
N	1,086,606	1,086,603	1,100,406	1,100,403
C. Repeat-Holder Relationship				
Repeat-Holder	-0.032	-0.050*	0.966***	0.965***
	(0.024)	(0.025)	(0.001)	(0.001)
Repeat-Holder × Post HQLA	-0.127***	-0.146***	0.003**	0.003*
	(0.035)	(0.037)	(0.002)	(0.002)
R^2	0.752	0.763	0.398	0.399
N	1,086,606	1,086,603	1,100,406	1,100,403
Bond Controls	Y	Y	Y	Y
Issuer Type × Year FE	Y	Y	Y	Y
Rating × Year FE	N	Y	N	Y

Bank Relationships and The Financial Crisis

	Offer Yield		*Purchase*	
	(1)	(2)	(3)	(4)
A. Underwriting Relationship				
Underwriter	0.074*	0.092**	0.938***	0.936***
	(0.044)	(0.042)	(0.003)	(0.003)
Underwriter × *Crisis*	-0.191**	-0.204**	0.003	0.005
	(0.083)	(0.083)	(0.004)	(0.004)
R^2	0.758	0.763	0.086	0.088
N	1,086,606	1,086,603	1,100,406	1,100,403
B. Credit Relationship				
Credit Relationship	0.023***	0.027***	0.003***	0.003***
	(0.007)	(0.006)	(0.001)	(0.001)
Credit Relationship × *Crisis*	-0.037***	-0.039***	-0.001	-0.001
	(0.012)	(0.012)	(0.002)	(0.002)
R^2	0.758	0.763	0.036	0.039
N	1,086,606	1,086,603	1,100,406	1,100,403
C. Repeat-Holder Relationship				
Repeat-Holder	0.054	0.071	0.939***	0.937***
	(0.043)	(0.045)	(0.003)	(0.003)
Repeat-Holder × *Crisis*	-0.122*	-0.136**	0.012***	0.013***
	(0.065)	(0.067)	(0.004)	(0.004)
R^2	0.758	0.763	0.142	0.144
N	1,086,606	1,086,603	1,100,406	1,100,403
Bond Controls	Y	Y	Y	Y
Issuer Type × Year FE	Y	Y	Y	Y
Rating × Year FE	N	Y	N	Y

Conclusion

- We use unique and comprehensive regulatory data to study how banks strategically navigate their choices among municipal bonds
- We provide causal evidence that banking relationship affects bank decisions to hold a bond and benefits issuers
- Banks benefit from the relationship with information advantage, leading to superior investment performance.
- Bank Relationships enhance bond issuance characteristics in good times and act as a stabilizer during adverse times

Policy Implications:

- Our results support the view that incentivizing banks to hold munis is good for the stability of the municipal bond market
- This could be achieved by reevaluating existing tax policies, which currently limit tax exemptions for municipal bonds *exclusively to banks*