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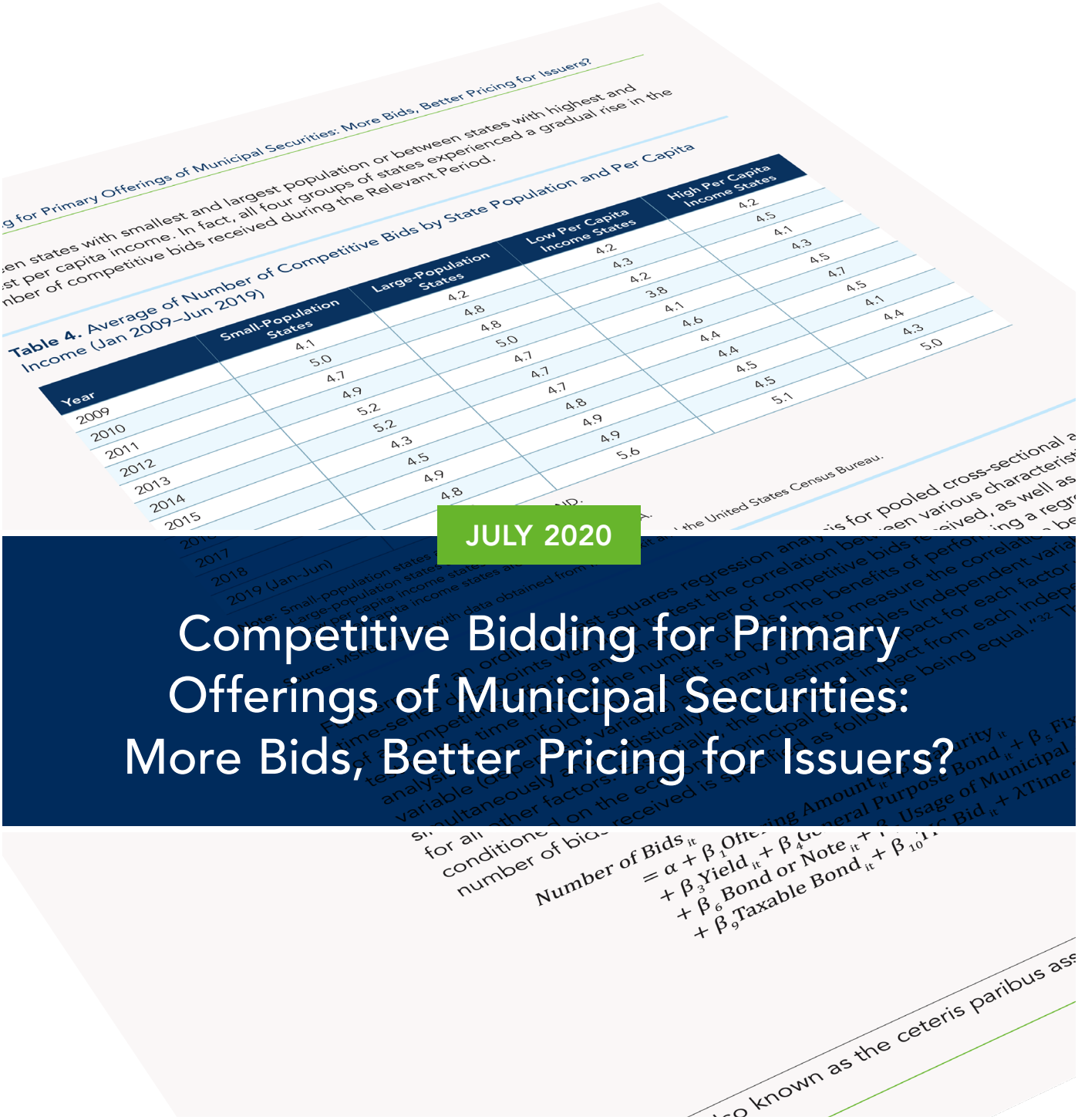

JULY 2020

Competitive Bidding for Primary Offerings of Municipal Securities: More Bids, Better Pricing for Issuers?

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CONTENTS

Abstract[1]

This paper examines the competitive bidding activity in municipal securities during the primary offering process. The prevalent view among industry participants is that when an issuer chooses the competitive offering method over the negotiated offering method or the private placement method, it is in the interest of the issuer to solicit as many bids as possible from competing underwriters or underwriter syndicates. Presumably, when underwriters compete to win the offering at a cost of sacrificing the profit margin, the issuer would benefit from the competition by selling the securities at the most advantageous price, or the lowest yield. There has been, however, scant research literature in recent years empirically investigating the relationship between competitive bidding activities and the resulting primary offering profit margin earned by the winning bidder from reselling.

This paper analyzes two aspects of the competitive offering process in recent years: 1) the average number of competitive bids received by an issuer; and 2) the impact of the bidding competition on winning underwriters' profit margins. We found that the average number of competitive bids received gradually increased over the past 10 years, from an average of 4.4 competitive bids per issuance in 2009 to an average of 5.7 competitive bids per issuance in the first half of 2019. This conclusion holds regardless of the size of an issuance, the population of the state where the issuance originated (referred to in this paper as "issuance origination state") or the per capita income level of an issuance origination state. In addition, we found that the winning bidder's primary offering spread was negatively correlated with the number of competitive bids received after controlling for characteristics of each offering, such as offering size, time to maturity and yield, etc. Therefore, all things being equal, soliciting more competitive bids does indeed improve an issuer's selling price and reduce the yield cost for the issuer.

We caution that the conclusion from this paper is preliminary and may warrant further investigation, such as further exploring immediate trading in the secondary market during the first 30 days subsequent to the initial offerings.

[1] The views expressed in the research papers are those of the author(s) and do not necessarily reflect the views and positions of the MSRB Board and other MSRB staff.

Introduction and Background

Municipal bond issuers typically use one of three methods to issue bonds in the primary market: competitive offering, negotiated offering or private placement. Academic researchers have offered insights into why a municipal issuer chooses one method of sale over the other, primarily because of the consideration of the overall cost of financing. The prevalent view among industry participants is that when an issuer chooses the competitive offering method over the negotiated offering method or the private placement method, it is in the interest of the issuer to solicit as many bids as possible from competing underwriters or underwriter syndicates.[2] Presumably, when underwriters compete to win the offering at a cost of sacrificing the profit margin, the issuer would benefit from the competition among underwriters by selling the securities at the most advantageous price, or the lowest yield. Despite the widespread agreement among market participants, there has been scant research literature in recent years empirically investigating the relationship between the competitive bidding activities and the resulting primary offering profit margin earned by the winning bidder from reselling. This paper focuses on how the average number of competitive bids received by an issuer has evolved in recent years and statistically tests and quantifies the impact of the bidding competition on winning underwriters' profit margins.

Overview of Municipal Securities Market

The municipal securities market in the United States is the major source of capital for state and local governments. Both the funding purpose and size of the municipal securities market underscore its importance in the U.S. economy. In addition to financing critical government projects and operations, municipal securities are used by state and local governments to meet a wide variety of other public needs, including transportation and environmental infrastructure, economic development, and utility, educational and healthcare facilities, among others. Issuers of municipal securities include towns, cities, counties and states, as well as state and local government agencies and entities with authority to issue debt.[3] There are estimated to be over 50,000 issuers of municipal securities.[4] At the end of 2019, the outstanding principal value of municipal securities was estimated to be approximately $3.85 trillion.[5] The annual issuance of municipal bonds amounts to between $300 and $450 billion in recent years.[6]

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2 The underwriter syndicate is a group of underwriters who jointly sell new offerings to investors. It is usually formed and led by a lead underwriter. Underwriters often form a syndicate for competitive bidding to disperse the liability for a deal among the underwriters in a syndicate.

3 In addition to conduit borrowers.

4 This compares to the public corporate securities market, which has approximately 5,900 issuers who have issued approximately 48,000 individual securities. *See* Bloomberg data for 2019.

5 Board of Governors of the Federal Reserve System. "Financial Accounts of the United States," Table L-212, Federal Reserve Bank, March 22, 2020. When measured in market value, the outstanding amount of municipal securities was around $4.14 trillion.

6 Thomson Reuters.

The municipal securities market provides important investment opportunities for both retail and institutional investors. By purchasing and holding municipal bonds, investors are, in effect, lending money to a bond issuer in exchange for a promise of regular interest payments, usually semi-annually, and the return of the face value of the bond, or "principal," either on a pre-specified maturity date or on a call date when the issuer repays the bond before its maturity date.[7] The interest on municipal bonds is generally exempt from federal income tax and may also be exempt from state and local taxes depending on state laws and an investor's residency.[8] As of the end of 2019, the household sector directly owned approximately 45.7% of the total value of municipal bonds outstanding, and indirectly owned up to another 26.8% via mutual funds, closed-end funds, exchanged-traded funds and money market funds.[9]

Municipal Securities Primary Offerings

The municipal securities market is highly fragmented due to, among other reasons, its size, the number of issuers and the differential tax treatments by states for bonds issued in-state and out-of-state. While the municipal securities industry has developed a well-functioning secondary market for trading, many investors acquire municipal bonds either during the primary offering process or immediately after the start of the secondary market.[10]

Among the three methods of bond issuance, the method of competitive offerings, also referred to as "competitive bidding," involves the issuer requesting underwriters to submit a firm bid to purchase a new issue of municipal securities through the Notice of Sale. The issuer dictates the structure of a competitive offering up front, such as call features, maximum/minimum dollar price, etc., and identifies the date and time of the sale. The issuer awards the municipal securities to the underwriter or underwriter syndicate presenting the lowest interest rate cost according to stipulated criteria set forth in the Notice of Sale.[11]

By comparison, a negotiated offering refers to the sale of a new issue of municipal securities by an issuer directly to an underwriter or underwriter syndicate selected by the issuer

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7 *See* Wu, Simon Z., John Bagley and Marcelo Vieira, "Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems," Research Paper, Municipal Securities Rulemaking Board, October 2018.

8 Bond investors typically seek a steady stream of income payments and tend to be more risk-averse and more focused on preserving, rather than increasing, wealth. Given the tax benefits, the interest rate for municipal bonds is usually lower than on comparable taxable fixed-income securities such as corporate bonds and even some treasury securities.

9 Board of Governors of the Federal Reserve System. "Financial Accounts of the United States," Table L-212, Federal Reserve Bank, March 22, 2020. Some of these holdings in funds, however, could be from institutional investors.

10 In general, municipal securities investors tend to be "buy and hold" investors. Trading patterns for municipal securities typically involve relatively frequent trading during the initial period after issuance, such as the first thirty days, followed by infrequent or sporadic trading activity during the remaining life of the security. *See* Wu, Simon Z., John Bagley and Marcelo Vieira, "Analysis of Municipal Securities Pre-Trade Data from Alternative Trading Systems," Research Paper, Municipal Securities Rulemaking Board, October 2018.

11 *See* "Glossary of Municipal Securities Terms" published by the MSRB (http://www.msrb.org/glossary.aspx).

previously, with negotiation on the interest rate, call features and purchase price of the issue but without public competitive bidding.[12] The negotiated offering is similar to the traditional initial public offering (IPO) process conducted in the equity market.

Lastly, in a private placement offering, a placement agent sells a new issue of municipal securities on behalf of the issuer directly to investors on an agency basis, usually to a limited number of sophisticated investors.[13] With a private placement, issuers are not subject to the same disclosure requirements, such as the continuing disclosure requirements, as other forms of public offerings.[14]

Competitive Bidding Process

The competitive bidding method is unique to the municipal bond market, as initial offerings of other types of securities, such as equity and corporate bonds, are usually conducted through the negotiated sale method.[15] When conducting a competitive bid, an issuer generally has already designed an offering, usually with the advice of a municipal advisor. With this method of sale, the issuer essentially determines the size and other characteristics of an issuance and completes all other necessary tasks for the issuance of the bonds, including advertising for the Notice of Sale, prior to soliciting bids from underwriters.[16] The date and time for a competitive sale is set in advance, as well as bidding requirements and other criteria, and underwriters or underwriter syndicates are invited to submit their bids at the specified time. Once all bids are collected by a certain deadline, the issuer evaluates the bids and awards the offering to the underwriter submitting the lowest interest rate that adhered to the issuer's terms and conditions of the sale.

The Notice of Sale specifies the method used to calculate interest rates in a competitive offering, usually either the net interest cost (NIC) or the true interest cost (TIC) method. NIC takes into account any premium or discount embedded in the issue, as well as the dollar amount of coupon interest payments over the life of the issue.[17] In addition to this, TIC also takes into account the time value of money and discounts the future coupon interest payments to the present day. As a result, TIC produces a slightly different yield from the NIC method.[18] Both NIC and TIC refer to the overall interest rate to be paid by the issuer over the life of the bonds.

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12 *See* MSRB "Glossary of Municipal Securities Terms." (http://www.msrb.org/glossary.aspx).

13 Ibid.

14 *See* SEC Rule 15c2-12.

15 In comparison, United States Treasury securities are sold via a single-price auction conducted by the Department of Treasury in the primary market.

16 *See* "Competitive v. Negotiated: How to Choose the Method of Sale for Tax-Exempt Bonds," The Government Finance Officers Association, Third Print, November 1999.

17 *See* MSRB "Glossary of Municipal Securities Terms." (http://www.msrb.org/glossary.aspx).

18 Ibid.

Literature Review

While there is abundant academic literature on issues related to underwriting activities and primary offerings in the municipal securities market, very few studies to date focus exclusively on the competitive bidding process for municipal offerings, with most studies comparing the choices of competitive and negotiated offerings. This section summarizes the relevant literature from recent years.

Bergstresser and Cohen (2015)[19] examined competitive bids data for municipal offerings. The authors undertook an investigation of competitive bidding in the primary market and trading in the immediate post-issuance secondary market for municipal bonds. They measured the distance, or price differential, between the winning underwriter's bid and the next highest bid and documented a "winners' curse" effect: bonds where the distance-to-next bid was higher saw smaller price increases in the post-issuance secondary market. This winners' curse effect appears to vary significantly across time, being lower at the peak of the financial crisis, as well as by bond type.

Aside from the Bergstresser and Cohen paper, other research papers mostly addressed the difference between the competitive and negotiated sale methods for municipal bonds and the relevant borrowing costs for issuers. In addition, to address the costs of issuance, Joffe (2015) divided these costs into 13 categories and found that issuance costs as a percentage of face value were significantly higher for smaller issues, with the largest percentage of fees going to the underwriter (46%), bond counsel (15%) and municipal advisor (14%).[20] In conclusion, Joffe argued a need for greater transparency around issuance fees to help reduce the cost burdens on issuers.

[19] Bergstresser, Daniel and Randolph Cohen, "Competitive Bids and Post-Issuance Price performance in the Municipal Bond Market," Brandeis University Working Paper, March 2015. *See* http://people.brandeis.edu/~dberg/papers/competitive_20150303.pdf.

[20] Joffe, Marc D., "Municipal Bond Costs of Issuance," Working Paper, August 26, 2015. Joffe identifies thirteen categories of potential issuance costs: Underwriter's Discount 46%, Bond Counsel Fees and Expenses 15.1%, municipal advisor/Consultant Fees and Expenses 14.2%, Rating Agency 7.9%, Bond Insurance 3.6%, Disclosure Counsel Fees and Expenses 2.6%, Underwriter's Counsel Fees and Expenses 1.7%, Trustee – COI – Agent - Paying Agent and/or Escrow Agent Fee 0.7%, Printing 0.7%, Verification Agent 0.2%, CUSIP Fees (if separate) 0.03%, Contingency 1.1% and all other fees 6.2%.

Empirical Analysis

The analysis in this paper concentrates on competitive bidding activities and their impact on the primary offering spread earned by underwriters for competitive municipal offerings during the period from January 2009 through June 2019 ("Relevant Period").

Data and Methodology

The data used in this paper were compiled from several sources. Competitive bidding data for the Relevant Period were obtained from Ipreo, a subsidiary of IHS Markit®.[21] The IHS Markit Ipreo database captures the bidding activities for close to 94% of all competitive issues.[22] The data include the name of the issuer, the state of the issuance, the amount of the total issuance, the date and time of the bidding process, the CUSIP numbers, the identity of the underwriter making a bid either on behalf of itself or a syndicate, the NIC/TIC of the bid made (expressed in yield), the winning bid and the type of bond (bond or note).[23] All bids are priced based on the entire issue as opposed to each individual security that constitutes an issue.[24]

In addition to the IHS Markit Ipreo data, the MSRB's Real-Time Transaction Reporting System (RTRS) data,[25] Thomson Reuters' municipal market primary offering data,[26] as well as data from MSRB's Security Master Database[27] were also used for the analyses.

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21 IHS Markit Ipreo provides an electronic order entry platform for underwriters bidding for competitive issues.

22 When compared to the Thomson Reuters' municipal market primary offering data. By contrast, Bergstresser and Cohen (March 2015) showed that approximately 72% of all competitive offerings from 2005 through 2011 as captured by the Mergent Fixed Investment Securities Database had a match with IHS Markit Ipreo's competitive bid database, with the rest chiefly being short-term issues that were not included in the IHS Markit Ipreo database. *See* Bergstresser, Daniel and Randolph Cohen, "Competitive Bids and Post-Issuance Price performance in the Municipal Bond Market," Brandeis University Working Paper, March 2015.

23 About 16% of the competitive offerings from the IHS Markit Ipreo data do not contain a CUSIP number.

24 Many municipal bond issuances could have 10 or more securities (CUSIP numbers), with each security representing a unique maturity with its own yield.

25 The MSRB upgraded the trade reporting system for the RTRS data on May 29, 2018, with the previous system being in service since the beginning of the RTRS on January 1, 2005. One change in the new RTRS system is that more trades are now published by the system that previously would have been flagged as "non-published" trades as a result of a delay in receiving certain security-related information, such as trades for tax-exempt commercial papers.

26 Now under Refinitiv, and the London Stock Exchange Group is in the process of being acquiring Refinitiv.

27 The Security Master Database includes data from ICE Data Services and CUSIP Global Services. CUSIP numbers and certain related descriptive information are copyrighted by the American Bankers Association.

As mentioned previously, a competitive bid is quoted either on a NIC or a TIC basis. Since NIC and TIC computations treat the time value of money differently and there is a slight variation in their respective calculated values, competitive offerings with NIC bids and TIC bids were grouped separately in analyses that compared the winning competitive bid yield to the initial reoffering yield. In addition, whether the competitive bids were solicited by an issuer on a NIC or a TIC basis does not seem to be entirely random. Table 1 shows that virtually all TIC-based competitive offerings (98%) were structured as a bond (with maturity greater than one year) rather than as a note (with maturity at one year or less), while more than half of the NIC-based competitive offerings were structured as a note. Similarly, almost all competitive offerings quoted on a TIC basis included more than one security (CUSIP number) in the issuance (96%), while more than half of the competitive offerings quoted on a NIC basis had only a single security in an issuance. Consequently, as expected, TIC bidding rates were more often quoted for competitive offerings of bonds with multiple securities that had maturities longer than one year, where the time value of the money really matters.

Table 1. Types of Competitive Offering Bids and Issuance (Jan 2009–Jun 2019)

Bidding Rate Basis	Issuance Type		Number of Securities (CUSIP Numbers) per Issuance	
	Note	Bond	One Security	More Than One Security
NIC	55.4%	44.6%	58.2%	41.8%
TIC	1.9%	98.1%	4.0%	96.0%

Source: MSRB analysis with data obtained from IHS Markit and MSRB's Real-Time Transaction Reporting System (RTRS) and Security Master Database.

Since the IHS Markit Ipreo data do not provide bids for each individual security but rather for an entire issue, when comparing the initial reoffering yield to the winning bid yield, a weighted-average of reoffering yields is calculated for each issue based on the weighting by time to maturity and par amount of each security in the issue to derive a comparable initial reoffering yield for the entire issue.

Recent Landscape of Municipal Securities Primary Offerings

Table 2 shows the breakdown of all primary offerings between competitive, negotiated and private placement offerings. More than 90% of the reported municipal bond primary offerings were either competitive offerings or negotiated offerings in recent years. The proportion of competitive offerings fluctuated between 38.2% and 42.7% between 2009 and 2017 but had noticeably increased since 2018 to around 46.5%. The recent gain in the market share of competitive offerings between 2017 and early 2019 seems to have come at the expense of both negotiated and private placement offerings.

Table 2. Percentage of Competitive Sales in Primary Offerings (Jan 2009–Jun 2019)

Year	Percent Competitive	Percent Negotiated	Percent Private Placement
2009	39.4%	57.8%	2.7%
2010	38.2%	59.3%	2.5%
2011	42.3%	54.3%	3.4%
2012	40.5%	55.4%	4.1%
2013	41.0%	51.4%	7.6%
2014	42.7%	49.6%	7.8%
2015	40.6%	51.2%	8.3%
2016	40.8%	50.5%	8.6%
2017	40.8%	48.3%	10.9%
2018	46.7%	43.8%	9.5%
2019 (Jan-Jun)	46.5%	46.9%	6.6%
Percentage of Offerings with Municipal Advisors	**88.0%**	**51.0%**	**37.0%**

Source: MSRB analysis with data obtained from Thomson Reuters' municipal market primary offering database.

Overall, 88% of the competitive offerings were advised by a municipal advisor during the Relevant Period, while 9% of the competitive offerings were not, with the status for the rest of them unknown. By comparison, only 51% of negotiated offerings and 37% of private placement offerings were advised by a municipal advisor.

Number of Competitive Bids Received

For competitive offerings, the IHS Markit Ipreo data identify all the bids received for each deal, as well as the winning bid. Table 3 displays the total annual number of competitive offerings as well as the yearly average number of competitive bids received for competitive offerings from January 2009 through June 2019.[28] Overall, the number of competitive issuances annually has been relatively stable, hovering around 6,000 competitive offerings per year, with a high of 6,700 offerings in 2016 and a low of 5,700 offerings in 2018. On the

[28] In November 2011, the MSRB implemented amendments to Rule G-23 by prohibiting dealers who act as a financial advisor (municipal advisor) to issuers from role-switching and conducting underwriting activities. The analysis in this paper does not measure the impact of the 2011 MSRB Rule G-23 amendments on competitive bidding activities. Instead, the MSRB is planning to address this topic in a separate analysis.

aggregate level, the average number of competitive bids received has gradually increased from 4.4 bids per offering in 2009 to 5.7 bids in the first half of 2019.[29]

Table 3. Average Number of Competitive Offering Bids (Jan 2009–Jun 2019)

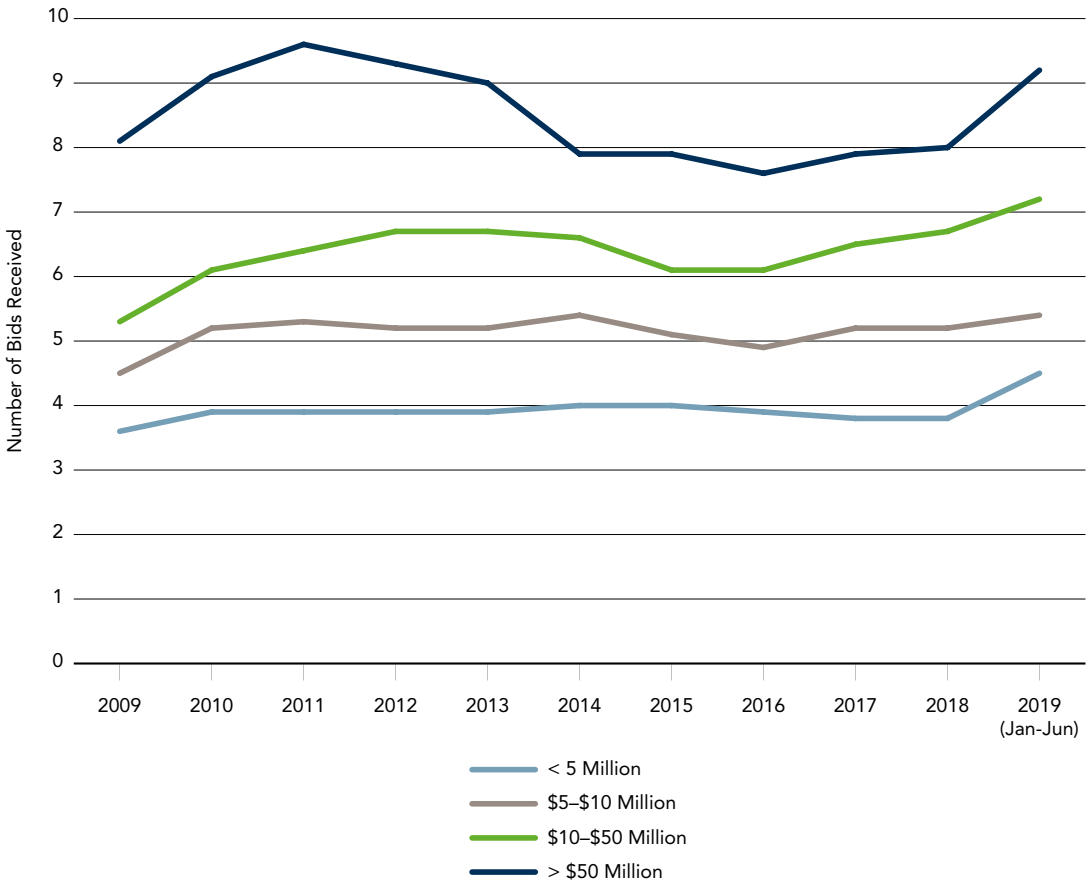
Year	Number of Competitive Offerings (Per CUSIP Numbers)	Number of Competitive Bids
2009	5,873	4.4
2010	6,496	4.9
2011	5,819	4.9
2012	6,669	4.9
2013	6,020	4.9
2014	6,016	5.1
2015	6,543	4.9
2016	6,686	4.9
2017	6,035	5.1
2018	5,690	5.1
2019 (Jan-Jun)	2,907	5.7
Total	**64,754**	**4.9**

Source: MSRB analysis with data obtained from IHS Markit.

While the average number of bids for all competitive offerings has gone up, the following analyses show that, when segregating by issuance size and issuing states, competitive offerings with a smaller issuance size or with less "visibility" have also experienced a similar increase in the number of competitive bids received during the Relevant Period. First, Chart 1 displays the average number of competitive bids received by issuance size categories: Less than $5 million, $5 million to $10 million, $10 million to $50 million and $50 million or more. While competitive offerings with a larger issuance size consistently received more bids than competitive offerings with a smaller issuance size, all size categories, including the sub-$5 million category, received a stable to slightly larger number of competitive bids between 2009 and the first half of 2019.

[29] While the number of competitive bids received had gone up, the number of dealers trading municipal securities had declined steadily since 2009. Still, there were around 800 dealers who transacted municipal securities with customers during 2019. Since on average an issuance only received six bids or less in 2019, for a given issuance, a vast majority of the dealers did not participate in competitive bidding. Therefore, the reduction in the numbers of active dealers does not necessarily impact the number of "available and ready" bidders. *See* "Dealer Participation and Concentration in Municipal Securities Trading," the MSRB, May 2019.

Chart 1. Average Number of Competitive Bids by Issuance Size (Jan 2009–Jun 2019)



Source: MSRB analysis with data obtained from IHS Markit.

The data offered a similar answer to the question: Would issuances originating from smaller localities, such as states with smaller populations or lower per capita income, receive less attention from underwriters nationwide during the competitive offering process? Table 4 examines the average number of competitive bids received at each state level for 16 states and aggregates the results into four groups based on the characteristics of issuing states:[30] "small-population" states, "large-population" states, "low per capita income" states and "high per capita income" states.[31] Table 4 shows that competitive offerings located in states with the largest population or the highest per capita income did not necessarily receive more bids than competitive offerings located in states with the smallest population or the lowest per capita income. In addition, it did not appear that the trajectory for the average number of competitive bids received between 2009 and the first half of 2019 differed materially

[30] For each state, competitive offerings include issuances by the state government as well as by all other issuing municipalities and entities located in this state.

[31] State population and per capita income data come from the 2010 United States Census and the American Community Survey, published by the United States Census Bureau. The 16 states include four states with the smallest population, four states with the largest population, four states with the lowest per capita income and four states with the highest per capita income.

between states with smallest and largest population or between states with highest and lowest per capita income. In fact, all four groups of states experienced a gradual rise in the number of competitive bids received during the Relevant Period.

Table 4. Average of Number of Competitive Bids by State Population and Per Capita Income (Jan 2009–Jun 2019)

Year	Small-Population States	Large-Population States	Low Per Capita Income States	High Per Capita Income States
2009	4.1	4.2	4.2	4.2
2010	5.0	4.8	4.3	4.5
2011	4.7	4.8	4.2	4.1
2012	4.9	5.0	3.8	4.3
2013	5.2	4.7	4.1	4.5
2014	5.2	4.7	4.6	4.7
2015	4.3	4.7	4.4	4.5
2016	4.5	4.8	4.4	4.1
2017	4.9	4.9	4.5	4.4
2018	4.8	4.9	4.5	4.3
2019 (Jan-Jun)	6.2	5.6	5.1	5.0

Note: Small-population states are AK, VT, WY and ND.
Large-population states are CA, TX, FL and NY.
Low per capita income states are AR, MS, WV and LA.
High per capita income states are MD, NJ, HI and MA.

Source: MSRB analysis with data obtained from IHS Markit and the United States Census Bureau.

Furthermore, an ordinary least squares regression analysis for pooled cross-sectional and time-series data points was used to test the correlation between various characteristics of a competitive offering and the number of competitive bids received, as well as to test for the time trend of the number of bids. The benefits of performing a regression analysis are manifold. One benefit is to be able to measure the correlation between one variable (dependent variable) and many other variables (independent variables or factors) simultaneously and statistically test the estimated impact for each factor while controlling for all other factors. Essentially, the estimated impact from each independent variable is conditioned on the economic principal of "all else being equal."[32] The regression model for number of bids received is specified as follows:

$$\begin{aligned} Number\ of\ Bids_{it} &= \alpha + \beta_1 Offering\ Amount_{it} + \beta_2 Maturity_{it} \\ &+ \beta_3 Yield_{it} + \beta_4 General\ Purpose\ Bond_{it} + \beta_5\ Fixed\ Rate\ Bond_{it} \\ &+ \beta_6\ Bond\ or\ Note_{it} + \beta_7\ Usage\ of\ Municipal\ Advisor_{it} + \beta_8 Insured\ Bond_{it} \\ &+ \beta_9 Taxable\ Bond_{it} + \beta_{10} TIC\ Bid_{it} + \lambda Time\ Trend_t + \varepsilon_{it} \end{aligned}$$

[32] Also known as the *ceteris paribus* assumption.

In the model, Number of Bids, Offering Amount, Maturity (weighted-average for the entire issue) and Yield (weighted-average for the entire issue) are expressed in natural logarithm,[33] the seven indictor variables (General Purpose bond, Fixed-Rate Bond, Bond or Note, Usage of Municipal Advisor, Insured Bond, Taxable Bond[34] and TIC Bid) carry essentially a yes-or-no value (a value of one if yes and zero if no),[35] subscript i corresponds to a particular competitive offering and subscript t corresponds to a particular offering date. In addition, Time Trend is specified as a running count of calendar days from January 1, 2009 through the offering date of each competitive offer.[36]

The regression analysis confirmed that there has been an upward trend in the number of competitive bids received over the Relevant Period, and the trend is statistically significant at the 1% level, after controlling for various characteristics of each competitive offering. In addition, the regression analysis found that, ceteris paribus, the number of competitive bids received for a competitive offering is positively correlated with the offering amount of an issuance, the weighted-average maturity, and the fact that an issuance is composed of general obligation bonds, is payable with fixed-rate interest rates, is a bond rather than a note, is quoted on a TIC basis and uses a municipal advisor during the offering process. Conversely, competitive offerings receive fewer bids when a bond issue has a higher yield,[37] is insured and is taxable. None of the regression analysis findings are counter intuitive, as municipal issuance with more complex features (variable rates, insurance status and taxability) tend to receive fewer number of bids after controlling for the size, maturity and yield. For the detailed estimates of parameters and their statistical significance from the regression analysis, *see* Appendix B.

In conclusion, the IHS Markit Ipreo data show that the average number of competitive bids received increased over the past 10 years. This conclusion holds regardless of the size of an issuance, the population of an issuance origination state or the per capita income level of an issuance origination state, and the upward trend is also statistically significant after controlling for the idiosyncratic characteristics of each competitive offering.

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[33] The natural logarithm difference is used as a proxy for percentage difference for these variables in the equation.

[34] For the purpose of this analysis, a municipal issuance is considered taxable if bonds are not exempt from the federal tax or the federal alternative minimum tax (AMT).

[35] In statistics and econometrics, particularly in regression analysis, an indicator (dummy) variable is one that takes the value of zero or one to indicate the absence or presence of some categorical effect that may be expected to shift the outcome.

[36] Each issue's credit rating at the time of the issuance could also be correlated with the number of competitive bids received in the model. However, the historical credit rating data are either not available for many issues or are contractually prohibited from being used in this analysis.

[37] Since the regression model already controls for the maturity of a bond issue, the yield variable can be viewed as a measure of riskiness for the issue. The regression analysis employed both the initial reoffering yield and the first 30-day secondary market traded yield as a proxy for "yield" in the model, and the results are generally similar regardless of the proxy used.

Price Competitiveness of Bidding

While the average number of competitive bids received per each offering has gone up over the Relevant Period, the price competitiveness of bids also improved. Table 5 explores the bidding price by capturing the median of two measures of bid spread for all competitive offerings: the median bid spread between the winning bid and the cover bid (second highest bid) and the median bid spread between the winning bid and the "least" bid (lowest bid).[38] The table shows that the both measures of the median bid spread displayed a steady decline from 2009 through June 2019. It shows a 20 basis-point aggregate reduction in the median bid spread between the winning bid and the "least" bid and a 4.6 basis-point aggregate reduction in the median bid spread between the winning bid and the cover bid.

Table 5. Median Bid Spread from Winning Bids (Jan 2009–Jun 2019)[39]

Year	Number of Competitive Offerings	In Percentage	
		Median Spread Between Winning Bids and Least Bids	Median Spread Between Winning Bids and Cover Bids
2009	5,758	0.383	0.071
2010	6,415	0.334	0.052
2011	5,711	0.342	0.057
2012	6,565	0.290	0.050
2013	5,911	0.285	0.046
2014	5,891	0.239	0.041
2015	6,529	0.227	0.036
2016	6,650	0.213	0.032
2017	6,002	0.195	0.032
2018	5,640	0.180	0.030
2019 (Jan-Jun)	2,905	0.183	0.025

Source: MSRB analysis with data obtained from IHS Markit.

The bid spread shrinkage could partially be explained by the low-yield environment since the financial crisis of the late 2000s, as there has been limited room for spreading out the competitive bids. In addition, market volatility has been relatively subdued since the end of the financial crisis, which could also have contributed to the lowered variance in competitive bids.[40] However, since interest rates and volatility were consistently low between 2010 and 2019, they are unlikely to have caused the steady contraction in the bid spread after 2010. In fact, there is a possibility that with the ongoing improvement of technology and information

[38] For example, if there are four competitive bids received for a deal, the winning bid would be the bid with the lowest yield, the cover bid would be the bid with the second lowest yield, and the least bid would be the bid with the highest yield.

[39] Competitive offering bids with no CUSIP number assigned were not included in this analysis as well as in the subsequent analyses.

[40] Market volatility is thought to be an indicator of uncertainty.

transparency in the marketplace, underwriters may be increasingly submitting more informed bids so that competitive bids from different underwriters have become more clustered together.

Underwriter Profit Margin and Bidding Activities

Primary offering yield spread, or simply primary offering spread, represents the winning underwriter's or the winning underwriter syndicate's profit margin. The primary offering spread could also be viewed as an expense which issuers incur to place the newly issued bonds with investors via underwriters.[41] All else being equal, an issuer would aim to sell the securities at the most advantageous price, or the lowest yield inclusive of the primary offering spread. A competitive offering receiving more underwriter bids is generally viewed as advantageous to an issuer, as presumably the issuer receives a better value from the offering as a result of the price competition from the bidders. On the other hand, a winning bidder facing more competition would likely have to accept a narrower profit margin (primary offering spread) in order to win a deal. This section investigates the relationship between the number of competitive bids received and the primary offering spread for winning bidders, which is calculated as the difference between the winning bid yield and initial reoffering yield.

Table 6 illustrates a subsample of competitive offerings from the IHS Markit Ipreo data matched with each offering's initial reoffering yield during the Relevant Period. The initial reoffering yield represents the yield-to-maturity (or the yield-to-worst if a bond has a call feature) at which an underwriter offers to sell newly issued municipal bonds to investors. As mentioned previously, the winning bids were quoted either on a NIC or a TIC basis for an entire issue, rather than for each individual security (CUSIP number) with a distinct maturity or other unique characteristics constituting the issue. Initial reoffering yields obtained from the Security Master and RTRS trade data were correspondingly weighted across all CUSIP numbers in each issuance to arrive at an equivalent yield for the entire issue. In addition, if the initial reoffering yield was not available for all CUSIP numbers in an issuance, those issues were not included in this analysis, as the weighted-average initial reoffering yield would not be comparable to the winning bid yield for the entire issue. As shown in Table 6, there were a total of 19,488 NIC winning bids and 15,728 TIC winning bids that met the criteria for this analysis between January 2009 and June 2019.

[41] Underwriter profit margin is only one components of issuance costs for an issuer, which also include bond counsel fees, municipal advisor fees, credit rating fees, and CUSIP fees, etc.

Table 6. Summary Statistics for Competitive Offerings with Matching Initial Reoffering Yield (Jan 2009–Jun 2019)

	Bidding Rate Basis			Total
	NIC	TIC	Unknown	
Number of Competitive Offerings from Ipreo with CUSIP Numbers				**54,363**
With Winning Bids	25,654	28,682	15	**54,351**
With Initial Reoffering Yield from Security Master/RTRS Trade Data	22,691	27,320	6	**50,017**
With Matching Offering Size from Security Master/RTRS Trade Data	19,488	15,728	5	**35,221**

Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

Table 7 presents the median of the yield spread across all competitive offerings during the Relevant Period.[42] Because of the difference in deriving a NIC yield and a TIC yield, the median yield spread is presented separately for competitive offerings quoted on a NIC basis and on a TIC basis. The non-weighted median for all competitive offerings with a NIC yield is 0.14%, while for offerings with a TIC yield the non-weighted median is 0.1%. When weighted by each competitive offering's total principal amount (par dollar amount), the median yield spread is 0.02% for offerings with a NIC yield and 0.06% for offerings with a TIC yield, considerably lower than the non-weighted medians. The result suggests that competitive offerings with a larger offering size as measured by par amount have a lower primary offering spread.

Table 7. Median Primary Offering Spread by Bidding Rate Basis (Jan 2009–Jun 2019)

Bidding Rate Basis	Number of Competitive Offerings	Median Offering Spread (In Percentage)	
		Non-Weighted	Weighted by Principal Amount
NIC	19,488	0.137	0.020
TIC	15,728	0.101	0.060

Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

To further illustrate the correlation between the competitive offering size and the primary offering spread, Table 8 presents the median primary offering spread for the following six issuance principal amount groups:

- less than $1 million;
- $1 million – $5 million;
- $5 million – $10 million;

[42] An average of the yield spread was also calculated, but only the median numbers were presented because the median is less affected by outliers than the average. In addition, an analysis of the median primary offering spread by year over the Relevant Period did not reveal any discernable trend; therefore, the analysis in this section would focus only on the cross-sectional impact.

- $10 million – $50 million;
- $50 million – $100 million and;
- $100 million or more.

It is apparent that as the offering size increases, the median primary offering yield spread decreases until the offering size rises above the $50 million range, at which point the median primary offering spread then stabilizes.[43] The pattern is similar for both the competitive offerings with NIC yield bids and the competitive offerings with TIC yield bids.

Table 8. Median Primary Offering Spread by Issuance Size (Jan 2009–Jun 2019)

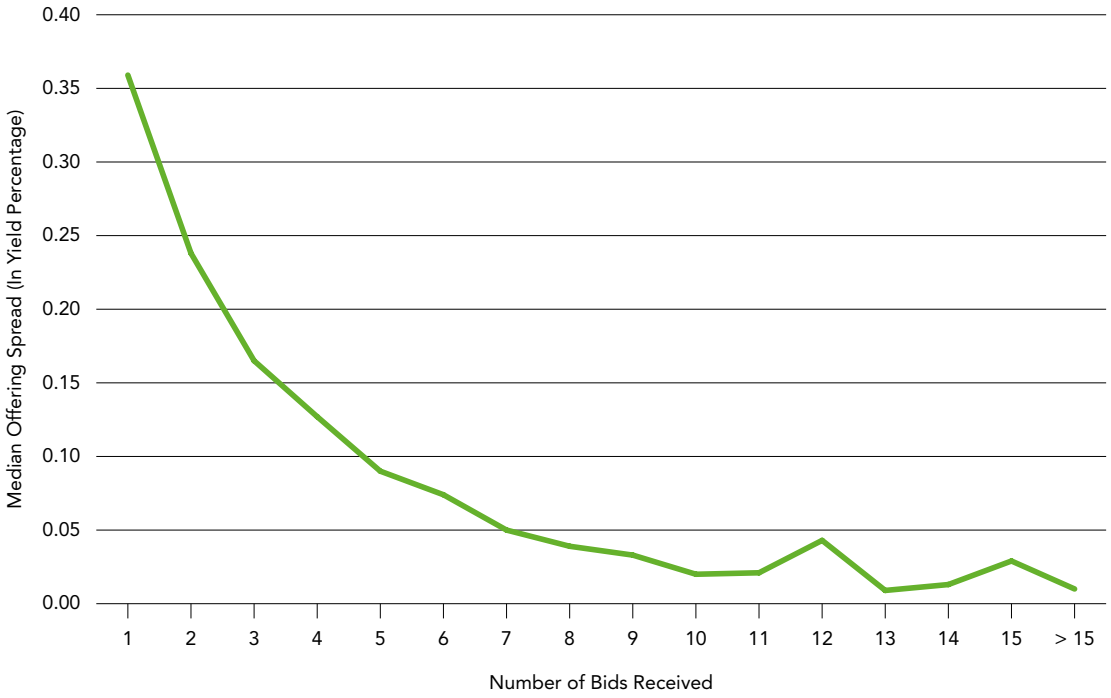
Bidding Rate Basis	Issuance Principal Amount	Number of Competitive Offerings	Median Offering Spread (In Percentage)
NIC	< $1M	3,577	0.300
NIC	$1M - $5M	8,002	0.152
NIC	$5M - $10M	3,985	0.072
NIC	$10M - $50M	3,605	0.034
NIC	$50M - $100M	210	0.024
NIC	>= $100M	109	0.024
TIC	< $1M	611	0.177
TIC	$1M - $5M	5,913	0.119
TIC	$5M - $10M	3,430	0.099
TIC	$10M - $50M	4,230	0.073
TIC	$50M - $100M	779	0.046
TIC	>= $100M	765	0.046

Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

The offering size of a competitive sale, along with other characteristics of an offering such as the offering structure, bond maturities, interest rate structure, issuance purpose, taxable status, insurance status and the decision to use a municipal advisor are generally pre-determined before the publication of a Notice of Sale and the initiation of a competitive bidding process. Once the structure of an offering is set and the competitive bidding process begins, the number of competitive bids received is the only additional factor that would have an impact on the primary offering yield spread. Charts 2 and 3 both show there is a negative correlation between the number of competitive bids received and the winning bidder's primary offering spread regardless of whether the bids were quoted on a NIC or a TIC basis. For competitive offerings with NIC yield bids, the primary offering spread declines from 0.36% with one competitive bid to around 0.02% with 10 or more competitive bids. For competitive offerings with TIC yield bids, the primary offering spread declines from 0.19% with one competitive bid to less than 0.02% with 18 or more competitive bids.

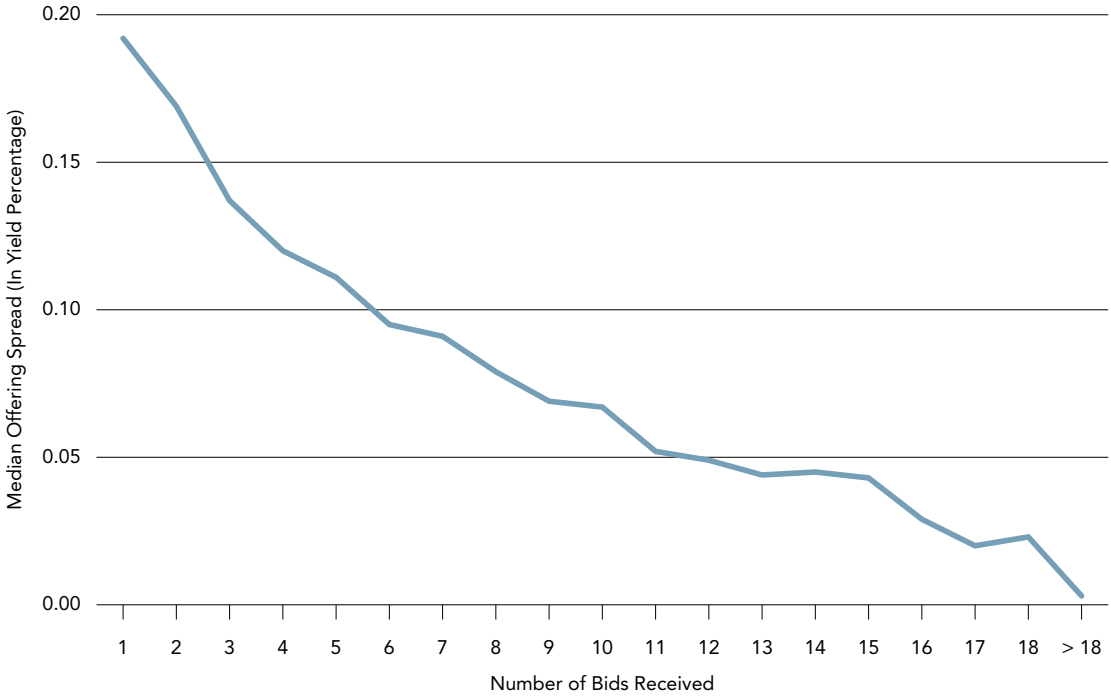
[43] It should be noted that the result in Table 8 does not control for other factors that may also affect the primary offering spread. The regression analysis that follows presents the relationship between the size of a competitive offering and the primary offering spread after controlling for other factors.

Chart 2. Median Primary Offering Spread and Number of NIC Bids (Jan 2009–Jun 2019)



Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

Chart 3. Median Primary Offering Spread and Number of TIC Bids (Jan 2009–Jun 2019)



Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

Finally, a cross-section regression analysis is employed to test for the statistical relationship between the number of competitive bids received and the primary offering spread after controlling for other idiosyncratic characteristics of a competitive offering.

$$\begin{aligned} &Primary\ Offering\ Spread_i \\ &\quad = \alpha + \beta_1 Number\ of\ Bids_i + \beta_2 Offering\ Amount_i + \beta_3 Maturity_i \\ &\quad + \beta_4 Yield_i + \beta_5 General\ Purpose\ Bond_i + \beta_6 Fixed\ Rate\ Bond_i \\ &\quad + \beta_7 Bond\ or\ Note_i + \beta_8 Usage\ of\ Municipal\ Advisor_i \\ &\quad + \beta_9 Insured\ Bond_i + \beta_{10} Taxable\ Bond_i + \beta_{11} TIC\ Bid_i + \varepsilon_i \end{aligned}$$

Similar to the regression analysis discussed earlier in this paper, Primary Offering Spread, Number of Bids, Offering Amount, Maturity (weighted-average for the entire issue) and Yield (weighted-average for the entire issue) are expressed in natural logarithm,[44] the seven indictor variables (General Purpose bond, Fixed-Rate Bond, Bond or Note, Usage of Municipal Advisor, Insured Bond, Taxable Bond and TIC Bid) are represented by a yes-or-no value (a value of one if yes and zero if no), and subscript i corresponds to a particular competitive offering.[45] When specifying Primary Offering Spread in natural logarithm, which is an approximation of the percentage change in yield spread, the regression analysis essentially acknowledges that the relative yield spread matters.[46]

Testing the correlation between Number of Bids and Primary Offering Spread is the most important object of this analysis. The regression analysis found that, after controlling for the other factors, the primary offering spread is lower when the number of competitive bids received for a competitive offering rises, and the correlation is statistically significant at the 1% level. As to the magnitude of the correlation between the two variables, Table 9 presents the regression model-predicted impact on the primary offering spread based upon the hypothetical scenario of doubling the number of competitive bids received, such as from two bids to four bids, holding everything else constant. When doubling the number of competitive bids received, the model-predicted primary offering spread decreases to 0.095% from a hypothetical spread of 0.1%, and to 0.189% from a hypothetical spread of 0.2%. In the case of the 0.2% hypothetical primary offering spread, holding everything else constant, the decrease in the primary offering spread would amount to $5,382 in yield cost savings annually for an issuer if the total offering principal amount were $50 million and the initial reoffering yield stayed the same.

[44] The natural logarithm difference is used as a proxy for percentage difference for these variables in the equation.

[45] Each issue's credit rating at the time of the issuance could also be correlated with the primary offering spread in the model. However, the historical credit rating data are either not available for many issues or are contractually prohibited from being used in this analysis.

[46] For example, in a relative sense, a 10 basis-point yield spread for an issue with a weighted-average yield of 1% may be viewed as a more substantial spread than the 10 basis-point yield spread for an issue with a weighted-average yield of 3%.

Table 9. Primary Offering Spread When Doubling Number of Bids Received

Hypothetical Primary Offering Spread	Model-Predicted Primary Offering Spread When Doubling Number of Bids Received
0.100%	0.095%
0.200%	0.189%

Source: MSRB analysis with data obtained from IHS Markit and MSRB's RTRS and Security Master Database.

The correlation between the primary offering spread and other independent variables is mostly as expected. All else being equal, the primary offering spread was found to be positively correlated with an offering that has longer weighted-average maturity, is insured and is quoted on a TIC basis,[47] but negatively correlated with the offering amount of an issuance, weighted-average yield, and the fact that an issuance is structured with a fixed-rate interest rate and engages a municipal advisor during the offering process. Additionally, the usage of municipal advisors had a downward statistically significant impact on the primary offering spread. While it may warrant further research, this finding seems to be supported by previous studies on this issue. For example, Daniels and Vijayakumar (2006)[48] found that municipal advisors have a significant impact on borrowing costs, reoffering yields and underwriter gross spreads because municipal advisors provide important and useful services, including monitoring the issuance process and relevant information on behalf of issuers, therefore reducing information asymmetry between issuers and other market participants.[49]

For the detailed estimates of parameters and their statistical significance from the regression analysis, please refer to Appendix B.

[47] In an upward-sloped yield curve environment, which is more common than otherwise, a rate quoted on a TIC basis would be slightly lower than a rate quoted on a NIC basis for the same issue as a result of the discount for future cash flows. Therefore, all else being equal, the primary offering spread is expected to be wider for an offering with a TIC rate than with a NIC rate.

[48] Daniels, Kenneth and Jayaraman Vijayakumar, "The Role and Impact of Financial Advisors in the Market for Municipal Advisors," Journal of Financial Services Research, February 2006.

[49] In economic theory, information asymmetry refers to when one party to a transaction has more or better information than the other party, which creates an imbalance of power in the transaction and can lead to a non-optimal pricing outcome, or in the worst case, the transaction to go awry.

Potential Future Research

The analyses and findings in this paper raised a few interesting questions that could merit their own research studies. We have identified three potential areas of future research. First, while this paper focuses entirely on competitive offerings, it would be interesting to compare the primary offering spread as well as other issuance-related costs between competitive and negotiated offerings in the same period. Academic literature has not uniformly concluded whether an issuer's choice of primary offering method is economically rational. Some papers found that the method of sale had a significant impact on issuers' borrowing costs, and issuers' selection of sale method may not be economically rational.[50] Other papers concluded that there are economic reasons why issuers choose the negotiated sale method over the competitive sale method despite the higher costs, and municipalities choose the sales method that is most beneficial to them.[51] Therefore, another study in this area with an attempt to control for the differences in bond issuance characteristics between competitive and negotiated offerings would further contribute to the literature.

Another topic for future research is an investigation of trading that occurs in the secondary market subsequent to the primary offering, such as during the first 30 days after the initial offering. Past analysis seems to indicate that the trading price continues to evolve afterward and does not settle at a steady-state level until a later time. Hence, the aggregate profit margin may grow (or shrink) further. If it is true, this phenomenon would not be unique to the municipal bond market. The equity market, for example, witnesses a similar pattern during and after the initial public offering process.

Finally, the relationship between the usage of a municipal advisor by an issuer during the issuance process and the primary offering spread as well as any other measures of issuance costs can be further explored. Previous research[52] indicated that there is a positive role played by municipal advisors in terms of reducing issuance costs, though the extent of cost reduction may depend on the quality of a municipal advisor and the interaction between municipal advisor and underwriting firms, in addition to the type of issuance and bond characteristics.

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50 *See* Moldogaziev, Tima and Tatyana Guzman, "Which Bonds Are More Expensive? The Cost Differentials by Debt Issue Purpose and the Method of Sale: An Empirical Analysis," Public Budgeting and Finance, Fall 2012; and Liu, Gao, "Self-Selection Bias or Decision Inertia? Explaining the Municipal Bond 'Competitive Sale Dilemma.'" Public Budgeting and Finance, March 2018.

51 *See* Fruits, Eric and James Booth, Randall Pozdena and Richard Smith, "A Comprehensive Evaluation of the Comparative Cost of Negotiated and Competitive Methods of Municipal Bond Issuance," Municipal Finance Journal, January 2008; Marlowe, Justin, "Method of Sale, Price Volatility, and Borrowing Costs on New Issue Municipal Bonds," Working Paper, January 26, 2009; and Krupa, Olha, "Is There a Reason for Higher-Cost Financing?" Working Paper, February 2005.

52 *See* Moldogaziev, Tima and Martin Luby, "Too Close for Comfort: Does the Intensity of Municipal Advisor and Underwriter Relationship Impact Borrowing Costs?" Public Budgeting and Finance, 2016; Allen, Arthur and Donna Dudney, "Does the Quality of Financial Advice Affect Prices?" The Financial Review 45, 2010; and Daniels, Kenneth and Jayaraman Vijayakumar, "The Role and Impact of Financial Advisors in the Market for Municipal Bonds," Journal of Financial Services Research, 2006.

Conclusions

The data from IHS Markit Ipreo shows that the average number of competitive bids received per issuance gradually increased over the past 10 years, from an average of 4.4 competitive bids in 2009 to an average of 5.7 competitive bids in the first half of 2019. This conclusion holds regardless of the size of an issuance, the population of an issuance origination state or the per capita income level of an issuance origination state. The upward trend was also statistically significant after controlling for idiosyncratic characteristics of each competitive offering.

In the meantime, the bid spread between the winning bids and other bids, such as the cover bids, has reduced over the Relevant Period. This is likely due to the continuous improvement of technology and information transparency in the marketplace, as well as other market-wide factors such as interest rate and volatility. As a result, underwriters may be increasingly submitting more informed bids so that competitive bids from different underwriters have become more clustered together.

Lastly, the winning bidder's (winning underwriter or underwriter syndicate) primary offering spread was found to be negatively associated with the number of competitive bids received, after controlling for characteristics of each offering, regardless of whether the bids were quoted on a NIC or a TIC basis. For competitive offerings with NIC yield bids, the primary offering spread declined from 0.36% with one competitive bid to around 0.02% with 10 or more competitive bids. For competitive offerings with TIC yield bids, the primary offering spread declined from 0.19% with one competitive bid to less than 0.02% with 18 or more competitive bids. Therefore, all things being equal, soliciting more competitive bids would indeed improve an issuer's selling price and reduce the yield cost for the issuer.

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Appendix A—About the Author

Simon Wu, Ph.D., Chief Economist—Mr. Wu is the Chief Economist for the Municipal Securities Rulemaking Board (MSRB). With two decades of experience applying economic expertise to securities policymaking and regulation, Mr. Wu oversees economic analysis of MSRB rulemaking and municipal market transparency initiatives, and leads related statistical, econometric and financial economic analysis. Before joining the MSRB, Mr. Wu served as a financial economic expert on securities trading, market structure, best execution, investment management and financial institution risk management at several economic consulting firms. Mr. Wu also served as Chief Economist at the Federal Housing Finance Agency (FHFA), Office of Inspector General, where he was involved in regulatory oversight on mortgage-backed securities issuance and trading, capital market risk management and unsecured lending by banks. He began his career as senior economist at the Financial Industry Regulatory Authority (FINRA) where he led economic studies in support of securities rule proposals and policy impact analysis. Mr. Wu has a doctorate and master's degree in economics from Vanderbilt University and a bachelor's degree in economics from Belmont University.

Appendix B—Regression Analyses

Model 1: Ordinary Least Squares (OLS) Regression for Number of Bids Received[53]

$$\begin{aligned} Number\ of\ Bids_{it} &= \alpha + \beta_1 Offering\ Amount_{it} + \beta_2 Maturity_{it} \\ &+ \beta_3 Yield_{it} + \beta_4 General\ Purpose\ Bond_{it} + \beta_5 Fixed\ Rate\ Bond_{it} \\ &+ \beta_6 Bond\ or\ Note_{it} + \beta_7 Usage\ of\ Municipal\ Advisor_{it} + \beta_8 Insured\ Bond_{it} \\ &+ \beta_9 Taxable\ Bond_{it} + \beta_{10} TIC\ Bid_{it} + \lambda Time\ Trend_t + \varepsilon_{it} \end{aligned}$$

Variable	Parameter Estimate	Standard Error	t Value	Statistical Significance at 1% Level?
Intercept	-1.728	0.068	-25.53	Yes
Offering Amount	0.164	0.002	99.16	Yes
Weighted-Average Maturity	0.048	0.005	9.80	Yes
Weighted-Average Yield	-0.185	0.005	-36.84	Yes
General Purpose Bond	0.063	0.005	11.63	Yes
Fixed-Rate Bond	0.206	0.062	3.32	Yes
Bond or Note	0.143	0.011	13.64	Yes
Use of Municipal Advisor	0.174	0.008	22.43	Yes
Insured Bond	-0.065	0.008	-8.08	Yes
Taxable Bond	-0.024	0.009	-2.80	Yes
TIC	0.246	0.006	42.21	Yes
Trend	0.00003	0.000	15.13	Yes
Adjusted R-Square	0.33			
Number of Observations	50,007			

[53] Note: All variables are in natural logarithm form except for the indicator variables (general purpose bond, fixed-rate bond, bond or note, usage of municipal advisor, insured bond, taxable bond and TIC bid) and trend term.

Model 2: Ordinary Least Squares (OLS) Regression for Winning Underwriter's Primary Offering Spread[54]

$$\begin{aligned} Primary\ Offering\ Spread_i &= \alpha + \beta_1 Number\ of\ Bids_i + \beta_2 Offering\ Amount_i + \beta_3 Maturity_i \\ &+ \beta_4 Yield_i + \beta_5 General\ Purpose\ Bond_i + \beta_6 Fixed\ Rate\ Bond_i \\ &+ \beta_7 Bond\ or\ Note_i + \beta_8 Usage\ of\ Municipal\ Advisor_i + \beta_9 Insured\ Bond_i \\ &+ \beta_{10} Taxable\ Bond_i + \beta_{11} TIC\ Bid_i + \varepsilon_i \end{aligned}$$

Variable	Parameter Estimate	Standard Error	*t* Value	Statistical Significance at 1% Level?
Intercept	0.901	0.0432	20.86	Yes
Number of Bids	-0.080	0.0025	-32.31	Yes
Offering Amount	-0.030	0.0010	-28.99	Yes
Weighted-Average Maturity	0.025	0.0026	9.66	Yes
Weighted-Average Yield	-0.160	0.0025	-63.54	Yes
General Purpose Bond	-0.003	0.0032	-1.05	No
Fixed-Rate Bond	-0.158	0.0402	-3.93	Yes
Bond or Note	0.006	0.0055	1.10	No
Usage of Municipal Advisor	-0.029	0.0039	-7.49	Yes
Insured Bond	0.048	0.0052	9.22	Yes
Taxable Bond	-0.005	0.0044	-1.19	No
TIC Bid	0.028	0.0033	8.65	Yes

Adjusted R-Square	0.25
Number of Observations	35,215

[54] Note: All variables are in natural logarithm form except for the indicator variables (general purpose bond, fixed-rate bond, bond or note, usage of municipal advisor, insured bond, taxable bond and TIC bid).

ABOUT THE MSRB

The Municipal Securities Rulemaking Board (MSRB) protects investors, state and local governments and other municipal entities and the public interest by promoting a fair and efficient municipal securities market. The MSRB fulfills this mission by regulating the municipal securities firms, banks and municipal advisors that engage in municipal securities and advisory activities. To further protect market participants, the MSRB provides market transparency through its free Electronic Municipal Market Access (EMMA®) website, the official repository for information on virtually all municipal bonds. The MSRB also serves as an objective resource on the municipal market, conducts extensive education and outreach to market stakeholders, and provides market leadership on key issues. The MSRB is a Congressionally created, self-regulatory organization governed by a board of directors that has a majority of public members in addition to representatives of regulated entities. The MSRB is subject to oversight by the Securities and Exchange Commission.

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