Using EMMA to Assess Municipal Bond Markups

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In the past, assessment of the reasonableness of municipal bond markups depended on anecdotal recollection of markups and subjective judgment about what was customary. Interested parties including regulators can now use the MSRB's EMMA service to determine the markups charged on a set of transactions and can make precise and accurate statements about how unusual such markups were, controlling for many factors thought to effect the reasonableness of markups.

We analyze over 13.6 million customer trades, totaling $2.5 trillion in par amount traded in fixed-coupon, long-term municipal bonds. We estimate that investors were charged $10.58 billion in municipal bond markups between 2005 and 2013 in our sample - $6.38 billion in trades on which excessive markups appear to have been charged.

Our sample includes about 30 percent of the fixed-coupon municipal bond trades and so the total markups charged from 2005 to 2013 is likely to be at least $20 billion. $10 billion of this $20 billion in markups were charged on trades on which excessive markups appear to have been charged. These markups are a transfer from taxpayers and investors to the brokerage industry and could be largely eliminated with simple, low-cost improvements in disclosure.

I. Introduction

Broker-dealers exercise broad discretion when selling municipal bonds to the public at markups over the price they buy bonds from issuers, other dealers and investors. The absence of pre-trade price transparency and post-trade markup disclosure has allowed some broker-dealers in recent years to charge investors billions of dollars of excessive markups.

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In the past, evaluation of the excessiveness of suspect markups compared to customarily charged markups has often relied on the professional judgment of municipal bond traders or brokerage industry supervisors. Such judgment is both subjective and based on the professionals' imperfect recollections. The Municipal Securities Rulemaking Board's ("MSRB") recent widespread dissemination of transaction data and advances in computing technology allow us to empirically determine where markups charged fall in the range of observed municipal bond markups. The tools we describe significantly improve the ability of investors, regulators and the industry's compliance and supervision personnel to identify and correct excessive markups.

We estimate that $10.58 billion in markups were charged on trades in municipal bonds in our sample. Our sample includes about 30% of the fixed-coupon municipal bond trades so the total markups and markdowns charged from 2005 to 2013 is likely to be at least $20 billion.

We identify potentially excessive markups if the percentage markup charged is twice the median markup for similar sized trades or is more than 0.5% larger than percentage markup charged on recent trades in the same bond. $6.38 billion in markups were charged on the twenty-one percent of trades in our sample flagged by this procedure as being potentially excessive.

II. Electronic Municipal Market Access or EMMA

One half of the $3.7 trillion in municipal bonds outstanding at the end of 2012 was held directly by individual investors and another quarter was held by individual investors indirectly through mutual funds.[2] Table 1 reports the par amount traded from 2005 to 2012. The amount traded increased from $5.1 trillion in 2005 to $6.7 trillion in 2007 and declined to $3.2 trillion in 2012. This pattern is almost entirely due to the increase in the trading in variable rate bonds including auction rate securities and variable rate demand obligations prior to 2007 and the decline thereafter. Trading in fixed-rate bonds changed little from 2007 to 2012.

[2] SIFMA *Outstanding U.S. Bond Market Debt*

Table 1: Par Amount Traded in $ Million, *MSRB 2008, 2010, 2012 Fact Books*.

	2005	2006	2007	2008	2009	2010	2011	2012
Total	5,113,146	6,081,093	6,685,128	5,514,420	3,791,271	3,749,730	3,285,766	3,225,803
Trade Type								
Customer Bought	2,526,943	2,841,565	3,156,765	2,722,682	2,029,305	1,956,906	1,670,951	1,619,769
Customer Sold	1,976,700	2,294,673	2,519,994	1,970,188	1,186,992	1,220,495	1,088,513	975,487
Inter-Dealer	609,503	944,854	1,008,370	821,550	574,974	572,330	526,302	630,547
Coupon Type								
Variable	3,394,072	4,222,021	4,612,810	3,072,472	1,485,005	1,584,165	1,271,220	1,195,640
Fixed Rate	1,345,385	1,485,042	1,646,518	1,970,885	1,756,439	1,734,705	1,614,755	1,677,625
Source of Repayment								
General Obligation	790,675	894,899	993,515	950,757	756,960	748,160	704,025	731,491
Revenue	3,730,663	4,548,557	5,082,029	3,875,546	2,392,348	2,496,929	2,132,012	2,112,740
Tax Status								
Tax Exempt	3,810,983	4,399,138	4,824,632	4,131,213	2,848,863	2,921,186	2,656,646	2,736,514
Taxable	280,718	402,839	438,619	315,193	327,701	503,719	294,909	272,799

The MSRB distributes market statistics, disclosure documents, issuer and investor education material, and trade data through its Electronic Municipal Market Access (EMMA) system.[3] It has webpages, presentation slides and online videos to help users search for and interpret trades in specific bonds. Users access documents and trade data by entering a CUSIP or security name into a "Quick Search" dialog box in the navigation bar across the top of most of the EMMA webpages. There is also a search page which allows users to narrow the list of bonds by specifying the state of issuance, first 6 digits of a CUSIP, coupon rate or range of coupon rates, issuer name, dated dates (the date from which interest due starts to accrue) and maturity dates. With a subset of this identifying information and a little bit of practice users can easily locate specific municipal bonds and review offering documents, continuing disclosures and trade history.

Our research relies on the EMMA trade data covering 73,750 municipal securities made available since January 2005. To be included in our sample, bonds have to have been issued after January 1, 1995 with a maturity of greater than 19.5 years when issued and must pay a fixed coupon rate. Our sample includes 20.8 million transactions totaling $3.9 trillion from January 1, 2005 to April 15, 2013 in bonds from all 50 states plus the District of Columbia, Guam, Puerto Rico and the Virgin Islands. See Table 2.

[3] emma.msrb.org

Table 2: Sample Statistics, January 1, 2005 to April 15, 2013.

	All States	California	New York	Texas	Florida
Number of Issues	73,750	10,919	7,677	7,435	4,433
Number of Trades	**20,824,108**	**3,454,422**	**2,416,282**	**1,345,041**	**1,595,498**
Customer Bought	10,674,659	1,690,126	1,210,199	697,973	771,680
Customer Sold	4,026,028	700,681	453,326	234,798	335,562
Interdealer Trades	6,123,421	1,063,615	752,757	412,270	488,256
Par Amount Traded ($ billions)	**3,944**	**839**	**564**	**311**	**213**
Customer Bought	1,696	359	236	128	87
Customer Sold	1,040	227	150	78	57
Interdealer Trades	1,208	252	178	105	68
Average Trade Size	189,386	242,761	233,383	231,129	133,292

III. Markups

The MSRB instructs members to calculate markups on municipal bond trades as the difference between the prices charged to the customer and the prevailing market price and to calculate markdowns as the difference between the prices paid to investors and the prevailing market price. The broker-dealers' contemporaneous cost of acquiring - or proceeds from disposing of - the bonds through inter-dealer trades or offsetting trades with investors establishes a presumption of the prevailing market price.[4]

Two of the MSRB's rules place limits on the prices broker-dealers can charge investors. Rule G-17 admonishes broker-dealers to deal fairly and refrain from deceptive practices. Rule G-30 requires that broker-dealers only charge prices including markups which are fair and reasonable given the facts and circumstances surrounding the trade.

> **Rule G-17** Conduct of Municipal Securities and Municipal Advisory Activities
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> In the conduct of its municipal securities or municipal advisory activities, each broker, dealer, municipal securities dealer, and municipal advisor shall deal fairly with all persons and shall not engage in any deceptive, dishonest, or unfair practice.[5]
>
> **Rule G-30** Prices and Commissions (in part)
>
> (a) *Principal Transactions.* No broker, dealer or municipal securities dealer shall purchase municipal securities for its own account from a customer or sell municipal securities for its own account to a customer except at an aggregate price (including any mark-down or mark-up) that is fair and reasonable, taking into consideration all relevant factors, including the best judgment of the broker, dealer or municipal securities dealer

[4] www.msrb.org/Rules-and-Interpretations/Regulatory-Notices/2010/2010-10.aspx
[5] www.msrb.org/Rules-and-Interpretations/MSRB-Rules/General/Rule-G-17.aspx

> as to the fair market value of the securities at the time of the transaction and of any securities exchanged or traded in connection with the transaction, the expense involved in effecting the transaction, the fact that the broker, dealer, or municipal securities dealer is entitled to a profit, and the total dollar amount of the transaction.[6]

Financial Industry Regulatory Authority (FINRA) has disciplined member firms for violations of MSRB Rule G-17 and Rule G-30 which closely track FINRA Rule 2110 (fair dealing) and Rule 2440 (reasonable pricing). A FINRA Hearing Officer found that David Lerner Associates, Inc. charged excessive markups on municipal bond sales and collateralized mortgage obligations sales.[7] FINRA and Morgan Stanley entered into a settlement under which Morgan Stanley paid a $1 million fine and $371,000 in restitution for excessive markups and markdowns on corporate and municipal bonds in violation of Rule 2110, Rule 2440, G-17 and G-30.[8]

The recent widespread availability of municipal bond trade data has allowed researchers to more effectively study the range of markups charged. The published research on municipal bond trading costs includes Hong and Warga (2004), Harris and Piwowar (2006), Green, Hollifield and Schürhoff (2007a, b), Green, Li and Schürhoff (2009), Ciampi and Zitzewitz (2010), Li and Schürhoff (2012), Schultz (2012) and Cestau, Green, and Schürhoff (2013).

Hong and Warga (2004) found that retail investors are charged, on average, a premium of 2.5% of the market value of a bond compared to institutional investors. Harris and Piwowar (2006) found that markups charged on municipal bond trades decreased dramatically with trade size and attribute this phenomenon to a lack of transparency in the municipal bond market.[9]

Green, Hollifield and Schürhoff (2007a) found that in an opaque trading market, such as the municipal bond market, dealers could exercise significant bargaining power, which decreases with trade size and increases with complexity of the bond traded. Green,

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[6] www.msrb.org/Rules-and-Interpretations/MSRB-Rules/General/Rule-G-30.aspx
[7] *Department of Enforcement v David Lerner Associates, Inc. and William Mason*, Disciplinary Proceeding No. 20050007427, April 4, 2012
[8] http://www.finra.org/web/groups/industry/@ip/@enf/@ad/documents/industry/p125084.pdf
[9] Edwards, Harris, and Piwowar (2007) implements the same methodology and draws similar conclusions on corporate bond trades. The analysis of corporate bond trades is based on FINRA's Trade Reporting and Compliance Engine (TRACE) database.

Hollifield and Schürhoff (2007b) found that brokers' sales to customers of newly issued municipal bonds occurred at increasing and highly variable prices in the first weeks after a new issue but that broker's purchases from customers and inter-dealer trades occurred at prices close to the reoffering price.

Ciampi and Zitzewitz (2010) found that the spreads on corporate bonds and municipal bonds traded during times of economic crisis were much higher than the spreads reported in previous research, especially for small trades, low-credit quality bonds, and longer dated bonds. [10] Schultz (2012) found that the MSRB's dissemination of transaction data in 2005 reduced the dispersion in markups but not their overall level. Cestau, Green, and Schürhoff (2013) analyzed markups in the offerings of Build America Bonds and found them to be higher than in the offering of tax-exempt bonds.

The Government Accountability Office's *Municipal Securities: Overview of Market Structure, Pricing and Regulation*[11] found that percentage markups charged on large municipal bond trades are substantially smaller than markups charged on smaller trades. The GAO Report attributed the much higher trading costs incurred by investors on small trades to the information disadvantage smaller traders suffer compared to larger traders and dealers. The Securities and Exchange Commission issued the *Report on the Municipal Securities Market* on July 31, 2012 and found that markups in the municipal bond market are higher than in the corporate bond and equity markets and that they are much higher for small municipal bond trades than for large trades.[12] The SEC Report recommends new regulations to increase trade and quote transparency in the expectation that more information on available prices will lead to lower markups.

Methodology

The MSRB transaction data allows for several alternative measures of markup. In the spirit of the MSRB guidance, if there are sufficient interdealer transactions in the same bond on the same date, we measure the percentage markup as the difference between the price at which the customer transacts and the volume weighted average price

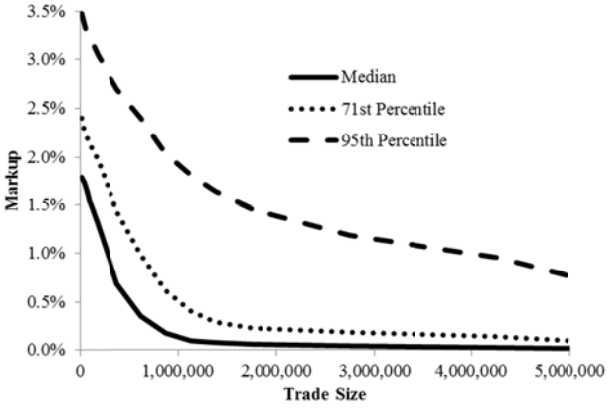
[10] Marlowe (2013) provides a good discussion of liquidity of municipal bonds during the financial crisis.
[11] Available at gao.gov/assets/590/587714.pdf.
[12] Available at www.sec.gov/news/studies/2012/munireport073112.pdf. See pages 112-133.

on the interdealer transactions divided by the volume weighted average price on the inter-dealer transactions. If there are no inter-dealer prices to estimate the prevailing market price, we estimate the markup as the difference between customers' transaction prices and the volume weighted average of customer transaction prices occurring in the same bond on the same date. If there are neither interdealer trades nor other customer trades on the same date as the customer transaction, we expand the window to two business days before and two business days after the customer transaction and estimate the markup as the difference between the transaction price and the volume weighted average price of interdealer trades. If there are no interdealer trades in this expanded window we use the volume weighted average of customer trades in this expanded window to estimate the prevailing market price. The trade prices on different dates are adjusted according to a municipal bond index before calculating the volume weighted average price. This procedure allows us to estimate markups for over 93% of the 14.7 million customer transactions in our sample.[13]

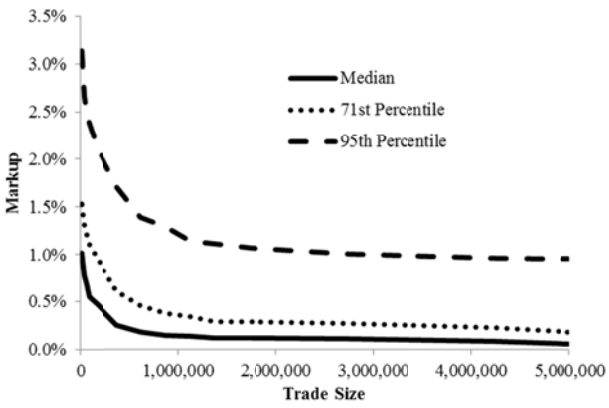
Figure 1 plots the median, 71st percentile, and 95th percentile percentage markups at various trade sizes for all bonds in our related research.[14]

Figure 1: Markups, 2005-2013.

a) Customer Bought



b) Customer Sold



[13] Some researchers use yield benchmarks or regression analysis to estimate half-spreads for transactions. These more complicated approaches would allow us to capture the remaining transactions in our data but the published literature shows these more complicated alternative approaches yield quite similar results on the issues we are addressing. 6.1 million transactions of the 20.8 million trades in our dataset are inter-dealer trades.

[14] We report the 71st percentile markup percentage because of the NASD's prior use of that percentile for determining what markup percentage was presumptively excessive. See Ferrell (2008).

Markups decline substantially with trade size so that percentage markups which are commonplace on $25,000 trades are excessive when applied to $1,000,000 trades. Median markups decline approximately 90% as trade sizes increase from $25,000 to $1,000,000 and another 80% as trade size increases from $1,000,000 to $5,000,000.

We list median, 71st percentile and 95th percentile markups by trade size separately for customer purchases and customer sales in Table 3. Median markups on customer purchases are greater than on customer sales for trades of less than $1,000,000 but are the less for trades greater than $1,000,000.

Table 3: Markups by Trade Type and Size.

	Customer Bought				Customer Sold			
Size	N	Median	71st Percentile	95th Percentile	N	Median	71st Percentile	95th Percentile
0-$25,000	4,883,761	1.79%	2.40%	3.48%	1,597,557	1.02%	1.52%	3.14%
$25,000 - $50,000	2,387,964	1.73%	2.27%	3.37%	851,935	0.78%	1.31%	2.66%
$50,000 - $75,000	1,127,125	1.66%	2.21%	3.27%	427,566	0.67%	1.20%	2.48%
$75,000 - $100,000	206,267	1.55%	2.14%	3.24%	106,189	0.55%	1.10%	2.38%
$100,000 - $250,000	839,305	1.31%	1.97%	3.05%	396,189	0.47%	0.96%	2.12%
$250,000 - $500,000	165,009	0.69%	1.44%	2.70%	105,689	0.25%	0.61%	1.71%
$500,000 - $750,000	75,498	0.36%	0.99%	2.40%	57,557	0.19%	0.46%	1.39%
$750,000 - $1,000,000	15,595	0.17%	0.61%	2.03%	13,609	0.15%	0.39%	1.29%
$1,000,000 - $1,250,000	52,423	0.10%	0.41%	1.81%	47,084	0.14%	0.34%	1.14%
$1,250,000 - $1,500,000	8,436	0.08%	0.29%	1.64%	7,382	0.12%	0.29%	1.11%
$1,500,000 - $2,000,000	17,314	0.06%	0.23%	1.46%	15,325	0.12%	0.29%	1.07%
$2,000,000 - $3,500,000	48,239	0.04%	0.18%	1.19%	40,682	0.11%	0.28%	1.00%
$3,500,000 - $5,000,000	14,658	0.03%	0.14%	0.96%	11,237	0.08%	0.23%	0.96%
$5,000,000 +	69,707	0.02%	0.10%	0.77%	50,273	0.06%	0.18%	0.95%
	9,911,301				3,728,274			

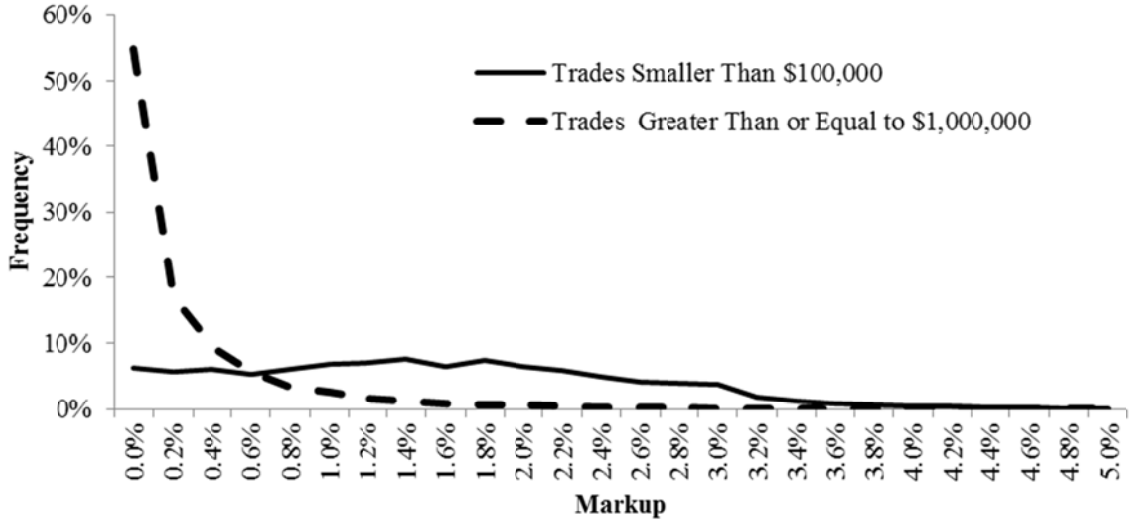
The 95th percentile markups remain quite high on large trades compared to the median markups. The 95th percentile markup exceeds the median by three times the amount the 71st percentile markup exceeds the median markup for trades less than $500,000. Beyond the $500,000 trade size, the 95th percentile markup exceeds the median markup by six times the amount the 71st percentile exceeds the median markup. That is, while the median and the 71st percentile markups decline significantly with trade size the highest 5% of markups remain quite high in percentage terms, yielding extraordinarily high dollar markups.

Median percentage markups illustrated in Figure 1 and listed in Table 3 generate a hump shaped pattern of median dollars markups by trade size. The 1.7% median markup generates an $850 markup on a $50,000 purchase and the 0.7% median markup generates a $3,500 markup on a $500,000 trade. The median dollar markup declines as the size of

the trade increases beyond $500,000 though, remaining consistently between $1,200 and $1,500 for trade sizes between $1,000,000 and $5,000,000.

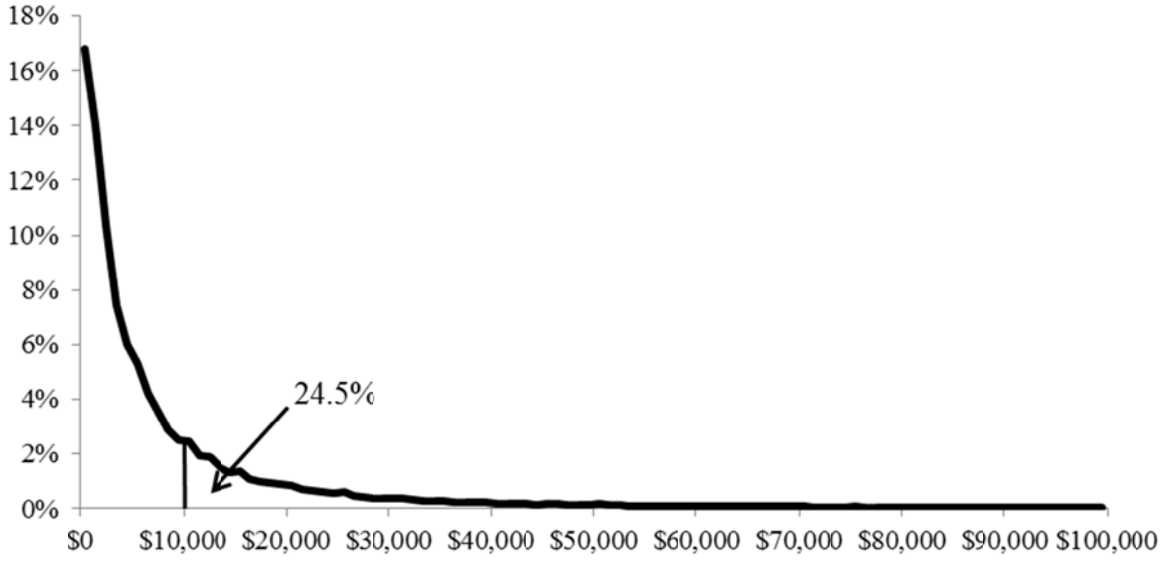
Figure 2 plots the distribution of markups for a range of trade sizes from the 21 million bond trades we analyzed. Reflecting the same phenomena as Figure 1, markups are lower on average and more tightly bunched on larger trades than on smaller trades but there remain many large markups on large trades.

Figure 2: Distribution of Percentage Markups by Trade Size, 2005-2013.



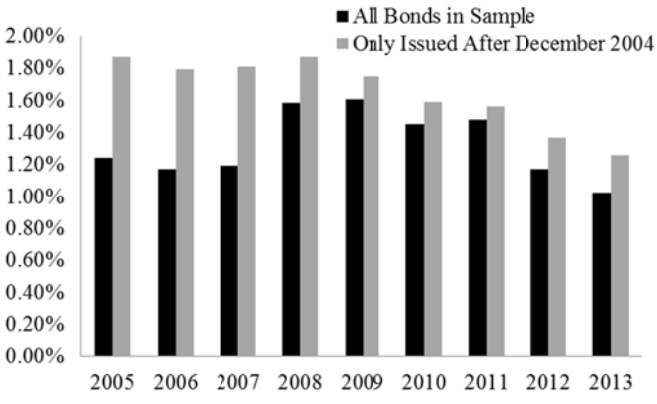
The large percentage markups on large dollar trades in Figure 3 generate even more dramatic markups in terms of dollars. Figure 4 plots the distribution of markups on trades of greater than $1,000,000. While the median markup on trades of greater than $1,000,000 is only $1,752, markups of greater than $10,000 were charged on 24.5% of the trades of greater than or equal to $1,000,000.

Figure 3: Distribution of Dollar-Markups for trades greater than $1,000,000, 2005-2013.



Median markups have declined over time since the MRSB started reporting trades in January 2005. The markups declined from 2005 to 2007, increased slightly in 2008 and then declined through the end of our data period. See Figure 4.

Figure 4: Markups by Year, 2005-2013.



Year	All Bonds in Sample	Only Issued After 2004
2005	1.23%	1.87%
2006	1.16%	1.79%
2007	1.19%	1.81%
2008	1.58%	1.87%
2009	1.61%	1.75%
2010	1.45%	1.59%
2011	1.48%	1.56%
2012	1.16%	1.36%
2013	1.02%	1.25%

Municipal yields were about the same on average in 2011 as they were in 2005 and 2006 and so the decline in median markups from 1.87% in 2005 to 1.56% in 2011 in bonds issued after January 1, 2005 and from 1.59% to 1.48% in our entire sample is not related to a decline in municipal yields and maybe the result of improved transparency due to EMMA. However, municipal yields did decline substantially from 2011 to 2013

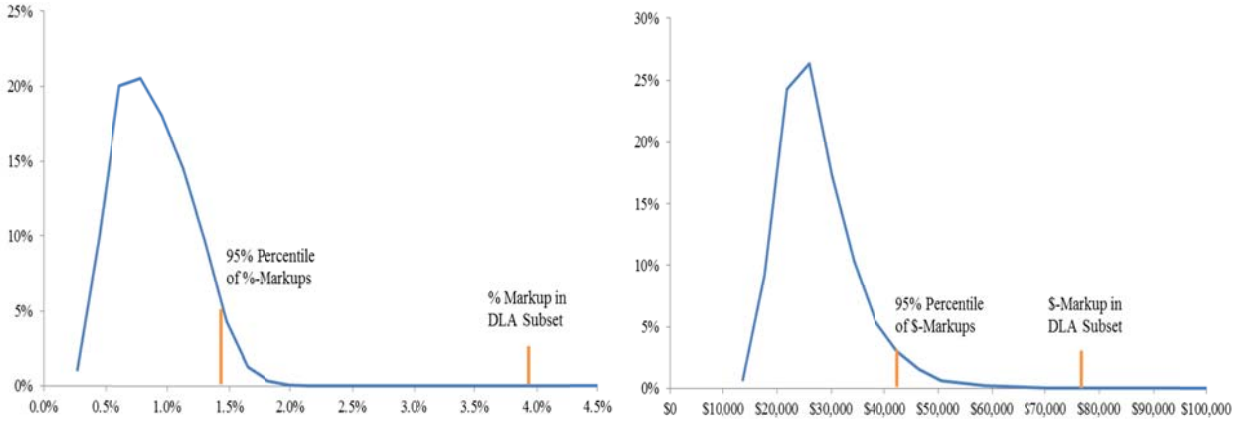
and so the further decline in median markups from to 1.25% in bonds issued after January 1, 2005 and to 1.02% in our entire sample may be the result of declining yields and not a continuing benefit of improved transparency.

IV. Excessive Markups in Individual Portfolios

The distributions of weighted average percentage markups and dollar markups in Figure 2 and Figure 3 can be drawn for subsets of the EMMA trade data and used to assess the unusualness of observed markups in an investor's accounts or in groups of accounts serviced by the same brokerage firm or advisor. To illustrate, we select 10,000 random samples of 50 trades each which have similar characteristics to a set of 50 trades selected from the trades reported in the FINRA v David Lerner Associates case. We filtered the trades by time period, size and remaining maturity to match the characteristics of the trades in the DLA case.

Figure 5 plots the distribution of weighted average percentage markups and $-markups from the 10,000 samples of 50 bonds each. The 4.0% weighted average markup charged on DLA trades we analyze is at the 99.99th percentile in the distribution of percentage markups on similar bond trades. The $78,000 in markups charged in the subset of DLA trades we analyze is more than three times the $23,900 median markup and is at the 98.2nd percentile in the distribution of dollar markups on similar bond trades.

Figure 5: Assessment of FINRA v DLA Markups in Weighted Average Percentage and Aggregate Dollar Markups.



V. Examples of Excessive Markups Identifiable by Inspection

We review four examples of excessive markups before we report our systematic assessment of markups.

City of Commerce, California Infrastructure Bond, CUSIP 20058RBA

Our first example is from trading in a City of Commerce, California infrastructure bond listed in Table 4.[15] On January 17, 2013 a customer bought $1,450,000 for $101.36 that had just been sold 4 minutes earlier for $99.00. Compared to the average inter-dealer trade price that day of $99.22, the investor paid a $30,909 markup. The median markup on a purchase of this size of 0.075% would have generated $1,077. This investor was charged nearly 30 times the median markup.

Table 4 City of Commerce, California

Trade Date/Time	Settlement Date	Price	Yield (%)	Trade Amt ($)	Trade Submission Type	
01/17/2013 : 09:24 AM	2/1/2013	$100.88	3.493	$50,000	Customer bought	
01/17/2013 : 10:12 AM	2/1/2013	$100.48	3.541	$50,000	Customer bought	
01/17/2013 : 12:51 PM	2/1/2013	$99.19	3.652	$1,450,000	Inter-dealer Trade	
01/17/2013 : 12:52 PM	2/1/2013	$99.88	3.607	$20,000	Customer bought	
01/17/2013 : 12:57 PM	2/1/2013	$99.25	3.648	$1,450,000	Inter-dealer Trade	
01/17/2013 : 01:39 PM	2/1/2013	$101.37	3.435	$50,000	Customer bought	
01/17/2013 : 01:39 PM	2/1/2013	$99.38	3.639	$50,000	Inter-dealer Trade	
01/17/2013 : 01:39 PM	2/1/2013	$99.38	3.639	$50,000	Inter-dealer Trade	
01/17/2013 : 02:39 PM	2/1/2013	$99.00	3.665	$1,450,000	Customer sold	
01/17/2013 : 02:43 PM	**2/1/2013**	**$101.36**	**3.436**	**$1,450,000**	**Customer bought**	$30,909 Markup

City of Moberly, Missouri IDA CUSIP 607010AE5

Our second example comes from trading in a City of Moberly Missouri industrial development bond listed in Table 5.[16]

After the $3,025,000 par amount in this series was sold to investors in the offering, there was no further trading until October 21, 2010 when two positions totaling $1,110,000 face value were sold to a dealer (or less likely to two different dealers). This

[15] Trading in this bond can be found at emma.msrb.org/SecurityView/SecurityDetailsTrades.aspx?cusip=AA26831D723177D0DF520958201EDF2D9.

[16] Trading in this bond can be found at emma.msrb.org/SecurityView/SecurityDetailsTrades.aspx?cusip=AF4F36FB38E73DB8C2962F0CA104AFD6E. On April 3, 2013 Missouri's Secretary of State submitted a Petition for an Order to Cease and Desist and to Show Cause against Morgan Keegan over taxable municipal bonds Morgan underwrote for the City of Moberly in July 2010.

dealer then sold the bonds to investors over the next four weeks for $1,143,090 – a $33,090 or $2.48 average markup over the $100.50 paid to the selling customers.

On October 22, 2010 a dealer charged a customer $105.419 for a $25,000 trade despite three other customer trades for $25,000 the same day at $102.669 and two trades for $20,000 the day before at $102.671. The $105.41 price was clearly unfair and the markup charged excessive. It appears the same dealer a few days later made sales of $20,000 and $10,000 at $105.414 despite a sale of $10,000 at $102.664 the same day. The $105.414 charged twice on October 27, 2010 was unfair and the markup excessive.

Table 5: City of Moberly, Missouri

Trade Date/Time	Settlement Date	Price	Yield (%)	Trade Amt ($)	Trade Submission Type
10/21/2010 : 02:16 PM	10/26/2010	100.5	5.255	$610,000	Customer sold
10/21/2010 : 02:16 PM	10/26/2010	100.5	5.255	$500,000	Customer sold
10/21/2010 : 02:51 PM	10/26/2010	102.671	4.75	$20,000	Customer bought
10/21/2010 : 03:49 PM	10/26/2010	102.671	4.75	$20,000	Customer bought
10/22/2010 : 10:50 AM	10/27/2010	102.669	4.75	$25,000	Customer bought
10/22/2010 : 01:40 PM	10/27/2010	102.669	4.75	$25,000	Customer bought
10/22/2010 : 01:43 PM	10/27/2010	102.669	4.75	$25,000	Customer bought
10/22/2010 : 03:19 PM	10/27/2010	102.669		$25,000	Inter-dealer Trade
10/22/2010 : 03:19 PM	10/27/2010	102.419		$25,000	Inter-dealer Trade
10/22/2010 : 04:37 PM	**10/27/2010**	**105.419**	**4.128**	**$25,000**	**Customer bought**
10/22/2010 : 04:37 PM	10/27/2010	103.669		$25,000	Inter-dealer Trade
10/25/2010 : 08:19 AM	10/28/2010	102.668	4.75	$10,000	Customer bought
10/26/2010 : 09:38 AM	10/29/2010	102.666	4.75	$10,000	Customer bought
10/26/2010 : 02:35 PM	10/29/2010	102.535		$180,000	Inter-dealer Trade
10/26/2010 : 02:35 PM	10/29/2010	102.476		$180,000	Inter-dealer Trade
10/26/2010 : 02:55 PM	10/29/2010	102.666	4.75	$10,000	Customer bought
10/26/2010 : 02:56 PM	10/29/2010	103.536	4.551	$180,000	Customer bought
10/27/2010 : 10:14 AM	11/1/2010	102.664	4.75	$5,000	Customer bought
10/27/2010 : 01:24 PM	11/1/2010	102.414		$30,000	Inter-dealer Trade
10/27/2010 : 01:24 PM	11/1/2010	102.664		$30,000	Inter-dealer Trade
10/27/2010 : 01:33 PM	11/1/2010	105.414	4.127	$20,000	Customer bought
10/27/2010 : 01:33 PM	11/1/2010	103.664		$30,000	Inter-dealer Trade
10/27/2010 : 01:33 PM	**11/1/2010**	**105.414**	**4.127**	**$10,000**	**Customer bought**
10/27/2010 : 03:51 PM	11/1/2010	102.664	4.75	$10,000	Customer bought
10/28/2010 : 01:37 PM	11/2/2010	102.412	4.808	$100,000	Customer bought
11/01/2010 : 12:26 PM	11/4/2010	102.658	4.75	$25,000	Customer bought
11/01/2010 : 04:36 PM	11/4/2010	104.199	4.398	$5,000	Customer bought
11/01/2010 : 04:36 PM	11/4/2010	102.658		$5,000	Inter-dealer Trade
11/02/2010 : 09:15 AM	11/5/2010	102.658		$5,000	Inter-dealer Trade
11/02/2010 : 09:15 AM	11/5/2010	102.858	4.704	$5,000	Customer bought
11/04/2010 : 11:49 AM	11/9/2010	102.651	4.75	$5,000	Customer bought
11/04/2010 : 01:52 PM	11/9/2010	102.651	4.75	$15,000	Customer bought
11/05/2010 : 11:59 AM	11/10/2010	103.302	4.6	$260,000	Customer bought
11/05/2010 : 12:02 PM	11/10/2010	102.401		$260,000	Inter-dealer Trade
11/19/2010 : 11:47 AM	11/24/2010	102.631	4.75	$25,000	Customer bought
11/19/2010 : 03:36 PM	11/24/2010	100.472		$150,000	Inter-dealer Trade
11/19/2010 : 03:37 PM	11/24/2010	101.99	4.9	$150,000	Customer bought
11/19/2010 : 04:44 PM	11/24/2010	102.631	4.75	$125,000	Customer bought

Bexar County, Texas Revenue Bond, CUSIP 088518JF3

Our third example comes from trading in a Bexar County, Texas revenue bond listed in Table 6.[17] On January 8, 2013 a customer bought $950,000 face value for

[17] Trading in this bond can be found at emma.msrb.org/SecurityView/SecurityDetailsTrades.aspx?cusip=A4F707A59EFF635A0E825F2AFADFB28E1.

$104.86. The average interdealer trade price that day was $102.41 so this investor paid a $2.45 markup. The average interdealer trade price over the prior five days was $101.15 and so against this benchmark, the customer paid a $3.71 markup. The median markup on trades this large is only 0.17%. The average price charged on ten much smaller customer purchases over the prior five days was $103.28. The $104.86 charged on the $950,000 trade was clearly excessive.

Table 6: Bexar County, Texas

Trade Date/Time	Settlement Date	Price	Yield (%)	Trade Amt ($)	Trade Submission Type	
01/02/2013 : 11:51 AM	1/23/2013	$104.208	3.479	$40,000	Customer bought	
01/02/2013 : 11:51 AM	1/23/2013	$101.910	3.76	$40,000	Inter-dealer Trade	
01/02/2013 : 11:51 AM	1/23/2013	$104.208	3.479	$30,000	Customer bought	
01/02/2013 : 11:51 AM	1/23/2013	$101.910	3.76	$30,000	Inter-dealer Trade	
01/02/2013 : 12:48 PM	1/23/2013	$101.298	3.836	$2,000,000	Inter-dealer Trade	
01/02/2013 : 12:52 PM	1/23/2013	$101.358	3.828	$2,000,000	Inter-dealer Trade	
01/04/2013 : 11:53 AM	1/23/2013	$102.395	3.7	$100,000	Inter-dealer Trade	
01/04/2013 : 11:53 AM	1/23/2013	$102.395	3.7	$100,000	Customer bought	
01/04/2013 : 04:12 PM	1/23/2013	$102.638	3.67	$150,000	Inter-dealer Trade	
01/04/2013 : 04:14 PM	1/23/2013	$102.638	3.67	$150,000	Customer bought	
01/07/2013 : 10:00 AM	1/23/2013	$102.270	3.715	$50,000	Inter-dealer Trade	
01/07/2013 : 10:00 AM	1/23/2013	$102.395	3.7	$50,000	Inter-dealer Trade	
01/07/2013 : 10:00 AM	1/23/2013	$104.270	3.471	$50,000	Customer bought	
01/07/2013 : 10:41 AM	1/23/2013	$102.395	3.7	$50,000	Inter-dealer Trade	
01/07/2013 : 10:41 AM	1/23/2013	$104.745	3.414	$50,000	Customer bought	
01/07/2013 : 12:12 PM	1/23/2013	$102.335	3.707	$100,000	Inter-dealer Trade	
01/07/2013 : 12:14 PM	1/23/2013	$102.395	3.7	$100,000	Inter-dealer Trade	
01/07/2013 : 12:22 PM	1/23/2013	$102.720	3.66	$100,000	Customer bought	
01/07/2013 : 12:22 PM	1/23/2013	$102.720	3.66	$100,000	Inter-dealer Trade	
01/07/2013 : 03:41 PM	1/23/2013	$102.395	3.7	$15,000	Inter-dealer Trade	
01/07/2013 : 03:41 PM	1/23/2013	$103.795	3.529	$15,000	Customer bought	
01/07/2013 : 03:46 PM	1/23/2013	$102.395	3.7	$15,000	Inter-dealer Trade	
01/07/2013 : 03:46 PM	1/23/2013	$103.795	3.529	$15,000	Customer bought	
01/07/2013 : 03:49 PM	1/23/2013	$104.704	3.419	$25,000	Customer bought	
01/07/2013 : 03:49 PM	1/23/2013	$102.395	3.7	$25,000	Inter-dealer Trade	
01/08/2013 : 12:31 PM	1/23/2013	$102.395	3.7	$2,115,000	Inter-dealer Trade	
01/08/2013 : 12:35 PM	1/23/2013	$102.420	3.696	$2,115,000	Inter-dealer Trade	
01/08/2013 : 01:04 PM	1/23/2013	$102.910	3.637	$220,000	Customer bought	
01/08/2013 : 01:13 PM	**1/23/2013**	**$104.860**	**3.4**	**$950,000**	**Customer bought**	$23,299 Markup
01/08/2013 : 01:26 PM	1/23/2013	$102.910	3.637	$700,000	Customer bought	
01/08/2013 : 01:28 PM	1/23/2013	$103.860	3.521	$245,000	Customer bought	

California State General Obligation Bond, CUSIP 13063BP7

Our fourth example comes from trading in a California State General Obligation listed in Table 7.[18]

[18] Trading in this bond can be found at emma.msrb.org/SecurityView/SecurityDetailsTrades.aspx?cusip=A00F107479E462AE214AF012F4DD203D7.

On March 20, 2013 a customer bought $1,880,000 for $101.625. The average interdealer price that day was $99.286 and the average price charged on much smaller quantities in the same bond the same day was $99.98. The customer paid a $2.37 markup - $43,972 – relative to the interdealer price that day when the median markup on a trade of this size would have been less than $2,000. This customer paid $42,000 more than the median markup for this trade size and $31,000 more than what she would have paid if she had just been charged the average markup charged on the smaller trades the same day in this bond.

Table 7 State of California

Trade Date/Time	Settlement Date	Price	Yield (%)	Trade Amt ($)	Trade Submission Type
03/20/2013 : 10:14 AM	3/27/2013	$99.375		$100,000	Inter-dealer Trade
03/20/2013 : 10:14 AM	3/27/2013	$99.475	4.03	$100,000	Customer bought
03/20/2013 : 10:14 AM	3/27/2013	$99.315		$100,000	Inter-dealer Trade
03/20/2013 : 10:16 AM	3/27/2013	$102.000	3.754	$10,000	Customer bought
03/20/2013 : 10:53 AM	3/27/2013	$99.200		$1,000,000	Inter-dealer Trade
03/20/2013 : 10:55 AM	3/27/2013	$99.125		$1,000,000	Inter-dealer Trade
03/20/2013 : 11:02 AM	3/27/2013	$99.477		$35,000	Inter-dealer Trade
03/20/2013 : 11:02 AM	3/27/2013	$99.227		$35,000	Inter-dealer Trade
03/20/2013 : 11:06 AM	3/27/2013	$99.577	4.024	$10,000	Customer bought
03/20/2013 : 11:06 AM	3/27/2013	$99.477		$10,000	Inter-dealer Trade
03/20/2013 : 11:25 AM	3/27/2013	$99.315		$1,750,000	Inter-dealer Trade
03/20/2013 : 11:26 AM	3/27/2013	$99.375		$1,750,000	Inter-dealer Trade
03/20/2013 : 11:57 AM	3/27/2013	$99.477		$55,000	Inter-dealer Trade
03/20/2013 : 11:57 AM	3/27/2013	$99.352		$55,000	Inter-dealer Trade
03/20/2013 : 11:57 AM	3/27/2013	$99.577	4.024	$55,000	Customer bought
03/20/2013 : 12:37 PM	**3/27/2013**	**$101.625**	**3.8**	**$1,880,000**	**Customer bought**
03/20/2013 : 02:01 PM	3/28/2013	$101.250	3.846	$15,000	Customer bought
03/20/2013 : 02:03 PM	3/27/2013	$101.250	3.846	$20,000	Customer bought
03/20/2013 : 02:37 PM	3/27/2013	$101.418	3.825	$20,000	Customer bought
03/20/2013 : 02:37 PM	3/27/2013	$99.700		$20,000	Inter-dealer Trade
03/20/2013 : 02:49 PM	3/27/2013	$99.650	4.02	$50,000	Customer bought
03/20/2013 : 02:59 PM	3/27/2013	$102.000	3.754	$15,000	Customer bought
03/20/2013 : 04:09 PM	3/27/2013	$99.700	4.017	$35,000	Customer bought

VI. Excessive Markups in the Aggregate

The four examples reflect our proposed markers of excessive markups. Each example involved a markup which was a multiple of the median markup for similar-sized trades. In several of the examples the investor was charged a higher markup than the weighted average markup charged on smaller purchases of exactly the same bond on the same day or during the previous five trading days. We estimate the amount of excessive

markups in the aggregate in our sample by first selecting trades on which excessive markups appear to have been charged based on these two proposed markers.

We identify trades as having been charged an excessive markup if either Condition 1 or Condition 2 holds.

> **Condition 1:** Markup (markdown) charged is more than twice the median markup (markdown) for similar size trade in the same calendar year.
>
> **Condition 2:** Markup (markdown) charged is greater than the weighted average markup (markdown) charged on smaller sized trades in the same bond during the prior five trading days by 0.50% or more.

The first condition judges a markup based on how large it is relative to the same size purchase or sale in the same year. We identify the markup as excessive if it is twice the percentage markup on similar-size trades in similar bonds in the same calendar year.

The second condition more narrowly focuses on trades in exactly the same bond in the prior week. This criterion is motivated by FINRA's assessment of the fairness of prices charged by dealers in light of prices charged other investors at the same time for the same bond. We identify the markup as excessive if the dealer has charged a markup that is at least 0.5% greater than charged on average on smaller trades in the prior week. For example, our procedure would flag a 2.0% markup on a $1,000,000 if ten customer purchases of between $25,000 and $100,000 in exactly the same bond had been executed over the prior five days at a weighted average markup of 1.50% or less.

Both conditions take into account current market conditions and attributes of the trade being evaluated. Both conditions can be relaxed or made more stringent by varying the threshold to be greater than or less than twice the median markup or greater or less than 0.5% of the average markup on smaller trades in the same bond.

Table 8 reports the results of applying these two conditions to trading in long term municipal bonds. The markup charged on nine and a half percent of the trades in our sample is at least twice the median markup for similar-size trades. Dealers charged $5.24

billion in markups on these trades, $4.30 billion of which was in excess of the markups which would have resulted from applying the median markup for similar-size trades.

Table 8 Excessive Markups in the Aggregate

Condition	Percent of Trades	Aggregate Markups	Markups in excess of Median
1	9.5%	$5.24 billion	$4.30 billion
2	16.0%	$3.24 billion	$2.10 billion
1 and 2	4.4%	$2.10 billion	$1.76 billion
1 or 2	21.1%	$6.38 billion	$4.64 billion

The markups charged by dealers on just 9.5 percent of the trades equal as much of the $10.58 billion total in our sample as the markups dealers charged on the remaining 90.5 percent of the trades. In other words, the average markup on the nine and a half percent of trades flagged by our first condition are ten times as great as the average markup charged on the remaining ninety percent of the trades.

The markups charged on sixteen percent of the trades in our sample satisfy the second condition. Dealers charged $3.24 billion in markups on these trades, $2.10 billion of which was in excess of the markups which would have resulted from applying the median markup for similar-size trades.

Four percent of the trades in our sample satisfy both conditions. $2.10 billion in markups were charged on these trades, $1.76 billion of which was in excess of the markups which would have resulted from applying the median markup for similar-size trades.

Twenty-one percent of the trades in our sample satisfy one or the other or both conditions. $6.38 billion in markups were charged on these trades, $4.64 billion of which was in excess of the markups which would have resulted from applying the median markup for similar-size trades.

VII. Conclusion

Based on our analysis of a portion of the MSRB's EMMA data, we estimate that investors have been charged at least $20 billion in markups and markdowns since 2005.

We've provided four examples of how the EMMA data can be used to determine whether the price charged for a municipal bond was fair and the markup not excessive. We have determined that between $1.76 billion and $6.38 billion of excessive markups and markdowns have been charged since 2005 on our subset of publicly available municipal bond trades. Given our large but not exhaustive data set, the aggregate amount of excessive markups since 2005 likely substantially exceeds $10 billion. This same publicly available data – supplemented by non-public information available to dealers and regulators – could improve surveillance of pricing in the municipal bond market.

Sunshine would eliminate much of the municipal bond markup abuses we have identified. Dealers are already required to determine that the prices and markups charged are fair. This can only be done by reference to prevailing market values, typically grounded in the dealer's contemporaneous cost. Prevailing market values and markups are already estimated by dealers every time they execute a trade. If dealers disclosed to investors what markup was being charged, the markups charged on municipal bonds would quickly drop to markups found on other securities. This sunshine would benefit both taxpayers and investors.

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