Portfolio Absorption, Speculative Trading, or Bounded Evaluation Capacity? Drivers of Secondary Market Trading Activity for Municipal Securities

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Abstract

Why do some municipal securities trade hundreds of times a year while other do not trade at all in the secondary market? Harris and Piwowar (2006) have shown that these differences in trading frequency cannot simply be attributed to transaction costs - actively traded bonds are not necessarily less expensive to trade. Understanding determinants of trading frequency can inform investors as well issuers on how the market perceives municipal securities and potentially improve government debt issuance outcomes and household investment decisions in the future periods. To better understand the drivers of active trading, this paper tests three hypotheses: portfolio absorption, limited information dissemination, and speculative trading. Results support the first two hypotheses and reject the latter.

Keywords: municipal securities, municipal bonds, secondary market, actively traded municipal bonds, trading activity, speculative trading, portfolio absorption, bounded information dissemination.

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1 Introduction

According to the SEC (2012), investors held $3.7 trillion in municipal debt[1] in 2012. As of the third quarter of 2015, this number is estimated to stand at $3.71 trillion.[2] But most municipal bonds rarely trade in the secondary market. Municipal Securities Rulemaking Board reports that most actively traded securities traded 491 times between 2003 and 2010, with an average of 108 trades per year (MSRB (2014b)). These differences in trading frequency, however, cannot be attributed to transaction costs, since actively traded bonds are not necessarily less expensive to trade than infrequently traded bonds (Harris and Piwowar (2006)).

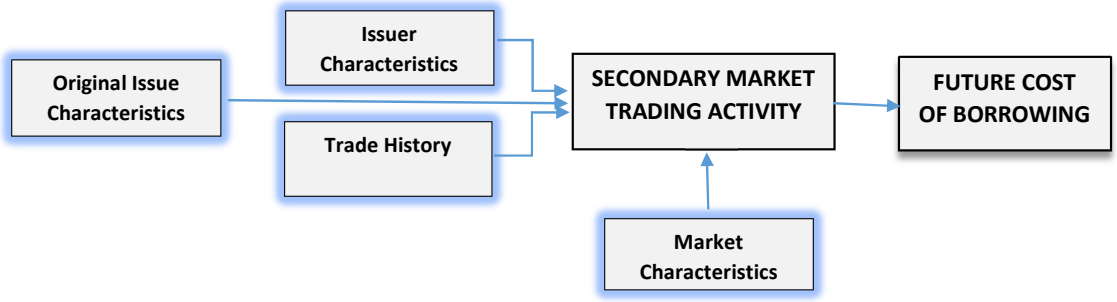
Despite its magnitude and impact on the financial markets, determinants and implications of trading activity of municipal securities have not been explored much in the literature, partially due to the lack of access to the transaction-level data. This paper explores why some municipal securities trade hundreds of times while other do not trade at all in the secondary market. Understanding what drives such dispersion in trading activity can benefit investors as well as current and future issuers of municipal securities. Debt issuing governments can achieve lower borrowing costs in the future if they understand how the market perceives their securities. On the other hand, investors can make better approximations of the liquidity of their investments.

This study identifies the determinants of trading activity in the secondary municipal securities market using both issuance and transaction-level data. The findings can aid

[1] In addition to the 50 states and District of Columbia, there are approximately 3,000 counties, 36,000 municipalities, 37,400 special districts, and 14,600 public school systems in the United States (CBO (2010)). Debt issued by these national governments is commonly referred to as municipal debt.

[2] http://www.sifma.org/research/statistics.aspx

Figure 1: *Potential Causal Mechanism*



future research in understanding the effects of increased trading activity on subsequent cost of borrowing for municipal governments and point to potential signals the market may be sending to municipal investors. A potential long-term causal mechanism is described in Figure 1. The effect of secondary market trading activity on future cost of borrowing is analyzed in a separate paper.

Instead, this study focuses on the relationship between original issue, issuer, historical trade, and market characteristics and secondary market trading activity. Three different hypotheses are tested to identify drivers of trading frequency. Portfolio absorption hypothesis tests whether attractive and safe bonds are quickly absorbed into the inactive investor portfolios. Speculative trading hypothesis explores whether risky securities are traded more than their low-risk counterparts. Finally, I test whether a relatively complex security is traded less, or not traded at all, merely due to the analytical burden of valuing its features. Results support the portfolio absorption and bounded evaluation capacity hypotheses, but not the speculative trading hypothesis.

2 Bond Trading Literature

The goal of this research is to identify the drivers of secondary market trading frequency of municipal securities. We should care about trading frequency because it may signal for liquidity issues. Liquidity of assets is highly valued in financial markets. Although high trading frequency can imply liquidity, Ronen and Zhou (2013) show that infrequent trades are not necessarily a sign illiquidity or market inefficiency for corporate bonds. Investors might simply be waiting for specific information and act on that information in large trades in the future.

Drawing on corporate bond literature can provide important insights into the municipal securities trading. environment. Corporate bond research shows that trading frequency generally declines as bonds age and find their way into portfolios of household investors and mutual funds. Ronen and Zhou (2013) find that once corporate bonds are absorbed into portfolios, their liquidity declines rapidly, especially if they are rated as investment-grade. Hotchkiss and Jostova (2007) also claim that issue size and age are the main determinants of trading volume in the corporate bond market.

Additionally, trade size is an important factor in the secondary market trading for corporate bonds. Large trades that can be split into multiple blocks are easier to dispose of for dealers and thus, less costly. Both municipal and corporate bond markets are dominated by large institutional investors. Ronen and Zhou (2013) show that corporate bonds with the highest institutional trade volume change over time but maintain common characteristics such as age, maturity, credit quality, and bond complexity.

On the other hand, Harris and Piwowar (2006) hypothesize that large institutional

traders have a better sense of the valuation of municipal bonds than uninformed retail investors. The municipal bond literature distinguishes between large institutional-size trades and smaller retail-size trades, although the threshold between the two categories is somewhat arbitrary. The cutoff point between institutional and retail trades ranges from $\$25,000$ to $\$100,000$ in most studies. The MSRB (2014b) report shows that $\$25,000$ is the median trade size in the municipal market. Since it is not necessarily correct to distinguish institutional and retail size trades simply based on trade size and we do not have access to additional identifying information, I only focus on whether a trade is reported as customer or institutional trade by the MSRB.

The MSRB reports secondary transactions as customer trades (purchases from customers or sales to customers) or interdealer trades. Customers in this context are non-institutional investors. Therefore, retail-size trades and interdealer trades are not mutually exclusive. A dealer may be involved in both a retail-size trade and an institutional-size trade. Similarly, a customer sale or purchase may be of institutional size but that is less unlikely.

3 Hypotheses

To understand the drivers of active trading, or lack thereof, I test the following three hypotheses: portfolio absorption, speculative trading, and limited information dissemination.

H1 - Portfolio Absorption: As securities find their way into inactive investor portfolios, municipal securities trading activity declines.

H2 - Speculative Trading: Securities with more underlying risk are traded more frequently in the secondary market.

H3 - Bounded Evaluation: Securities with more complex features are traded less in the secondary market due to the limited evaluation capability of investors.

Portfolio Absorption. If the portfolio absorption hypothesis holds, there may be competing effects between the age (negative expected sign) and time left until maturity (positive expected sign) of the security. As bonds age, they are likely to get absorbed into inactive portfolios of household and institutional investors, reducing trading activity. Corporate research has demonstrated that a bond's age has a negative impact on trading volume. Specifically, new issues, defined as bonds issued in the previous three years, exhibit higher trading activity in the secondary market as they are first introduced into the market. Therefore, all else equal, a negative relationship between bond's age and trading activity is expected.

If the portfolio absorption hypothesis is valid, then as time to maturity shrinks (i.e. age increases), trading activity should decline, implying a positive relationship between time to maturity and trading frequency. On the other hand, if higher liquidity is associated with higher trading activity, we should see less trading activity as time to maturity increases, negating the portfolio absorption theory.

Finally, bank-qualified issues may trade less frequently as they get absorbed into bank portfolios. Issues sold after August 6, 1986 and designated as bank-qualified allow banks to deduct the interest expense for the purchase and holding of these obligations. Therefore, banks have an incentive to absorb such issues into their dormant portfolios, thereby reducing possible trades on these issues.

Speculative Trading. To measure risk speculations in the secondary market, I construct measures of historic yield and price volatility. Simply including trade price and trade yield indicators in the regression where the trading frequency is the dependent variable is not methodologically correct, as these trade characteristics are determined at the time of the trade. In order to circumvent this issue, I construct trade and yield volatility measures to control for the effects of past trade performance.

Trade and yield volatilities are measured as backward-moving standard deviations of average trade prices and trade yields, respectively. This allows me to construct a measure of trade performance information that would have been available to the investor at the time of trade. Further, speculative trading implies that trading activity for risky securities should be higher, all else equal. Smaller governments with more idiosyncratic risk are unlikely to issue large amounts of debt. Therefore, if trading activity is driven by risk speculations, larger par value should be associated with less trading activity, all else equal.

The corporate literature has documented that speculative trading for lower-rated non-investment grade (NIG) corporate bonds is higher than that for investment grade (IG) corporate bonds. Further, standard investment theory tells us that investors are compensated for increased risk with higher interest rates. Therefore, higher coupon bonds are likely to be riskier securities. On the other hand, since coupon rate is determined at the issuance and does not change for most bonds (except for variable rate securities), it may not have any long-term effects. Therefore, I also control for credit ratings, coupon rates, and coupon types.

Bounded Evaluation Capacity of Investors. Securities with various complex features, such as put and call options,[3] can become difficult to evaluate, especially for unsophisticated retail investors. Consequently, the presence of multiple complexities may be associated with less trading activity due to the cost of disseminating information. This is more likely for customer trades than interdealer trades since brokers are better informed about the bond market compared to an average customer.

Harris and Piwowar (2006) characterize bond complexity by the following six features: callable feature, sinking fund provision,[4] special redemption/extraordinary call features, nonstandard interest payment frequency, nonstandard interest accrual basis bonds and financial guarantees such as insurance, letter of credit, etc. Hotchkiss and Jostova (2007) hypothesize that embedded options may reduce price-induced trading for corporate bonds, but they do not find support for this claim.

I construct a nominal measure of security complexity which increases by one unit for each of the following features for a given security: put option, call option, make-whole call feature, extraordinary call feature, super sinker, material event(s) feature, and/or partial redemption flag. These features are not easy to evaluate and each one adds a new level of complexity to an already opaque bond market.

[3] "A put option is an option contract giving the owner the right, but not the obligation, to sell a specified amount of an underlying security at a specified price within a specified time. This is the opposite of a call option, which gives the holder the right to buy shares." Accessed http://www.investopedia.com/terms/p/putoption.asp

[4] "Sinking fund provision is a stipulation in many bond indentures that the borrower retire a certain proportion of the debt annually. The retirement may be effected by calling the bonds from the investors (if interest rates have declined) or by purchasing the bonds in the open market (if interest rates have increased). This orderly retirement may be advantageous to a bondholder because it creates some liquidity; however, it also may cause the holder to give up a high-yielding bond at the call price (often at par) during a period of reduced interest rates." http://financial-dictionary.thefreedictionary.com/sinking+fund+provision

4 Methodology

I model the determinants of trade frequency through the impact of various issue, issuer, historical trade, and market characteristics as following:

$$\text{Trading Frequency} = \text{f (issue, historical trade, and market characteristics)} \quad (1)$$

Since most municipal securities do not trade at all (zero trading activity), while others trade frequently (positive trading activity), a model that takes lower bound censoring, rather than a regular panel regression, is necessary.[5] It is unclear whether the untraded securities were untraded because they were unattractive to investors or because these securities were not available for trading. Note that the assumption of random-effects rather than fixed-effects is constraining as there may be a correlation between observables and the unobserved effect, α_i. However, fixed-effects Tobit (or probit) is not computationally feasible. The following model is used to estimate a random-effects Tobit model:[6]

$$\text{Trading Frequency}_{it} = \max(\alpha_i + X_{it}^{'}\beta + \epsilon_{it}, 0) \quad (2)$$

$$\epsilon_{it}|x_i, \alpha_i \sim \text{Normal}(0, \sigma_\epsilon^2) \quad (3)$$

where α_i is the unobserved effect and X is a vector of explanatory variables including an intercept.

[5] I also considered using a zero-inflated negative binomial model (ZINB). However, ZINB suggests that the pile-up at zero is generated by a different process than the count values. There is little evidence to believe that this applies to traded and untraded securities.

[6] The analysis was conducted in SAS using the NLMIXED procedure which requires manual coding of the model and increased runtime as quadrature points are increased.

5 Data

5.1 Data Sources

This study uses large databases of issuance (primary market) and transaction (secondary market) data, currently not available to the public. The analysis is conducted at the CUSIP[7] level (maturity level), rather than the issuance level. To clarify, most securities are issued in multiple increments at different prices with different amounts, maturity dates, discounts/premiums, and CUSIP numbers. CUSIP-level analysis, therefore, is more granular than issuance-level analysis. To accommodate computational constraints, the unit of observation is converted to CUSIP-years.

Daily historical transaction data from 2005 through 2014 is obtained directly from the MSRB and is not publicly available. Each observation of the MSRB data contains the issue CUSIP number, the transaction date and time, trade price, coupon rate, yield to maturity,[8] trade amount, and whether the trade was sale to a customer (investor) by a dealer, purchase from a customer by a dealer, or an interdealer trade.

The second data source is obtained from the Mergent's Municipal Bond Securities Database (MBSD) and is also not available to the public. This database contains the CUSIP numbers and issuance information including issuance and maturity dates, debt type, coupon type, type of capital purpose and use of proceeds, credit rating and other enhancements, default information, original sale type, etc.

[7] CUSIPs are unique security identifiers issued by the Committees on Uniform Securities Identification Procedures (CUSIP) Bureau.

[8] Yield to maturity is the total return anticipated on a bond if the bond is held until the end of its lifetime.

The third database is manually compiled from various data sources such as the Bureau of Labor Statistics, The Bond Buyers, and the Bloomberg Professional Services. The three databases are merged using the CUSIP numbers and state identifiers.

5.2 Circumventing Truncated Transaction Data Issue

Since most securities are not traded in a given year, issuance data is converted to CUSIP-years for all years that the issue was active. For example, instead of one observation for a security that was active for 10 years between 2005 and 2010, six CUSIP-year observations are created for the years 2005-2010. Then the trading activity variables are replaced with zero for each year with no matching transactions in the MSRB data. This allows to circumvent truncated transaction data issue of observing only those securities that were traded. Note that looking at only traded bonds in the analysis introduces significant selection bias.

5.3 Measurements

Table 1 provides an overview of variable names, definitions, data sources and expected signs. Several dependent variables identify differences in trading activity between trade types. What drives hyperactivity or speculative interdealer trading may be quite different from what impacts retail investor trades. Note that it is not possible to simply add an indicator variable for trade type rather than running separate regressions because trade frequencies are aggregated at the annual level.

Table 1: Variable Descriptions

Variable Name	Description and Measurement	Data Source	Model/ E(Sign)
Dependent variables			
All trades	Number of trades per year	MSRB	Tobit
Interdealer trades	Number of interdealer trades per year	MSRB	Tobit
Customer purchases	Number of customer purchases per year	MSRB	Tobit
Customer sales	Number of customer sales per year	MSRB	Tobit
Issue Characteristics			
Par value	Log of the principal amount of the maturity's original offering	MBSD	+
Age	Number of years since issuance	MBSD	−
Time to Maturity	Number of years left to maturity	MBSD	+
Coupon rate	Coupon rate on the maturity	MBSD	+
Coupon type	Binary variable for each coupon type with reference group as FIXED	MBSD	varies
Federal Tax	Binary variable indicating whether the maturities are federally taxable	MBSD	?
State Tax	Binary variable indicating whether the maturities are subject to state taxes	MBSD	?
Security Type	Binary variable denoting whether the security type is Unlimited Tax General Obligation (GO)	MBSD	varies
Capital Purpose	Binary variable indicating whether the issue is Refunding with New as the reference group	MBSD	varies
Credit Ratings	Two binary variables indicating whether the maturity was rated as investment grade (IG) by S&P and Moody's	MBSD	−
Insured	Binary variable indicating if the security has insurance	MBSD	−
Bank Qualified	Binary variable indicating if the security allows banks to deduct the interest expense for the purchase or holding of these obligations	MBSD	−

Table 1: Variable Descriptions

Variable Name	Description and Measurement	Data Source	Model/ E(Sign)
Complexity Score	Nominal score between 0 and 5 indicating the number of complexities. See Section 5.3	MBSD	–
Trade History			
Past Price Volatility	Backward moving standard deviation of average annual trade prices	MSRB	–
Past Yield Volatility	Backward moving standard deviation of yearly average yields	MSRB	–
Market Conditions			
Muni Market Index	Yield to Maturity for the Muni Bond Index	BB	
Unemployment rate	Annual state unemployment rates (seasonally adjusted)	BLS	

BB = The Bond Buyer, BLS = Bureau of Labor Statistics,
MBSD = Mergent's Municipal Bond Securities Database,
MSRB = Municipal Securities Rulemaking Board Historical Trade Data.

5.4 Exclusion Criteria and Sample Selection

The initial sample from Mergent includes $8,777,163$ observations of CUSIP-years for the period of 2005-2014. The initial sample for all transactions from the MSRB data includes $5,063,454$ observations of CUSIP-level transaction-years for 2005-2014.[9] I remove all issues with variable coupon rates[10]. Capturing the change in interest rate variation is beyond the scope of this paper. I restrict the sample to the 50 states and their subsidiary governments.[11] I also remove all issues that have been outstanding for less than one year. The transition from primary market to secondary market complicates

the analysis. Finally, I only analyze new and refunded bonds and remove all other issues.

The final bond sample comprises $6,017,685$ CUSIP-years and $1,007,272$ unique CUSIPs. The final non-bond sample comprises $530,420$ CUSIP-years and $92,680$ unique CUSIPs. The analysis is conducted separately on the 0.5% random sample of bond CUSIPs and 5% random sample of non-bond CUSIPs to reduce the computer run-time.

6 Empirical Findings

Table 2 provides descriptive statistics for bonds. (See Table 5 in the Appendix for similar descriptives on other securities.) Table 3 shows the distribution of CUSIP-years by trade types. As expected, there is significant pile-up at zero. About 68 % of observations (CUSIP-years) have no trading activity recorded.

Random-effects Tobit results are given in Table 4 for the 0.5% sample of the Unlimited General Obligation bonds. (See Table 6 in the Appendix for the results on other securities.) Both portfolio absorption and bounded evaluation hypothesis are confirmed, while there is not enough support for the speculative trading hypothesis. Results are consistent across all trading cross sections, regardless of whether it is an interdealer trade or customer transaction. This may seem surprising at first but makes sense if we think

[9]The merged initial sample contains 10,576,487 CUSIP-years for 2005-2014. This is due to the fact that some of the CUSIPs in the transaction data are not matched to the MBSD issuance data. This gap comprises 17.91% of the data and are dropped for now. I plan to find another technique to match the issuance and transaction data for this subgroup in the future by potentially manually collecting the issuance data from the Bloomberg terminal.

[10]More specifically, these are adjustable, deferred, floating auction, floating, floating at floor, inverse floater, index-linked, stripped, stripped convertible, or variable rate coupons

[11]I delete all securities issued in American Samo, Canal Zone, Guam, Northern Mariana Islands, Puerto Rico, Virgin Islands, District of Columbia, the United States government as well as any issues within missing state information.

Table 2: **Summary of Variables: Bonds**

Variable	Min	Mean	Median	Max	Std
All Trades	0.00	7.08	0.00	9547.00	40.19
Interdealer Trades	0.00	2.34	0.00	3655.00	13.49
Customer Sales	0.00	3.04	0.00	5035.00	20.47
Customer Purchases	0.00	1.70	0.00	3330.00	9.44
Par value	12.90	3,794,430	710,000	7,754,890,000	21,532,591
Age	1.00	5.69	5.00	114.00	4.10
Time to Maturity	1.00	9.98	9.00	99.00	5.67
Coupon rate	0.00	4.39	4.50	18.00	1.27
Federal Tax	0.00	0.05	0.00	1.00	0.22
State Tax	0.00	0.07	0.00	1.00	0.26
Investment grade (Moody's)	0.00	0.51	1.00	1.00	0.50
Investment grade (S&P)	0.00	0.47	0.00	1.00	0.50
Insured	0.00	0.50	0.00	1.00	0.50
Bank Qualified	0.00	0.37	0.00	1.00	0.48
General Obligation	0.00	0.47	0.00	1.00	0.50
New Issue	0.00	0.61	1.00	1.00	0.49
Refunding Issue	0.00	0.39	0.00	1.00	0.49
Original Issue Discount Coupon	0.00	0.39	0.00	1.00	0.49
Original Issue Premium Coupon	0.00	0.35	0.00	1.00	0.48
Fixed Coupon	0.00	0.22	0.00	1.00	0.42
Zero Coupon	0.00	0.04	0.00	1.00	0.18
Complexity Score	0.00	1.38	2.00	4.00	0.81
Yield Volatility	0.00	31.19	39.78	183.42	26.68
Price Volatility	0.00	1.25	1.38	67.41	1.17
Muni Market Index	4.36	4.87	4.74	5.44	0.37
Unemployment Rate	2.60	7.08	7.00	13.70	2.11
Cusip-years=6,017,685					

Table 3: Distribution of CUSIP-years

Number of trades	Frequency (in 1,000s)	Percentage
All Trades		
0	4,441	67.82
1-30	1,778	27.15
30+	329	5.03
Interdealer Trades		
0	4,980	76.05
1-30	1,475	22.53
30+	93	1.42
Customer Purchases		
0	4,498	68.69
1-30	1,997	30.5
30+	53	0.80
Customer Sales		
0	4,478	68.39
1-30	1,952	29.82
30+	117	1.79

about the structure of the secondary market and how the trades occur. Most investors are interested in investing in municipal securities when they call up their broker rather than investing in a specific security with certain characteristics. Therefore, it is reasonable that drivers of customer and non-customer related trades are similar, if not the same.

The age variable, with measures the number of years since the maturity's issuance, has a negative effect on trade frequency, supporting the portfolio absorption. As age rises by one year, overall trade frequency declines by more than one trade (-1.26). Most of

Table 4: Random-Effects Tobit Regression Results

	All Trades	Interdealer	Purchases	Sales
	Portfolio Absorption Hypothesis			
Age	-1.26 ***	-0.54 ***	-0.28 ***	-1.11 ***
	0.25	0.10	0.06	0.14
Time to Maturity	1.02 ***	0.36 ***	0.15 ***	0.50 ***
	0.16	0.06	0.03	0.08
Bank Qualified	-22.62 ***	-7.98 ***	-4.50 ***	-13.36 ***
	1.80	0.75	0.39	0.99
	Bounded Evaluation Hypothesis			
Complexity Score	-7.71 ***	-3.27 ***	-1.58 ***	-3.75 ***
	1.10	0.45	0.24	0.60
	Speculative Trading Hypothesis			
Yield Volatility	2.57 ***	0.95 ***	0.37 **	1.67 ***
	0.54	0.22	0.12	0.32
Price Volatility	-0.44 ***	-0.19 ***	-0.09 ***	-0.24 ***
	0.03	0.01	0.01	0.02
Par Value	13.97 ***	6.14 ***	3.16 ***	7.46 ***
	0.56	0.23	0.12	0.31
Constant	-114.16 ***	-99.18 ***	-92.61 ***	-102.04 ***
	1.43	0.61	0.30	0.83
σ_u	1,356.66 ***	199.15 ***	66.87 ***	353.99 ***
	46.25	7.70	2.23	13.32
σ_e	37.63 ***	14.82 ***	7.52 ***	24.28 ***
	0.30	0.14	0.06	0.19
CUSIP-years	30,422	30,422	30,422	30,422

***p< 0.0001, **p< 0.001, *p< 0.01

Controls: General Obligation, Refunding, Federal Tax, State Tax, Time to Maturity, Investment Grade Rating by S&P, Investment Grade Rating by Moody's, Insured, Coupon Rate, Original Issue Discount, Original Issue Premium, Zero Coupon, Muni Market Index, Unemployment Rate, and Year Fixed-effects

this is driven by customer sales (−1.11), which implies that customers are less likely to sell seasoned bonds. As expected, consistent with the portfolio absorption hypothesis, as time left until maturity increases (and bond's age is reduced), trading frequency increases by about one trade.

Bank-qualified securities, on the other hand, are traded much less than those that are not bank-qualified. Recall that bank-qualified issues give banks an incentive to hold these securities in their inactive portfolios. A coefficient of −22.62 is quite large in magnitude if you consider the distribution of trade frequencies and especially the distribution of the unit of observation used in this analysis (CUSIP-years). Given that the mean trade frequency for CUSIP-years is 6.42 (see Table 2), 22 more trades for a security that is not bank-qualified is a strong signal of portfolio absorption.

The results also support the bounded evaluation hypothesis, despite the tight distribution of complexity features of the bonds. As the number of complexity features increases by one, trade frequency declines by about 8 trades. It is interesting that customer purchases are affected less by the number of complexity features than other types of trades. This may point to the fact that most customers investing in municipal securities lack market sophistication. However, customer sales are very similar in magnitude to interdealer trades which implies the existence of other mechanisms.

Results provide inconclusive findings in terms of the speculative trading hypothesis. Issues with larger original maturity amounts are traded more frequently. As log of the maturity amount increases by one unit, which approximately corresponds to one percent increase in the amount, trading frequency increases by about 14 trades. If large issue

size is a signal about the idiosyncratic risk associated with the issuer, then this finding contradicts the speculative trading in the market as well. Higher historical secondary market yield volatility is associated with increased trading frequency, which also supports the speculative trading hypothesis. However, higher price volatility provides opposite of the expected effects. The fact that price volatility decreases trading activity contradicts my speculative trading hypothesis.

7 Conclusion

The study is based on large databases of security issuance and transaction information not availably publicly and supplemented by various market and issuer specific measurements.This paper explores the drivers secondary market trading activity of municipal securities by testing three hypotheses: portfolio absorption, bounded evaluation capacity of investors, and speculative trading. Results support the first two hypothesis and do not yet provide convincing evidence in favor of the third.

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A Appendix

Table 5: **Summary of Variables: Other Securities**

Variable	Min	Mean	Median	Max	Std
All Trades	0.00	6.42	0.00	5737.00	39.35
Interdealer Trades	0.00	2.14	0.00	1728.00	13.06
Customer Sales	0.00	2.65	0.00	2972.00	18.58
Customer Purchases	0.00	1.63	0.00	1423.00	10.89
Par value	2,000	3,222,737	545,000	3,000,000,000	24,996,452
Age	1.00	5.06	4.00	35.00	3.70
Time to Maturity	1.00	9.83	9.00	46.00	5.41
Coupon rate	0.00	4.48	4.50	15.00	1.15
Federal Tax	0.00	0.19	0.00	1.00	0.40
State Tax	0.00	0.10	0.00	1.00	0.30
Investment grade (Moody's)	0.00	0.50	1.00	1.00	0.50
Investment grade (S&P)	0.00	0.47	0.00	1.00	0.50
Insured	0.00	0.53	1.00	1.00	0.50
Bank Qualified	0.00	0.35	0.00	1.00	0.48
General Obligation	0.00	0.21	0.00	1.00	0.40
New Issue	0.00	0.79	1.00	1.00	0.41
Refunding Issue	0.00	0.21	0.00	1.00	0.41
Original Issue Discount	0.00	0.42	0.00	1.00	0.49
Original Issue Premium	0.00	0.24	0.00	1.00	0.43
Fixed Coupon	0.00	0.31	0.00	1.00	0.46
Zero Coupon	0.00	0.02	0.00	1.00	0.15
Certificate of Participation	0.00	0.37	0.00	1.00	0.48
Certificate of Obligation	0.00	0.22	0.00	1.00	0.42
Build America Bond	0.00	0.14	0.00	1.00	0.35
Warrants	0.00	0.12	0.00	1.00	0.32
Complexity Score	0.00	1.36	2.00	3.00	0.76
Yield Volatility	0.00	33.13	43.90	98.08	26.57
Price Volatility	0.00	1.39	1.55	59.15	1.17
Muni Market Index	4.36	4.85	4.74	5.44	0.37
Unemployment Rate	2.60	7.28	7.10	13.70	2.16
CUSIP-years=530,413					

Table 6: Random-Effects Tobit Regression Results: Other Securities

	All Trades	Interdealer	Purchases	Sales
	Portfolio Absorbtion Hypothesis			
Age	-1.26 ***	-0.54 ***	-0.28 ***	-1.11 ***
	0.25	0.10	0.06	0.14
Bank Qualified	-22.62 ***	-7.98 ***	-4.50 ***	-13.36 ***
	1.80	0.75	0.39	0.99
	Bounded Evaluation Hypothesis			
Complexity Score	-7.71 ***	-3.27 ***	-1.58 ***	-3.75 ***
	1.10	0.45	0.24	0.60
	Speculative Trading Hypothesis			
Yield Volatility	2.57 ***	0.95 ***	0.37 **	1.67 ***
	0.54	0.22	0.12	0.32
Price Volatility	-0.44 ***	-0.19 ***	-0.09 ***	-0.24 ***
	0.03	0.01	0.01	0.02
Par Value	13.97 ***	6.14 ***	3.16 ***	7.46 ***
	0.56	0.23	0.12	0.31
Constant	-114.16 ***	-99.18 ***	-92.61 ***	-102.04 ***
	1.43	0.61	0.30	0.83
σ_u	1356.66 ***	199.15 ***	66.87 ***	353.99 ***
	46.25	7.70	2.23	13.32
σ_e	37.63 ***	14.82 ***	7.52 ***	24.28 ***
	0.30	0.14	0.06	0.19
CUSIP-years	30,422	30,422	30,422	30,422

***p< 0.0001, **p< 0.001, *p< 0.01

Controls: General Obligation, Refunding, Federal Tax, State Tax, Time to Maturity, Investment Grade Rating by S&P, Investment Grade Rating by Moody's, Insured, Coupon Rate, Original Issue Discount, Original Issue Premium, Zero Coupon, Muni Market Index, Unemployment Rate, and Year Fixed-effects