

The Complexity Yield Puzzle: A Textual Analysis of Municipal Bond Disclosures

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Information Disclosure in Financial Markets

- Well functioning markets require clear communication between investors and those seeking funds. Disclosures play an important role. The optimal level of disclosure can depend on investor clientele

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INSTITUTIONAL



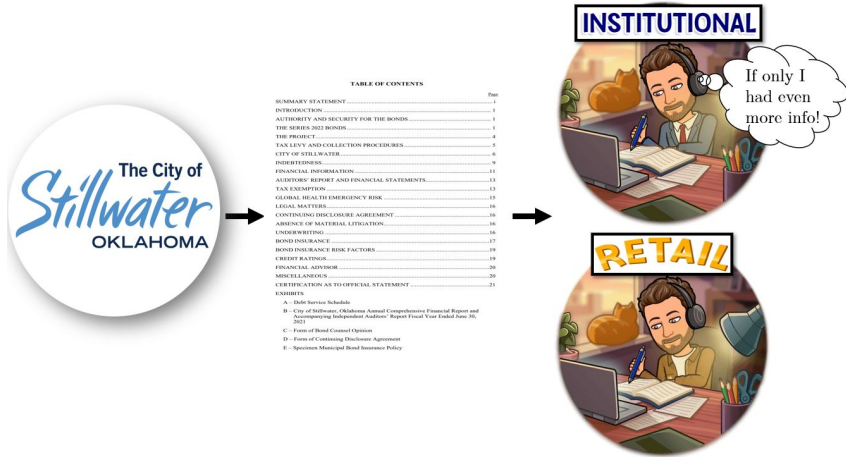
- PM at Muni-bond mutual fund
- Has team of analysts
- Extensive professional investing experience

RETAIL



- Works in medical equipment sales
- Limited time
- Invests on the side

With straightforward disclosure, most investor types will be able to process



Information in Municipal Primary Markets

- The \$4.2 trillion muni market's historical creditworthiness has allowed it to enjoy lax disclosure regulation
 - Unlike public firms, munis do not follow a standardized disclosure policy
 - The SEC has become increasingly vocal about its desire to enhance municipal disclosure
 - Local gov officials and underwriters fear muni disclosure regulation will be too burdensome
- A market with predominantly individual investors can suffer from too much complexity due to burdensome information processing costs

☰ **THE BOND BUYER**

SEC enforcement actions emphasize issuers, MAs

By [Connor Hussey](#) July 27, 2022, 2:58 p.m. EDT 3 Min Read

THE WALL STREET JOURNAL

MARKETS | FINANCIAL REGULATION

Local Governments, Many on Wall Street Line Up Against Muni-Data Bill

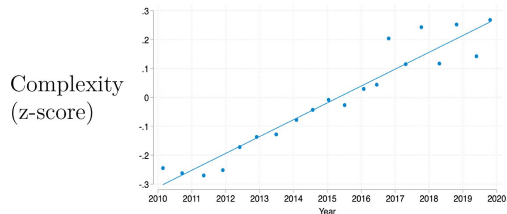
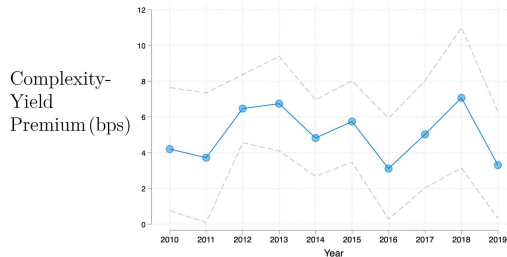
Effort to improve transparency by requiring machine-readable financial disclosures raises hackles

By [Heather Gillers](#) [Follow](#)
Nov. 26, 2022 7:00 am ET

Research Questions

- How does the complexity of municipal official statements (OS) affect the allocation of capital?
 - **Complexity Yield Premium** driven by bonds with **high retail presence** and **less complementary information**
 - In secondary market, complexity increases **volatility** and **markup differential** between retail and institutional investors
- How has the complexity of OS's evolved over time?
 - Steady increase in complexity, driven by **regulatory oversight** and **catering to institutions** (Bergstresser et al., 2016)

Main Results



Municipal Bond Official Statements

“Investors and other market participants have long criticized the quality, consistency, and timeliness of the disclosures provided by municipal issuers.”

- Former SEC Commissioner Luis Aguilar, Feb 2015.

- Municipalities are required to distribute an OS prior to issuing any new bond
 - Typical contents - amount, maturities, credit rating, source of repayment and their security, sources and uses of funds
 - Access to these statements has benefited retail investors, on average ([Cuny, 2018](#))
- The OS must be “complete” – an investor should not have to research the bonds beyond what is available in the OS
- We collect the universe of OS’s from EMMA (mid-2009 to 2019) and merge with primary market issuance data from Mergent at the bond issuance level
 - 85,317 statements covering >1mm bonds

Measuring Complexity

- We create a composite index of complexity using commonly used measures from the finance ([Loughran and McDonald, 2014](#)) and linguistics ([Wang et al. 2022](#)) literature
 - Number of Pages, Word Count, Flesch-Kincaid, Gunning-Fog, Auto Readability, Coleman-Liau, Linsear-Write, and Smog Index:

$$\text{ex : Flesch Kincaid} = 0.39 \times \frac{\text{total words}}{\text{total sentences}} + 11.8 \times \frac{\text{total syllables}}{\text{total words}} - 15.59$$

	Mean	Median	P25	P75	SD
Number of Pages	135.4	118.0	81.0	169.0	89.8
Number of Words (000)	63.4	48.8	26.8	80.3	57.3
Flesch-Kincaid Grade	20.2	18.9	16.1	22.7	6.6
Gunning Fog Grade	21.0	19.7	17.0	23.5	6.7
Observations	85,317				

Complexity Excerpt

“If available moneys in the Debt Service Fund after any required transfers from the Debt Service Reserve Fund and Redemption Fund are not sufficient on any day to pay all principal (including sinking fund installments), redemption price and interest on the Outstanding Bonds then due or overdue, such moneys (other than any sum in the Redemption Fund irrevocably set aside for the redemption of particular Bonds or required to purchase Bonds under outstanding purchase contracts) shall, after payment of all charges and disbursements of the Trustee in accordance with the Agreement, be applied (in the order such Funds are named in this section) first to the payment of interest, including interest on overdue principal, in the order in which the same became due (pro rata with respect to interest which became due at the same time), and second to the payment of principal (including sinking fund installments) and redemption premiums, if any, without regard to the order in which the same became due (in proportion to the amounts due).”

MASSACHUSETTS HEALTH AND EDUCATIONAL FACILITIES AUTHORITY REVENUE BONDS,
MASSACHUSETTS EYE AND EAR INFIRMARY ISSUE SERIES C (2010) (MA)

Page Count: 190

Word Count: 96,825

Readability grade level: 23.6

Complexity index: 1.2

Does Official Statement Complexity Affect Issuance Costs?

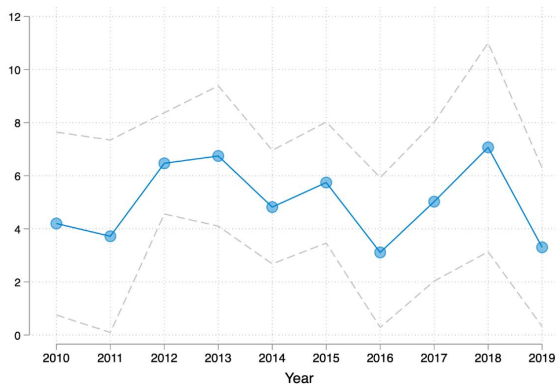
$$Yield\ Spread_{i,t} = \beta \cdot Complexity_{it} + \gamma \cdot X_{it} + State \times Year\ FE_{sy} + \varepsilon_{it}$$

- Bond issue i , issuance date t , state s , year y
- $Yield\ Spread_{i,t}$ is the within-issue value-weighted average difference between the offering yield of each bond and the coupon-equivalent risk-free rate

	Mean	Median	Std. Dev.
Yield Spread (%)	0.354	0.247	0.623

- *Bond and County Controls* – unemployment rate, population, issue size, maturity, negotiated, callable, insured, credit rating, GO

Complexity-
Yield
Premium (bps)

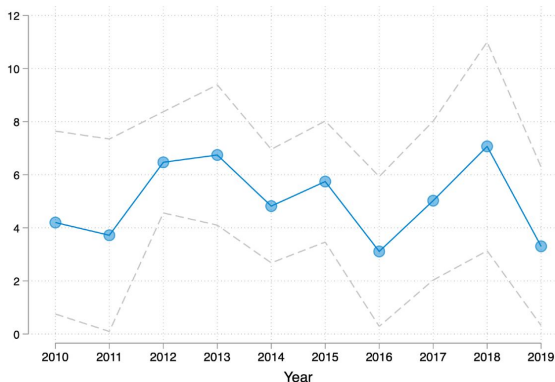


Full sample average of 4.9bps is 7.9% of yield spread standard deviation

5.1% of average credit spread between AAA and BBB bonds

Issuances w/ a disclosure complexity level ≥ 0.5 standard deviations above average paid \$1.4 billion more in agg. interest payments

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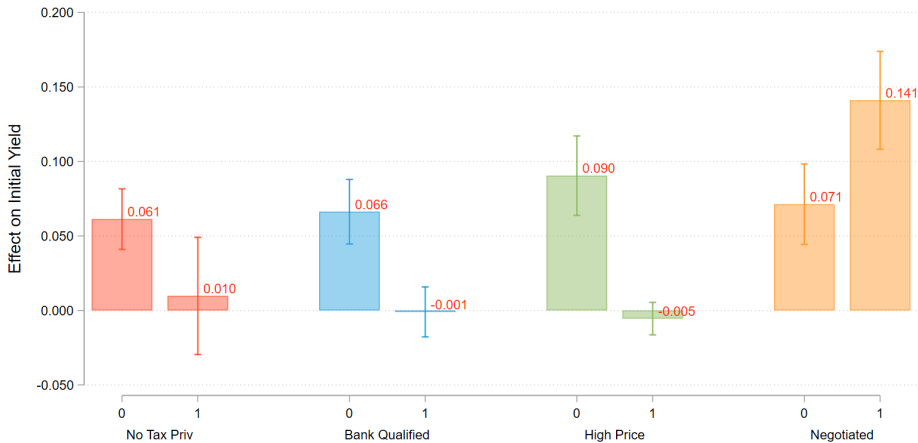
What Drives the Complexity-Yield Premium?

- The complexity-yield premium depends on the share of unsophisticated investors in the market **Look at settings where retail participation varies.**
 1. Bonds issued in states with **low/no tax privilege** – less incentive for local retail investors to dominate market ([Babina et al 2019](#))
 2. **Bank Qualified** bonds – higher participation by banks ([Dagostino, 2022](#))
 3. Bonds with **“High Price”** – less likely to trigger de minimus threshold and thus more attractive to mutual funds ([Bagley, Gissler, Hiteshew, and Ivanov 2023](#))
 4. **Negotiated** bonds – have special window for retail participation in primary market
- The complexity-yield depends on the level of complementary information from external sources
 1. **Examine subsample regressions by credit rating bins.** Low and unrated bonds will have less complementary info and worse signal precision ([Cornaggia et al., 2018](#))
 2. **Revenue bonds.** Less historical info (relative to GOs).

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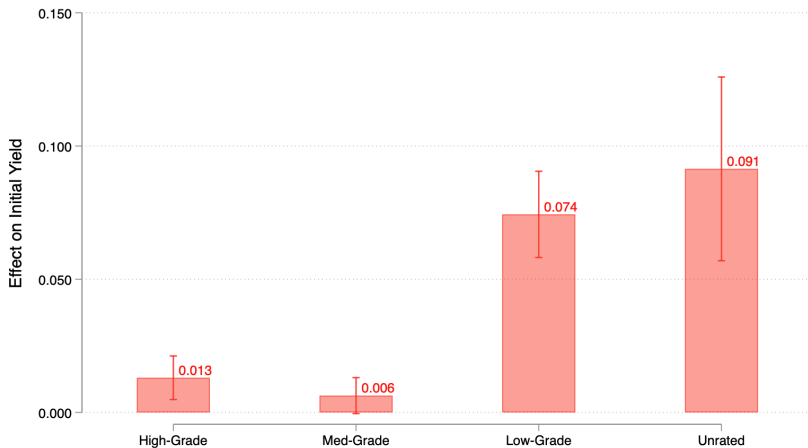
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Complexity Premium is Moderated when Inst'l Investors are more Present



Baseline Complexity Yield Premium is 0.049

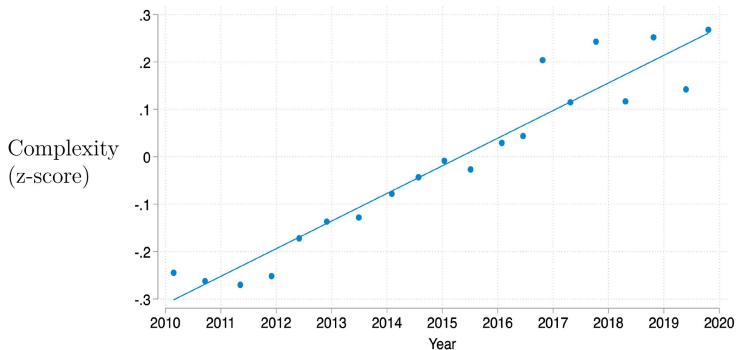
The Complexity Premium is Highest for Low and Unrated Issues



Baseline Complexity Yield Premium is 0.049. Revenue bonds also have higher premium (see paper).

Official Statements have Steadily Increased in their Complexity (Puzzling!)

- Given complexity is costly on average, issuers should be aiming to simplify OS's. What are the time trends?
- Graph shows how complexity changes through our sample



Dissecting Complexity

- **Catering Hypothesis:** Complexity may be increasing in subsets of bonds that cater to institutions
 - We find some evidence of this for states with no tax privilege (see paper)
- **Regulatory Burden Hypothesis:** Increased regulatory burden (without standardized guide) may pressure munis to put more detail/complexity into OS

Is Complexity Increasing for Munis with Higher Regulatory Burden?

- Use increase in SEC enforcement workers during 2015-2017 regulatory push
 - During Chair Mary Jo White's enforcement push, the number of enforcement officers in regional offices increased by 70%, on average
 - Large regional variation - Boston increased by 150%, Fort Worth by 9%

$$Complexity_{i,t} = \sum_{y=2009}^{y=2019} \beta'(High\ Enforcement_i \times Year_t) + \gamma \cdot X_{it} + State\ FE_s + \varepsilon_{it}$$

- *High Enforcement* = 1 if muni is in the state of a regional office with above median growth in enforcement workers



U.S. SECURITIES AND
EXCHANGE COMMISSION

Speech

A New Model for SEC
Enforcement: Producing
Bold and Unrelenting
Results

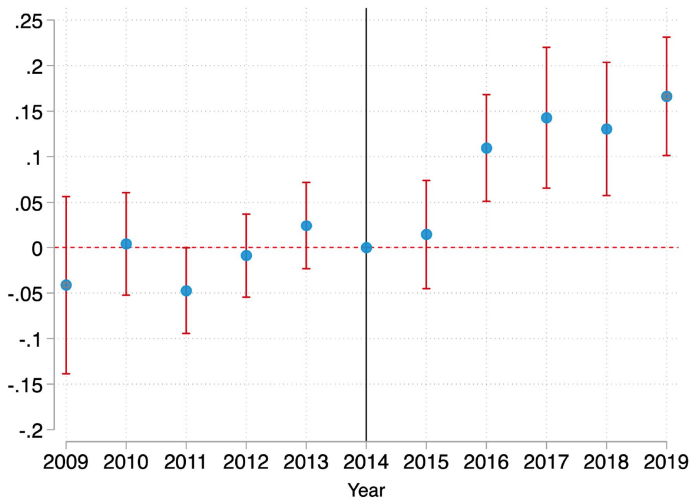
Chair Mary Jo White

New York University School of Law Program on Corporate
Compliance and Enforcement
New York University School
of Law Pollack Center for Law and Business

Nov. 18, 2016

Complexity is Increasing in States with Higher Regulatory Burden

Difference in
Complexity
For High-
Enforcement
Munis

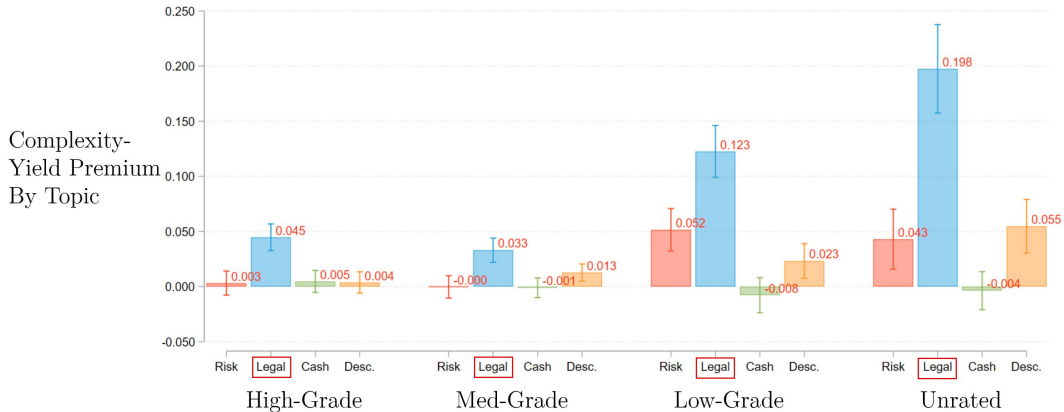


Where is Complexity the most problematic within an OS?

- OS's are not standardized and therefore do not follow a common table of contents
- Use Latent Dirichlet Allocation (LDA) to discover the “topics” within an OS
 - LDA classifies each portion of a document in terms of how relevant it is to each discovered topic
 - Manually assign these topics to groups based on relevance within the municipal disclosure

LDA Topic Examples	
Risk	Bond Description
Security, Risk, Fund Liability, Deferred, Resource Default, Event, Trustee	Redemption, Bond, Date Project, Improvement, Capital Bond, Price, Discount
Cashflow	Legal
Budget, Appropriation, Year Expense, Fee, Cost Fund, Investment, Portfolio	Mean, Resolution, Shall Authority, Finance, Resolution Bond, Opinion, Counsel

LDA Topic Regression Results



Conclusion

- The cost of complexity in municipal disclosure varies based on investor clientele.
 - Complexity is bad for cost of capital, volatility, and liquidity if there are more unsophisticated investors, but can be helpful if there are more sophisticated investors
- Puzzlingly, official statements have become increasingly complex, at the cost of higher muni financing expenses
 - Increased regulatory burden appears to be an important channel. Catering to institutions is also relevant.