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PAPER SESSION 4: CURRENT ISSUES IN MUNICIPAL BORROWING

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**WESSEL:** And we're looking forward to a good day today. We have two papers -- everything today will be in this room. We have two paper sessions and then we have a panel at about 1220 on the looking at the long lasting effects of COVID on the downtowns and municipal finance. I want to renew my work on behalf of my colleagues at WashU Olin Business School, the Brandeis Rosenberg Institute of Something or Other, and the Brandeis International Business School, Rosenberg Institute of Global Finance. We had to make the type small to fit all that in. And the Harris School of Public Policy at the University of Chicago. And I also want to renew my thanks to Haowen and Megan Waring, Stephanie Cencula, Brie Nicker and the others on our staff who have helped pull this off with such skill and efficiency. A moderator for the first session this morning is Steve Winterstine. Alpha Ledger, is that the name of your new firm? That's your old firm. So, new firm is Steven Winters LLC or something? SBW. All right. Steve Winterstine.

**WINTERSTEIN:** Thank you. Thank you. Thank you, David. To lower the mic here. So today, if we if we have Stefan Gissler presenting a paper called - and I was you know, you get these papers and there's, you know, the titles can be bland sometime, even though the content is very interesting. But, "Pushing Bonds Over the Edge," it sounds like a terrifying title, but, "Pushing Bonds Over the Edge: Investor Demand and Municipal Bond Liquidity." John Bagley at the MSRB, Stefan Gissler at the Federal Reserve, and Kent Hiteshow at E&Y. And so I'm going to ask oh, I'm sorry, and Ivan Ivanov at the Federal Reserve of Chicago. So we're going to invite Stefan up and present the paper, and Kevin Bain will be the discussant afterwards. The floor is yours.

**GISSLER:** All right. Thank you very much for having us. So the usual disclaimer applies. These are my views, not of the Federal Reserve. And let me actually start off with something that happened way after we started this project, which was the banking stress last March. And in the aftermath of SVB's failure, BlackRock was supposed to sell SVB's large muni bond portfolio, and this wasn't seen to be an easy feat. And the bond buyer, for example, states that those bonds are very difficult to sell because the holdings consist of structure, not credit risk, which likely will require deep concessions given liquidity and the U.S. de minimis risk. So that quote actually summarize our paper pretty well. What we do is, we document that the de minimis risk leads to illiquidity, and then we actually show how this happens. We show that it's mainly institutional investors selling the bonds. But let me not do the bond buy at the top of describing our paper and give you a better high-level summary of it. So what's the institutional setting here? Well, interest income on municipal bonds is tax exempt. However, gains from trading are not. So each bond has a threshold. And if you buy a bond on the secondary market below that threshold and either hold it to maturity or sell it afterwards, you incur ordinary income and you have to pay ordinary income taxes. Now, why is this a risk? Well, municipal bond investors are highly tax sensitive. So on the one side, we have retail investors that are often in the highest income tax brackets. On the other side, the largest institutional investors, which are muni mutual funds, often cannot incur tax liabilities. So given that background, we take trading data and basically look around the the minimum threshold, how several trading statistics involve. We then supplement the data with quarterly institutional holdings to see how the largest institutional investors behave. Those are mutual funds flows and funds property, life insurance, property and casualty insurers, life insurers and the largest commercial banks. And the main findings that we're going to have are the trading really plummets once bonds cross the the minimum threshold. Trading volume and trade size drop very closely to the threshold. And all this behavior is not the same across all bonds. It mainly depends on the bonds interest sensitivity. There's a lot more trading still going on close to the threshold. If a bond is less interest sensitive, if a bond is highly interest sensitive, the sell off occurs way earlier. Now, what's driving all this? Well, it's mainly the institutional investors selling their entire positions. I'm going to show you that once Bond moves towards the minimum threshold, the largest holders, which are mutual funds, sell their entire positions and move out of the market. Their behavior also depends on the interest sensitivity of the bonds. They wait a little bit longer. If a bond is less interest sensitive. Well, this is all in the cross section in one of the last exercises. We will then look at the time series dimension of the risk and show you that it's not stable over time. Monetary policy, especially contractionary policy, actually amplifies to minimize risk over the cycle. So in the remainder of the presentation, I will just go into more detail of his points. But before this, let me give you either a reminder or a little primer on what the minimum threshold actually is. So

obviously from tech stocks and bonds, interest income is tax exempt. But the IRS says, well, if you get gains from trading municipal bonds, you have ordinary income and you have to pay taxes on that. So they set a threshold, which is a so-called the minimum threshold, and say if you buy a bond below that, you will have to pay taxes. Once you realize the gains, they can either be realized ones who sell them in the secondary market again at a higher price, or if you hold the bonds until maturity. The general formula the IRS sets is basically the so-called adjusted offering price. -25 basis points for each remaining for each year of remaining maturity. So the adjusted offering price is very simple to calculate if a bond was issued at par. It is simply the par price. So, for example, if you have a bond that was issued at par and has five years of remaining maturity, that the minimum threshold is just 98.75. If you have an original issued discount bond, it's a little bit more complicated, but more or less it's the same style and feature, right? So what we do is we calculate for each bond that was issued that was traded between 2010 and 2022 for each bond and each year the minimum threshold. Then we take as everyone else in these in this room, mainly for the presentation, the Amazon data, we aggregate it to the weekly level. We calculate average weekly trade prices, and then we supplement this data with institutional, quarterly, institutional holdings data coming from iMacros. They have data on mutual funds, property and casualty insurer, life insurance flows and funds. And now we also use confidential supervisory data from the Federal Reserve's 2014 that covers all the commercial bank muni holdings above \$100 Billion. So with this, we basically then just look at several trade statistics around the minimum threshold and the first piece of evidence that the minimum threshold actually leads to illiquidity can be seen by simply looking at a histogram of our data. So what you see here is the frequency we have of trade prices in our sample along the distance to the minimum threshold. So on the x axis, you basically see the average trade price minus the minimum threshold. Positive numbers means that the bond was traded above the threshold and negative numbers mean that the bond was traded below the threshold. And what you see is that once you approach to the minimum threshold, first trading frequency increases and then pretty quickly drops off and never recovers. Now how quick that drop off is and when the trading frequency really disappears depends on the interest sensitivity of a bond. So what I don't show here with you in the paper is we divide the sample of bonds with the duration above and below the median and for high duration bonds, the sell off or the trading frequency actually resembles that picture. And for bonds with a low duration, you have a lot more trading still going on between between one and 2% above the de minimis threshold. Now looking at other trading statistics, we also see quite a bit big deterioration approaching the the minimum threshold. This slide shows you on the left, the traded volume of bonds during a week. And on the right, the average trade size of the bond during the week. And you see that both of those variables decline pretty rapidly once you move to the minimum threshold. One caveat to have in mind when looking at these charts is they are conditional on a bond actually being traded. So while it may look like that these statistics recover once you cross the threshold. Bear in mind that I just showed you that there are barely any traits to begin with. However, the traits that there are are really expensive, as you can see here. So what we do here is we calculate for each transaction the markups, meaning that we construct complete intermediation chains. And then just take the difference between the last sale from a dealer to a customer and the very first sale in the chain from a customer to a dealer. And what you see is that irrespective of the trade size, trading costs actually increase threefold for every for every trader. Once a bond has crossed a minimum threshold. Now, what is going on here? Well, the first aspect to look to are mutual funds. They are the largest holder of municipal bond and one of the largest participants in the secondary market. And as a whole, they are actually very large net sellers of muni bonds. Once they approach the threshold, what you see in this graph is just simply net buying of the muni mutual fund industry again, across different buckets with the distance to the minimum threshold. And you see that this picture basically resembles the trading frequency graph I showed you earlier on. So once you move toward the threshold. The mutual fund industry starts selling their entire positions. They don't sell gradually. If a mutual fund sells, they sell the entire position. Again for them, the timing of the sale depend on the interest sensitivity of the bonds. If we take bonds with a low duration, the selling is way closer to the minimum threshold. Now. What does this. Sorry. And. We don't show it here, but for most of the other institutional investors, the picture actually looks exactly the same. I could show you the picture for commercial banks. It looks like this property casualty insurance. It looks like this closed end funds. It looks like this. The only investors we don't see this behavior are life

insurance companies, which we usually think of as our very typical buy and hold investor. Now. All this selling by institutional investors actually has a large effect as well on retail investors. We'll be showing this table is we run our measure of markups or trading costs. On a dummy. That is one. If the institutional investors have sold a majority of their position in the previous quarter and then interacted with the distance to the de minimis threshold. And what you see is that once a bond crosses the threshold, trading costs not increase, not only increase unconditionally, as I showed you before, but for small and medium trades, there's an additional increase in trading costs of about 10 to 17 basis points. So selling by institutional investors as a large externality for retail investors and medium rates. In another exercise, we're addressing a 2010 paper by Tang that basically made the claim of in order to explain the large increase in yield that you observe. Once that bond crosses the threshold, you would need an implicit tax rate of about 100%. What we do here is that we show that it is most likely liquidity driving this in order to make the claim. We divide the sample in turnover and then basically take a dummy. If a bond was in the lowest quintile of a in the lowest quartile of turnover and again interacted with our distance to the minimum threshold. And what you see is that the effect is by far the largest for the most illiquid bonds. And we therefore think it's less likely that it's 100% implicit tax rate and most likely the expected illiquidity of the institution of the of those municipal bonds. It drives institutional investors to sell those bonds in order not to incur those high trading costs. And in order not to be forced to sell those bonds in the market when it's very, very illiquid. Well, these are all things in the cross section. Let me spend the last exercise on the times here as the mention of the de minimis risk. Obviously, as monetary policy increases rates, bond prices go down. And what you see in this graph is. At times, CEOs of bonds traded in the region where they are basically at the risk of the sell off. So between the de minimis threshold and four percentage points above, this is even a very tight spread as we've seen. If we would increase this by one or two more basis points to five and six, we would still call them that. But those are bonds at risk. And even though it's not graphed here, you may be able to see that it really resembles the path of interest rates over time and in times of contractionary monetary policy, as we are in right now, sometimes over 30% of bonds traded in a given week are actually bonds very close to the minimum threshold. So I hope I convinced you that the minimum threshold actually leads to illiquidity in the secondary bond market and that the mechanism behind this is institutional investors expecting illiquidity, expecting large increases in trading costs and therefore moving out of the market. Let me close with one thing, but I haven't answered so far who is actually buying that stuff. And I showed you data on all the institutional investors that we kind of serve. So this is a very large caveat, and it seems that anecdotal evidence points toward either small banks buying little things or hedge funds buying those. Going back to the example I mentioned before with BlackRock selling as we bought Bond portfolio. Apparently the sale went pretty smooth. And anecdotally it seems it was institutional investors moving in and buying those those bonds. The problem here is we don't have data to observe hedge funds on this rather not-so-good note. Thank you very much.

**WINTERSTEIN:** Thank you, Stefan. And Kevin Bain. Hey, Kevin is going to address the paper and give us his thoughts. Thanks to the city of Detroit, by the way.

**BAIN:** All right. Well, good morning, everyone, and thank you, Stefan, for the wonderful presentation to all the authors of our great paper. My name is Kevin Bain and the debt manager for the city of Detroit. And obviously these are my own thoughts, not the city's. So I actually started my career in debt capital markets at Citigroup issuing bonds for corporates, which were taxable bonds, of course. And then I joined the city two and a half years ago where I started issuing taxable bonds. And immediately I had these questions about why the taxes on bond markets were peculiar and different than the taxable markets. And this paper actually answers a lot of my questions. It also begs more questions. And so that's what I'm going to talk about today. To summarize some of the key findings that resonate with me the most, not necessarily the authors major findings, but for me is, one, the impact on liquidity and to the steep sell off in these bonds as they approach the de minimis price, not at the de minimis price, but as it gets even just relatively close. Third, this acceptability to economic and monetary policy decisions, which is what Stefan was leading off on here. The red line is actually the Fed funds rate. So you can see the stark sell off of bonds. And then last, why? What is the purpose of this rule and why that is causing this distortion? So the

paper does address it a little bit. It says that the rules passed in 1993. So it's the same man that are the same age. I'm a couple months older, I'm a little bit wiser. But the gold is not really it was not part of the major goal and the estimates its name in one of the estimates in the Congressional Budget Office estimates. So although a lot of people here probably know how bonds priced just a quick run through for the taxable bond markets, issuers set the par value that they're going to sell. They build the order book with investors. If there's a lot of demand, we can drive down the interest rates and lower our borrowing cost and then ultimately be the yield and the coupon set at that yield. So the characteristics of a tax, a taxable bond, is that the issuer sets the par value and that determines the issuance size, The market determines the yield, which sets the coupon. The taxes and bond market operates differently though, and for us, we actually set the coupons ahead of time. The market standard is that we use 5%. Coupons are sometimes lower coupons based on your rating or the interest rate environment. But the 5% coupons are the standard. I've asked many times why this is and usually my answer is it's just the market standard that I think there are probably a lot of factors. But this taxes, this discount rule has to be one of them. And I know that because when I do sell bonds, I go to investors. We have to set that 5% coupon, which is much higher than yield in order to offer investors the protection that these bonds will never fall into the discount territory where they become highly illiquid. So the results are that the coupons don't equal our bond yields, which means that the issuance size does not equal par value. And to me this is market distorting because especially when a lot of our bonds are approved by voters and voters approve the size of the bonds, we have to decide are we setting par value or resetting the issuance size? So the summary is that in the tax and bond market, in comparison taxable, the issuer sets the par value and the coupon, the market sets the yield, which then determines the issuance size. So I joined the city right in the middle of a bond transaction. In 2021, we sold \$175 million of bonds and we actually had a tax exempt series and a taxable series, which makes our great comparison. Our Taxes M series had about 3.369% yield, but our coupons were the market standard of 5%. Our long term bonds actually were 4% coupons because interest rates were sold out and then interest rate sensitivity that anyways, we had over \$30 million of bond premium, which is pretty sizable for the sized deal. In comparison, our taxable bond \$40 million yield was 3.185% coupon set to match the yield, and that's how much we received in proceeds. Last the cost of issuance. I can return to this later. There's questions, but what I'm showing here is the resin maturities and the coupons. You can see that all five, 4% and in the yield column showed that our yields are, you know, in the 2% so far off from the coupons. And here to look at is the price column because if you are pricing a bond at par all those would be a 100. But instead we're actually pricing about 25% premiums of this bond. So to put it in context, our 2021 deal took place at really historical market lows. We had an optimal timing for this time. We were very happy about it. As it just so happens, I also price a bond last week and thankfully there was a really good inflation report and we were able to accelerate a bond yield because I was very nervous about pricing a bond while standing up here at the same time. But now I have a great comparison talk to here. About. So as we're going into this deal, we obviously look at how our bonds are trading in the secondary market. And as it so happens, are the bonds we issue in 2021. Some of them are trading below the de minimis threshold at the bottom of the screen. Our 2020 ones that were issued at the 4% premium are now in the low nineties or high eighties and have become highly illiquid. This happened even though we offered the investors the protection of issuing the higher coupons. These were 4%. They weren't 5%. But keep in mind the 4% coupon still generated 25% premiums for us. So if we had done the 5% coupons, we would have had really an extreme premium. So going into this deal, again, we actually had three series two tax exempt and one taxable. The first taxes on series of 52.5 million was a little bit on the front end of the curve. So the yield was actually below 5%. But what's interesting is that even those below 5%, that wasn't enough for investors to accept the 5% standard coupon. And we actually had to increase our coupon to five and a quarter or 6% in some cases. And what's interesting about that is that, again, even though we could get below 5% yield, we actually, based on our underwriters feedback, didn't think we could sell those bonds because it would be just too close to par and too risky going into discount territory. Are the \$25 billion deal was more on the front the longer and the curbs that would price that 5.3% yield. I mean how do 6% coupons both of those prices just a little bit premium this time. But again, the taxable bond, very simple yield was 7.4% set to keep out of that field. We received the \$22.3 million after cost of issuance. So here you can see for this most recent tax on series last week is that our price is much

closer to par. We have about, on average a 6% premium. But my experience with this is as I try to explain this, because, you know, I do have to explain everything that happens to public commenters and to city council. And so the question is, if the market widened 200, 300 basis points in this two years, why did our coupons only change 25 basis points or 100 basis points? Some cases that may sound like a win, but one day the rates will come down and they're going to ask us why didn't our coupons come down more? Also very interesting to me again, that even though our yield was under 5%, we still couldn't do that 5% coupon. We had to increase our coupon. So it seems bizarre to me that coupons actually change the yield you redeem in a in a in a normal world, you wouldn't think that the coupon actually changes your yield, although it would obviously change your issuance size. But if we wanted to see that 5% coupon, we would have had a higher yield and probably not going to sell those bonds. And then secondly, I thought what is interesting is that in this high rate environment, due to monetary decisions, our although our coupons in changed much, the amount that we issued our issuance size, our premium did change a lot. And again, this gets confusing when we're trying to meet voter authorizations and we have to figure out, are we going to set par, are we going to set issuance? And that can get very confusing in one pricing day when you're trying. If you do decide to set an issuance level, you have to actually decrease your power during the deal. So all in all, I just keep wondering why do we even have this marking complexity? And so my takeaways from again, I thought the authors did a really great job and I don't have a lot of feedback about how to improve their current scope because I think that they really explored all the angles and had robust math methods. But I just can't help correlating that to the primary market. So in the authors findings, in the secondary market, we find that investor demand really decreases a lot, not at the price, the Jimenez price, but before it. While in the primary market, we actually have to set our coupons well above the yield to do a bond premium. So investors are asking for this protection. The entire lifetime of the bond at issuance entering secondary market trading and really creating a level of liquidity so tiered the bonds are highly illiquid below that to maintain this price in the secondary market and the primary market, the bond yields are driving the the the coupons higher. So I can't even sell a bond with a coupon to close to my yield makes it makes selling more difficult. And then lastly, the effect of military actions on both the secondary market and the primary market. And so my my feedback is that I would love to see this research expanded into the primary market. I particularly like to see how issuers deal with the issuance premiums in different ways. I think it might be interesting. Compare different how different coupon bonds trade. Again, in a normal world, you wouldn't really expect the coupon to affect trading, but we do see it. Since it does it factor in the primary market, Maybe it does have an impact in the secondary market as well. And so I would really like to question who benefits from this rule that's causing such market distortion, because I would like to answer that. If this rule does cause market distortion, then who's getting the benefit and what's the point of that? So again, thank you to the authors. I really enjoyed reading the paper and as Stephan said, great title. Yeah. Yeah.

**WINTERSTEIN:** Stephan. So, Stephan, why don't you respond to Kevin's comments for a few minutes and then we'll open it up to the audience?

**GISSLER:** All right.

**WINTERSTEIN:** Here.

**GISSLER:** Okay, perfect. Well, first of all, thank you very much. I think you fill the gap that is always asked of us, always are represented and that there are a lot of economists that thing like, oh, liquidity in a secondary market, who cares? So for people who don't intrinsically care about liquidity, need a secondary market. The follow up question is always what happens in the primary market. And I think you filled like a massive gap in our on our understanding how it distorts that market and provide a very good starting point for us to think more about it. To what you suggest of like more exercise, what we can do. I think it's very good to the point where the coupons looking at different coupon rates. When we started the project, we wanted to do it. Problem was, interest rates were very low. So the 5% coupons, which are most of the bonds, were really far away from the minimum threshold. Now, thankfully, the Federal Reserve has come to the rescue and now

those 5% bonds are very close to the threshold and some of them under. So we should definitely revisit that. And so but again, thank. Thanks so much.

**WINTERSTEIN:** So I'm I'm going to weigh in as a as a previous institutional buyer, I can say the observations are spot on in both cases, both with the paper, and Kevin, your your observations. I think that it would be interesting to pair this paper with inequalities, work on the acceleration of duration and around the market discount cut off price and how how that that duration becomes negatively convex, it accelerates to the downside. But having said that, I'll turn it over to the audience, and I have to call one of the authors. Kent Hiteshew.

**HITESHEW:** Am I allowed to comment on my own paper?

**WINTERSTEIN:** You are.

**HITESHEW:** Okay.

**WINTERSTEIN:** Can I prevent you?

**HITESHEW:** I think I have an answer for Kevin. The beneficiaries are the mutual funds that are buying your bonds because the the distorting effect that's not accounted for directly and in the paper is the standard ten year call par call in the market. So, in effect, you want to borrow for 30 years. The mutual funds are lending you money for only ten years because the the coupons really only locked in for ten years at that point where your yields are only locked in for ten years. After ten years, the yield kicks eventually to the coupon bonds. So you have a huge incentive unless interest rates take off of refinancing your debt at an unknown cost in ten years. So effectively, the mutual funds have gotten a yield of 30 years or somewhere between ten and 30 years because the index is all 5%, 5% coupons. So when you price to a spread, it's not the spread that's 30 years. It's the yield to worst on the ten year. And so effectively, you're borrowing 30 year money at at a price that doesn't reflect or that reflects the the likelihood that you're going to call the bonds out. And so the the investors are getting a a higher yield than they and they should. For example, there's a whole lot of reasons why muni issuers and including Detroit couldn't sell ten year debt with a bull of maturity. Rating agencies don't like that you've got rollover risk. You probably have statutory restrictions on your ability to have a big balloon payment due in one year, but would be very interesting if the municipal market would start selling more ten year bullet maturities and find out what the true ten year cost of capital is, as opposed to selling 30 year bonds with a ten year call that's going to force you to refinance your debt at an unknown interest rate on that date. So I think and my explanation of this to Ivan, I guess, is the reason why I'm listed as a coauthor, because I didn't write a word of this thing.

**WINTERSTEIN:** Yes, Mike.

**AUDIENCE MEMBER:** Mike [inaudible], Bancroft Capital. Appreciate the conversation. You said your dates when you were looking at the trading was between 2010 and 2022. Obviously, you've got a falling interest rate environment for pretty much the entire duration of that time period. So I'm curious as your thoughts with the data that you looked at, what would you expect to see now that we're in it in a rising interest rate environment? Because obviously the de minimis - in a falling interest environment, the de minimis is going to be helped by the fact that bonds continue to to gain in value. As it's gone the other way, you see Kevin's, you know, slide and you see the difference in his pricing and what he was able to do. In the secondary, obviously, you're going to see those bonds sell off to from premiums to \$91. What do you anticipate if you were to do this in 3 to 5 years and look at the the rising interest rate environment, What would you expect to see?

**GISSLER:** So the results are actually well, as I said before we started, we only had the decreasing rate environment. We started like 20, 21, maybe something like that. And obviously once we started including more and more data, 2021, 2022, now even more recent quarters, the results just got stronger. So the results are perfectly robust, even in a low rate environment. But as you clearly

mentioned, it's like there's just less bonds traded close to that threshold. And the closer you get, the higher the interest rates move, the more mass of trading you have going on. And now, as I mentioned to Kevin, now we even see like 5% coupon bonds like in this region. So I think if we move 30 years down the road, I'm not sure if I'm still working on the minimums within 30 years, but I still think the results will hold and we will see the exact cyclicalities that I showed in the last slide of just depending on the level or the increase in interest rate. At a given time, you will see either a maybe just 10% trading close to the threshold or as we see right now, 30, 40% is trading close to that threshold.

**WINTERSTEIN:** I got time for one more, Matt. I think you were the one of the first guys with your hand up. Make it quick. We got 3 minutes.

**AUDIENCE MEMBER:** Yeah, thank you so much. 3 minutes, all right, I'll make sure I keep it under one. So generally speaking, when pricing a new issue deal. Right. This is for you, Kevin. You mentioned about institutional accounts coming in for bonds. Right? And generally the oversubscription in these maturities is what actually drive a lower interest rate or borrowing cost to the issuer. So my question to you is why would issuers be focused on secondary trading as opposed to the actual cost of issuing the debt?

**BAIN:** Yeah, thank you for the question. I mean, I think I and I know this from when I do go out into the bond market that, you know, we investors expressed their concern if we're too close with coupon, the yield that the bonds will fall into discount territory. So again in 2021, we didn't really have these conversations. We really just went with the market standard versus 5% coupon. So we didn't really have that experience. But in 2023, when our yields were so close to the 5% coupon and it you know, I think a lot of people believe that interest rates are close to that peak and will be coming down soon. So they're not so worried about bonds going down too far in the future. But if it was just too close to par, then maybe there's still the risk, especially in the short end of the curve. You know, it's an arbitrary rule, right? 25 basis points, ballpark by year maturity. It could band given 50 basis points, hundred basis points, ten basis points. I don't know why they chose 25, but to shorten the curve, you really don't have much room to fall into discount territory below the mispricing. So I think that of course investors care about buying bonds that are liquid, that they believe they can trade in the future and they don't want to buy something that is at risk of becoming illiquid any time soon. So I do think that it carries over. I do think that I mean, there's institution investors in here. So you can you can chime in. I think people do care about whether they'll be able to trade in the future.

**WINTERSTEIN:** Thank you. We've got to keep things moving here. I've been appointed the task master. And so what we're going to do is move on to our next paper. So thank you guys very much. I'm going to stay up here and introduce. I've been really it's a privilege because I have really interesting titles that I'm moderating. "The Complexity Yield Puzzle: A Textual Analysis of Municipal Bond Disclosures." Something that we're all interested in, and something that's extremely important in governing costs of borrowing. So this paper, written by authors Michael Farrell from the University of Wisconsin-Milwaukee, Dermot Murphy from the University of Illinois in Chicago, and Marcus Painter from Saint Louis University, and Guangli Zhang from Saint Louis University. And I believe, Marcus, you are going to be presenting. So how about it? I think that.

**PAINTER:** All right. Thank you. So the the effective transmission of information is going to be a joint activity between a sender and a receiver. And so if we think about the optimal way to have a financial market function, we need clear communication between the investors and those that are seeking the funds. So if you're going to communicate with these investors, one of our primary ways of doing that is through our disclosure. And we need to think about how to write that disclosure based on who could be the ultimate and holder of that investment. So it's still early in the morning. So I thought cartoons would be a good way to brighten up the day. So my extreme example of what our clientele in the muni market is, it's kind of as follows We're going have a lot of a gradient in between who can be these, but one extreme might be a very professional institutional investor. You could think a portfolio manager at Immunity Bond Mutual fund who has a wealth of resources



to process a lot of information. They might have a team of analysts and they themselves are going to have extensive investing experience. They want as much information about that bond as possible to process and to value that bond. The other end of the spectrum is going to be retail investors. They could be very intelligent, successful people. My example here who works in medical equipment sales, and he's done very well for himself. So he's in a very high tax bracket, but has limited time, might have an advisor helping, but ultimately investing on the side going to have, especially compared to an institution, much lower bandwidth in terms of processing complex information. So if you look at a couple of different bonds, I pulled a couple from the city of Stillwater here. This is a relatively straightforward disclosure. Just looking at the table of contents, you see the how we might see a reaction from these investors. The institution will be happy to see what they have, but they might want even more information because they they can have the bandwidth to process this, whereas our retail investor might be satisfied with that straightforward disclosure again, because they don't have so much time for any more extra information. But if you go and look at another this is another bond I pulled from Stillwater that even just from the table of contents you can see is much more complex. About twice the size now the institutions happy so much to analyze. There's a lot of information here. The retail investor might struggle here. And then again, it's not because they don't understand the information. They might not have the bandwidth or the time to go through all of this. So they may just pull back from from this specific bond. Now, we think this is a real issue in the muni space because of the lack of real straightforward policies in how these things are constructed. It's kind of like the Wild West when you're in these these statements. There's no standard, you know, management disclosure section, there's no risk section like you see in the public markets. So we see very large variation here. And now the SEC has become more vocal about this and concerned about the state of disclosure in the muni space. There's been some enforcement actions against both municipal advisors and issuers. But then there's also been pushback on standardizing these things from local governments and underwriters. So we have some tension here about what's going on in this space. And I think there's going to be effects on cost of capital because we have a market that's predominantly individual investors that are ultimately owning these things. So that gets to the research questions. Here we have two main research questions. First, does the complexity of these statements actually have outcomes for the market? Does it affect cost of capital? And we find that it does. So we call this our complexity yield premium. It costs more to issue or there's a higher associated cost to issue bonds that have more complex disclosures in the primary market. Now, this is driven by bonds that are more likely to have retail investor presence as well as bonds that have less complementary information. So if they're unrated, for instance, you're going to see a higher premium. We don't have time to look at the secondary market today. We do look at it in the paper. We see that the more complex statements are associated with more volatility and a higher markup differential between retail and institutional investors in the secondary market. The second part of the paper is just trying to look at the characteristics of these official statements over time, which is where we uncover that puzzle that's in the title of the paper. We see a stark increase in the complexity over time, which we think is puzzling because these bonds typically cost more to issue if there is much more complexity in those statements. So we delve into why we find suggestive evidence of a clientele effects catering to institutions specifically. And then we also find some evidence that increased regulatory oversight without a really standardized policy structure is also leading to this complexity. So a little bit more about these statements, and I think everyone here is pretty familiar with them. But these these are kind of our end all be all of what we need to look at in the primary market for bonds. So there's not a lot of guidance on exactly what needs to be in. Here, except for we need to be complete, which means an investor should not have to research the bonds beyond what is available in this OS. All of our material information needs to be within this and we get a lot of the contents that you care about the of the maturity of the bond, the size, whether or not it has a credit rating. So we collect these from MSR, they're posted on ammo, but we get the bulk download of them ever since they've been required to be posted on AMA from mid 2009 through 2019. And we're going to merge this with primary market data from Merchant. We end up with about 85,000 statements which are of course associated with a lot more bonds. But we'll look at this at the issuance level. So then we need to measure the actual complexity here. And we can't just look at the visual table of contents. We need to do it more systematically. So we're going to rely on some some motivating literature, both from finance and the linguistic space, from the finance space that we think a lot

about, the overall volume of information, things like the number of pages and the word count of the document. And then there are a lot of different ways of thinking about the readability of a document from the linguistics literature. And we're going to create a composite index of this. So we don't want to take too big of a stance on any one of these. What we're going to do is kind of take all of these and say if they're all kind of trending towards complexity, that's going to be a complex document, well centered around zero, so that if you have a complex index score of zero, you're an average complexity in the sample. If you're one, you're one standard deviation above, and it can go above or below. Thinking about some stats here. These things are usually about a couple hundred pages on the low end, about 80 pages. A high end could be over upwards of 200. The readability scores are typically at a grade level to think about. So like on the 25th percentile of these readability scores, you need about an undergraduate degree to understand them. Roughly speaking, at the higher end, you need basically a Ph.D. So these things get pretty complex when you're when you're getting towards the high end of the distribution. So I wanted to pull one excerpt is to show that it seems to be capturing complexity in a document. So this one is an official statement from the Massachusetts Health and Educational Facilities Authority. It's talking about the debt service fund, a lot about how it might be redeemed through outstanding different pieces here. I'm not going to read the whole thing. I just wanted to show this is one sentence in the document. It's a run on to end run ons. You see a lot of this within these types of complex statements, and we're picking up that in our index here. This one's 1.2 standard deviations above the average here. Now, we want to see if this is associated with a higher cost of capital for investors in the primary market. Does it cost more to issue these things? So we look at yield spread, looking at this in a relatively standard regression framework with typical bond controls and fixed effects. And we look at it in several different ways. I just wanted to show that time series graph once again about that complexity yield premium. What this is telling us is how much more does it cost to issue one of these bonds? If we had a one standard deviation increase in our complexity of these statements? And I'm showing it over a years. So it's pretty stable between about four basis points and close to eight. The full sample averages about five basis points. So that association, it's pretty economically significant. One way to think about this is we look at issuances with a disclosure complexity that's a half a standard deviation or more above the average. Collectively, within those issuances, they pay about \$1.4 billion more in issuance costs. And that's over our sample here. But it's a pretty economically sizable magnitude for this complexity yield premium. So we want to look into ways of figuring out where this is the most important. A couple of hypotheses we look at is looking at where retail participation might vary. So we're looking at a clientele effect where we might have investors that might have that lower cognitive bandwidth to process these things. The other place we're going to look and I'm just going to skip to results here, but looking at the second piece is where complementary information might be lacking. So we might not have a third party credit source or that third party credit rating might not be as informative. So just skipping to the results here, we look at this complexity premium and an interaction test. But what I'm showing you here is the effect in setting settings where we have low institution versus high institution investment. So in states where we have a no tax privilege, we're going to have more institutional investors. So that's the the red graph. The second one, we don't see an effect, whereas where there is tax privilege, we'll have more retail investors. We see that complexity premium. When we look at bank qualified bonds, we have more institutions for those. Obviously, we'll have banks investing. There's no effect when they're not bank qualified, it's larger. We also pulled from Stefan's paper the the de minimis threshold. Those bonds that are issued at a higher price are going to attract more institutional investors. We don't see the premium there. This negotiated one's actually flipped. So negotiated bonds have a special window in the primary market for retailers to invest. So we'd expect them to actually be participating directly in the primary market here. And we see the effects higher for those negotiated bonds. When we look at credit ratings, so these are Benz high grade, medium grade, low grade bonds and then unrated, we see most of the effect is coming from those low and unrated bonds where, again, we're going to have less complimentary information that so that we'll have to rely more on that the context of the official statement. So the second part of the paper, we're trying to document whether or not this is changing over time. And that's again, where this puzzle comes from. We see that complexity has been drastically increasing over time. Again, it's costly to do this. So why is this happening? Why are they getting more and more complex if it's costing these municipalities more and more to issue these things? So we look at two hypotheses to try to explain

why it's increasing over time. The first one we call the catering hypothesis. This is that complexity might be increasing in subsets of bonds that cater to institutions where this premium might not really exist. We find some mixed evidence of this. It's not particularly robust across different tests, but we see some evidence of it. But I'm going to skip to that. The regulatory burden hypothesis, which we think is a bit more robust. The idea here is that if there's increased regulatory burden for a municipality, they might just start to throw a lot more information into these statements to try not to get sued or dinged later on after omitting something again, because we don't have that standardized framework. They might just try to keep compiling more and more information into these documents. So the way we look at this is by exploiting regional variation in the number of SCC enforcement officers in regional offices. So between 2015 and 2017, there was a very drastic increase in the number of SCC officers due to a push by Mary Jo White, and there was large regional variation. Overall, the number of enforcement workers increased by 70% during this period. The Boston SCC office increased by 150%. Fort Worth only 9%. So we're going to do a different if here we're going to sort our munis that are associated with states that have a high enforcement increase. So the Bostons of the world, if you're born, is issued in Massachusetts, you're going to have a high enforcement sorting in our tests. If your bond is issued in Texas, it's going to be a law enforcement will do that for all of the regional offices of the SCC. So let me just show you that over time, again, the outcome here is how complex are these documents? And we're sorting we're comparing the the difference between the high enforcement states and the low enforcement states, the bonds that are issued in those states. They're not really different. Before about 2015, we see very significant results there. Around 2016 is when we see a stark increase and we see much more complexity in the documents of munis that are issued in those high enforcement states. And again, it was 2015 to 2017. So we saw kind of a roll out of those enforcement workers. So we kind of see it gradually happen over time. The last thing we do is try to add some structure to these unstructured documents by doing some machine learning through what's called Leyton Dear Chalet allocation. And it's a topic modeling that use textual analysis to group words that are very similar to each other. And then we as researchers assign what these groups look like within the documents. The four groups that we identify as the most prevalent within these documents are risk sections, bond description, cashflow and legal. What comes out from doing this? Our algorithm will tell us certain types of words that we then group. So when we see this, the sections that are talking about things like mean resolution and shall we think that's legal talk when it's talking about default event trustee, we think that's risk talk and we want to see is the complexity within these sections more informative about the yield spread over our sample here? And we'll do this for subsets of our rating bins. So again, a lot going on here. I just really want to point out one the biggest effect here. Again, these are the coefficients on the complexity within those different parts of the statement. The legal complexity is the most important. So across from the high grade bins all the way down to the unrated legal is driving this complexity yield premium. But it gets bigger and bigger when we're in those low and unrated sections where the as the others become most important and low grade and unrated, but their magnitudes are going to be much smaller. So in conclusion, there's a cost to complexity in the municipal bond space. We think it's largely because we have a large presence of ultimate investors being retail investors. If there's more institutions, it's not such a problem that despite of that kind of puzzlingly, we see a stark increase in complexity. We think it's because an increased regulatory oversight and there's also some evidence of that, that catering hypothesis. Thank you very much. When I look forward to your comments.

**WINTERSTEIN:** So for those of you who've been coming to this conference for a while, you're all familiar with the inimitable Win Smith from Wells Fargo. Win, please. Thanks.

**SMITH:** Hi. Good morning. I'm Win Smith, I'm with Wells Fargo in the Air Innovation Team, but I have 30 years of bond market experience. Before I start, I do have to stress that these are my thoughts and not those of Wells Fargo. Thanks very much for that interesting presentation, Mark. And I really glad these two papers came together this morning because the the de minimis talk and, you know, and these these real examples from from Detroit really set up an important issue with this kind of analysis which is the dependent variable here is is a yield spread or a complexity yield premium. And the calculation here is done comparing expect to cash flows on a missile bond

to maturity to Treasury, Treasury cash flows to Treasury bonds to maturity. So as I understand it, what we've got here really is a bond muni bond yield to maturity versus a Treasury yield to maturity. And as we just saw in the earlier presentation, the market has gotten very strange with all these high premium callable bonds. And as was mentioned, these bonds are really in effect ten year bonds all of the time and not really 30 year bonds. So and I've mentioned this, but I think it'd be really important for you to take a hard look at at the call option and make sure that you're taking that into account and not just assuming that through the cash flows at maturity or the most relevant thing here. And I think that that yield spread also was involved in a couple of the papers yesterday. So I think anyone who's doing this kind of regression analysis in the municipal bond market, you've got to be real careful. I think there's a there's a corporate bond approach that's been adapted to municipal bonds. But that call option is so important. It's it's not just a flag that you go into the regression analysis. It completely changes the character of the bond. So it's really, really crucial to take into account the call option. And that's, you know, that may change the character of some of the results. So, you know, I hope that you do that. And then that, of course, was something that Andy Carty talked about it at length yesterday with great passion, as he always does. And it really is important. It's something that creates all these weird distorting things in this in this market. And so I just urge all researchers to to be very careful about that. But I do know that this is a really great paper, this this analysis of the complexity. Oh, I like to like the topic analysis. And it's really very plausible that, you know, complexity makes makes the costs higher for the retail investors. And the retail investors are really important. There's more and more of these separately managed accounts. There are a lot of fairly sophisticated retail investors, but when you have all this, often there's just redundant, difficult information that that example you had up there, I, I didn't do slides because I would have to go through five layers of approval at Wells Fargo. But if I could do a slide, if you remember the first Willy Wonka movie and the kids come into the factory and they have to sign this contract, does anybody remember that contract? It starts up here and it gets in smaller and smaller print and it kind of goes off to infinity and is pretty much like like a bond. That looked just like that. And and it's great. And that's and that's what a lot of legal disclosure looks like. But, you know, you worked on complexity measures of complexity, some about readability. I just want to point out that we there's - where's Rich? There's Rich. Rich hosted a really, really interesting discussion at lunch yesterday about about disclosure quality. And I learned a lot from all these different perspectives and there's there's a lot to disclosure quality. It's it's a complex topic The complexity itself is. Just one one of the issues. So you kind of have an access between simple and complex. But it's not it's not the only access. And there's there's an example in your in your paper. They got a fairly good score because a sentence is well short. But it basically said this account is blah, blah, blah, blah, blah, this other account is blah, blah, blah, blah. It was just it was kind of a run on paragraph. It wasn't really that easy to read and it wasn't really that easy to say, Well, why is this here and what does this matter? And if you spend enough time on it, you say, Well, these three accounts really actually are true assets. And these other accounts are things that the issuer manages for somebody else. But you've got to spend a lot of time to break that out, even though it's short sentences, it's not that complex in one way. It's really not very clear. So I think there's an access between, you know, clear and unclear. It's not quite the same thing between simple and complex. So and then there's, you know, is it standardized or. No, we had a great conversation about, well, can everything get standardized or is it a practical or how do you define what the standards are? There's so much that so, so much to think about with all that. But there are some new approaches to looking at clarity with neural networks. There's a paper of Oh, sure, with you can use that or not, but there would be there would be something to take a look at. The last thing I'd really like to mention is, I guess I'll say that pirates didn't cause global warming, you know, if you've seen seen this, but you there's a nice chart that says the number of pirates going down over time is correlated very well with global warming. So, yeah, these are two things that happened at the same time. So there's an association and you're careful to say association, but it's important, I think, to be careful that we mean we don't oversell. Where is the causation? I mean, it does seem really clear that between retail and institutional, there's a real complexity effect. But, you know, you do a lot of analysis across a lot of dimensions. And, you know, are there times when something is just an inherently difficult bond issue and it's going to need a lot of disclosure, but it's inherently just risky. And so the complexity is not really causing the complexity of the disclosure. Is it really causing the the pricing? It's just two things that are coming out of out of the same, like, you know,

ice cream ship sales and shark attacks or whatever. Probably one is not causing the other, although I probably want some ice cream if I was, you know, scared by a shark. But so and then, you know, if you've got a nice school district, whether it's a hundred pages or 200 pages, you know, and whether you get to buy a good biographies of all the board members, I don't know if that really is going to affect affect the pricing very, very much so. But I think that everybody's got to be really careful about the corruption in the muni world and just taking the comparable maturity treasury. You know, a 30 year muni isn't really a 30 year muni most of the time. It's really much more likely to be a ten year. And so to compare that against it's a 30 is, you know, could very possibly distort your results. So again I really appreciate the paper and and thanks very much.

**WINTERSTEIN:** Thanks, guys. I guess one of the questions that that I have is or one of the observations I guess that I have is that remembering that that this document, these documents are the bond indenture, its it is the security and the institutional market wants to wants to see all the fine print and all the details and they actually read through them and the more disclosure you have. So, so the idea that and when you brought up causality, the idea that that that complex sentences and complex words are are somehow associated with higher higher yields or higher spread seems to me to to to be that that it's just the reverse something that that is a lower quality security is going to require more more disclosure more explanation and it gets complicated in the in the document itself. And so I would just say I guess echo wins comments that that be careful with causality versus correlation. But Marcus, why don't you take a few minutes to respond?

**PAINTER:** Yeah. Thank you both for for those comments. I'll just one thought about that. We we do a lot to try to control for, you know, the observable things that you can see being different between the different types of bonds, you know, the size of the bonds at maturity and and call ability. Ultimately, it's difficult to distinguish the communication of the complexity versus the complexity of the actual bond. And we've been working on more ways to look into why that might be driving the results. I think that's why the clientele results are so interesting. It's because we see a lot of the dynamics coming from that retail space for institution with with plausible exogenous and how we define those clientele effects. One thing I didn't get to show you, you mentioned it might be the reverse in terms of the complexity benefiting in the secondary market. And there's, you know, all the caveats with how much trading is happening. But we see markups are actually smaller when it's an institutional trade for more complex bonds. Now it's higher for retailers, but it's actually smaller for those institutions where you can kind of see a clean cut of their they're likely the ones trading here, which is consistent with what you were saying. So and then when awesome comments we really thank thank you for all that time I he warned us about him bringing out the call option spread in terms of instead of the yield spread. So we looked at and it's you know a very small subsample of non callable bonds and things are qualitatively similar there. And you still see that that big increase in complexity. So that was reassuring. But I think we do need to do it at a full sample and do it more, more thoroughly. So thank you for that. I'm definitely stealing your Willy Wonka reference for my slides next time. And that that clarity versus complexity, that paper, that sounds like a good free through for us. So please, please share that.

**WINTERSTEIN:** Okay. Questions. Laurie.

**AUDIENCE MEMBER:** Thank you. I think that there's a huge difference depending on the bond as to who's reading, if anyone. The disclosure statement. And that's what you were getting out with the retail institutional. But I think it's relevant. Who's writing. So in those official statements, you have the names of the law firms, you have the names of the underwriter, you have the names of the underwriters, counsel. I think it's funny because I'm always telling my clientele, you know, public agencies, don't worry about the who, look at the what. But here I'm going to say look at the Who, because people do have styles and approaches. And then I would also think that and by the way, I love your paper and I love the concept of it. And I would also look at whether it was a competitive or negotiated sale. And that is something that I don't hear that in any of the papers here. But it is relevant to every bit of research because the process for bringing a bond to market in the competitive sale and a negotiated sale is very different. And then I'll just say I've had I've had dozens of expert witness cases in which it appeared to me that I was the only person who read the

official statement. And so people are being deposed. Right. Going back, you know, did you read the official statement? And they're like, yes. And they're like, do you have any correspondence on it? Did you ask any questions? Is there any evidence? Whatsoever that you read this and they didn't. But they're testifying that they did. And then when we show them what apparently they weren't aware of, the case kind of ends. Right. And then the other thing is, you said something about the SCC. And my observation is there's very little prosecution of a failure to disclose, even though they may have increased the cases in terms of how many bonds there are. And yet in a litigation, that disclosure document is absolutely key at almost every single point of a claim going to what that little that official statement said. So. And so you're talking about lawyers reacting to litigation or prosecution. And I think you should actually interview, you know, the ones that you're seeing in the in the high complex and the low complex, some of those counsels that wrote it and ask them what influences them. Because what you might find is you have some proxy factors, you know, in your regression. And if you actually ask them what's motivating, you'll you'll find some interesting things because I don't find that lessons of litigation actually make it anywhere. And the reason is because so few bonds default. So people will say, we're doing this to avoid this kind of problem. And when I'm on the beginning, I say, has that problem ever occurred that you know of? And people, they just don't they have a they have a point of view and a bias and whatever. So I encourage you to get more into the people and how they're making decisions. And then I will just say, over time, I've seen these things get so complex that nobody reads them. And there's one more thing. I have no idea if you can test this, but you're doing this stuff with language. The lawyer writing and the financial information coming from somebody else can produce not good disclosure or excellent disclosure, depending on that process. So I don't know how you would explore that, but I'll just give you a simple example. Very often what I do in an expert witness case is I take the numbers that are in the official statement and I just extend them further in time. Or I do one small change to them and I show that the bonds defaulted exactly as predicted in the official statement. If there was the numbers had been extended, does that make sense? So it's like a simple thing. Why is this only being shown for five years when it could be shown for ten? Right. Why are these seven factors shown and not totaled? It's things like that that make the difference. So and there's a numbers language issue, and I'm not articulating it very well, but if you want to talk to me after, I'll give you some more examples.

**PAINTER:** Oh, that would be great. Yeah, I'll respond. That was more questions that I can respond to even in that one. So I'll try my best. That was awesome, Laurie, that's, let's talk to you more about it. So in terms of who is writing it, I agree that's a very important thing. We did look at competitive versus negotiated issues and we see that it was primarily strongest in the negotiated and there's various reasons for that, which is what we need to untie. Is it because retailers can participate or is it because it's mostly written by the underwriter? But we need to collect that data. We need to collect the number of bond counsel and the number because these things have all expanded throughout time. And I think once we have that data, we can answer more questions about who is writing it, how important are they within that. But and I agree, we need to do it. This is our first step in more interaction with practitioners, but we need to interview some people to get to the bottom of it.

**WINTERSTEIN:** I think where I want to keep moving. We only got a minute left here, but Laurie, thank you so much for this comments. Always appreciated. I just want to keep things on schedule here. So I'm sorry for the audience, but let's thank you, Marcus. Thank you very.

**WINTERSTEIN:** Okay. Our last paper for this session, "Financing Infrastructure with Inattentive Investors: The Case for U.S. Municipal Governments." Ehsan Azarmsa from the University of Illinois in Chicago, and financing infrastructure with inattentive investors. You better pay attention.

**AZARMSA:** Hello, everyone. Oh, I need to speak to you. Hello, everyone. It's great to be here. And is a good project to present my work and get your feedback on it. So I should say that is my only municipal bond related paper, so I really need your feedback on this. Okay, so the vendors, as everybody knows in this role, municipal governments are responsible for providing infrastructure, really infrastructure, stuff like schools, hospitals, roads, bridges. And they finance these projects by

borrowing in the municipal bond market. The municipal bond market is the primary source of financing for these important projects. And because of that, the fund, the functioning of the market. This means a bond market is very important for us. So that's the topic of this paper. There are some puzzling observations in the market. On one hand, we see that the bonds are quite safe in terms of their piles of defaults or the empirical rate of default has been quite low. So they are safe and they should be very attractive for investors. That's one thing. The other thing is that in the academic literature, we have several other evidence suggesting that the these governments are facing difficulties in raising their debts or they have difficulties in getting the financing for investing in this project. So it's kind of a puzzle for us. So potentially there are several reasons that are contributing to this puzzle. It could be related to taxes. Some papers have shown that it could be about regulation to some extent. But here I want to talk about the role of investor composition. So it's something that actually we actually Markus talked a lot during the previous presentation that the investor composition in the market is very unique. It's something that you can see in this figure. So more than 40% of the municipal bonds are being held directly by the household sector. This number for our present ratios are 7% and 6% respectively. So in terms of investor composition, things are very different compared to other markets. And the point that I want to make during this presentation of this investor composition matters for the ability to raise financing. And actually it can make it difficult for governments to raise financing, at least in a timely manner. Okay. So households are being known to be a buy and hold investor. They don't necessarily pay attention to the market developments or new bond issues. And because of that, I argue that the borrowing ability of these governments are limited to the capital available to mutual funds and institutional investors. So that's the thing that I testing the data. And also I have a model to kind of illustrate the mechanism. I do some calibration. Okay. So to illustrate this point, this figure is helpful. So this figure shows the ownership of municipal bonds by the mutual fund sector by quarters after issuance. So what we see is the mutual funds as the specialized intermediaries in this market, they disproportionately hold newly issued bonds and gradually resell those bonds to the rest of the market. And this transition takes more than ten years. This figure is very robust. So you can see many versions of this paper in the appendix version. In the appendix, take some white paper, which is posted on the web page. It is robust with respect to the choice of State K credit rating, time to maturity, whatever. And what we learned from this figure is that mutual funds are acting as some form of market maker to when there is a new issue. They disproportionately buy the new issue and gradually resell to the rest of the market. And because of these capital available to these mutual funds is very important for the borrowing ability of these governments. So that's the thing that I test and verifying data. And also I have a model for that. Okay. So as I said, I have a model to make sense of what's going on. So technically, in any market and in any financial market, we can think of things as something in this figure that that the ultimate holders of all of these assets, municipal bonds or anything else are households. So the thing that is different in the municipal bond market card is the fraction of the direct holding versus indirect holding. And the problem is that the households are quite low or maybe they don't have enough time. So Marcus actually had a very good this life for that, that maybe they don't have the time to actually analyze the assets and the cash flows. And because of that, institutional investors are actually helpful to facilitate the transactions. And the point that that so the implication of this is a capital available to institutional investors like mutual fund is important. So basically what I test is specifically in the empirical. Fiction is that the capital flows in and out of mutual funds. Impact the borrowing ability of this government also have results about the cost of borrowing, but they show that their impact is basically larger for the size of the borrowing. And I have a model to illustrate the mechanism, also calibrate the parameters based on my empirical estimates, because eventually what we learn from this study is that how easy it is to quantify it, it like quantify it, that how easy it is to raise debt in a timely manner. So I look at the short term and long term demand elasticity that is helpful for us to understand how easy it is for governments to raise their debt, like in a like a in a short period of time, like like the thing that we need it during a pandemic. So you need to access to liquidity in a short period of time, as is important in the how easy it is to do that. Okay. So first I talked about the empirical part. The data are used to mean two main data sources. One is Bloomberg, from which I obtained the historical bond issuance data of 262 county governments. I focus on county governments, not state governments or at the state level government units, because so states are very different in terms of regulation on taxes. So you want to somehow control that or you want you

want to isolate yourself from those differences. And because of that, I mostly compare counties within a state in my analysis. So that's basically the nature of analysis. And counties are good because they are the largest sub state government units and mostly focused on the largest and the largest county governments are the ones that are issuing bonds frequently. And the other sources from which I obtain the historical holding data of mutual funds. And because of that, I can see which mutual funds are important for a certain kind of government. And some some resources think so. This kind of governance issue, \$82.3 million in every quarter that they have issuance and they have issuance roughly in one out of four quarters regarding their mutual funds in my sample. So their market share has almost doubled over the past ten years. And that's another reason to understand what their role in the market. And one important thing about the mutual funds is that they have very little cash buffer. So when they receive withdrawal request, they need to respond by selling some of their assets and because of that, capital available for them becomes important. So that's something that I verify. So they cannot respond to withdraw request by by by just basically losing their cash because they don't have any cash or they have little cash. Okay. Another thing is that these mutual funds hold very diversified portfolios, that there is no mutual fund, that only a special being county government. So they hold very diverse portfolios in the states that which are active. And you see that the average exposure to county governments is about 5.9% and in the 90th percentile is 11.7%. And the maximum exposure to a single contango, sorry, the 90th percentile exposure to a single county government is about 2%. So there is no mutual. So there is almost no mutual fund, especially is in a single county government. So that's something that becomes important identification. Okay, so what do we want to do? So regarding the astrology, Okay. So first the hypothesis, as I said, was that we want to understand how this capital flows in and out of mutual funds, impact the borrowing ability of these governments. And the problem is basically in the identity of these flows in order to establish a causality. So flows basically change with the taxes, the economic condition. So the trick here is to exploit the heterogeneity across county governments in their exposure to mutual funds. I talk about that and I clarify that in the next led by the very, very standard strategy in the empirical asset price in literature. Okay, say my data, I have a bond token, the government bunch of funds and these bonds, some of them are more some of these kind of bonds, almost four to some funds less exposed to the others. For example, fund one is an important fund for contribution, but fund is fund two is less important. So suppose fund one receives a large outflow. It means that it needs to sell some of these assets, especially country one get affected country to get affected less. And because of that country, one faces more problem in raising new capital from Fund one or overall. And because of that, we want to see how country one responds to this outflow, how this outflow impact country one compared to quantity two. So we are going to compare a company 1 to 2, but overall. In a day that definitely all falls. This is some sort of inflow or outflow. So what I look at is the aggregate impact on the demand for the bond. So basically, I, I construct this measure of flow induced demand by aggregating the impact. And I look at how countries with a high flow in this demand behave differently compared to countries with a low following this demand. So that's the empirical strategy. And because of this, I'm isolating the impact of taxes, economic conditions. So because I'm just comparing these of governments based on their exposure to mutual funds. Okay. So the assumption here is that the cross section of the flows is uncorrelated with the government funding needs. What does it mean? It means that if I'm investing, fund the fund one. I'm not doing that because fund one is a little bit more exposed to country wanted than quantity. And that's basically okay because so as I said, mutual funds hold very diverse portfolios and because of that, obviously their exposure to the government is very small to basically make basically to the to to make investors to invest in a certain fund. Okay. So now we get to the result. So what I find is a 1% increase in the following estimate increases the size of issuance in the next quarter by point to a percent. And this result is robust with respect to different basically a specification, different set of controls after controlling for the economy condition or the financial situation of the countries, even with considering the taxes. I have a whole section about the role of taxes in the results and this result is quite robust. And also look at the long term impact. So the long term impact is a bit smaller to 1% increase in the following year. Demand increases the size of each month in the fourth quarter by 0.1 percent. So the short term impact is about two times larger than the long term impact. So a short term impact is quite large and it's something that is important in my calibration regarding the cost of issuance. It impacts the cost of issuance or the thinking that the size is way smaller to 1% increase in the



following as demand increases the cost of borrowing by 0.2 basis points. So the impact is about 100 times less than the impact on the size of borrowing. So what we learn from this observation is that these are when when we when can the governments receive basically demand from the mutual fund sector, the most will respond in the quantity dimension rather than the price dimension. So basically their supply of bonds is quite elastic and it makes sense when they are ready to issue new bonds. So they are mostly just they are mostly adjusting in the quantity dimension rather than the price dimension. Okay, so now I talk about the model and the in the model, we have a representative municipal government that sells the bonds, and the bonds are risky and I match the default with the empirical corresponding the empirical default rate. And on the demand side, we have some investor investment directly with and some investors indirectly investing in the in the muni bonds and mutual funds, if which all funds are taking the money of the indirect investor line with the in the mini governments that the the key element of the model is that these investors are law in the are is law in their rebalancing. So they rebalance. So they are basically the speed of rebalancing is captured by one minus lambda. When lambda is higher it means that they they they they are slower in their rebalancing and basically but mutual funds are different. So the are active. So the so I also estimate the demand for the mutual fund sector. So I basically use the empirical estimates to calibrate this model. What I find is that the losses of supply is quite high. So to basically match this observation that the most of the response is in the quantity rather than price dimension, that the long term demand elasticity is also high. So there is no problem in the market thing, like in terms of the long term demand or most of the problem is in the short term demand, the short term demand elasticity is quite low. It means that the market is quite slow in responding to new bond issues. And because of that, the evidence suggests that the empirical evidence suggests that governments have difficulty in raising debt, like expanding their debt quickly. And that's especially important in times of like a pandemic or the time that actually they need to access liquidity. And to conclude, I thought it is puzzle that governments are behaving as if that are credit constraint while they are issuing bonds, that they should be very attractive to investors. So the explanation. So there are several factors. That basically contributed this small part. I would argue that partly is because of the fact that because of the investor composition, the fact that the market is dominated by retail investors and the implication is that capital available to retail funds and institutional investors is important for the borrowing ability of these governments and it's something that is consistent with data. And also I gave a lot of model to illustrate the mechanism. And the policy implication is that there are many market is not resilient against shocks. So at a time of pandemic or a time of crisis that maybe the government did provide some assistance with the with access to liquidity, because because of this, the problem from the investor competition is very difficult for even for governments to expand their debt quickly. And in fact, in my model and with with the calibration, I can provide some rough estimates. How much assistance should be provided based on the amount of capital outflows that the mutual fund sector experiences. Thank you very much.

**WINTERSTEIN:** So the discussant Kent Hiteshew from E&Y, Federal Reserve, U.S. Treasury and the list goes on and on.

**HITESHEW:** Thanks very much. How do I make this? It's the hardest part of the presentation. This is my first opportunity to be a discussant, and I think this paper really epitomizes what this conference is all about. I had a 30 year career as a public finance investment banker, and I'm totally intimidated by economists like a son and his expert statistics, regression analysis, econometrics and so forth. So I'm not going to attempt to pierce those issues or try to understand those issues. I'm going to give you and I've given a son a perspective from what I observed over the course of my career, and that's the approach I'm going to take to this presentation. The summary of the findings, as I read the paper, trying to turn it into English is that tax exempt securities are primarily attractive to individual retail investors who are quote unquote inattentive. Therefore, attentive mutual funds are the conduits for retail to initially purchase new issues before to restrict redistributing them over time as a science first chart demonstrates. And in fact, it ties in very well with the first paper that I participated in this in this panel. In periods of reduced retail demand and or mutual outflows, the cost and availability of capital for infrastructure is impeded. The conclusion to that is that retail, this retail dynamic that we all know about in the U.S. market is

a primary reason for the poor state of is a primary reason for the poor state of U.S. public infrastructure. And finally, in terms of the policy recommendations, the science suggests that the Federal Reserve should intervene during periods of mutual fund outflows to support state and local infrastructure investment. So overall, this is a great paper because it demonstrates what we all know in the municipal bond market. And what we practice every day is that our market is heavily dependent on retail investors, whether it's direct or indirect, because of the tax exemption that is available through the tax code. I think my my issues really surround the use of into attentive and attentive, which is why I've quoted them, because I think that it is kind of a pejorative term that doesn't really appreciate what's going on underneath and why this these kinds of behaviors occur. And then lastly, I want to talk about the conclusions that Azaan draws from from this dynamic that we all appreciate. So why are retail investors considered inattentive? There's a number of reasons. First of all, when we're talking about selling retail bonds, the sales commission that is available that motivates broker dealers to sell these in the primary market is very low. So it's \$50 if you sell someone \$10,000 of bonds. And so we always had a favorite expression in the that when can appreciate when we have a pricing wire that goes out and it explains each maturity as Kevin was showing what the price is, what the yield is. And then over here, I'm sorry. And then over here on the right is the sales commission. And we always used to joke that the retail and broker dealers, they don't read right to left. They read left to right, right. So if they said, see a sales commission for \$5, they're probably not going to call their retail customer and instead they're probably going to sell them a bond in the secondary market at a much bigger spread, or they may sell them another entirely different asset class that has much bigger spreads. Number two, the initial market, as we know, is is really 50 separate markets in the individual. Retail usually buy retail bonds in their own state. And so the timing and size of retail demand isn't clearly in in most instances not going to correspond to when an insurer is coming to market. And then the third point is I think people don't appreciate the mismatch between the availability of capital from retail and the need for capital by issuers. Issuers financed long term assets, capital improvements over a 20 to 30 year horizon. Retail investors have no interest. The typical ones in investing for 20 or 30 years. And so the concentration of retail demand is at the front end of the curve, not at the long end of the curve. And of course, most of our debt is sold as low level debt service with a sending principal. So the principal is backloaded and the retail demand is at the front end. And so there's a mismatch between even though we are markets dominated by retail, there's a mismatch between the individual retail investor and what the issuer wants. Let's turn to the mutual fund side, the attentive mutual funds. Well, one of the mutual funds. Why are they such big players in the primary market? Well, when you go to market and you you need \$10 million to build your new school, You can't just say, I'll take 5 million and be done with it. You need this price the entire issue at a clearing price. And so you need institutions to support individual retail so that the entire bond transaction can get done on the same day, same time, and at the same interest rate. The issue about mismatch is solved by mutual funds. Mutual funds effectively create synthetic demand for longer term maturities because they take in retail investments which are available at the NAB at any time to get out to redeem. And they're able to look for a yield and buy at the long end. So essentially, institutional investors and in particular mutual funds are critical to resolving this mismatch between retail and and the needs of issuers. If we didn't rely so much on retail, the natural buyers would be pension funds and insurance companies who would otherwise not benefit from tax exemption. So they are largely absent from our market. But I will say that there are also times when there's less retail demand, when traditionally we have what are called crossover buyers that come in who are not natural tax exempt buyers, but they see the inefficiency in the muni subsidy, but the tax benefit and they come in and they buy the bonds and the market is then strengthened and the value of the tax exemption goes back up and mutual funds come back in. So that's inattentive investors versus attentive ones. The conclusion that absence of retail demand inhibits state and local infrastructure investment, I think is largely true. But I would like to distinguish between the cost of capital versus the availability of capital and generally because of these market forces. My experience is that issuers don't largely time their issues to when there's a lot of demand, when there's a lot of supply. They generally have a long schedule of governmental approvals and creating very complex disclosure documents that when they're ready to go, they need. They have contracts that have been signed and they for new money issues, they come to market. I think it's more likely that this timing issue is directly affecting refunding is more than new money. And I'll talk about that and

some data suggestions. So I wonder and again, not able to comment on a science, you know, incredible regression analysis work if it's actually true, because my experience is that it's not that retail demand actually impacts the availability of capital. It certainly impacts the cost of capital. What I think the paper doesn't explore is the state and local debt capacity limitations on infrastructure investment. And I think I think that's the strongest factor, two factors being the affordability there, the ability of for debt service and the political support necessary to raise revenues, whether they're taxes, fees, fares, utility rates, whatever that are necessary to support investment in infrastructure capital. Just two examples here in terms of the inflows and outflows of mutual funds. So obviously in March of 2020 through April of 2020, just in like a six week period, we had about \$45 billion an unprecedented outflows into our out of mutual fund. As retail rushed to get out of the market as the pandemic took hold and all the markets were put into a crisis. It's interesting, though, that what the beginning of the Fed tightening policy. We've had three times as much outflows as during that period, during the pandemic. But outside the municipal market, no one's really aware of that or talking about it because it's occurred over, you know, a 12 to 18 month period and certainly during March and April for a whole lot of reasons. The you know, we had illiquidity. We had no issuance. But I don't believe that issuance has suffered particularly other than refinancings refunding during the last year. And then lastly, I've always been an advocate of trying to deal with this retail issue by expanding the market into taxable quickly. Just suggestions for a stance paper. I think he may not be capturing a very important element of demand, which is principal reinvestment in the mutual funds. So as Ms. penalties either pay off their debt, whether through scheduled amortization or redemptions, they reinvest that into the marketplace. I don't know if that was picked up in the data. The increasing importance of SMEs, several people have mentioned there was a headline by Bloomberg yesterday that estimates now account for 25% of the municipal market demand. Again, I'm not sure that that was picked up. I've already mentioned I think it would be very interesting to do the analysis separating out new money deals from refunding. And I would also be interested in seeing the same analysis if we focused on large repeat issuers, regardless of whether a county is state or revenue bond, because I think their behavior may be different than what a son found with 262 counties. Lastly, I have to comment on the policy recommendations being at the Fed. When I was, I learned a lot about the Federal Reserve's authority, its legal authority. And Section 13 three dictates when the Fed can intervene in unusual and or exigent circumstances. It takes a vote of five of the seven Reserve board members, governors, plus the approval of the Treasury secretary in order to intervene. The statute says there has to be an inability, inability to secure adequate credit accommodations, its reserve for providing liquidity to the financial system. It's a fact. It's effectively a backup, not a first lender. And there has to be the interest rate has to be set at a penalty to encourage repayment of the loan as quickly as possible once normal market conditions are restored. A lot of people didn't like the interest rates for the for the municipal liquidity facility, but that's where it comes from. And I question, having been through this once, how likely it would be for the Fed to intervene only in the municipal market as opposed to all markets. I think the reason the Fed intervened in the COVID for the first time in its 100 year history in the municipal market was because all the markets were in disarray, including the municipal market. Even if the statute provided the opportunity for the federal government to intervene. I think there are serious policy questions around moral hazard, as we talked about in some of the panels yesterday. And then finally, my favorite sort of policy issue, that or the issue that policymakers, I think, confuse all the time is the difference between funding and financing. I think we have plenty of capital in this country, but we don't have I'm sorry, we have plenty of financing and capital in this country, but we don't have funding capacity, meaning the revenues to support investment in infrastructure. So with that, I appreciate the science paper and the opportunity to discuss it with you today.

**WINTERSTEIN:** David, we're running right up, we're running right up against 1115. Shall we pass on Q&A?

**WESSEL:** [off-mic]

**WINTERSTEIN:** Okay. Okay. Good. Good. So, Ehsan, why don't you briefly respond, and if we have a minute for a question, we'll take it there.

**AZARMSA:** Sure. So I --

**WESSEL:** Microphone. Button on the bottom.

**AZARMSA:** It's okay. Perfect. Okay. So, first of all, thank you very much for the comments. So I really couldn't ask for better because, as I said, it's my first time in this world one market related project. So and I learned a lot from your comment, and definitely I took them and incorporate them in the next version. And I'm also very glad that you agree with the main point that that so there is this problem with the investor competition. We should take it more seriously and it could affect the access to capital so big. And I also I agree with your suggestion that we should basically expanded the taxable portion. I really I agree with that. And that helps with the financing. And regarding a few points. So yeah, I need to look at the new money versus the refinancing. So that's the important thing because eventually what we want to understand is but is that whether governments have difficulty in funding new projects erm just through finance think that the all our debt and regarding the timing, so there is something that I couldn't show during the presentation that this demand from the mutual fund sector cannot predict the timing of the issuance. It can also. So, so basically once the government enters the market, so conditional on issuance and being ready to issue, that's the thing that demand actually gets affected by the demand. So on issuance, demand impacts the size of issuance. So that's basically what they find, which is kind of consistent with the fact that it is very difficult to it. There's a long process of getting to the market and yeah, so you raise a lot of several points that I need to basically take take into account in my empirical analysis.

**WINTERSTEIN:** I think we have time for a question or two. Yes, Mark.

**AUDIENCE MEMBER:** Thanks. The underlying problem seems to be the tax exemption, because that creates a much more narrow market and a much more illiquid and maybe reactive market. So I'm wondering if building on something and one of Kent's slides, how do you feel about the following solution, which is that we permanently replace the tax exemption on municipal bonds, whether with a subsidy to the issuer. So basically make the Build America bond permanent and use that as a replacement for what we currently have.

**HITESHEW:** So I see my friend smiling in the back on that question. I think that would be very difficult politically, and I think from a policy point of view, there's problems with it because the history of the Babs program is that Congress began to cut back the subsidy, and that has left an incredibly sour taste on the issuer side. And I think it creates policy uncertainty going forward. But I am a big advocate of Babs as a market regulator, so that if there was the right subsidy level and that was always available in the marketplace, first of all, you could develop a consistent demand from the taxable sector of the taxable sector, never invested the time and resources necessary to be true muni investors because Babs only lasted a year and a half, but if it was permanent, you could build that capacity. And then when the when the tax exemption got too cheap and this was going on, on the yield curve when we sold Babs, we only sold Babs on the long and we we used traditional tax exemption on the short end and we created a blended structure that was the most efficient. And having that Babs as a market regulator together with tax exemption, would bring in new investors while keeping the benefits of the retail.

**WINTERSTEIN:** Mark, you had a question and I think that's it. We'll wrap it up. Go ahead, Mark.

**AUDIENCE MEMBER:** It's just a comment. I am so glad that Kent mentioned the politics. You know, issuing bonds generally requires voter approval and frequently requires a supermajority. That is a major constraint.

**WINTERSTEIN:** Ehsan, Kent, thank you very much.

**HITESHEW:** Thanks, Mayor.

**WESSEL:** Great. Thank you. We're going to take a break. We'll be back here in 13 minutes at 1030 for our next panel.