29 SEPTEMBER 2016

MUNICIPAL BOND PRICING & BENCHMARKS

NEW YORK ATHLETIC CLUB,
180 CENTRAL PARK SOUTH,
NEW YORK

INTRODUCTION

A Briefing on Recent Developments in the Market for Municipal Bond Fund Pricing, Indices & Benchmarks

The acquisition of Barclays index group by Bloomberg and the proposed purchase of Standard & Poor's Securities Evaluations by ICE (also owners of Interactive Data) raise a number of issues for municipal bond mutual fund managers and administrators.

Operational practices of many years standing in the fund pricing and benchmarking process are called into question, and firms are being forced to consider changes and alternatives.

This comes at a time when municipal bond fund operations are subject to increasing regulatory and reporting hurdles and a challenging investment landscape.

This Briefing presents the results of an extensive user survey of muni funds on their response to these developments. During June 2016 we polled mutual funds on their reaction to both acquisitions and their current intentions with regard to pricing and benchmark sources. The conclusions provide some much needed empirical data to inform the discussion surrounding this.

To assist with planning and strategy for overburdened fund Treasurers, accountants and administrators facing these problems we have also organized a series of vendor panels. These discussions will review the issues in the service provider market and help to answer user questions on developments.

AGENDA

08:00	Registration	
08:30	Introduction & Survey Results	Ian Blance - Voltaire Advisors
09:00	Panel Session: **ATS & Market Pricing** Moderator: Matt Posner The Court Street Group	John Gallagher - MarketAxess Tom Meder - TMC Bonds John Cahalane - Tradeweb Direct Charlie Moore - MuniAxis
09:45	Coffee	
10:00	Panel Session: **Evaluated Pricing** Moderator: Ian Blance Voltaire Advisors	Jimmy Suppelsa - Best Credit Data Varun Pawar - Bloomberg Liz Duggan - ICE Data Services Jayme Fagas - Thomson Reuters Matthew Fiordaliso - Markit
10:45	Expert Discussion: **Indices & Benchmarks**	JR Rieger - SPDJI Tom Doe - Municipal Market Analytics
11:30	Close of Briefing	

SPEAKERS

Ian Blance

Ian Blance is Managing Director of Voltaire Advisors. Ian has over 30 years' experience in the financial markets focused on research and valuation of securities and derivatives. He is a regular commentator on valuation and risk issues in the media and a frequent conference speaker.

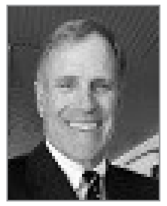
In his earlier career Ian developed and ran securities valuation operations for two of the major information vendors and has provided consulting services for the others. Ian spent 4 years as Head of Evaluated Pricing for SIX Financial Information, based in Zürich, Switzerland and 12 years with Interactive Data Corporation, setting up and building their fixed income valuations business in London and subsequently becoming Managing Director of the market leading Evaluated Pricing unit in New York. Before Interactive Data, Ian was an economist and senior bond strategist in investment banking.

John Cahalane

John Cahalane is Managing Director and Head of Tradeweb Direct, a leading provider of fixed income trading services to financial advisors and traders. He has extensive knowledge of electronic fixed income markets from over a decade of experience focused in electronic trading.

Cahalane joined Tradeweb Markets in 2010 as Head of Tradeweb Retail to restructure and grow the business. In 2013, Cahalane oversaw the acquisition of BondDesk Group, integrating the business with Tradeweb Retail to create Tradeweb Direct.

Prior to joining Tradeweb, Cahalane held several positions at Morgan Stanley Smith Barney (MSSB). Most recently he was Executive Director and Director of Third Party Distribution – Capital Markets, where he supervised sales teams and advisory traders while managing resources. He previously worked in the Fixed Income Division at MSSB as Vice President, Director of E Commerce, and held earlier positions as Vice President, Regional Sales and Marketing Coordinator and Associate Vice President, Dealer Sales Associate. Prior to those roles, Cahalane was a Sales and Marketing Consultant for MSSB's Taxable Fixed Income Division. Cahalane received a B.S. from the University of Scranton and holds Series 7, Series 24, Series 53 and Series 63 professional securities licenses.



Tom Doe

Thomas G. Doe is President of Municipal Market Analytics, Inc. (MMA) which acquired Municipal Market Advisors at the conclusion of 2014. Mr. Doe founded and served as the CEO of Municipal Market Advisors, the leading independent research firm in the municipal industry, from its inception in 1995.

Mr. Doe has been a sought after speaker on industry issues and its future. His insight, integrity, candor and historical context is sought to establish a clear perspective of current conditions impacting investors and issuers in the municipal cash and derivative markets. Most memorably, on January 20, 2011, Mr. Doe forcefully represented the industry in a CNBC interview to accurately define market credit risks in response to Meredith Whitney's alarmist municipal default projection. Mr. Doe is the lead analyst on MMA's monthly Advisor publication which began in 1995, and the firm's Strategist report. He also contributes to the intraday Insight service, when the Strategist is not published.

Between 2002 and 2005, Mr. Doe served a 3-year term as a public member on the Municipal Securities Rulemaking Board (MSRB), the regulatory entity of the municipal securities industry.

Prior to his leadership role at MMA, Mr. Doe served as an analyst and manager at Municipal Market Data, Inc. from 1984 to its successful sale to the Thomson Reuters Corporation in 1994.

Mr. Doe received his undergraduate degree from Colgate University and a Master's from Harvard University. He resides in Concord MA with his wife of 30 years. He has two daughters who reside in Austin, TX and Charlottesville, VA.

Liz Duggan

Liz Duggan is managing director, Global Evaluated Pricing Business Development for ICE Data Service's company Interactive Data's Pricing and Reference Data LLC. She has more than 20 years of experience in market data services, working with investment companies, investment advisors, broker/dealers and other financial institutions.

Liz oversees key initiatives related to enhancing and expanding Interactive Data's evaluated pricing services from end of day to continuous evaluated pricing, broadening overall market coverage and providing new credit market tools relating to transparency, Best Execution, and Liquidity.

Liz has held several roles within Interactive Data — most recently serving as Managing Director of Global Evaluated Pricing Operations. Prior to joining the Interactive Data, Liz served as a senior vice president of Thomson Financial Securities Management.

Jayme Fagas

Jayme Fagas has been the Global Head of Valuations and Transparency services with Thomson Reuters' Pricing and Reference Services (PRS) business since January 2014. Prior to this role Jayme was the Global Head of Evaluated Pricing with Thomson Reuters former Enterprise Content sector.

Ms. Fagas brings significant expertise to Thomson Reuters having worked in evaluations, trading and analytics at a number of major Wall Street firms and has been a pivotal driver in transforming the evaluated pricing market. Jayme has over 28 years valued experience within the global financial industry.

As a member of the Thomson Reuters PRS Leadership Team, Ms. Fagas focuses on managing our evaluated pricing and transparency propositions which are delivered via Thomson Reuters DataScope Select, the strategic data delivery platform for non-streaming content.

Ms. Fagas is an active industry participant working closely with mutual funds, hedge funds, asset managers, fund administrators and custodians, to provide solutions that meet the industry's regulatory and compliance needs.

Matthew Fiordaliso

Matthew Fiordaliso heads securitized products and municipal bond pricing for IHS Markit. Previous to his current role he held various trading positions at buy and sell side institutions focusing on MBS. He holds a master's degree from the College of William and Mary.

John Gallagher

John Gallagher is Head of Municipal Bonds and U.S. High Grade Product Management at MarketAxess, responsible for managing Municipal Bond and U.S. High Grade product development.

Mr. Gallagher joined MarketAxess in 2002 following the acquisition of TradingEdge, Inc. which he had joined in 2000 with the responsibility for high yield and distressed debt sales. At MarketAxess, Mr. Gallagher was initially responsible for electronic trading product development for U.S. high-grade, high yield, U.S. Agency and emerging market debt markets. Mr. Gallagher also piloted the development and sales for MarketAxess' first inter-dealer trading platform, DealerAxess®, as well as the launch of the firm's credit derivatives trading platform in 2005. Mr. Gallagher began his career as a fixed income and mortgage-backed securities (MBS) trader and has an established track record in MBS sales and trading with senior roles at various broker-dealers such as Merrill Lynch and Nomura. Mr. Gallagher received a B.A. in Economics with a Minor in German Language from Fairfield University.

Thomas Meder

Thomas Meder is Director of Buy Side Sales at TMC Bonds and runs the firm's overall Buy-side efforts as well as serving as Co-Head of Sell-Side Sales (including covering our consortium owners). Tom joined TMC in October 2012.

Prior to TMC, Mr. Meder was an institutional fixed income trader at Tahoe Fixed Income covering both Municipal and Taxable markets (Rates, Credit, and MBS). Previously, Tom had extensive institutional sales & trading roles at Stone & Youngberg (SVP & Partner), Seattle Northwest (VP), Wells Fargo Institutional Brokerage (VP), and Bankers Trust (Principal). He was also the Senior Portfolio Manager for Hewlett Packard's Treasury Department managing a $500 million fixed income portfolio in addition HP's money market balances. Mr. Meder holds a BS degree in Finance from San Jose State University.

Charlie Moore

Charlie Moore is CEO of Axis Trading Solutions, Inc., a corporation that develops and operates MuniAxis, a municipal bond trading platform. MuniAxis is offered in partnership with RBC Capital Markets as sponsoring broker-dealer, a Municipal ATS designed to facilitate efficient information flows between buyers and sellers, enabling them to make better-informed trade decisions.

Charlie has spent considerable time evaluating municipal trading and pricing in the secondary market. He concluded that existing bid-wanted alternatives were outdated, and recognized a need for a more open, independent trading platform. With the encouragement of asset managers and dealers, he founded Axis Trading Solutions, Inc. and recently launched MuniAxis, in partnership with RBC Capital Markets. MuniAxis eliminates the blind bidding of the past and provides buyers and sellers with the tools they need to operate more efficiently in the secondary market.

A seasoned entrepreneur, this is Charlie's third new business. He got his start in corporate finance as a member of the Financial Development Program at Digital Equipment Corporation. He holds his Series 7 & 63, an MBA from Babson College and a BA from Union College.

Voltaire ADVISORS

Bloomberg

Varun Pawar

Head of Bloomberg's Evaluated Pricing Service Bloomberg Enterprise Solutions

Varun Pawar is the global head of business strategy and product development for Bloomberg's Evaluated Pricing Service. This team provides objective and independent valuations, referred to as the BVAL price, for fixed income securities, such as corporate, government, agency, supranational, U.S. Municipal bonds and Securitized products (MBS/ABS). Varun was named to this role in 2015 and is based in New York City. Varun joined Bloomberg in London in 2007 to oversee product development for Bloomberg's fixed income BVAL pricing service, including valuations for European and Asian government and corporate bonds. Varun has been instrumental in developing BVAL's data-driven methodology and price transparency tools so risk and valuation professionals can view and validate how Bloomberg's pricing engine works. The evaluated pricing business is part of Bloomberg's Enterprise Solutions, a business unit that helps companies integrate people, processes, information and technology for the front office, middle office and operations. Bloomberg Enterprise Solutions partners with institutions to protect and capitalize on data, manage risk, deliver transparency and control costs.

Prior to joining Bloomberg, Varun developed solutions for fixed income markets in multiple roles at Thomson Reuters.

Originally from India, Varun holds a Bachelor's Degree in Accounting and Finance from Bangalore University and a Master's Degree in Finance and Portfolio Management from the University of Exeter in the United Kingdom.

CSG

Matt Posner

Matt Posner is founder and principal of The Court Street Group - an independent research firm with a focus on public finance and financial technology. Clients range from leading municipal dealers and asset managers as well as influencers in Silicon Valley re-shaping technology to enhance the municipal bond market. Mr. Posner has more than a decade of experience in public finance and policy. He has testified before the U.S. Senate Committee on Finance on infrastructure finance problems facing the country and spent years educating staff in the U.S. House of Representatives, the U.S. Senate, the U.S. Treasury Department and the Securities and Exchange Commission on public policy and market implications. Mr. Posner has been quoted on his views and published in the Wall Street Journal, the New York Times, Bloomberg News, The Bond Buyer, the Municipal Finance Journal, and the Government Finance Officers Association's Government Finance Review, among others.

Mr. Posner is an active voice on public finance issues and has presented to the Annual Congressional City Conference, The Municipal Buyer's Conference, The Bloomberg Portfolio Manager Mash-Up, The National Municipal Bond Summit, the National Association of Counties Annual Conference, Massachusetts Investors Conference, the Government Finance Officers Association Annual Conference and to the Council of Development Finance Agencies.

S&P Dow Jones Indices
An S&P Global Division

James Rieger

James "J.R." Rieger is Managing Director and Global Head of Fixed Income, at S&P Dow Jones Indices (S&P DJI). With over 30 years of fixed income experience, J.R. leads S&P DJI's global fixed income efforts, overseeing a team of subject matter specialists tasked with the creation and management of fixed income indices around the globe.

Under J.R.'s management, S&P Dow Jones Indices has launched a global suite of fixed income indices, which includes a focus on transparency for municipal, corporate, and high-yield bonds, senior loans, commercial paper, sovereign debt, credit default swaps, Sukuk securities, and the Australian bond market. Recent innovations include the S&P 500® Bond Index covering corporate bonds issued by the companies in the S&P 500, the S&P U.S. Aggregate Bond Index, as well as indices that track the global developed sovereign, China onshore, Pan Asia, ESG, Indian, and African bond markets.

J.R. serves as the firm's voice to media outlets on the bond markets, in addition to performance and attribution topics. His research and unique metric innovations are frequently cited in national publications, and he has contributed as a guest on CNBC's Squawk Box and Bloomberg News. He frequently speaks to industry leaders at conferences around the world on the current state of the global debt markets.

Previously, J.R. was vice president, global evaluations at Standard & Poor's Securities Evaluations, Inc. Active in the financial community, J.R. is a member of the Municipal Bond Club of New York, New York Society of Security Analysts, Municipal Analysts Group of New York, and the National Federation of Municipal Analysts. In 2012, J.R. served as Adjunct Professor at Adelphi University's Robert B. Willumstad School of Business, teaching Investments for the graduate school program.

J.R. holds a B.S. from Widener University and an MBA from Adelphi University.

BCD Best Credit Data

Jimmy Suppelsa

Jimmy Suppelsa is Chief Operating Officer of BCD and leads the sales, marketing, operational and client service functions, with a special focus on partnerships that will allow BCD to grow our channel revenue.

Before BCD, Jimmy spent nearly 21 years at FactSet, creating, building and leading many different teams and businesses, including the Data Feed and Data Warehousing Businesses. As employee #23, he helped shape the core business practices of the company as the company grew to over 7,000 employees and over $1 billion in annual subscriptions.

Prior to his career at FactSet, Jimmy worked at MFS Investments and graduated from Boston College with a BS in Finance and Management Information Systems. Jimmy is a Chartered Financial Analyst.

PANEL SESSION: **ATS & MARKET PRICING**

Matt Posner (MP)

The changing dynamics of the investor base and the regulatory environment in municipals and the developments in benchmarks and pricing this event covers is an extremely important topic.

I look at trading systems and the market pricing that this offers market participants in the context of technological ideas – how are we changing the way that you all interact with each other? This panel will consider some of these questions and will also address some of the issues arising from the changing market landscape and how their solutions help us all to be more efficient in our business practices.

First, I would like the panel to introduce themselves and their firms.

John Gallagher (JG)

MarketAxess is a global credit platform started in 2000 and we entered the muni market in May of this year primarily at the request of our buy- and sell-side clients. Our main impression of the muni market is that it is very fragmented. On the sell-side alone there are around 140 dealers, many of whom are on the platform already, as are the investors and asset managers.

Our main focus is how do we make trading much more efficient for both the buy- and sell-side. How do we allow dealers to display inventory more effectively, and how do we organize the buy-side order management systems to interact with MarketAxess, execute a trade and demonstrate best execution in a global, centralized network.

John Cahalane (JC)

Tradeweb Direct is the market leading odd-lot trading solution in the US. We do every 1-in-5 MSRB-reported municipal bond trades executed daily. Over 2,500 firms participate in our marketplace and over 90,000 individuals. This has led to a misconception that we are primarily a retail platform, but over 400 of the participating firms are buy-side shops looking to access liquidity.

We are currently progressing to the next stage of our evolution, moving from a trading venue, to developing tools to aid portfolio management alongside execution. We believe this will be the next stage of fixed income trading, driven more by market events and opportunities and bringing in third-party and proprietary pricing to help make investment decisions.

> ***Our main impression of the muni market is that it is very fragmented.***
> John Gallagher, MarketAxess

Charlie Moore (CM)

MuniAxis is the newest entrant to this market – we started trading in March with roughly 100 firms currently signed up – and are exclusively focused on the muni market, operating in partnership with RBC, as our sponsoring broker/dealer. The idea for the business came from the buy-side and we focus on odd-lots and the inefficiencies in the smaller segment of the market.

Many asset managers face the same problem. They are efficient in their inbound side of their business, buying large blocks which then get allocated to their various accounts, but when it comes to selling the market and its pricing models break down. We believe that if you put good tools into the hands of smart people then these results can be improved.

For example, sellers can put a reserve on a block and place it out as an auction. Bidders can know when they submit a bid whether they are the highest, and if not, they can bid again. With the market changing quickly, we felt that there was the need for a better approach.

Tom Meder (TM)

TMC Bonds was founded in 2000 as TheMuniCenter, and is a fixed income ATS operating as an all-to-all marketplace on a riskless, principal basis. We have over 900 firms trading on our marketplace; individuals do not have direct access. There is no cost to access the system using our browser-based front end or to buy municipal bond on our site. TMC has a 'seller pays model'.

We have 60-70,000 muni offerings on the platform, live and executable in contrast to the request model. There is trade anonymity, settlement being with TMC rather than the other side of the trade, simplifying counterparty credit management.

Giving some metrics around liquidity, 300 separate firms trade munis directly on TMC daily, involving 1700 traders, 4-5,000 bids wanted and 2,200 trades per day. With regard to evals and pricing, I believe that the best price for a bond is the high bid on a bid wanted that's been exposed to a wide and extensive marketplace like TMC.

TMC has search tools and a portfolio function allowing the upload of up to 10,000 CUSIPs, which allows a quick view of any offering, bid or bids wanted on your specific portfolio during the day. There is also an API which can provide market data feeds into your own systems.

MP - Looking now at best execution, this is something that has been around in the industry for years, yet we are still struggling to understand how to best implement this. How do your platforms address this issue?

JG - Our Muni platform is quite new, but looking generally at MarketAxess, to achieve a good Transaction Cost Analysis (TCA) needs a whole lot of data. We use our own composite pricing, reported trades (MSRB), evals, bids wanted stack, etc. to compare execution to where the market is at the current time and at close. We produce TCA reports for clients on an automated basis which allows portfolio managers, traders and compliance staff to check on this historically.

Our traditional client-to-dealer trading model is now enhanced by our Open Trading all-to-all approach, started 3 years ago. Over 20% of liquidity comes from this channel.

MP - Charlie, I believe MuniAxis has a different approach to bids wanted?

CM - We do. Our whole idea is to provide information during the bid process, rather than just afterwards, to aid a trade/no trade decision. But I think that the real issue here with best execution is that dealers put their offerings out on multiple platforms at the same time, and, whilst understandable, that creates a lot of confusion. We recognize that this is the real world, though, and our tools are designed to help here.

TM - When G-18 went into effect for the muni dealer community, TMC saw a significant uptick of bid wanted activity on our platform. Whilst not specifically targeted at best execution, it seemed that putting dealer activity out onto an ATS platform is deemed a step in the right direction in an effort towards complying with G-18 requirements.

TMC provides a suite of compliance reports which can be reviewed historically against bids wanted and also comparing data against a range of benchmarks such as IDC, MMA and Treasury benchmarks.

Audience Question - What is the endgame for muni ATS? There are four vendors on the panel and there are others, but is there room for such variety or will there be a drive towards a centralized trading platform or exchange?

JC - One unique aspect of the muni market is the fragmented way in which issues are underwritten and traded. This would make it difficult to get to one central exchange without a change in the way issuance is done, such as that recently proposed by Blackrock in the credit markets, with larger and more consistent deals.

Given this fragmentation, however, I don't see anything wrong with competition amongst platforms. The more market participants, the more competition and liquidity generated.

CM - Competition is a good thing! It makes us all perform better. We see different parts of the market moving in different directions. We came at it from a buy-side perspective, because many folks there felt that the market as currently structured wasn't working well for them. What we are seeing now is that more and more buy-side firms are building trading capabilities in house, and are more likely than ever before to go out into the market and bid bonds. So, if an ATS can sit in the middle of two buy-side traders, just taking a small commission rather than a dealer bid-offer spread, then everyone is better off since we have injected efficiency into the marketplace. Of course, when there isn't a match to be made between buyside firms, there is still an important role for Dealers to bridge the gap and supply liquidity. Their participation is very important.

I can see some consolidation of platforms over time, but we are never going to be down to one or even two.

TM - I would just add that, in secondary trading of muni bonds, most do so in the first 6 months after they come to market. A number of years after issue, no-one is going to stand by a two-sided market of any depth for the range of CUSIP's out there. So the concept of a centralized order book, common in equities, is not likely to develop for municipals.

> ***...in secondary trading of muni bonds, most do so in the first 6 months after they come to market.*** Tom Meder, TMC Bonds

Audience Question - Listening to the terminology being used when discussing the muni market sounds a little like the equity market in the late 90's. The way that developed was that many venues traded amongst themselves and only offered deals out to the wider market if they were not matched in this closed network. Does the panel think that muni's trading may head in a similar direction?

JG - Unlikely. There are 2 million plus CUSIPs, most very small, so there is not nearly enough liquidity in the market. If you own the bond they you then you are typically one of the few to be willing to offer it, so there will not be a raft of offers. As mentioned before, unless the market structure changes it will be difficult to implement this.

In terms of ATS's intertwining with each other, I also don't see it happening. We all serve different market segments.

Audience Question - A lot of major retail firms are currently doing algorithmic automated bidding. Do you see that as developing and enhancing liquidity in the market?

TM - We view this as incremental to the traditional secondary trading in the market and think that it is very constructive. It affords liquidity and market depth. This activity has also resulted in a narrowing of bid-offer spreads over the last few years as the bids wanted process has become more competitive with auto-bidder participation.

Another important point is that the auto traders are not active in all the market, all the time – they tend to pick their spots. This implies that in periods of volatility or dislocation, this group might provide a good bid-side when others are looking to sell.

JC - There is a misconception that no-one is looking at the prices generated by auto bidders before they are submitted. In reality, most of the firms have the algorithms that create suggested prices which are then filtered through real, experienced traders before they respond.

From a best execution perspective, our tools then get used on a pre-trade basis to look at those responses to determine whether they should be executing against them, based upon a waterfall of live market data, historical transactions and evaluated prices.

Just because you are getting many more bids does not mean that lots more trades are happening.

> ***There is a misconception that no-one is looking at the prices generated by auto bidders before they are submitted.***
> John Cahalane, Tradeweb Direct

MP - Touching on technology, in the current low interest rate environment may more players are interested in municipal bonds – so called 'crossover' participants. How does trading evolve with these parties and how do your platforms help in this process?

TM - One example we saw was with Puerto Rico under stress, we started getting calls from hedge funds. Here was a whole class of investors looking at the muni space that hadn't existed before. However, coming from other asset classes, particularly equities, they were very comfortable with electronic trading.

I think that in times of dislocation or distress, the ATS's offer another side of the market that can offer a bid-side.

JC - It has been a difficult rate environment for 'true' muni buyers. We have seen increased use of ETF's for fixed income investors, which I believe is a short term phenomenon based on their ease of exit. As yields increase we see a rush of real money returning to the market, and I would expect much of the money currently parked in ETF's to return to the cash market when rates begin to rise.

Audience Question - Would you say that the ETF does give you a good indication of where the price of the underlying bonds should be?

JC - In a non-volatile market, yes, I would say that ETF's do provide a fair price (minus a small liquidity premium) of where the cash bonds are. In a volatile market, all bets are off!

MP - And yet, it is in a volatile market where we are most concerned about price! Arguably, in usual cases a large ETF basket gives the best indicator of where institutional bids in the market are. The concern is when these bids disappear. What happens then?

JG - Looking at the example of the credit markets, the rate factor of an ETF is a large component which many people fail to realize. Here we see the ETF working pretty well as an indicator, even in times of volatility, since there tends to be increased trade activity.

MP - Talking about trading platforms and pricing, the regulators are placing the industry under pressure to effectively price bonds, include that in best execution and be able to understand completely and with a transparent process how that pricing came about. That plays a role in secondary market transactions. The companies you represent have all grappled with this, so how do you look at pricing in the municipal space?

CM - That's why we as a company exist! Because of lack of transparency, especially in the odd-lot trades. If you don't have real time information during the bid process, and if you can't inform both buyers and sellers at that level of transparency, we have a problem. Absent this, a trade will happen and one side or the other may not be happy with the result.

JC - I could take the other side of that, noting that liquidity providers are willing to give valuable prices to the market place in an RFP because of the anonymity. I think that there could be an issue with dealers broadcasting their balance sheets publicly, especially in times of stress. We don't seem to have an issue getting liquidity on the current basis.

TM - I think we should view ATS's of critical importance when it comes to trading and price discovery. An ATS is not a sole solution but should definitely be a go-to tool for PM's and traders.

JG - There is nothing beating a broad market composed of many participants. We produce our own composite pricing derived from our market in addition to the MSRB reports and evals.

> ***If you don't have real time information during the bid process, and if you can't inform both buyers and sellers at that level of transparency, we have a problem.*** Charlie Moore, MuniAxis

MP - The muni world is changing – fintech is coming. Generally, it is argued that fintech is 10 years behind the rest of the world when it comes to technology, but I would argue that munis are 10 years behind fintech!

PANEL SESSION: EVALUATED PRICING

Ian Blance (IB)

As I mentioned in the introductory comments to this event, operational practices of many years standing in the fund pricing and benchmarking process are being called into question, and firms are being forced to consider changes and alternatives.

This comes at a time when municipal bond fund operations are subject to increasing regulatory and reporting hurdles and a challenging investment landscape. In addition, as Matt mentioned in the ATS session, developments in financial technology are finally beginning to impinge in the muni market.

The Evaluated Pricing segment of the market is one where these trends are all apparent, and our panel has all the major providers of such data represented.

Dealing first with present market conditions. As you know the current interest rate and issuance environment in the muni market is difficult. What sectors of the municipal bond market are currently most challenging to evaluate, and how does your firm address these challenges?

JS - At BCD we see the challenges in the marketplace today as a multifaceted. No-one has changed a primary or secondary vendor in the muni market for years, maybe decades. How do you look at a potential new product? What does quality really mean? If something hasn't traded in 200 days, what do you compare your pricing source against? Shouldn't coverage play into quality? If a provider does not price the bonds that are more difficult to price, then their quality score goes up but that does not help the client, who has no price. We think that coverage is critical so we price over 1.3m muni bonds and provide a confidence quotient for each.

BCD provides observation-based pricing. We collect as much data as we can on the market, not just on today's activity, but historically, going back 8 years. At 4pm we run the whole time series to come up with a best price for each bond and publish before 4:30. The starting point is not just yesterday's price, but the complete data set.

The bonds that are most challenging are those with few or no observations. Examples include volatile sectors such as Puerto Rico and private placements.

ED - As Jimmy highlights the obvious challenge with providing evaluated pricing for municipal fixed income is the size of the municipal marketplace of over 1.4 million bonds and very limited number of actual transactions occurring. It is important to highlight that there is no public data that I am aware of that supports or defines the number of firms that actually change evaluated pricing vendors and the frequency of those changes. What we do know from our personal client experiences and I believe my colleagues on the panel would agree with, is that the asset management community, in particular the mutual funds, conducts robust due diligence activity and usually at a minimum annually, to revalidate their evaluated pricing vendor of choice. In essence, while there may not be a vendor change annually, there is certainly an annual conscientious decision making process to reselect the evaluated pricing vendor of choice.

> ***No-one has changed a primary or secondary vendor in the muni market for years, maybe decades. How do you look at a potential new product?*** Jimmy Suppelsa, Best Credit Data

IB - That has certainly been on the rise, and all of you have mentioned to me that the number of fund board meetings taking place has risen significantly in recent years.

VP - Yes, within user firms there are pricing committees responsible for the vendors they use, and they will typically use statistical models to prove that their vendor of choice is the best one from a coverage and quality perspective.

The principal quality test – the next-day trade error test – compares the price of all the bonds that traded today to the evaluated price that is based on yesterday's price at 4pm. Doing this over a period of time, with a big enough sample set across vendors will show which vendors are tracking where the market is going and which ones are lagging.

This is something we ourselves track and report, and it is a great resource to show to the client as a quality metric to go alongside any coverage stats.

Looking at the question of the challenges we face in these market conditions, the MSRB trade data is a hugely valuable resource for those with the time and bandwidth to look at it in detail. One of the trends we have noticed is an influx of overseas investors chasing yield, especially in the taxable muni sector, which leads to some trades significantly different to others. An international investor, for instance, will bid up a bond, impacting the price, and there are local muni investors that do not understand why the price is rallying.

> ***The principal quality test – the next-day trade error test – compares the price of all the bonds that traded today to the evaluated price that is based on yesterday's price at 4pm.*** Varun Pawar, Bloomberg

MF - I think that what firms should do when they look at vendors is not just look at trade price versus previous day, but take a reactive and proactive approach to what the vendor is actually doing. So look at the trade price the day before, the day of and the day after. This will show how much the vendor reflected the trades, did they see them coming and how quickly they reacted to the observed trade and give you a full picture.

On the market conditions point, one way firms can implement technology to make their lives easier on the vendor side in on the high yield space. Right now most firms take a very manual approach. What we have seen work here is to take the financials, run them through parsing technology to produce the ratios which help the evaluator.

The other thing is to consider what is going on in the wider context. For instance, as Varun highlighted, over the last 6 years, international holdings of munis have increased by 50% to around 2.5% of the whole market.

JF - When I think of what is challenging in the muni market is the sheer volume of instruments. With over 1.5 million active issues, this is a major pricing exercise. Models are essential to deal with this, and the problem is how to achieve the right balance between automation and hands-on evaluation. Delivering accurate, reliable pricing is about grouping the universe of municipal bonds into the largest bucket possible to make things efficient, but the smallest bucket possible to maintain accuracy.

Beyond the models, the gathering of as much data and market color as possible is also essential, and deciphering this data (such as whether a trade was truly representative or not).

> ***Delivering accurate, reliable pricing is about grouping the universe of municipal bonds into the largest bucket possible to make things efficient, but the smallest bucket possible to maintain accuracy.***
>
> Jayme Fagas, Thomson Reuters

ED - Coverage and quality are probably the two dominant criteria for choosing a vendor.

IB - Not cost?

ED - If you engage with participants in the fund business, cost is obviously a factor, but their first criteria will usually center around quality followed by coverage. When it comes to gauging or defining metrics regarding quality, I agree with the panelist that described the three different ways to measure an evaluated price: the distance between the trade versus the day before the trade, day of the trade, and day after the trade. These types of metrics provide an asset manager with a significant perspective regarding their evaluated pricing vendor. It allows them to observe trends, lags, and general reaction to the market movements. However, I have observed that while the fund community continues to move toward the three type of trade measurement, there is also a move measuring a trade against an evaluated price that is generated at the time of the trade. There is continuous tension in measuring a trade against an evaluated price that does not capture the "real-time" market movements. And so we see firms moving away from an end of day evaluated price for measuring quality and moving toward using an evaluated price that reflects the time of the trade to measure the quality of the evaluated pricing vendor.

In addition, to quality, coverage, cost, firms are also being very diligent around Business Continuity, which is very much in the headlines and on the SEC radar after the BNY Mellon/SunGard issue last year.

Looking more broadly at the muni market, we absolutely expect over the next two to three years that there will be major technological leaps to accelerate additional functionality and capability within the municipal marketplace such as a continued advancement toward increased adoption of continuous evaluated pricing, transparency of inputs into the evaluated pricing, and liquidity metrics for municipal securities. We see the municipal market place changing from the sleepy animal is used to be to a more technically savvy marketplace.

Audience Question - The value of the MSRB trade data was mentioned, but this is ex post data. I am interested to know whether any of the panel are using ex ante data in their processes. I don't mean talking to the street and getting market color, rather real live data perhaps from the ATS platforms or dealers.

IB - That fits very neatly into my second question, which is relates to methodologies and process, in municipal bond evaluations. Perhaps we can look at what other data sources are used in addition to trades?

VP - Yes, in addition to the MSRB data we get indicative and firm levels from the dealer community, which I think most people would agree, point to where a trade is going to take place. If there is one word I would use to describe Evaluated Pricing that is extrapolation. Taking the data observable from the market and using that, through models and methodology, to extrapolate behavior in the 95% of illiquid issues. This is truer for munis than many other asset classes.

In addition to dealer levels, you can also look at bonds from similar issuers that are trading.

JS - Observation based pricing is based solely on all off this data and we gather as much as we possibly can from all of our sources. Our task is then to layer in all relationships, such as sister bonds, so that when we add data it not only impacts the direct bond but also has a ripple effect on all the others related to that bond in other sectors of the market. Our model is institution-based, so we look at the size of the trades to determine the weighting. A retail-oriented trade will not necessarily cause us to move our price if we don't consider it representative of the institutional market.

We think that security coverage is critically important when measuring a vendor's overall pricing quality. Many customers measure them separately, but what good is a pricing vendor if they don't price the securities the client holds? The key is in knowing the confidence of that price, which gives clients a more complete picture. At any level of pricing confidence, clients would rather get a price than not get a price for their holdings. Our concern is that when clients don't include coverage as a key part of their vendor quality evaluation, they are encouraging vendors to drop coverage on securities that are difficult or expensive to price.

MF - Jayme mentioned 'bucketing' and Varun talked about extrapolation and both of these techniques are necessary to produce pricing for munis. I would also add that these will only work if you have the right data, bond characteristics and model flexibility within your process to deal with the dynamic market changes.

> ***...over the last 6 years, international holdings of munis have increased by 50% to around 2.5% of the whole market.*** Matthew Fiordaliso, IHS Markit

JF - Yes, hopefully not garbage in, garbage out! We look for as much bid wanted and other market activity as possible, and there are a number of shops out there collecting such data. We also try to use the data coming from the ATS's and electronic platforms as much as possible.

ED - As a panel we highlighted that the pricing process consist of market data inputs that vendors must extrapolate in a meaningful way, and that the models or pricing techniques must be architected in a way that produces an evaluated price that reflects the market's value for that security. But how does the audience take those very correct descriptions and use if for their vendor oversight. When the audience is thinking about their evaluated pricing vendor of choice, in addition to measuring the vendor's quality against MSRB data, you might also want to ask some questions or collect some metrics regarding the market color or inputs as we have been saying from your primary and secondary vendor. How many observations does the vendor collect? How many bids and offers does the vendor receive? What is the diversity of those sources? Does the vendor utilize parsing technology, and how is that market data integrated into the pricing applications or models?

There are basically three components for the audience to collect metrics around and pose questions about when it comes to an evaluated pricing vendor: the market data or inputs that are utilized, the actual evaluated pricing system/technology, and the analysts that interact with the systems. A question as simple as the number of analyst employed in an asset class and how does the analyst interact with the evaluated pricing applications or models.

VP - I couldn't agree more. We recently looked at the MSRB feed and found that less than 1% of issues per week trade in institutional size ($1m and above) which needs to be factored in.

There has to be a good blend of automation and manual analysis since the muni market is extremely fragmented and while you can probably automate around 80% of the market you need a team of evaluators with capital markets experience to look at the rest.

IB - Finally, I would like to give the panel an opportunity to look into their crystal balls. You will all probably know that Chair White of the SEC has changed her tune of late and is now requiring mutual fund boards and their advisers to think more actively about future risks in addition to dealing with day to day issues.

From the perspective of your own companies, what developments – either technical or strategic – is your firm planning to implement in the next few years to address the challenges we have identified in the muni market?

JF - We think that 'forced transparency' is just going to continue and we are gearing up to provide as much of this as possible, be that a score, or more data fields on trade inputs or more insight into the pricing methods. This is not just in municipals, but across the board.

Additionally, we are going to be making some significant additions to the staff in our muni group and add some new content. We are also looking to stay on top of market developments, such as incorporating ETF spread movements into the process.

Specifically relating to Thomson Reuters, we are looking for a lot more synergy between TRPS and MMD.

MF - We see the need for vendors to change their mentality in terms of not being a pricing provider, but including a lot more supporting information such as trade stats, liquidity scores and the like, to provide the building blocks for audit and compliance of users.

JS -Because Best Credit is a new company and we take a fully-automated approach to evaluated pricing, we were able to build the company from scratch to address the existing market challenges as well as the impending regulatory requirement for much greater transparency. It was just a matter of time before Big Data and massive computing power revolutionized municipal evaluated pricing; that time is now and the improvements are dramatic. For example, take price challenges; we can predict with a high level of accuracy which prices will be challenged by a client and provide answers and explanations before the questions are even asked.

When clients look at our data, they see that we consistently have better coverage than our competitors and they ask how we can be so competitive. The answer is focus - our entire business is focused on fixed income evaluated pricing, which means 100% of our investment and 100% of our employees are working on constantly innovating and perfecting the products we have in this segment. We are not distracted or constrained by other product or segment priorities. This type of focus is what leads to excellence and innovation.

ED - Our emphasis is in the muni marketplace's adoption of electronification. The sleepy animal the muni market was once regarded as is now embracing technology at a much faster pace than previous years. So we at ICE Data Services continue to invest in technology that supports our changing client. For instance, today clients perceive end of day evaluated pricing as less relevant– and market participants require instant gratification regarding the value of a municipal bond at any time of the day, not just end of day. In addition, we see clients continuing to be vocal regarding continued investment in muni bond transparency such as defining the perceived liquidity of a muni bond and defining the ability to exit that position under various market conditions. The industry is also clamoring for the continued advancements of a fixed income best execution tool that leverages the industry's accepted evaluated pricing methodologies and approaches. We are investing in the areas our clients are moving into. We clients' using a continuous evaluated pricing to support their pre--trade decision making and to measure their back office quality, while they use transparency tools to support their internal and external audits, and clients are utilizing liquidity indicators to empower front office traders to support their bond selection criteria or middle office risk teams to assess the liquidity of the firm's assets. And more recently we have begun to invest in creating municipal benchmark indices for the market place. The acquisitions of various benchmark indexes have caused firms to reflect on their current benchmark or index and explore other options or offerings such as ICE Data Services Benchmark offerings.

VP - Obviously #1 and #2 muni pricing providers have now combined, which opens up a spot for #2 which is a great opportunity for us. Tests conducted by the Barclays indices prior to the close of the acquisition by Bloomberg showed that BVAL does have the requisite quality from a muni perspective.

Looking at the future, we already use scores and provide transparency. We are looking at liquidity too, but in munis we are especially looking at optionality. This is something that is not widely discussed in the market, but half of muni issues have embedded options, and there is not a consistent way to value this. My team is looking closely at a solution for this.

> ***The sleepy animal the muni market was once regarded as is now embracing technology at a much faster pace than previous years.***
>
> Liz Duggan, ICE Data Services

IB - So the 'dinosaur' of the muni market is facing significant changes, and we all hope that it doesn't suffer the same fate as them and become a fossil!

EXPERT DISCUSSION:
MUNI BENCHMARKS & INDICES

Tom Doe (TD)

My name is Tom Doe and I am President of Municipal Market Analytics. We started the firm in 1995 and we provide a broad range of publications, tools and consulting to the wider municipal industry. To my left is JR Rieger, and our mandate today is to discuss the benchmark issue in the muni sector.

Before I get to that I would like to reflect on the preceding discussions. The focus on ATS and trading systems in the role of price discovery was useful, but I felt it was lacking, given recent market consolidation, a discussion on who is doing the transactions, what percentage of the market do they represent and what was the intent behind it.

Thinking about the evaluation process, going back to the 1980's, there have been two misconceptions that have dogged our industry. First, the activity inspired by a falling interest environment gave the impression that there was active trading in the market and that muni bonds were a transactional product, rather than a buy-and-hold market.

The other related issue is that, with munis, we are talking about an evaluated market. This is not market pricing, and I think that this creates an illusion amongst investors and regulators. The waterfall approach referenced earlier starts with actual transactions – although there are not enough of these – which leads to an evaluation, followed finally by an analyst opinion.

The previous panel discussed how to define the quality of an evaluation – should it be how close it gets to a transaction? I have long maintained that the closest market to muni bonds is residential real estate, so perhaps Zillow should be a model for muni evaluations! We are long only market, there is no process for correcting price discrepancies (talk of arbitrage in the muni market is confusing to me) and everyone wants to see prices rising. I would argue that we perhaps have a 35 bps premium built into muni evaluations since this rally started in 2013, and when a correction occurs this will be a factor in its severity.

Now looking at the world of benchmarks according to our brief, which could be addressed in many different ways. We could look at yield indices, benchmarks for settlement of derivatives and setting of coupons, indices measuring investment returns, etc. Here we will primarily focus on Total Rate of Return indices, which get used in performance measurement, marketing and tracking by passive investment vehicles such as ETF's. In such circumstances, the index becomes ever more important and with it the prices used for calculating the index levels and associated NAV's.

At JR's instigation I looked at the work on Benchmarks being done by IOSCO, especially their analysis of the failing of LIBOR. They focused heavily on the principles guiding index governance, accountability, transparency and integrity, and how index continuity can be maintained as market change and evolve. We should also look at the models used to create and maintain indices and assess whether investors truly understand this.

JR can comment on how some of the lessons learned in the wider global fixed income index world could possibly be applied to municipals.

JR Rieger (JR)

I am Managing Director and Global Head of Fixed Income at S&P Dow Jones Indices, one of three groups that make up the S&P Global business. My focus is on fixed income indices, but my first love is municipals.

As Tom mentioned, there are a lot of different reasons why a benchmark exists and a lot of uses to which they get put. Mainly they are used to track exposure to different markets, but increasingly they are used as a basis for investing. This has an impact on the importance of the bond valuation used to price the index constituents.

When used as a basis for resetting a floating rate bond coupon, the index needs to be representative of a part of the market. When used to track investment sector performance, that requires lots of bonds divided into the relevant investment sectors, such as healthcare, housing, etc. Investable indices are designed to be replicable by passive investors and tend to include the more liquid bonds that are traded in the market.

Not all are traded, but we can illustrate this with statistics. Looking at our large benchmark muni index, about 56% of the 90k plus bonds in the index trade on any given month. They may have traded only 10 bonds, or 20 million, but they traded. Looking at the investable muni index, that goes up to about 66-68%. This may sound better, but in the corporate bond market our main index has 88% trading, and our index based on the bonds of the issuers in the S&P 500 has over 95% reported trades.

So you can see that munis are significantly less liquid.

TD - So how do you define liquidity when you are reviewing the bonds for inclusion in the indices, and when looking at the pricing of these constituents?

JR - The historical proxy for liquidity for indices has been par amount outstanding, but give the tendency for bonds to trade only in the first few months of issue, that may not be the best metric. What we have done is to look at other data such as the size of the cover, the number of bids, etc. to help us get to the next iteration. We do look at liquidity scores, of which there is a number available, but would rather look at the underlying inputs that went into these and are working our way down that path.

With the passive investment community, liquidity is everything. Here it is all about identifying a small group of bonds that can be optimized for a portfolio manager track, with a huge caveat – you can't introduce turnover, which needs to be kept to the level generally pertaining in the market. This is a huge challenge.

> ***The historical proxy for liquidity for indices has been paramount outstanding, but give the tendency for bonds to trade only in the first few months of issue, that may not be the best metric.***
>
> JR Rieger, SPDJI

TD - When we had all the hedge funds participating in the muni market during the early stages of the Puerto Rico crisis, the most liquid bonds in the market were from Puerto Rico, which isn't necessarily what we associate with 'most liquid' – i.e. being distressed. The problem with the fragmented market in munis is that, whatever the demand component prevailing at the time can skew what is most liquid in the market, and the associated pricing.

Coming back to ETF's, there has been a huge explosion on AuM – up 26% in muni ETF's this year – and they are growing in popularity and regulatory attention. We have been talking to investors who are looking to trade ETF's by buying them at a discount to their NAV. Continuous evaluations was mentioned earlier, which might help to reduce this arbitrage, but is this possible?

JR - Looking at US ETF's they are required to have an intra-day NAV intended to reflect the value of the basket not just at the end of the day. We are going down the real-time path but would like to use real two-way market prices rather than evaluations. We have done this for the S&P 500 corporate bond index, and think that if we focus on the small slice of the muni market which is truly liquid, we can do the same here without using evaluated pricing.

TD - Tying benchmarks to actual transactions seems to be where the regulators want to be, but we have the disadvantage of a small number of actual trades in the muni market. Would the creation of a market priced muni index allow the new participants in the market – i.e. the algo traders – to start exerting a force?

JR - Yes, it creates a focused set of liquidity which could be open to manipulation. I remember when munis used to have a futures contract which suffered from the same problem.

However, as markets and technology changes, creating indices with a small number of bonds that represent beta perhaps can work. The majority of our customers want the big benchmark with 95,000 bonds in it. They want to be able to slice and dice this universe and assess where their choices add value against the overall market and contribute return. Our passive index is around 9,000 bonds which is still a lot of issues and can't necessarily be traded, so portfolios need to be optimized to reflect this.

You mentioned IOSCO, the International Organization of Securities Commissions, and I would like to follow up on this. Following the LIBOR and other mark-to-market scandals, IOSCO have issued a series of principles for benchmark providers focused primarily on the independence of the index.

We look at this as 'no big deal'. SPDJI have been producing indices under these rules for a very long time. Short term commercial objectives are not allowed to impinge on these principles since the index teams independently run their operations, and the whole process is audited.

Independence comes at every stage of the chain. We use SPSE pricing for our muni indices, but we have an arm's length contract with them, as we do with all our data providers. We are a customer and our index managers cannot change data points. They can challenge, but the data source needs to either change of validate the data.

> ***The problem with the fragmented market in munis is that, whatever the demand component prevailing at the time can skew what is most liquid in the market, and the associated pricing.***
>
> Tom Doe, Municipal Market Analytics

Voltaire ADVISORS

TD - Coming back to this audit and integrity aspect, this is very important in the index world, especially in the context of recent changes such as Bloomberg's acquisition of the Barclays business and the change in evaluation sources.

What we have noticed looking at the data for the last nine quarters is that, in the last two weeks of each quarter there has been an improvement in municipal evaluations. Interesting that the first two weeks of a month see a correction in prices, with this followed by a gradual increase peaking at the end of the month/accounting period.

I come back to one of the IOSCO principles in the idea of data sufficiency and integrity. In relation to your use of evaluated prices for constituent pricing, how do you go about assessing and reviewing your confidence in these?

JR - We operate in a very similar way, and consume data in a similar way, to the buy-side. The difference is that we state who our bond pricing source is in each methodology document. That way anyone using the index can see where the pricing come from and we think that this is part of the transparency required.

That process of review tends to be rather sticky. We do our homework at the beginning and try to avoid changing sources after that. However, we have changed our sources before because of our process identifying flaws in either the pricing or the reference data that underlies this. Under IOSCO rules it is very difficult to change and recalculate indices due to errors, so the data needs to be right.

We are finding more and more the need for multiple inputs – especially for reference data – which increases the complexity of producing the index. Regarding recent developments in the market, we regard Bloomberg buying Barclays indices as disruptive to the muni index sector. We understand that there is more competition coming, particularly from ICE. But when you have single sourced data feeding an index, these problems get magnified.

> ***Under IOSCO rules it is very difficult to change and recalculate indices due to errors, so the data needs to be right.***
>
> JR Rieger, SPDJI

TD - Again, reviewing data back over the last decade in the muni market, there has really been an appreciable difference pre- and post-crisis. The loss of the bond insurers and less consistent couponing in the market has had an impact, as has changing activity and technology. The result is, for indices and benchmarks, is that the process has become much more complex and eclectic. One last question, what is the regulatory environment in relation to indices at the moment? Is it getting hotter? Is this linked to ETF's or is it coming anyway?

JR - We believe that it is coming anyway. When you look at the European regulatory environment, heavily driven by IOSCO principles, the European Commission is pushing regulation for benchmark providers. We think that will ripple through to the US, and we don't see that as a bad thing, since we run our operations that way anyway.

This touches on transparency, which is key part of the regulatory requirement. There are differences to the way some index providers approach transparency. SPDJI puts everything out on a free website and into the various portfolio analysis systems, and the benefits of transparency outweighs any commercial leakage that may result.

CAVEAT EMPTOR? OVERSIGHT AND DUE DILIGENCE OF FUND SERVICE PROVIDERS

The panel sessions of our Breakfast Briefing have all featured vendors providing various services to the municipal mutual fund community. This is especially topical, since fund service providers have been very much in the regulatory spotlight over the last few years, with frequent reminders from the Securities & Exchange Commission (SEC) about their importance to fund operations, and the need for effective oversight of them by fund boards and their advisers.

The first inkling of the concern showed by the Commission came with the updated guidance on the use of pricing service providers in the Money Market Reform program of 2014. Buried in a 900-page document was a reiteration of the obligations of fund directors to determine fair value of a fund's securities in good faith in the event of market quotations not being readily available. Boards were reminded that they could engage others to assist them with this, but could not abdicate the ultimate responsibility.

Coming in the wake of the Morgan Keegan case, where fund directors were sanctioned for not fulfilling their oversight duties with respect to securities valuation, in one sense this was a reminder of the kind the SEC staff produces on a regular basis. What made this one different, however, was an explicit focus on the role of third-party pricing providers in fund valuation. The Commission noted the importance of this vendor segment and advised fund boards to ensure that they were fully apprised of the process and techniques used by such firms to generate securities prices, and to assess whether this was an appropriate valuation method for their fund.

Vendor risk was thrown into sharper relief in summer 2015 when the failure of an investment accounting system (Sungard's InvestOne) resulted in severe disruption to one mutual fund administrator's (BNY Mellon) ability to calculate Net Asset Value (NAV) for the funds they serviced. This was a double layered problem, with one service provider to a fund being disrupted by a vendor they – rather than the fund itself – employed, adding to the complexity for fund board oversight.

This outage prompted the SEC to issue guidance to mutual funds on Business Continuity Planning (BCP). The new guidance reminded funds of the need for suitable business continuity plans under Rule 38a-1 but also extended this responsibility to oversight of critical service providers.

"Additionally, because fund complexes also outsource critical functions to third parties, the staff believes that they should consider conducting thorough initial and ongoing due diligence of those third parties, including due diligence of their service providers' business continuity and disaster recovery plans"

SEC IM Guidance Update 2016-04

Critical service providers were defined as each investment adviser, principal underwriter, administrator, and transfer agent named under 38a-1, as well as each custodian and pricing agent. In addition to looking at vendor business continuity and disaster recovery plans, the Commission also requires funds to consider issues of cybersecurity for themselves and their service providers.

One aspect of all these new regulatory rules, guidance and advice has, in our view, received insufficient attention. The 2014 valuation guidance in The Money Market Reform paper again set the tone, requiring fund directors to not only assess whether a pricing service was appropriate under current circumstances, but also to review how this might be affected by changing market conditions. This explicit anticipatory and forward looking role required of mutual fund boards and advisers over vendors is a new and challenging one.

This position was reiterated this year by SEC Chair White and has been a feature of many public comments by staff over recent months.

"It is simply not enough in today's environment and markets to be reactive to contingencies – we all need to be proactively thinking ahead and planning."

SEC Chair White, Speech, March 2016

In summary, the SEC position on fund service providers is pretty clear:

- Fund boards and their advisers have an obligation to conduct thorough and ongoing due diligence on critical service providers;
- For all vendors this should cover business continuity and cybersecurity planning, and should contain an assessment of the risks based on possible future scenarios;
- For pricing services specifically, there should be an understanding of the processes and techniques used to produce valuations and how these might be impacted by changing market conditions.

We believe that this appreciably raises the bar for funds and advisers when it comes to pricing vendor due diligence. No longer just a reactive review, funds now need to consider the methodologies of the pricing service in more detail and assess how these might be at risk of business disruption (for instance, if a critical input failed) and how they might be impacted by changing market circumstances.

Voltaire Advisors offers specialist advice and consulting in this area as part of our VIVA (Voltaire Independent Valuation Advice) package. For more information see **www.voltaireadvisors.com**.

As a reference for our municipal bond fund clients, we include in this section the profiles of a series of service providers operating in this market sector. These profiles are drawn from our annual Fund Valuation & Compliance Handbook (download a copy of the full Handbook from http://voltaireadvisors.com/fund-valuation-and-compliance-handbook.html). We hope you find it useful.

VENDOR PROFILES

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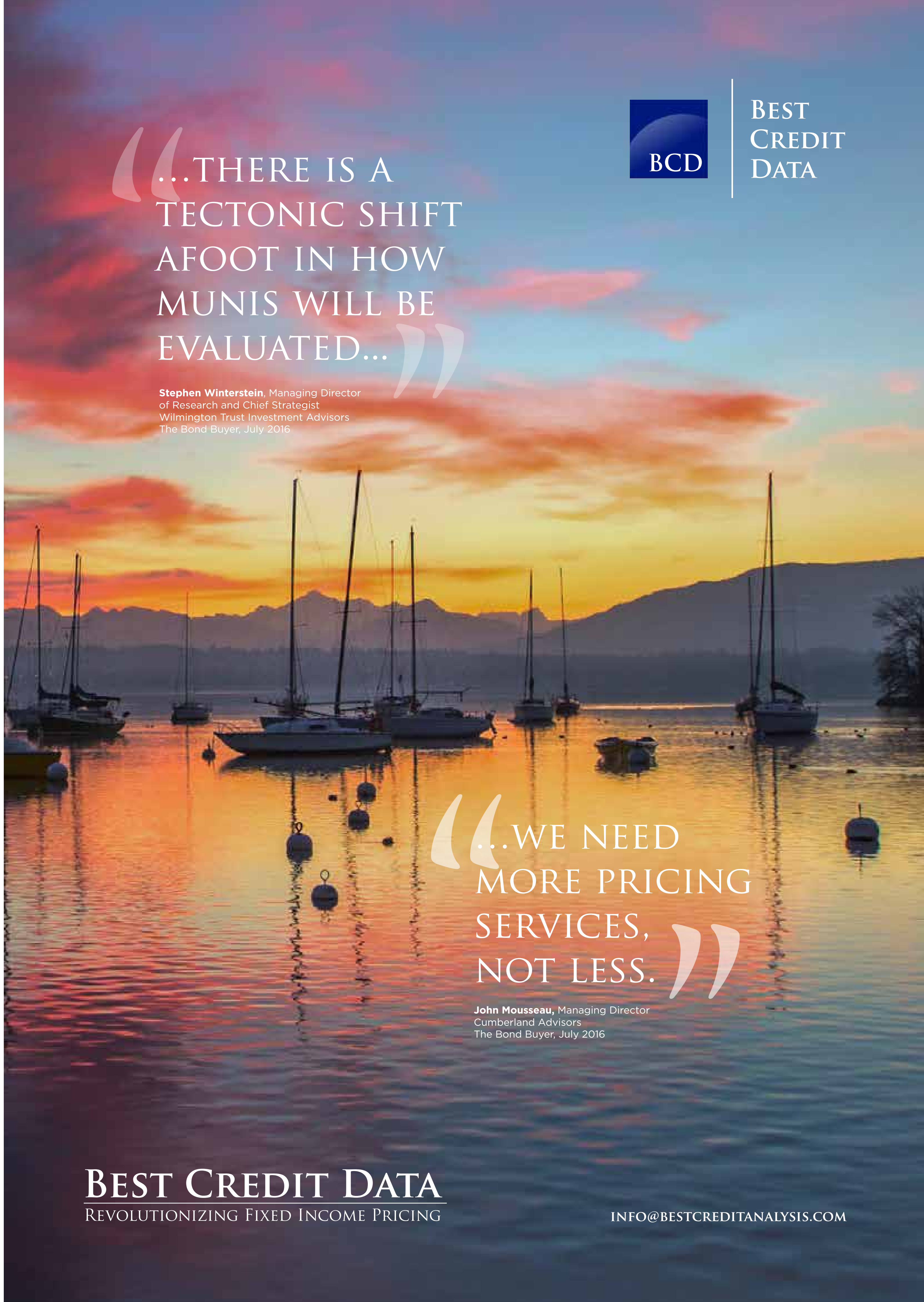

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BONDVIEW

BondView turns raw data into valuable information to promote smart investment decisions about municipal bonds. BondView is a multi-purpose product used by institutions, financial advisors, compliance, issuers and many retail investors. Key features for institutional users include:

X-Ray bond fund holdings: Xray, Analyze & Monitor all 2400 municipal Bond Funds fast.

We leverage CUSIP level data to spot key daily trends for each municipal bond fund including: 1) Stress Testing at the CUSIP level for each fund, 2) Filtered holdings by issuer, state, sector, etc. 3) Advanced insight into fund trading strategies by each bond traded, 4) Locate which funds own the same or similar bonds to your target bond 5) Upcoming Maturity schedules on fund holdings, 5) Alerts for all fund portfolio changes, 6) Peer group analysis 7) Holdings diversification and projected monthly income. All of the above is also available for 1000's of managed public portfolios and even retail portfolios.

Pre-trade analytics: Know the Market BeforeYou Trade

Utilizing our proprietary and back-tested pricing algorithms, BondView's Pre-Trade Analytics engine internally generates real time pricing on over 1.1mm municipal bonds. BondView's pricing is used daily by 10,000+ organizations. We provide context including rich or cheap analysis to support your pricing decisions. All data is available in report form which can be sent to a client or kept for your records.

Liquidity assessment: Know your Liquidity Funnel in Real-Time

Regulatory rules require fund managers, their boards and compliance teams to understand liquidity for each portfolio they manage. BondView's Liquidity Assessor provides a constant monitor of your holdings so that you can comply and report on fund liquidity while not building out expensive infrastructure and policy. (Coming soon)

BondView compliance: Monitor Your Trading Activity To Ensure Compliance

BondView Compliance assists desk Supervisors and Compliance staff in ensuring adherence to internal policies and procedure around best execution. Our tool set checks prices, performs mark up/mark down analysis and flags trades that are out of market.

BondView, LLC
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FactSet helps the world's best investment professionals outperform. For more than 35 years, financial professionals have relied on FactSet's streamlined solutions and unmatched client support to get their jobs done, better.

Our global datasets, powerful analytics, and comprehensive data feeds empower users to stay ahead of market trends, access extensive company and industry intelligence, and monitor the performance of their equity and fixed income portfolios in the office or on the go.

Over the past two decades, FactSet has developed an industry-leading global fixed income attribution and risk solution. FactSet's offering includes global fixed income index, pricing and reference data, which can be leveraged across our entire analytics suite. Whether you're a fixed income portfolio manager, risk analyst, or performance professional, FactSet provides you with the tools you need to effectively manage your investment process.

Headquartered in Norwalk, Connecticut, FactSet conducts operations with over 6,800 employees in 35 global office locations. Learn more at FactSet.com, and follow us on Twitter: Twitter.com/factset.

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ICE DATA SERVICES™

Intercontinental Exchange (NYSE: ICE) operates the leading network of global futures and equity exchanges and provides world class clearing, data and listing services across commodity and financial markets. The New York Stock Exchange is the world leader in capital raising and equities trading.

Formed in 2000, ICE's electronic trading platform brought more transparency and accessibility to the OTC energy markets. Soon after, ICE added global futures and cleared OTC markets across virtually all asset classes, data services and clearing houses. With a culture of growth through client service and innovation, ICE's global network and state-of-the art technology solutions serve the dynamic needs of market participants around the world.

Today, the result is an ecosystem of 11 exchanges, 6 clearing houses as well as global data and listings services that combine to provide access to global capital and derivatives markets.

ICE Data Services

ICE Data Services offers a robust end-to-end solution for information, analytics and connectivity, with a range of proprietary data and tools for global markets across fixed income, equities, commodities, FX and options. From exclusive real-time data driven by 11 global exchanges, leading continuous fixed income evaluated pricing, reference data and analytics, to robust desktops, trading tools, and connectivity solutions, thousands of market participants around the world deploy our award-winning data services to inform their market and economic perspectives and decision-making.

Pricing & Analytics

The leading pricing, analytics and market data offered through ICE Data Services support mission-critical processes across the front, middle and back offices of organizations around the world. With products such as our end-of-day evaluated pricing, continuous fixed income evaluated pricing, best execution services, and Liquidity Indicators, we're able to support intraday, real-time decision-making within financial organizations and help link strategic objectives with day-to-day actions. We deliver independent evaluations for approximately 2.7 million fixed income and international equity securities each day, including hard-to-value, thinly traded fixed income issues, provide trusted reference data for more than 10 million financial instruments, offer a low latency consolidated feed that connects hundreds of sources, publish leading market indices against which industry or security performance can be measured, and license for critical benchmarks like LIBOR and the LBMA Gold Price.

Evaluated Pricing

We deliver daily evaluations representing approximately 135 countries and over 50 different currencies for approximately 2.7 million financial instruments. As a proven industry leader in evaluated pricing, we help set the standard for coverage, high quality and reliable delivery.

Our teams of evaluators operating in the U.S., UK, Germany, Hong Kong and Australia serve both the buy- and sell-side; thousands of financial institutions worldwide, ranging from central banks to large investment banks, subscribe to our evaluations. Each daily independent evaluation represents our good faith opinion as to what a holder would receive in an orderly transaction for a security (typically in an institutional round lot position) under current market conditions. In addition to bid-side evaluations, we also offers mid/mean and ask-side evaluations.

ICE Data Services

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VENDOR PROFILES

IHS Markit™

Markit provides independent pricing, transparency and liquidity data on corporate, government, sovereign, agency and municipal bonds, as well as securitized products. Given the vast number of bond issues in the market, sourcing pricing information can prove difficult. Markit uses price inputs from a variety of sources that are either aggregated to calculate composite levels or fed into a dynamic model to produce a price validated against a number of parameters.

Markit provides insight into the municipal bond market by delivering independent and transparent pricing for more than 1.1 million municipal bonds, as well as value-added metrics and liquidity scores.

Our municipal pricing methodology incorporates the financial condition of each state and municipality, uses of proceeds and other factors at the issue level to drive movements in price. Our methodology also incorporates unique market color fueled by parsing technology that extracts OTC pricing content from messages in real time. These data points, along with data from the Municipal Securities Rule Making Board (MSRB) feed, are collected, processed and incorporated into our pricing platform to support immediate updates to bond prices.

Our municipal bond coverage includes more than 1.1 million instruments rated Aaa/AAA to Baa3/BBB- and covers both fixed and variable coupons Our methodology also incorporates the financial condition of each state and municipality, uses of proceeds and other issue level factors.

The strength of our pricing sources and methodologies underpin the quality of our pricing data, delivered with full transparency and dedicated customer support.

MARKIT

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Investortools

Investment System Solutions

At Investortools we develop top of the line portfolio management and credit analysis software for fixed income professionals. When you team up with Investortools you get more than just our software, you get us. We are experienced software specialists committed to earning your trust by asking the right questions and delivering tailored solutions.

We do this by providing software solutions that help equip you to best execute your investment strategies, and we couple that with stellar customer service. Whether you're a growing investment advisor or a leading investment management firm, we continually endeavor to serve you and your management needs.

Our culture combines the freedom and creativity of a software environment with the rigor and challenge of working among the smartest and brightest experts in the investment management industry.

Contact us today and discover for yourself why many of the biggest names in the industry are proud Investortools clients.

A TRADITION OF INNOVATION

In 1983, Paul Daniels, a portfolio manager and head of research at The John Nuveen Company, developed a portfolio management system with his son. Released as Perform®, this innovative system was the first of its kind in an industry run on paper, and became the foundation for our other industry-leading software solutions.

Three decades later, we're stronger than ever, having built our company on a combination of widely used products and uncompromising service to our customers.

We attribute our impressive track record of success to the blessing of great people in our company and our clients. We've been privileged to have some of the greatest minds in the investment community working with us, contributing to steady growth of revenues and consistent profitability.

CONTINUED INNOVATION

As we look to the future, we recognize a staggering amount of room for growth in the marketplace and our team is eagerly taking on these challenges. As we continually enhance our suite of incredible products, we look to the future confident that we are positioned for growth.

Investortools
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MarketAxess

MarketAxess brings over 16 years of unparalleled trading, market data and technology innovation to the global institutional credit markets.

MarketAxess was formed in April of 2000 in response to investors' need for a single trading platform with easy access to multi-dealer competitive pricing in a wide range of credit products. MarketAxess now operates a leading e-trading platform that enables market participants around the world to trade credit instruments using MarketAxess' patented request-for-quote (RFQ) technology.

MarketAxess is an innovative, award-winning electronic trading platform delivering valuable technology solutions for the institutional credit markets.

Over 1,100 institutional investor and broker-dealer firms are active users of the platform, accessing global liquidity in U.S. high-grade corporate bonds, eurobonds, high yield/crossover bonds, emerging markets bonds, municipal bonds, U.S. agency securities and credit default swaps (CDS).

Open Trading™, a new way to trade corporate bonds

In 2012, MarketAxess launched Open Trading, a centralized all-to-all electronic trading marketplace that connects over 1,100 fixed income market participants. Open Trading enables buy-side and sell-side participants to trade directly with each other, vastly expanding the available liquidity options for credit products.

Using Open Trading's range of disclosed and anonymous protocols, market participants can send and receive inquiries or requests for quotes (RFQs) - of any notional size - to any other participant on the platform. Open Trading delivers real cost savings by increasing trading efficiencies and vastly expanding the liquidity pool for global credit trading.

Open Trading has gained significant traction over the past 4 years, reaching a record $41 billion in traded volume in the second quarter of 2016.

Municipal Bond Trading on MarketAxess

MarketAxess has developed an e-trading platform for municipal bonds that provides institutional investor and broker-dealer firms with better price discovery, efficient trade execution, and centralized liquidity that help achieve best execution requirements.

MarketAxess municipal bond platform handles block and odd lots to execute taxable and tax-exempt bonds. The key features are:

- Centralized access to global liquidity through MarketAxess' multi-dealer RFQ and all-to-all Open Trading™
- Bid/offer list execution of up to 200 line items
- Consolidated dealer inventory
- IDC, JJK, and MSRB data
- Full Straight-Through-Processing (STP) connectivity from pre-to post-trade
- Complete audit trails, ticketless transactions, and compliance checks via OMS
- Transaction Cost Analysis (TCA) available for all clients

MarketAxess

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MERGENT

For over 100 years, Mergent, Inc. has been a leading provider of business and financial information on public and private companies globally. Mergent is known to be a trusted partner to corporate and financial institutions, as well as to academic and public libraries. Today we continue to build on a century of experience by transforming data into knowledge and combining our expertise with the latest technology to create new global data and analytical solutions for our clients.

With advanced data collection services, cloud-based applications, desktop analytics and print products, Mergent and its subsidiaries provide solutions from top down economic and demographic information, to detailed equity and debt fundamental analysis. We incorporate value added tools such as quantitative Smart Beta equity research and tools for portfolio building and measurement. Based in the U.S., Mergent maintains a strong global presence, with offices in New York, Charlotte, San Diego, London, Tokyo, Kuching and Melbourne.

Mergent has continuously refined its dynamic database of municipal and corporate debt securities, making it one of the most detailed fixed-income resources in the industry. Experienced research teams continually monitor a wide range of official and other respected data sources, compiling volumes of information and cataloging it into highly organized relational database formats. In addition to terms and conditions, we also provide corporate actions such as tenders, redemptions, refundings, reopenings, remarketings, and defaults.

Through our network of strong partnerships, we can also offer to clients end of day pricing with eight years of history on our corporate and municipal universes.

We also provide corporate action and dividend data on North American equities and mutual funds as well as an end of day historical pricing service. Our data is collected from stock exchanges, company filings, press releases, depositories, transfer agents & directly from the company. We provide the latest information available on North American companies including: Name Changes, Mergers, Acquisitions, Redemptions, Stock Splits, Maturities, Tender Offers, Reorganizations, Stock Splits, Spin-Offs & Shares Outstanding information. We provide our pricing data in both adjusted and unadjusted formats.

But that's only part of the story. We've built our business around clients, not products. Every Mergent product in existence today has been developed in response to a specific client need, and we view every client relationship as a partnership dedicated to building value.

For every client, there is an ideal solution, and we are committed to working with you to make it a reality.

Mergent
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t: 800.342.5647

Mergent Fixed Income Securities Master Database

Information Solutions

Benefits

- **Reference Data API provides quick and easy access to specific data fields for all operational securities data base.**
- Increase overall revenue by providing efficient up to date information
- Reduce operational risk and rapid error detection
- Meet compliance and regulatory demands
- Data transparency
- Control industry and sector risk
- Real-time sector analysis for buy/sell decisions maker

Delivery intervals options

- Real time (5 minute updates on Taxable and 15 minute updates on municipal bond data)
- Daily updates or full refresh
- Weekly or monthly refresh

Delivery Mediums:

- Internet FTP
- Web access

The Most Comprehensive Collection of Publicly Offered U.S. Taxable and Municipal Bond Terms and Conditions and Corporate Actions

Mergent provides global reference data solutions including key financial, corporate actions, fundamental and descriptive data, including complex structures, that support securities operations worldwide. Terms and conditions can be used to assist with STP (Straight Through Processing), global clearance and settlement, valuations, compliance, security master file maintenance and data management and operations.

Coverage

Detailed terms and conditions covering investment grade corporate debt issues, municipals bonds, high yield securities, U.S. treasuries and agencies, and other sovereign and government debt securities. Includes debentures, fixed, floating and adjustable rates, private placements, medium term notes (MTNs), convertible securities, bonds with embedded options and municipal securities

- Over 3.2 million municipal securities
- Over 340,000 US taxable securities
- Subscribe to a specific data universe or all securities

Specific issue and issuer information available:

Payment Data
- First Coupon
- Interest Payment Frequency
- Interest Accrual Date

Redemption Data
- Redemption History
- Special Redemption
- Sinking Fund

Refunding Data
- Defeasance Status
- Escrow Types and Percentages
- Prerefunded Data

Adjustable Rate Data
- Floating Rate Notes
- Range Bonds
- Step Coupons

Put and Tender Data
- Put Features Including Schedule

Disclosure Information
- Annual Financial Information

Sector Data
- Purpose Classification

Issuer Details
- Industry, S.I.C and N.A.I.C.S codes
- Stock tickers and exchanges
- Issuer and parent relationship

MERGENT

VENDOR PROFILES

MuniAxis is designed to provide an efficient transaction flow between sellers and buyers, particularly small blocks of bonds — improving results for all participants.

We are a mix of fixed income and technology professionals with a history of injecting efficiency into the market place.

RBC Capital Markets is our sponsoring broker/dealer and your counter party on every trade.

We no longer expose the bid, but provide all the benefits of transparency by enabling bidders to know where they stand...enter a limit and bid again.

BIDDING MADE SIMPLE

TIME and CAPITAL EFFICIENCY...that's our focus, and Pre-Trade Price Transparency is the key to making it work.

Get access to inventory through a single counter-party.

Bid more items without tying up your capital on items where you are not the high bidder.

Always KNOW WHERE YOU STAND. With Real-Time Bid Status you know if you have been out-bid...and you have the opportunity to BID AGAIN.

SELLING MADE SIMPLE

Bid-Wanted's
Set a Reserve Price to indicate to bidders that the bid has reached an acceptable level and the bonds WILL TRADE at the auction end time.

Otherwise, allow the auction to run its course, then make a "Trade" or "Don't Trade" decision based on Net-To-Me.

Offerings
Sell at an Offer Price, manage minimum quantity, minimum increments and minimum balance

MuniAxis

For general inquiries, please send an email to info@muniaxis.com

Or call us: (781) 235-5880

A Clear Alternative for Bidding Odd-lot Muni Bonds

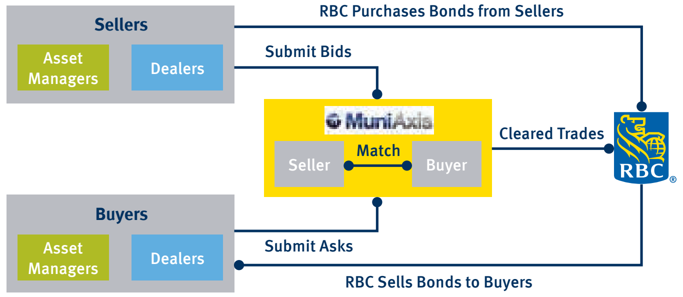
MuniAxis is an online, live-auction trading platform designed to provide clarity and improve efficiency for buyers and sellers of odd-lot Municipal Bonds. The platform has recently been redesigned to generate better bid participation and improve results for both sides of the trade and is now offered in partnership with RBC Capital Markets as the sponsoring broker-dealer.

Market Conditions Have Changed...

- Growth of separately managed municipal accounts
- Decline in bond insurance and eroding ratings credibility

But Trading Systems Have Not Changed...Until Now.

MuniAxis facilitates efficient information flow between buyers and sellers, enabling bidders to know where they stand without exposing the bid.



Overall Benefits

- Anonymous, "All-to-All" Participation: All users can be buyers or sellers and can trade with other participants – RBC acts as intermediary clearing all trades
- Simple sign up – no need for account lists
- Odd-lots ARE the focus, not just a courtesy
- Clear display of bid status enables bidders to make informed decisions

Transparency

PRE TRADE
Clarity when it matters:
- Limit Bidding
- Auto-Ratcheting within your parameters
- Know where you stand...even bid again

POST TRADE
Immediate access for all bidders:
- Number of bids
- Number of bidders
- Bid sequence

For Sellers

- Open to sellers from both sides of the market
- Solicit bids directly from institutions and dealers, anonymously
- Set 'reserve' levels – indicating a willingness to sell
- Enable bidders to know where they stand without exposing their bid
- Time saver – no need to post bids, with MuniAxis it is automatic and available to all bidders

For Buyers

- Bid directly, but remain anonymous
- Know where you stand, without exposing your bid
- Limit-bidding and auto ratcheting within your parameters
- Intuitive filters save time, provide focus
- Robust reporting available at your fingertips
- Clear and settle seamlessly through RBC Capital Markets

A TRUSTED PARTNER

Now partnering with RBC Capital Markets as the Sponsoring Broker/Dealer.

- RBCCM acts as counter-party on all trades
- Efficient trade clearing through a single entity

For more information, please call 781.235.5880

www.muniaxis.com

The key to success in trading the lies in RIMES Technologies Corporation focuses on meeting the specialist data needs of both asset managers and asset owners.

A pioneer provider of cloud-based managed data services, RIMES delivers highly customized financial data over the internet. A global company, RIMES serves over 300 investment managers, hedge funds, wealth managers, private banks, custodian banks, insurance companies and pension funds in more than 40 countries including 60 of the 100 largest global asset managers and 9 of the 10 largest asset servicers by TAUM. All RIMES managed data services deliver nearly 1,000 data sources from over 200 data partners in highly customized, fit-for-purpose feeds. RIMES currently feeds data into more than 60 third-party data warehousing, risk, performance and compliance solutions and many inhouse systems. RIMES clients benefit from a world-class data operating platform without a major investment in people or technology. Firms that choose RIMES achieve more with less.

RIMES Technologies
e: info@rimes.com
www.rimes.com

S&P Dow Jones Indices

An S&P Global Division

S&P Dow Jones Indices is the world's largest, global resource for index-based concepts, data and research. Home to iconic financial market indicators, such as the S&P 500® and the Dow Jones Industrial Average®, S&P Dow Jones Indices has over 115 years of experience constructing innovative and transparent solutions that fulfill the needs of investors. More assets are invested in products based upon our indices than any other provider in the world. With over 1,000,000 indices covering a wide range of asset classes across the globe, S&P Dow Jones Indices defines the way investors measure and trade the markets.

As the world's largest resource for index-based innovation, data and research our mission is to bring independent, transparent and cost effective solutions to the global investment community. S&P Dow Jones Indices is at the forefront of index change and innovation. Our goal is to continue to anticipate and respond to how our clients see global investment opportunities. In addition to our index family we also provide the following services:

Professional Resources

CE-accredited research, education and timely market commentary tailored to your investment profile.

Custom Indices

Through our independently calculated solutions, clients can create custom indices to meet their specific investment criteria. Whether creating a slice of one of our existing indices or a white label version, we construct, maintain and disseminate custom indices for investors, exchanges and ETF providers around the world.

SPICE®

Taking index analysis and research to the next level, SPICE® provides subscribers with access to timely, comprehensive data, corporate action alerts and developments that affect index composition and weighting.

Data & Index Licensing

Our indices are licensed to financial institutions around the world as the basis for a wide range of financial instruments. We also offer index data subscriptions across asset classes for clients who require consistent measures of market performance and need underlying data on component securities.

S&P Dow Jones Indices is a division of S&P Global (NYSE: SPGI), which provides essential intelligence for individuals, companies and governments to make decisions with confidence. For more information, visit **www.spdji.com.**

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VENDOR PROFILES

THOMSON REUTERS™

Thomson Reuters DataScope Evaluated Pricing Service offers an independent, accurate, and timely professional pricing of instruments. The service covers 2.6 million fixed income, derivative instruments and loans priced daily.

Prices are delivered throughout the day or at market closing times around the world depending on the asset class, with supporting commentary to give insight on the day's events. Of course, high levels of quality assurance and service along with a continuing investment in coverage enhancements to meet customers' evolving needs are part of our offering.

FUNCTIONALITY AND FEATURES

UNRIVALLED DATA COVERAGE

Our pricing service covers a global universe of 2.6 million over-the-counter (OTC) fixed income and derivative instruments.

CONTENT COVERAGE

- Securitized financial instruments including all agency and non-agency debt.
- Structured notes include equity, commodity, inflation and interest rate linked notes
- Corporate and Government securities, including all parts of capital structure from senior debt to preference shares, Islamic finance (sukuks), convertible bonds, money market instruments
- U.S. municipal bonds
- Bank loans
- OTC derivative instruments

LEADING EVALUATORS

Professional, experienced evaluators apply consistent and transparent pricing methodologies, reflecting regulatory and accounting standards. With over 175 fixed income professional in New York, London, Tokyo, Singapore and Bangalore, Thomson Reuters brings clients global coverage with local knowledge.

ADVANTAGES FOCUS ON CUSTOMER NEEDS

- The keystone for the Thomson Reuters DataScope Evaluated Pricing Service is the level of commitment to our clients
- Thomson Reuters is committed to improving the client workflow while never ceasing to increase the quality of the service offered
- Our staff work very closely with the clients in order to assure the highest level of services

FULL-SCALE PRICING SERVICE

The evaluations process encompasses strict validation procedures, including checks that review unchanged prices, daily tolerance breaks and risk free curve analysis to ensure accurate and timely evaluations.

DELIVERY

- Evaluated prices delivery is guaranteed within 45 minutes of the calculation cycle
- Thomson Reuters delivers prices at market closing times around the world, with supporting commentary to give insight on the day's events.

TRANSPARENCY

Clients can raise price challenges as soon as they receive their files, and they will be answered by an evaluator prior to the next pricing cycle.

To find out more, contact your local sales representative or visit **financial.tr.com**

TMC Bonds | TMCBONDS.COM FIXED INCOME MARKETPLACE

TMC Bonds is a privately held entity operating as a fixed income Alternative Trading System (ATS) under SEC Rule 600(b)(23) of Regulation NMS. The firm was founded as TheMuniCenter LLC in May 2000 by our CEO (Thomas Vales) with the financial backing of Merrill Lynch (now Bank of America Merrill Lynch), Salomon Smith Barney (now Citi Global Markets), and Morgan Stanley. Assured Guaranty (formerly Financial Security Assurance) became an owner during the second capital raise in April 2001. These original firms still play active leadership roles as market participants and Board of Director members. They also provide visionary insights into the evolution of electronic trading for both the taxable and tax-exempt fixed income markets.

TheMuniCenter was rebranded to "TMC" (aka "TMC Bonds") in June 2007 to better reflect its role beyond municipals reinforcing our cross-asset class capabilities. In September 2011, the firm formally changed its name to TMC Bonds. Today, TMC Bonds continues to be led by the industry's only intact founding management team. TMC Bonds has approximately 95 employees and is based in mid-town Manhattan.

TMC Bonds' daily inventory has expanded dramatically during 2015 given our high percentage fill rates (especially with improvements in Credit trading & record Muni offerings). Current inventory can approach 200,000 live and executable bids, offers, and bids wanted. Two-sided secondary market par value can exceed $60 billion intraday and spans the Retail ("odd lot"), Middle Market, and Institutional ("round lot") trading segments. Taxable content is generally 65-70% of the available line count as core products (i.e., Corporates, Agencies, and Treasuries) have extensive liquid two-sided markets. TMC Bonds also continues to enjoy a 35-40%+ inventory line count advantage for Municipal bonds, due to exclusive sell-side and buy-side content. Through our outreach to buy-side firms, TMC is gaining unique content for taxables (especially Corporate bonds) as well.

In mid-2014, TMC launched a new market related to its move up-market with Credit Trading. Our "Streaming" Spread-based application leverages TMC's extensive liquidity with new tools for more sophisticated Corporate Bond trading.

TMC Bonds, L.L.C.
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www.tmcbonds.com

Tradeweb direct

Tradeweb Direct is a leading electronic fixed income marketplace for financial advisors, registered investment advisors, traders, and buy-side investors.

Tradeweb Direct is one of the largest market destinations for electronic trading in Municipals, Corporates, Agencies, MBS and Certificates of Deposits. We offer a full range of front-end and workflow solutions, providing users with deep pools of liquidity and the tools they need to manage order flow, ensure competition, and mitigate risk. Driven by years of experience and client partnership, our trading and analytics platforms are engineered with flexibility in mind and tailored for the highest level of efficiency.

EXECUTE CONFIDENTLY WITH BREADTH AND SCALE

Real-time price discovery, analytics, and market transparency tools empower users and their end-clients with an unprecedented view of the market.

PRE-TRADE

- Advanced search capabilities with over 30+ bond variables with depth of market on live prices
- List functionality to promote portfolio-based trading and alerting of matching positions
- Compliance Solutions & Analytics including pre-trade price transparency tools and integration with our Portfolio Solutions product

ORDER EXECUTION

- A single trading screen delivers an efficient, transparent and seamless experience
- Access to liquidity from a diverse network of 200+ broker dealers including over 170,000 live executable markets, encompassing over 70,000 unique securities daily
- Flexible protocols such as live executable markets as well as Request for Quote (RFQ); average of 5 responses to each RFQ

POST-TRADE

- Straight-Through-Processing (STP) for trade executions and clearing
- FIX protocol
- Dedicated support from our sales traders to the client support desk all focused on improving the way you trade.

Our robust end-to-end solutions are designed to provide simplicity and efficiency to our clients' workflow in order for them to better serve their clients. We believe that enhancing two-way communication between advisors, the trading desks and their clients builds stronger relationships, greater loyalty and trust, and ultimately, the potential for more business.

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VENDOR PROFILES

Voltaire ADVISORS

Voltaire Advisors are specialists in Valuation Risk with deep domain knowledge of valuation methods, sources, data and processes not available to more general financial consulting and advisory firms. We work with a variety of clients in the valuation risk area, ranging from users and regulators through to vendors.

Our team is composed of a cadre of highly experienced and seasoned executives with unrivalled expertise in the financial valuations industry. We believe that the repository of expertise, knowledge and competence enjoyed by Voltaire Advisors is unique in the industry.

Our services

We provide bespoke advice to service providers and end-users involved in the business of valuing and analyzing the risk of financial assets…

Our end-user clients benefit especially from our bi-annual private briefing program, in which we present the detailed results of our annual user survey and vendor research. In this way, valuations users get invaluable insight into what their peers are doing to resolve their shared issues, and updated intelligence into what the vendors have planned in terms of product development and strategy.

We also work with company Board's and valuation operational teams within the firm to better educate them on Valuation Risk generally, and help to implement any changes required to ensure more robust compliance and best practice.

We publish unique and acclaimed research and analysis into key aspects of valuation risk…

*Our annual **Valuation Risk Handbook**, incorporates a series of 'state-of-the-nation' articles on the valuations business and a comprehensive directory of firms involved in it, and our quarterly **Valuation Risk Review**, assesses the latest thinking on valuation regulation and services.*

*Our annual **Valuations Risk Survey** polls hundreds of valuations users on key issues related to their practical experience of valuation. The size and geographical breadth of the sample allow us to draw some important and illuminating conclusions about the practical business of valuation in financial institutions today.*

We organize important conferences and events bringing together vendors and users of valuation data, analytics and models.

*In our **Valuation Risk Forums**, vendor's panel review the latest issues in their part of the industry, and exhibit their products and services, for an invited audience of end-users.*

Valuation Risk is inherent and unavoidable for many financial asset classes, and one can never eliminate the risk entirely. The main issue associated with this is how to recognize, classify and subsequently *control* this risk. Voltaire Advisors can help you achieve this.

Ian Blance
Managing Director

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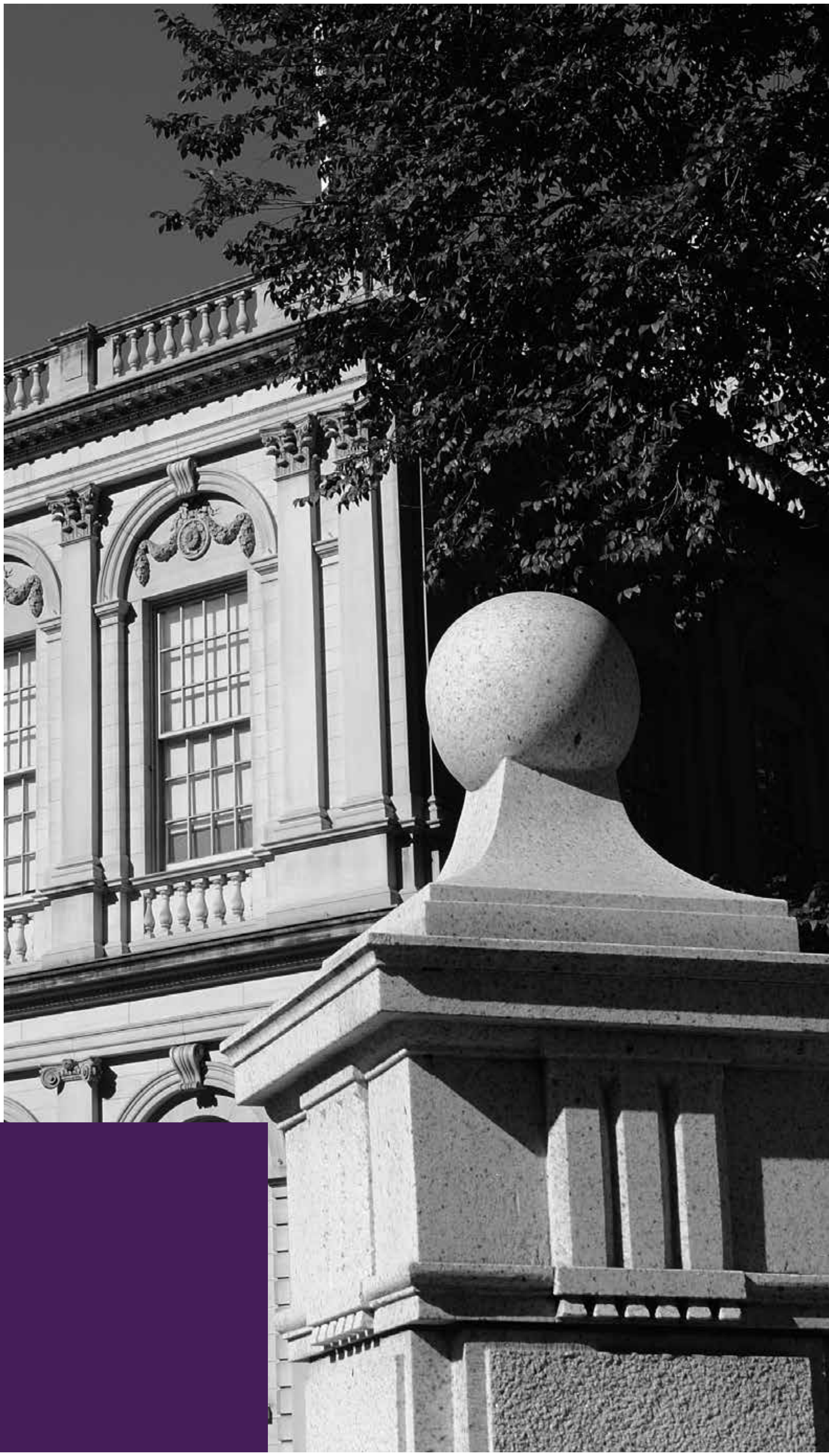

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