



## SPECIAL REPORT

Recent Developments in  
Municipal Bond  
Data & Analytics

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# INTRODUCTION



Welcome to this Special Report complementing our ongoing webinar and research program. Each element of the series covers a different topic in the field of valuation, risk and compliance for investment funds. The combination of expert presentations - recorded for future viewing - followed by a more detailed written Report, has proved popular. The program as a whole offers a comprehensive and regularly updated view of industry issues and challenges.

**The municipal bond market - once a sleepy dinosaur - continues to experience rapid changes in trading, pricing and analysis. Vendor consolidation is prompting a re-consideration of traditional operational and benchmarking practices, technology is changing how the market trades and prices, and regulation such as the Liquidity Risk Management rules for mutual funds requires significant development.**

Voltaire Advisors, in association with a group of industry experts, are conducting ongoing research on how Muni market firms and professionals are reacting to these changes and what kinds of issues and challenges they face in the process. This Special Report discusses some of the key current topics in this area.

**Kalotay Analytics** assess the trading opportunities offered by taxable munis in the current refunding round.

**JP Morgan PricingDirect** review their newly released municipal bond pricing service based on a hybrid machine-learning + human analyst model.

Finally, **BondView** report on their development of tools to assist with assessing the impact of the current health crisis on municipal bonds.

Many issuers who fund themselves in the muni market are in deep existential crisis, and with credit ratings a lagging indicator, there is a need for market-based tools to assess this shock.

As always, any questions or feedback please let us know.

*Ian Blance*

**Ian Blance** Managing Director



## Callable Taxable Munis Provide Hidden Value for Investors

By **Andrew Kalotay**, Kalotay Analytics

**Advance refunding of tax-exempt bonds with taxable bonds is a dominant activity in the muni market, and it is the major driver of the increase in taxable volume. According to a recent report in the Bond Buyer, taxable munis are now a “fixture, not a fad”. With increasing frequency, taxable munis are issued as callable. These bonds may turn out to be surprisingly good deals for investors.**

Municipalities can lock in interest savings by advance refunding their tax-exempt bonds with taxable bonds — their current taxable rate is well below the typical 5% coupon carried by their not-yet-callable tax-exempt bonds.

Refunding at their even lower tax-exempt rate would generate greater savings, but the 2017 Tax Cuts and Jobs Act bars advance refunding with tax-exempt bonds. The motivation of the Act was to eliminate the double dip into federal subsidy to the call date, while the defeased refunded bonds remained outstanding. By including a call provision in the refunding taxable bonds, the issuer can use it to switch back into tax-exempt debt, should the opportunity arise.

How does the call provision affect the coupon? Let’s consider a par 22-year taxable muni callable in 10 years, issued to refund tax-exempt bonds with 22 years to go. The fair coupon can be determined with an OAS calculator. For example, when the optionless taxable rate is 3.05% (as it was recently), at a 20% interest rate volatility the fair coupon of a non-call 10 bond turns out to be 3.25%. The 20 basis point spread is actually in line with current pricing. Evidently the consideration that the call will be based on the issuer’s tax-exempt rates does not affect the market’s perception.

Normally the best time to call for the issuer happens to be the worst for investors. But what if the issuer can dip into the tax-exempt market to refund its taxable bonds? Currently the long AAA optionless tax-exempt rate is roughly 50 basis points lower than the like taxable rate. Although the spread will vary, the tax-exempt rate will always be lower. Consequently, a taxable bond may be called when it is actually selling at a discount, as shown below. Needless to say, investors would more than welcome such calls.

To see this, let’s fast forward to the initial call date of our 3.25% bonds, due to mature in 12 years. Suppose that interest rates have increased: the 12-year tax-exempt rate is 2.87%, and the like taxable rate is 3.37%, 50 basis points higher. The issuer can save 38 basis points by calling its 3.25% taxable bonds and replacing them with 2.87% tax-exempt bonds. How would such a call look to a holder of the taxable bonds?

When the 12-year taxable rate is 3.37%, the fair taxable value of a 3.25% *callable* bond is about 98, i.e. 2 points below par. *A discount bond called at par is a bonanza for the investor*

Bond Terms	Issuer's View 12yr T/E Rate 2.87	Investor's View 12yr Taxable Rate 3.37
3.25% coupon currently callable 12 yrs to maturity	PV cash flows = 103.83 → Call at par	Taxable value = 98 Thanks for paying me 100

Needless to say, there are many combinations of taxable and tax-exempt rates where it makes sense for the issuer to call taxable bonds selling somewhat below par. The expected windfall to investors, which depends on the spread between the issuer’s tax-exempt and taxable rates, can be quantified by option-based analytics. The wider the spread, the larger the probability of ‘inefficient’ calls, and the greater the windfall; at a 50 bps spread the expected windfall is roughly 1.5 to 2 points.

In summary, callable taxable munis provide hidden value to investors. The source of this value is that the call decision depends on the issuer’s tax-exempt rates, while the bond’s value to the investor depends on the higher taxable rates. For new bonds callable in 10 years, the expected windfall is in the 1.5% to 2% range. How about seasoned bonds, or bonds with a shorter call? Identifying the hidden value requires complex analytics — a challenge for the buy-side.

### References

Kalotay, A., *Taxable Advance Refundings: A Critical Examination, Unpublished*

Kalotay, A., *There is Hidden Value for Investors in Callable Taxables, The Bond Buyer (March 4, 2020)*

Kalotay, A., *Are Taxable Advance Refundings Leaving Money on the Table?, The Bond Buyer (November 8, 2019)*

**Kalotay Analytics has been at the core of the world's most sophisticated fixed income valuation systems for almost three decades. From intraday NAVs of bond ETFs to instantaneous MBS portfolio risk analysis, Kalotay's patented technology performs computationally intensive calculations with the precision and speed demanded by today's market participants.**

**Technology**

Kalotay Analytics seamlessly integrates into any internal client system, external cloud service, or vendor application. Kalotay's cross-platform C, C++, C#, Java and Python SDKs are ideal for interactive applications and high-volume computations.

**Innovation**

**MuniSignal - Tax Loss Harvesting**

- Patent-pending framework for maximizing after-tax performance
- Tracks holder's basis and accrued OID
- Calculates cashflow benefit of selling, using 'hold value' as reference point
- Signals when to sell, taking into account the value of the forfeited tax option

**CurviLinear - Yield Curve & Volatility Estimation**

- Constructs best-fit intraday yield curves from bond prices
- Optimizer simultaneously solves for interest rate volatility

**Functionality**

- Option-adjusted spread (OAS)
- Effective duration, convexity, DV01, key rate durations
- Stress testing and scenario analysis
- Conventional price/yields and accrued interest for various daycounts
- Modified duration, convexity, DV01

**Coverage**

**BondOAS - Fixed Rate Bonds**

Includes callable, puttable, sinking fund, amortizing, pay-in-kind, and step-up structures.

- Agencies
- Corporates
- Treasuries
- Sovereigns
- Foreign Corporates
- CDs

**MuniOAS - Fixed Rate Tax-Exempts**

Patent-pending 'tax-neutral' OAS valuation of tax-exempt municipal bonds, including callables and OIDs.

- Tax-neutral OAS, duration, convexity, etc.
- Converts callable muni curve to par optionless curve

**FloatVal - Floaters and Structured Notes**

- Vanilla
- Capped, Range & Inverse
- Range Accrual
- Pct. of Libor
- Flip Note
- Callable Zero

**TIPSVaI - Inflation-Indexed Bonds**

- US TIPS
- Canadian RRB
- German Bund/BO
- Swedish
- Japanese
- Deflation Protection
- UK ILG
- French OATi/OAT€
- Italian BTP€
- Australian
- Fixed Coupon
- Inflation-adjusted Principal

**CLEANMBS - Mortgage-Backed Securities**

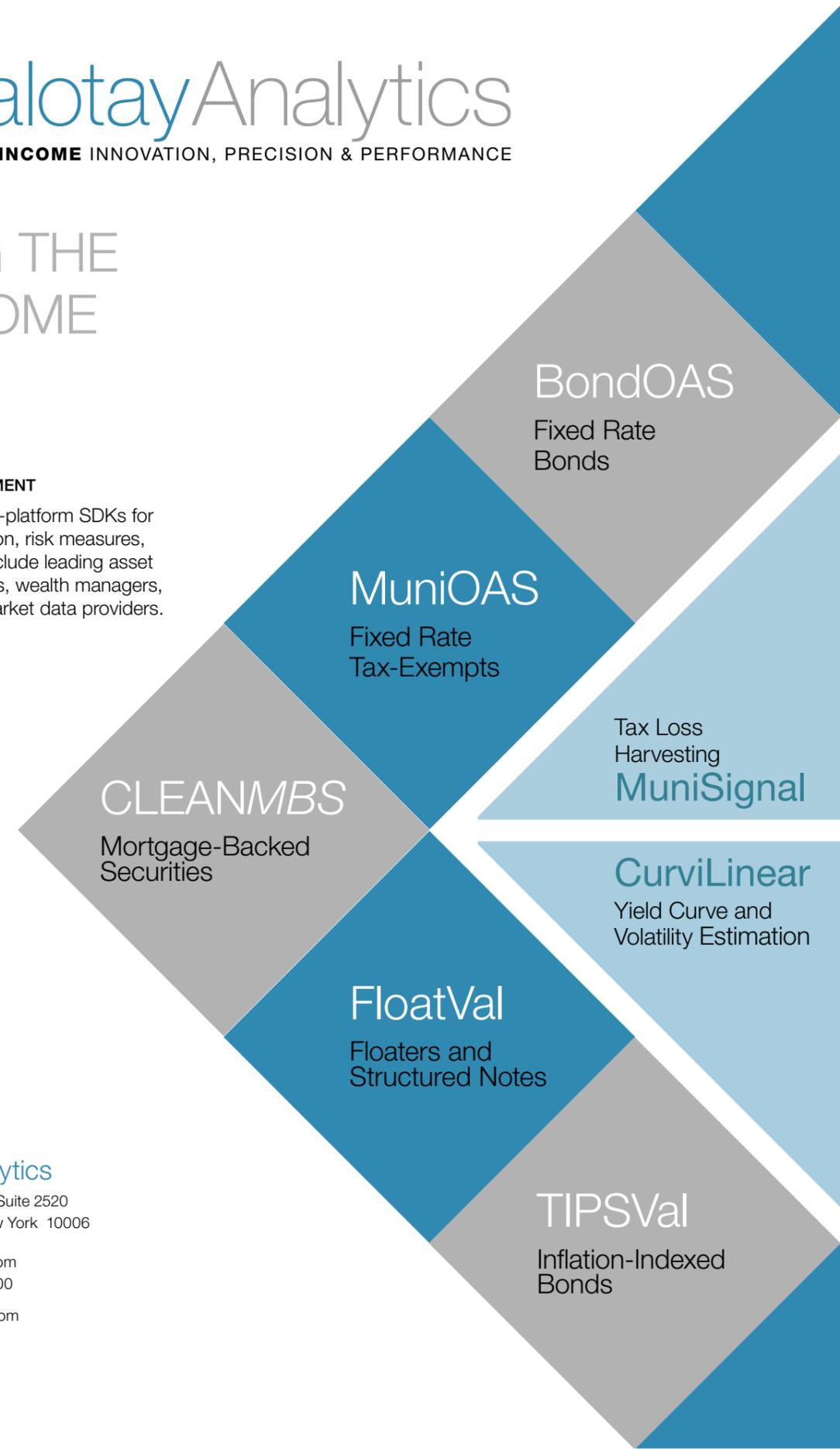
Patented recursive lattice-based valuation and prepayment modeling

- Agency pass-thrus
- Non-Agency pass-thrus (accommodating default and recovery rates)
- Interest-only (IOs)
- Principal-only (POs)

COVERING THE  
FIXED INCOME  
MARKETS

OAS-BASED ANALYTICS FOR  
VALUATION AND RISK MANAGEMENT

Kalotay Analytics delivers cross-platform SDKs for high-speed OAS-based valuation, risk measures, and scenario analysis. Client include leading asset managers, institutional investors, wealth managers, traders, index providers and market data providers.



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# PricingDirect

by J.P.Morgan



## The Quest for Better Pricing: Human + Machine

By **Unmesh Bhide**, Managing Director, JP Morgan PricingDirect

**Artificial Intelligence (AI) has revolutionized the world around us. In the financial industry specifically, there have been significant applications of AI, most commonly in areas such as AI-powered algorithmic trading. A significant focus for AI-powered systems in all industries has been known to automate and, in many cases, replace human-driven processes.**

**PricingDirect, a wholly owned subsidiary of JPMorgan Chase & Co, recently joined the list of companies that deploy these innovative techniques, specifically Machine Learning (ML). Rather than use ML to replace a human-driven process, PricingDirect's approach relies on both ML and human intelligence. Leveraging J.P. Morgan's strengths in the application of ML within its businesses, PricingDirect pioneered a municipal bond pricing model that highlights the combined benefits of human and machine.**

### The Pricing Direct Approach

While PricingDirect's ML model powers a significant part of the pricing process, so does human intelligence.

Every ML model has limitations. For instance, a model can only predict based on the data fed into it during its training. PricingDirect evaluators continue to play a crucial role in capturing and analyzing additional color that may not be represented through the ML model. Take, for instance, intra-day geopolitical or sector developments. PricingDirect evaluators monitor and incorporate this color into valuations throughout the day. Generally speaking, the evaluators also look at macroeconomic developments, buy-side and sell-side activity, and new-issue deals, as well as general sentiment across the U.S. capital markets.

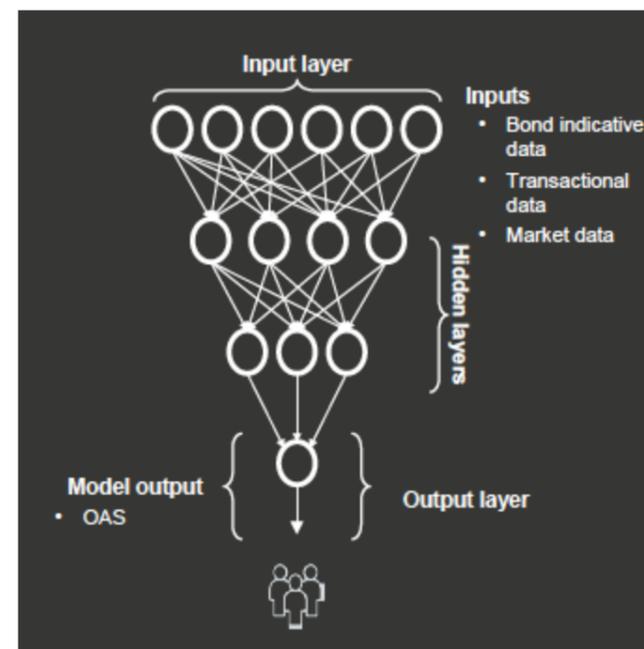
As a key quality control check, evaluators back-test the ML outputs against Municipal Securities Rulemaking Board (MSRB) trade information and apply rules-based adjustments, if necessary, to ensure production prices reflect real-time market trade color and account for any missing information from the model outputs.

PricingDirect's end-to-end process differs from a traditional valuation approach because it combines the use of ML and human intelligence. In a traditional approach, pricing providers rely on human intelligence — evaluators' experience and tacit knowledge — to analyze data and produce valuations. PricingDirect identified an inherent advantage in leveraging both machine power and human intelligence to price municipal bonds. Rather than engage in the human vs. machine debate, the idea was to leverage the strengths of both to drive valuation accuracy. The PricingDirect team believed, in this case, that the combined power of human and machine could exceed that of either alone.



### Basics of PricingDirect's ANN Model

There are different types of Machine Learning methods and computational systems available to build ML solutions. Artificial Neural Networks (ANN) are a common computational system made up of several layers of nodes, or neurons. ANNs were designed to process information much like the human brain and are especially well-suited to model complex relationships between inputs and outputs, while capturing patterns, nuances and hidden relationships between the two.



PricingDirect's solution utilizes an ANN given the multi-faceted nature of municipal bond pricing.

Despite having extensive coverage across other asset classes, PricingDirect did not price municipal bonds until recently. There is a large amount of data available in the municipal bond market (more than one million securities and corresponding trade data, as reported by the MSRB), and this posed a challenge to the PricingDirect team. Rather than settle on a traditional valuation process, which would require significant resources, PricingDirect evaluators sought an efficient way to leverage the available data for pricing purposes.

Inspired by the use of Machine Learning at J.P. Morgan, the PricingDirect team wondered if they could apply this technique to a muni pricing model.

## Why Municipal Bonds?

From a valuation perspective, the PricingDirect team believed municipal bonds would be a prime use case for ML because of the asset class' unique features. The market is extremely large and diverse with pockets of highly illiquid corners. The muni bond universe is made up of nearly 1 million securities, across more than 50,000 different issuers, and yet a large portion of the universe has not traded in years. With far more securities outstanding and far less daily transaction volume, the muni market is much more opaque than the other high-grade markets, such as the investment grade corporate market.

While the percentage of bonds transacted is smaller than corporate bonds, the trade data is available from the MSRB and the number of transactions is significant enough for reliable model building. PricingDirect's goal was to use the known data to extrapolate prices on all the bonds in the muni bond universe.

## Launching the Machine Learning Model

The PricingDirect team leveraged J.P. Morgan's strength in applied ML, including the firm's established infrastructure, to achieve their goal. After more than a year and a half of planning and development, PricingDirect launched a municipal bond pricing service powered by ML.

Municipal bonds are typically priced with spreads over a chosen benchmark or interest rate curve. Since the benchmark curve represents the macro-economic conditions and cannot be accurately predicted, PricingDirect focused its model on the prediction of pricing spreads, which are bond specific. PricingDirect's model has, on average, 30-plus known input features for training, with a single model output feature: pricing spread.

## Artificial Neural Networks: Putting the Puzzle Together

While traditional data scientists might use a programmatic approach to come up with training input data from a large potential data set, PricingDirect focused on the factors that traders and portfolio managers look at when they trade bonds. These were bond-and muni-specific characteristics such as:



The PricingDirect team also analyzed factors that affect the level of trading spreads such as: interest rate levels, shape of the curve, short-term liquidity of credit sensitive assets and factors that affect the bonds' liquidity. ANNs proved to be especially useful in this case, as they are well-suited to model complex relationships between inputs and outputs, while capturing patterns, nuances and hidden relationships.

Imagine, for example, doing a large puzzle. You have a range of different pieces, each with unique characteristics and you know what the picture should look like once it is complete. You are able to complete the puzzle because you know the picture that you are trying to build with this set of pieces. PricingDirect's ML model essentially does the same thing, but in a multidimensional space. The bond characteristics create a baseline image, which can then be used to predict future outcomes.

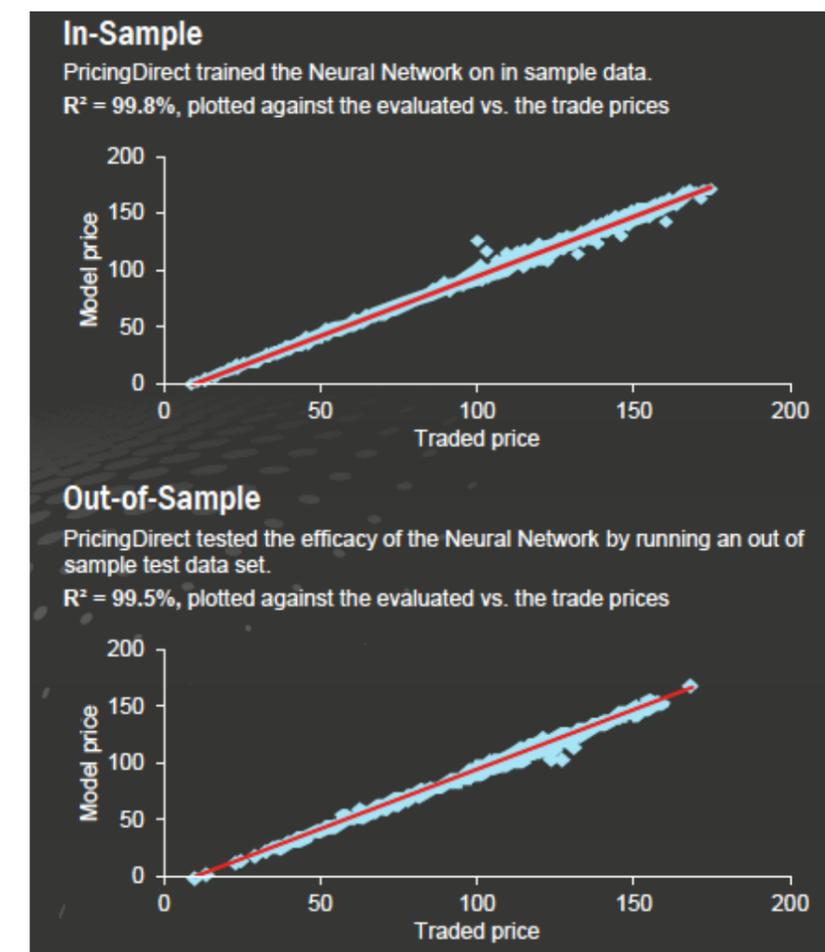
In PricingDirect's model, ANNs power the creation of multidimensional cohorts based on bond characteristics. They build a pattern that represents corresponding spreads based on more than 30 features of each bond in the training data set. The pattern can be used to predict spreads on bonds that are not in the training data set (out-of-sample), based on the current interest rates that are not part of the historical sample set (out-of-time). Essentially, the in-sample data creates a baseline image representing spreads based on bond characteristics. The model can then predict, using the parameters of the baseline image, where an out-of-sample data point will fit.

Many Machine Learning models suffer from so called "overfitting," meaning the model conforms too tightly around the in-sample data set. In other words, an over fit model is so input-data dependent that it doesn't display the same level of accuracy with out-of-sample data. A key indicator of an over fit model is great in-sample, in-time performance, and poor out-of-sample, out-of-time performance. If the goal of the model, in this case, is to derive spreads from muni bond characteristics, an over fit model will memorize the training samples to the degree that it is unable to accurately predict spreads on out-of-sample bonds. As indicated in the back-testing graphs below, PricingDirect's ANN model performs well in both out-of-sample and in-sample testing with an r-squared ( $R^2$ ) of 99.5% and 99.8% respectively.

A key advantage to this model is multidimensional cohorting across the muni bond universe. Additionally, the model is tested against out-of-sample data to avoid "in-sample bias," or overfitting and predict future outcomes.

## Regression Analysis In-Sample and Out-of-Sample

Regression analysis of both in-sample and out-of-sample data: PricingDirect valuations (model price) are back-tested against executed trade prices (traded price) on a daily basis. PricingDirect conducts both in-sample, and out-of-sample testing to avoid the "in-sample bias," or model overfitting.



## Final Thoughts

AI is a disrupting force in the financial industry and is transforming the way companies do business. While the applications of AI, specifically ML, vary in scope, it is clear that these technologies are revolutionizing day-to-day processes. PricingDirect's ML model serves as a prime example. The model powers a complex method of data analysis that is beyond the scope of human capability alone. And yet, PricingDirect's valuation process does not lack a human element. PricingDirect's innovative approach —combining the strengths of human intelligence and machine power —is a significant development in the valuation space as it pertains to the accuracy and efficiency of municipal bond pricing.

# PricingDirect

by J.P.Morgan

**PricingDirect delivers independent, reliable valuations and analytics services across 40 fixed income and derivative asset classes worldwide. Thousands of firms benefit from the comprehensive, real-time, and transparent information we deliver.**

## Independent market intelligence

Since 2002, we have been providing accurate, independent, and unbiased valuations to clients worldwide. We leverage real-time market intelligence from numerous sources including buy-side and sell-side market participants, the J.P. Morgan trading desks, and third-party distributors.

As the regulatory landscape continues to evolve, PricingDirect is the only pricing service to have maintained an annual SSAE 18/ISAE 3402 Type II certification for all products and services since 2005.

## Track record of precision

PricingDirect has been a trusted source of fixed income and derivative evaluations for over 15 years, through periods of market volatility and uncertainty. The accuracy of our prices is driven by our experienced evaluation team, which utilizes robust processes to generate mark-to-market prices.

Our evaluations are derived from primary and secondary trading insights, market-tested J.P. Morgan models, analytics and individual evaluator expertise.

We have the unique ability to obtain market color directly from the J.P. Morgan trading desk and integrate real-time market insights into our pricing framework.

As a part of one of the largest broker-dealers in the world, we have robust and in-depth access to the market and leverage this access to enhance the relevance and validity of our prices.

## Market leading client experience, supported by dedicated expertise

PricingDirect provides valuations to 90% of the top 50 mutual funds and 80% of the top 20 banks by AUM.

Our highly skilled team is committed to providing you with a complete first-class client experience. At least two PricingDirect evaluators will be assigned as your primary points of contact and, along with your dedicated sales professional, will be responsible for addressing all of your inquiries.

Our technology team will tailor our innovative platform to your technical requirements to ensure a seamless delivery process. With offices in New York, Boston, London, Mumbai, and Hong Kong, our teams offer around-the-clock service and support.

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## Measuring the Impact of COVID-19 on Municipal Bonds

By **Robert Kane**, CEO, BondView

**The COVID-19 pandemic is having a significant impact on the municipal bond market, and these effects will likely continue for a considerable time even when the economy begins to recover.**

**The initial market sell-off on Q2 2020, where yields on muni bonds rose around 200 basis points across the yield curve over three weeks, was the biggest market rout since 1984. The wave of investors converting securities into cash resulted in huge outflows from the bond markets and traditional sources of liquidity from broker dealers all but dried up. Muni spreads against Treasuries rose to historic highs during this time.**

### Sector and Issuer Exposure

A wholesale credit crisis in the municipal bond market seems to have been avoided, and now that some kind of equilibrium has been restored, thoughts are turning to the likely winners and losers in the post-COVID 'new normal'. While many issuers of municipal bonds are relatively well placed to weather the storm, others in more exposed sectors will face ongoing difficulties in the new environment.

Financially sound municipalities, with strong reserves, can be reckoned to have resilience to the long term economic effects of the public health crisis. They can also benefit from the financial support of federal programs such as the Municipal Liquidity Facility (MLF) designed to ease the economic shock. Similarly, issuers who provide essential public services such as power, water and sewerage are expected to be durable enough to withstand the dislocation.

However, issuers whose income derives from discretionary spending may potentially struggle, especially if the crisis and its impact are drawn out. States and localities whose revenues come from sales or income taxes, or from oil production, may see a shock from lower consumer spending and gas prices.

The education sector is currently in a state of flux, with many courses being cancelled or repurposed for online delivery, so these will merit continued scrutiny. Obligors from travel, tourism, sport and leisure activities, such as hotels, convention centers, toll roads and stadiums, are extremely vulnerable to a continued lockdown on large gatherings. Given its direct exposure to the pandemic, the healthcare sector is also under financial pressure.

### Tracking the Market Impact

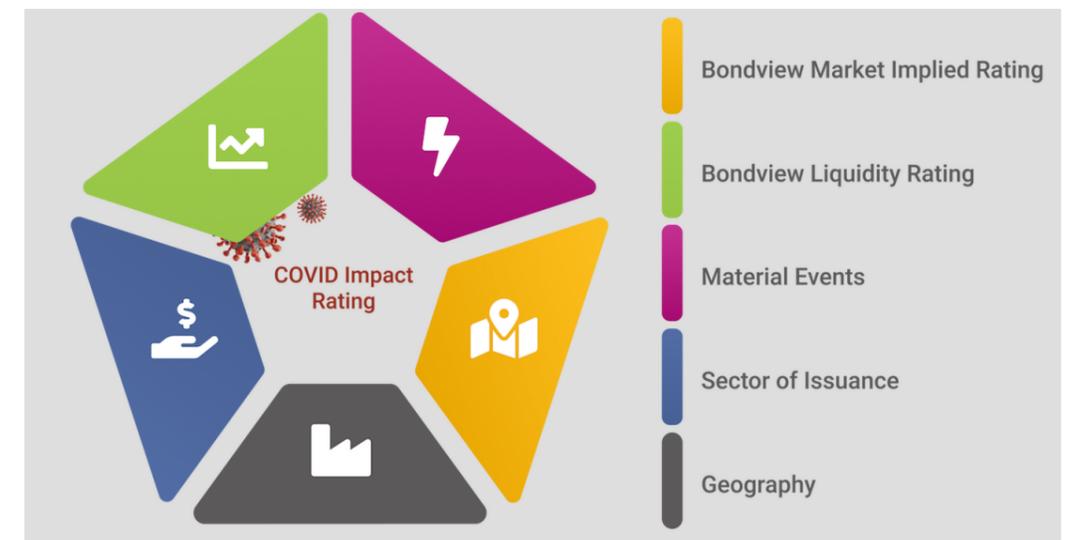
In short, the impact of the COVID-19 pandemic may hit state and local governments in a variety of ways and each of the 50,000 different issuer's financial conditions are unique. With over 1.5 million outstanding issues in the municipal bond market, how are investors to assess which of these bonds will be impacted, and to what kind of degree?

In time, as the impact on sectors and individual issuers are established and reported it can be assumed that credit ratings will reflect the changes in default risk. However, credit ratings tend to be a lagging indicator and the market will almost certainly have reacted to these developments before any official adjustments are announced. Investors and traders relying on credit ratings changes to give advance warning on any virus-related challenges are likely to miss the boat.

In response, BondView® has created an automated ratings analyst tool to help muni investors and traders to monitor the market and stay on top of these developments. BondView® COVID Impact Ratings focus on five key factors that help identify COVID risk for each municipal bond: sector of issuance, material events, geography, marketplace perspective, and bond liquidity.

### Methodology

The BondView® COVID Impact Rating combines these five factors by assigning an appropriate weight to each.



#### 1) Sector

The U.S. municipal bond market is one of the most diverse bond markets in the world. Municipal bonds are used to finance schools & higher education facilities, healthcare projects, water & sewer infrastructure, hotels, convention centers, airports, bridges, roads and so much more. As previously mentioned, each sector of the municipal bond market is being impacted by COVID with some seeing only minor impairment while other sectors are being hit with significant economic distress and future uncertainty.

BondView has preliminarily identified sectors impacted the most by COVID as: Entertainment, Healthcare, Housing and Transportation.

## 2) Material Events

Issuers are mandated to report material events that can or may impact their ability to repay the money they borrowed through the bond market. These notices are collected by the Municipal Securities Rulemaking Board (MSRB) and are made available to the investing public via its EMMA website. The type of material event that is reported by the issuer and the notice itself can be informative as to the impact of the COVID-19 pandemic.

## 3) Geography

The impact of the virus has varied across the different states and localities of the United States. Some areas have been much harder hit than others, and it can be reasonably assumed that these districts will be more exposed to the economic shock.

To take this factor into account the BondView COVID Impact Rating incorporates data from the Center for Disease Control and Prevention on COVID-19 cases and deaths reported by U.S. states, the District of Columbia, New York City, and other U.S.-affiliated jurisdictions.

## 4) Marketplace Perspective

Among other inputs, the market determines the yield of an individual bond based on its term structure and the market's perspective on the issuers ability to repay its debt. This creates a spread over the "risk free" U.S. treasury bond market. The larger the spread, the higher the perceived risk regardless of how the Nationally Recognized Statistical Ratings Organizations (NRSRO's) such as Moody's, S&P or Fitch have rated the bond.

The BondView COVID Impact Rating uses BondView's Market Implied Rating as the factor for marketplace perspective. The Implied Rating is computed daily based on the bond's return, or yield, relative to the yield of a treasury bond of equivalent maturity. A Treasury bond, which is backed by the U.S. government, is viewed as having no risk. So, the larger the spread (difference) between a bond's yield and its equivalent Treasury yield, the more default risk the market perceives for that bond. Another way of saying this is that the market is requiring a higher yield to compensate for the higher default risk. Bonds rated from five stars (best) to none. Bonds with lower spreads (less risk) are given more stars than bonds with higher spreads (more risk). Ratings are calculated frequently to ensure they reflect the most current market factors.

## 5) Bond Liquidity

There are well over 1.5 million bond issues outstanding in the municipal bond market. Deal size, issuer recognition, term structure, sector and quality are just some of the drivers for liquidity. BondView's Liquidity Ratings gauge liquidity by tracking both the individual bond's actual trading activity along with the number of institutional holders. Computed daily as a ratio based on the number of trades in a given bond compared to the average number of trades of all the bonds in a similar class. The higher the ratio, the more frequently the bond is traded relative to similar bonds. The range covers the last 45 days.

## BondView® COVID Impact Ratings

These five factors are combined and then appropriately weighted to create a single COVID Impact Rating for each bond issue. Bonds are rated from one to five stars based on the assessed COVID economic impact. The lower the rating the worse the assessed economic impact. For example, a one-star rating is assigned to bonds most vulnerable to a COVID Economic impact while a five-star rating is assigned to bonds least vulnerable to a COVID Economic impact.

COVID Impact Rating	Explanation
5 Stars *****	Borrowers <u>least</u> vulnerable to COVID Economic impact
4 Stars ****	Borrowers <u>somewhat</u> vulnerable to COVID Economic impact
3 Stars ***	Borrowers <u>vulnerable</u> to COVID Economic impact
2 Stars **	Borrowers <u>highly</u> vulnerable to COVID Economic impact
1 Star *	Borrowers <u>most</u> vulnerable to COVID Economic impact

## Use Cases

There are a number of ways in which the BondView® COVID Impact Ratings can help municipal bond investors and traders:

- o *Funds* - mutual and other funds who hold a portfolio of municipal securities can identify those bonds in the portfolio that might be most impacted by the COVID fallout and assess the scale of this impact. COVID Impact Ratings can be used as a pure monitoring exercise or help with portfolio rebalancing to reduce the risks.
- o *Broker/Dealers* - active muni traders can use the COVID Impact Ratings to identify potential opportunities in the market due to apparent mispricing of the risks. Bonds with a likely high exposure, but not reflected in the price, offers some interesting trade scenarios.
- o *Analysts* - investment and credit analysts can get an advance view of the likely impact of COVID as a supplement to their traditional fundamental analysis of municipal bonds. COVID Impact Ratings can also be used as a prioritization tool to identify bonds or issuers that merit attention.
- o *Financial Advisors* – often lacking the sophisticated tools available to institutional investors, financial advisors can use COVID Impact Ratings to monitor their client portfolios and suggest trade ideas and investment strategies to mitigate impact.
- o *Retail Investors* - retail investors and traders are able to use COVID Impact Ratings (along with other BondView capabilities) for similar purposes and to stay ahead of the game.

## Summary

The consequences of the current pandemic are likely to have a significant impact on many issuers in the municipal bond market. The nature and extent of this exposure will vary enormously between states, localities, sectors and individual issuers.

With over 1.5 million issues outstanding in the municipal market, tracking this variable impact is a major challenge for investors. Credit ratings can eventually be expected to pick up the effects, but this will lag the market consequences.

BondView® COVID Impact Ratings offer a market determined measure of which bonds will be most impacted and on what scale. This allows funds, broker/dealers, analysts, financial advisors and retail investors to monitor the impact on their portfolios, rebalance their investments as required and identify fruitful trading opportunities.

For more information see: <https://cms.bondview.com/landing-page-ratings>

# 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 Before You 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 500 Index**

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