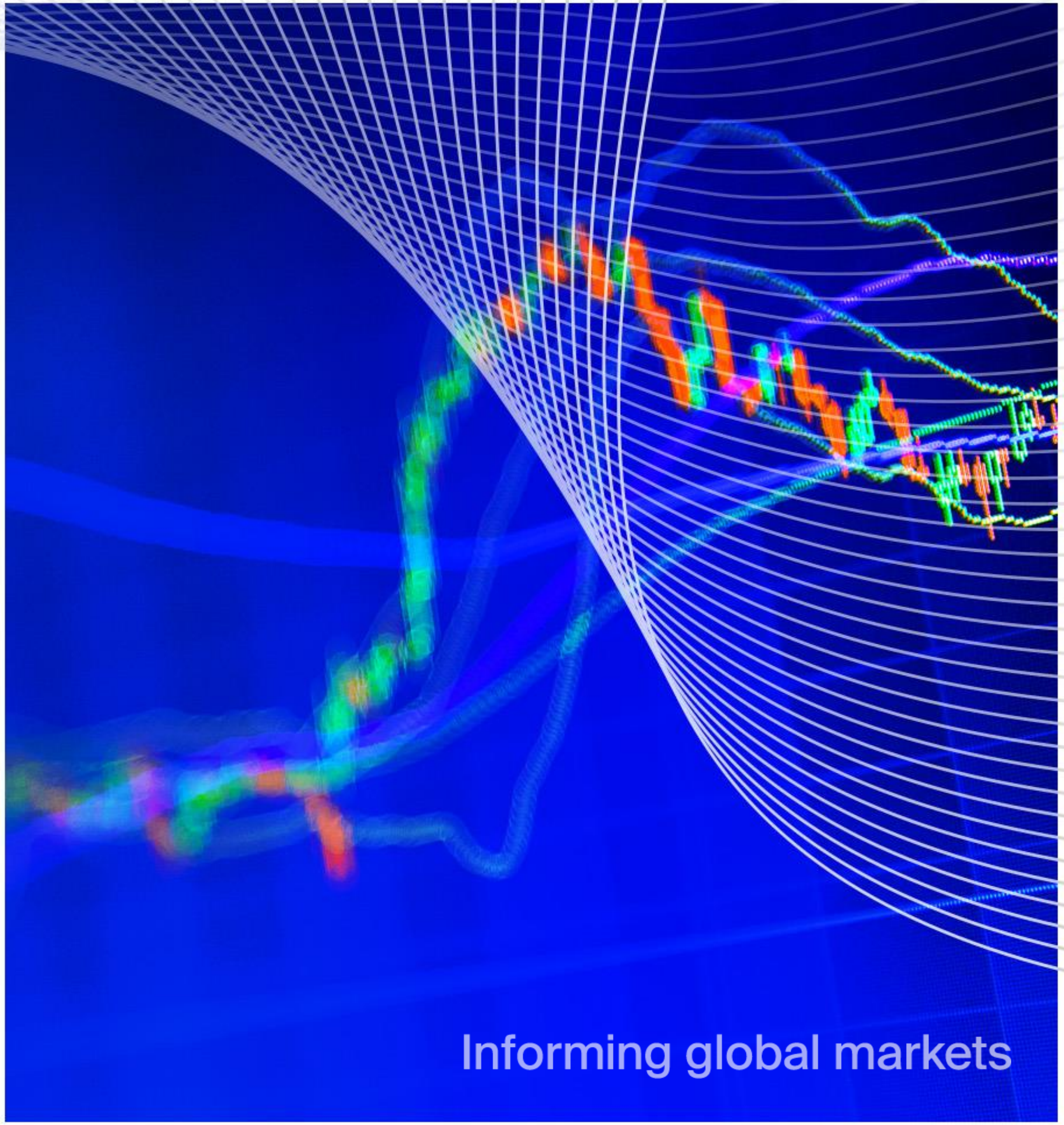
ICE Data Services

Muni Market Observations

FIMSAC Muni Transparency Subcommittee

October 5, 2020



US Municipal Market Overview: MSRB Trade Counts

Figure 1: **MSRB Trade Count: 2019 v 2020**

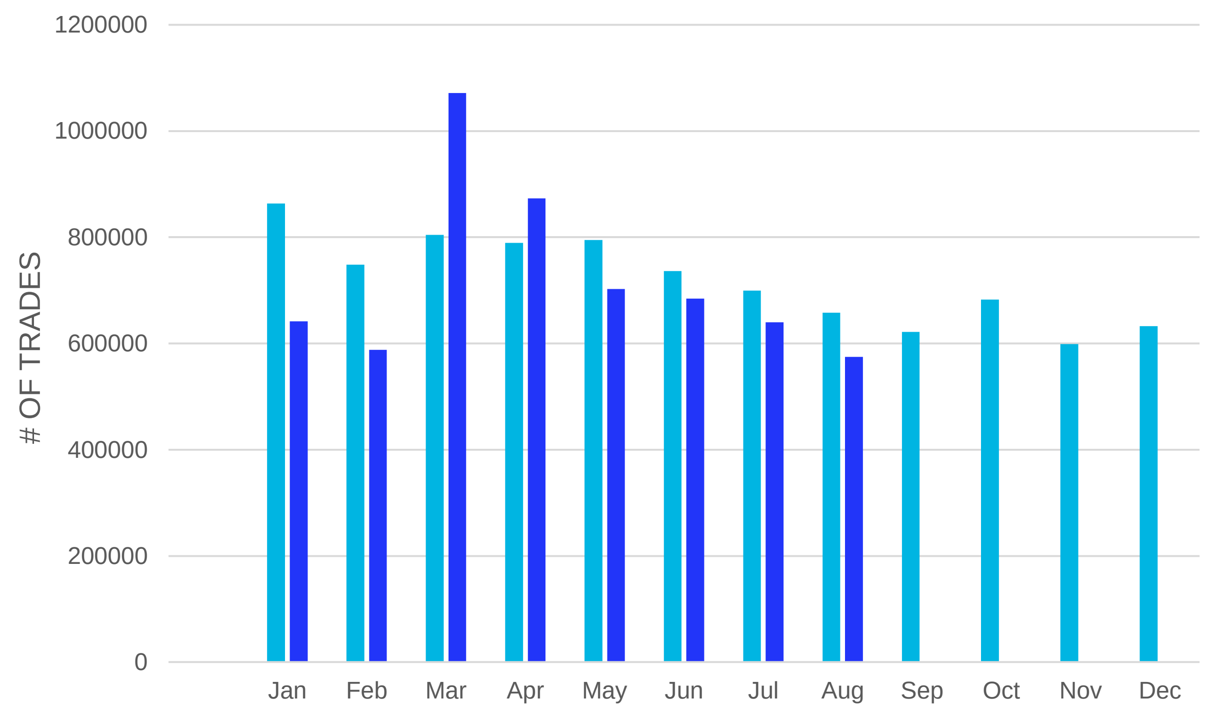
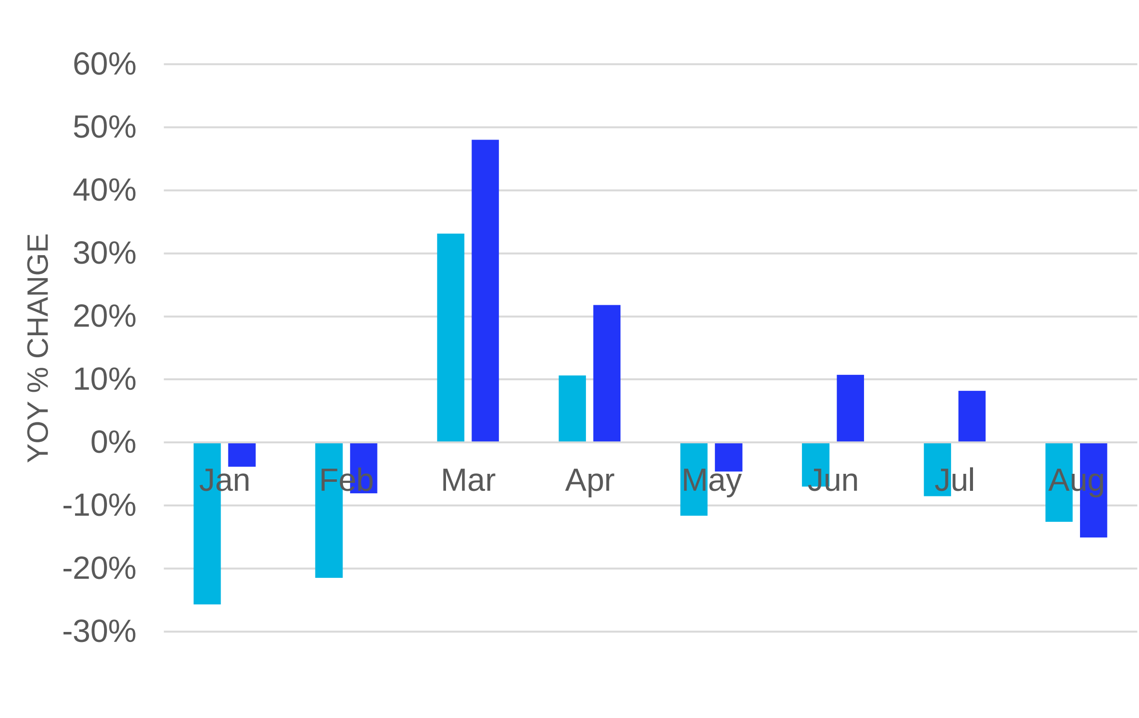


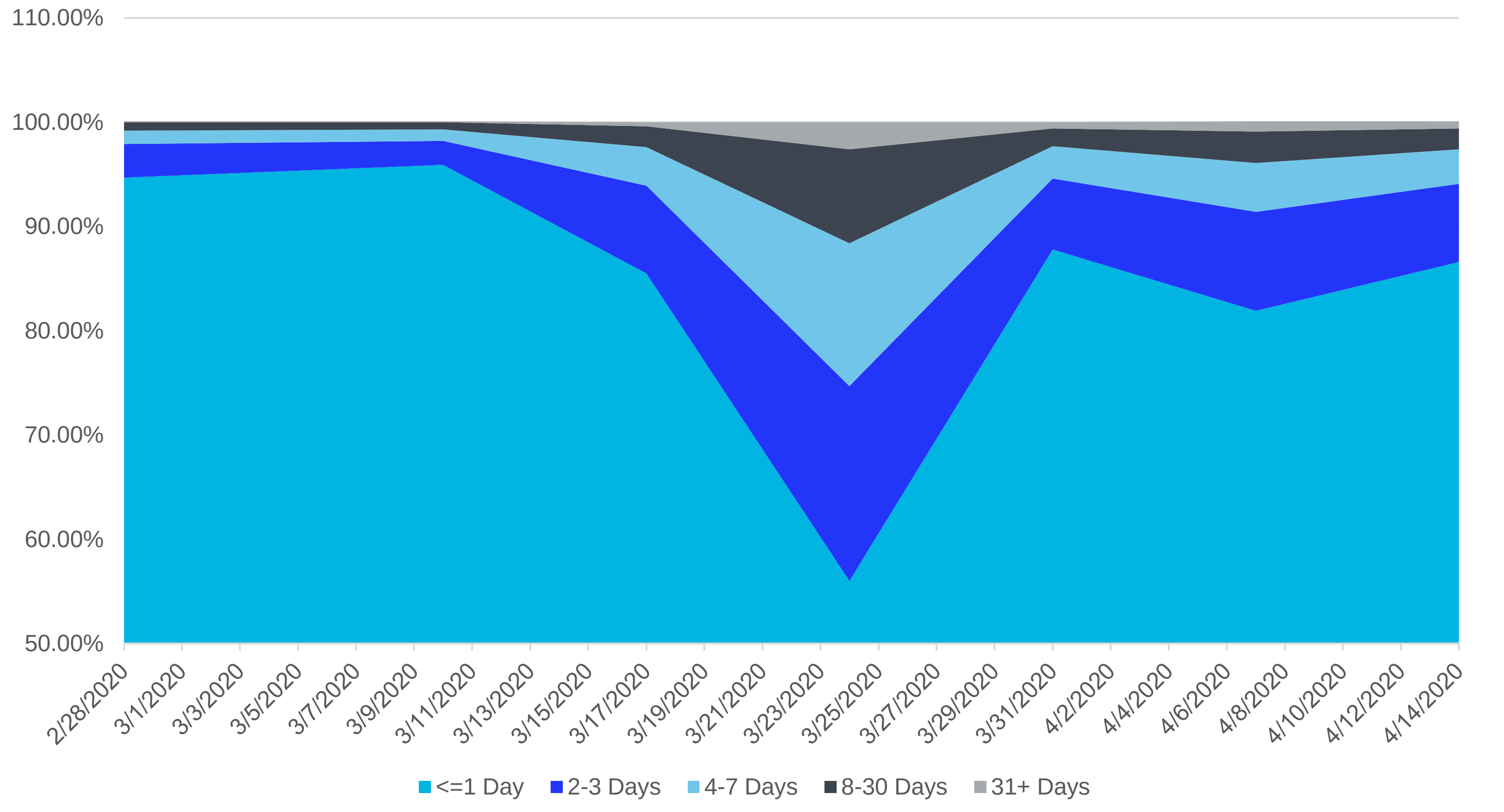
Figure 2: **MSRB Differences 2019 v 2020**



- **Figure 1:** With the exception of March and April, 2020 individual trade counts have decreased compared to 2019.
- **Figure 2:** Shows decrease in % 2019 vs 2020.
  - **Light blue:** All trades: Decreased trade counts with exception of March and April
  - **Dark blue:** Count of trades >=1mln in notional. Shows similar or increased trading in block trades.
- **Overall** there are fewer small retail trades taking place in 2020 when compared to 2019

US Municipal Market Overview: Liquidity

Figure 3: **Days to Liquidate Migration**



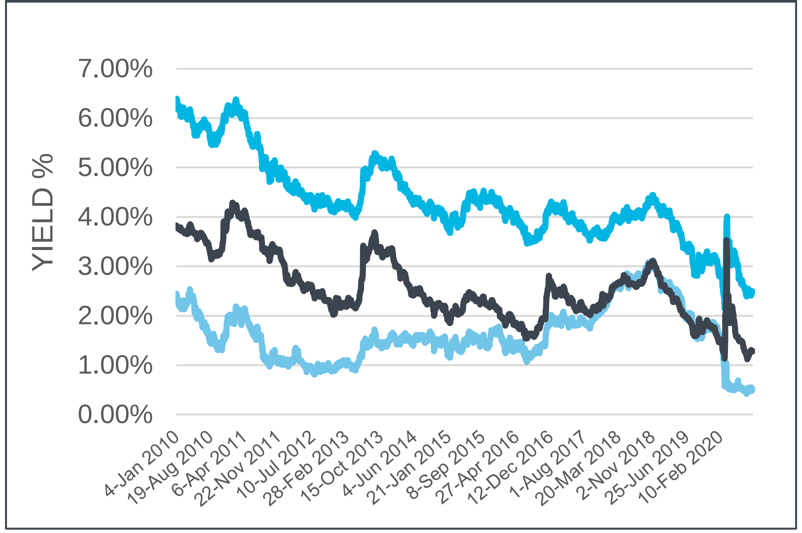
ICE BofA US Municipal Securities Index (U0A0):
$25BN Liquidation Volume | 50bps Target Market Price Impact

- ICE US Municipal Securities Index (U0A0) with approximately 18k holdings
- Using constant assumptions of a $25BN liquidation volume and a 50bp target market price impact (i.e. cost of immediacy or price haircut), we tracked liquidity performance over time throughout the COVID-19 pandemic
- The display indicates the percentage of the index that can be liquidated in the various DTL buckets: <=1 Day, 2-3 Days, 4-7 Days, 8-30 Days, and 31+ Days
- The data shows an initial degradation of liquidity in the latter part of the week of March 10th.
- The impact of these DTL outputs is largely driven by certain factors including:
  - ➢ Bid-Ask Spreads
  - ➢ Price Volatility
  - ➢ Observed Trading Volumes

Source: ICE Data Services

US Municipal Market: Index Yields

Figure 4:
Historical yields by asset class



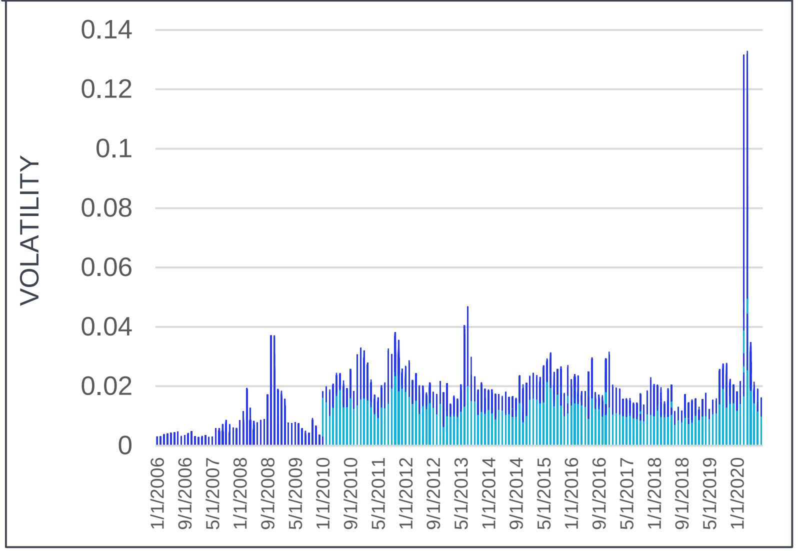
ICE BofA US Taxable Municipal Securities Index
ICE BofA US Treasury Index
ICE US Broad Municipal Index

Figure 4:

- Shows average index yield to worst for Taxable, Tax Exempt municipal and US Treasury bonds: 2018 to 2020
- High correlation and comparable yields across US Treasuries and Tax-Exempt municipal bonds
- Divergence due to COVID-19 between US Treasuries, Tax Exempt and Taxable municipal bonds

Source: ICE Data Services

Figure 5:
Annualized volatility: ICE US Broad Municipal Index: 2006-2020, ICE BofA US Taxable Index: 2010-2020



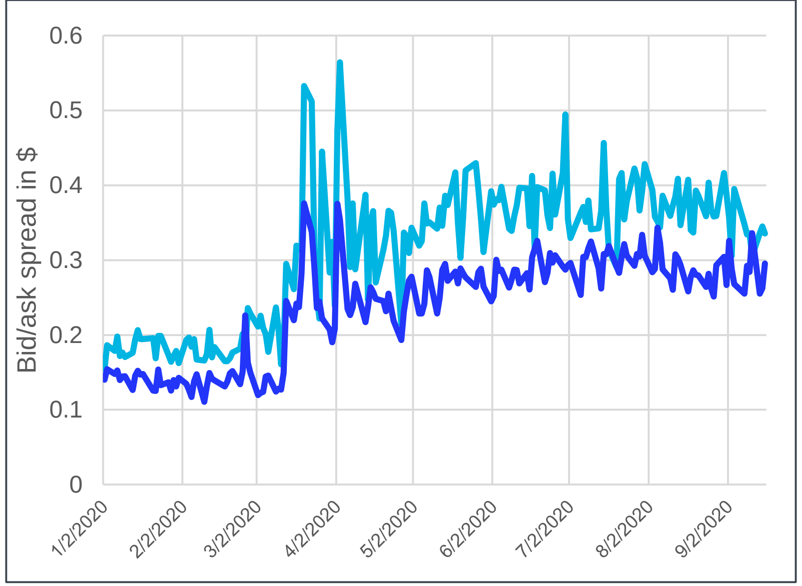
ICE BofA US Taxable Municipal Securities Index
ICE US Broad Municipal Index

Figure 5:

- Annualized historical volatility across tax-exempt and taxable municipal bonds, as applicable

Source: ICE Data Services

Figure 6:
Bid/Ask Spread: Taxable vs Tax-exempt Municipal bonds



Taxable Municipal Bonds
Tax-Exempt Municipal Bonds

Figure 6:

- Year to date Bid/Ask spreads across taxable and tax-exempt municipal bonds

Source: SIFMA & ICE Bonds

General Trading Activity Comparison

2007-2008 to 2008-2009

Trade Summary - 01/01/2007 to 01/01/2008

Trade Type	Number of Trades	Par Amount ($ Millions)
Customer Bought	4,248,212	$2,932,906
Customer Sold	2,307,320	$2,420,360
Inter-Dealer Trade	2,517,290	$983,598
All Trades	9,072,822	$6,336,863

Trade Summary - 01/01/2008 to 04/01/2009

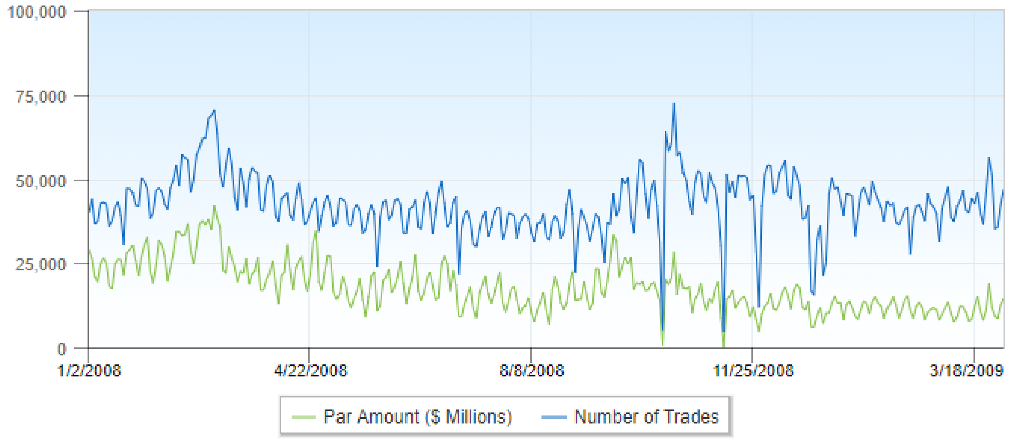
Trade Type	Number of Trades	Par Amount ($ Millions)
Customer Bought	6,870,056	$2,672,871
Customer Sold	2,765,623	$2,010,597
Inter-Dealer Trade	3,769,449	$935,828
All Trades	13,405,128	$5,619,296

Overall Trading Activity- 01/02/2007 to 12/31/2007

Daily Averages
Par Amount: $25,146 Million
Number of Trades: 36,003

Overall Trading Activity- 01/02/2008 to 04/01/2009

Daily Averages
Par Amount: $17,839 Million
Number of Trades: 42,556



Source: MSRB EMMA, overall trade patterns, for more see MSRB Municipal Market COVID-19 Trading Report, updated monthly, Hilltop Securities

General Trading Activity Comparison

2018-2019 to 2019-2020

Trade Summary - 09/15/2018 to 09/15/2019

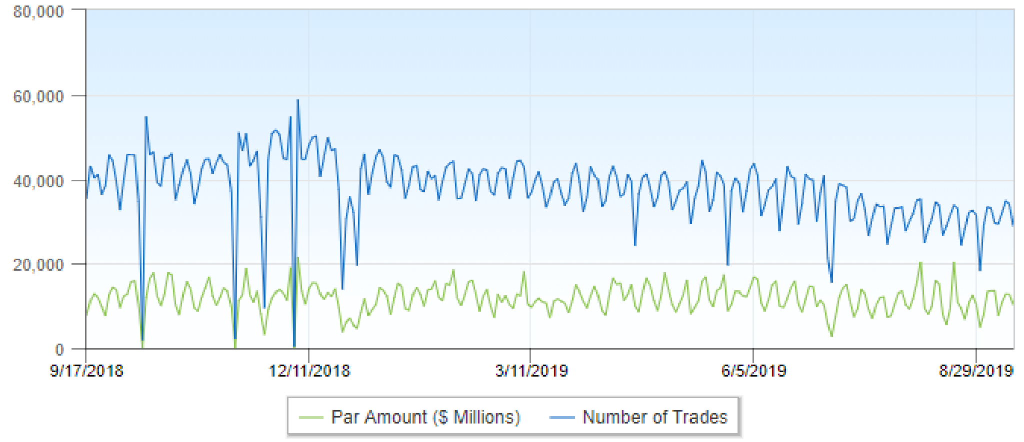
Trade Type	Number of Trades	Par Amount ($ Millions)
Customer Bought	3,600,038	$1,478,191
Customer Sold	2,214,398	$938,592
Inter-Dealer Trade	3,626,201	$527,935
All Trades	9,440,637	$2,944,718

Trade Summary - 09/15/2019 to 09/15/2020

Trade Type	Number of Trades	Par Amount ($ Millions)
Customer Bought	3,175,239	$1,646,108
Customer Sold	2,100,335	$971,506
Inter-Dealer Trade	3,247,080	$501,056
All Trades	8,522,654	$3,118,671

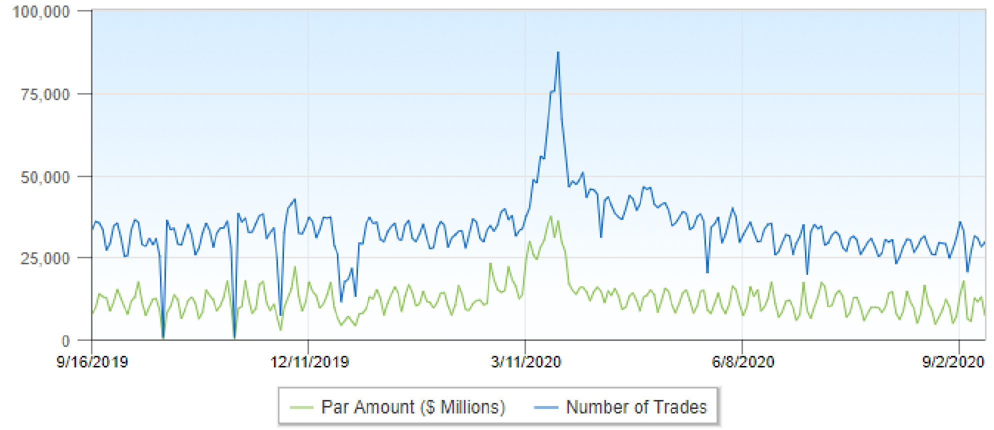
Overall Trading Activity- 09/17/2018 to 09/13/2019

Daily Averages
Par Amount: $11,732 Million
Number of Trades: 37,612



Overall Trading Activity- 09/16/2019 to 09/14/2020

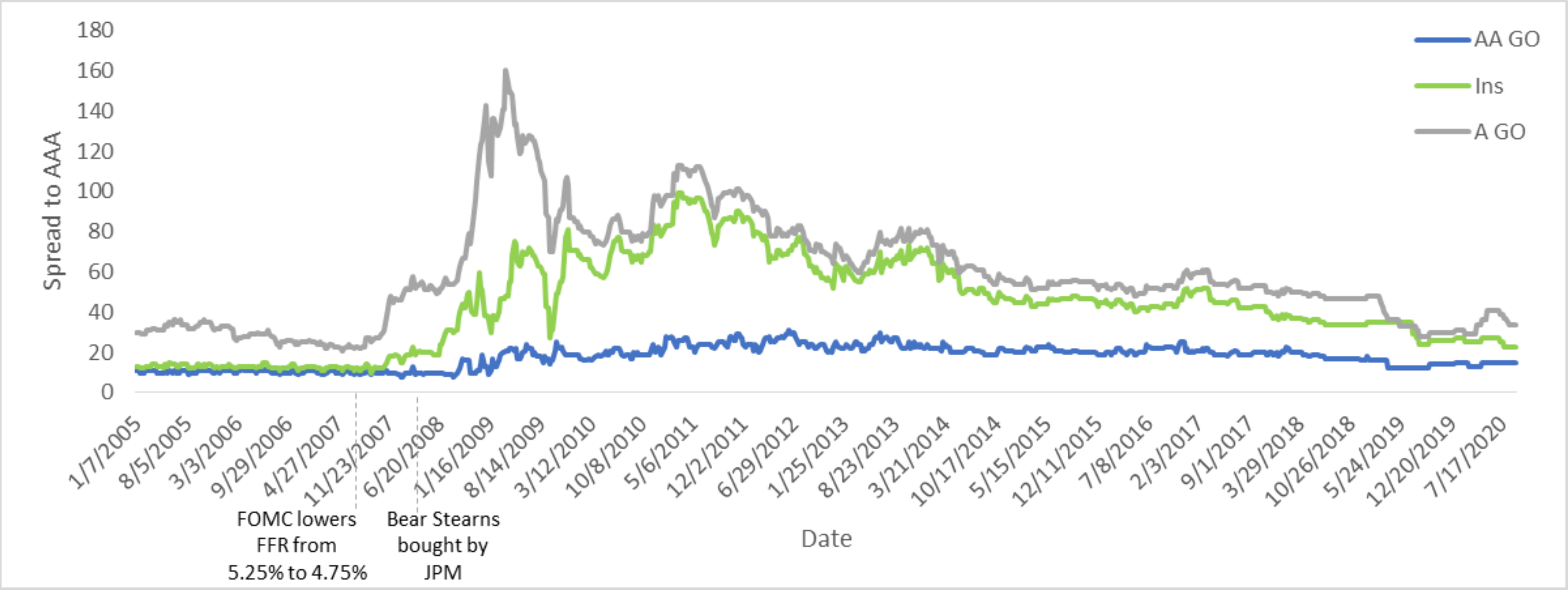
Daily Averages
Par Amount: $12,376 Million
Number of Trades: 33,820



Source: MSRB EMMA, overall trade patterns, for more see MSRB Municipal Market COVID-19 Trading Report, updated monthly, Hilltop Securities

Trading
Spread Analysis

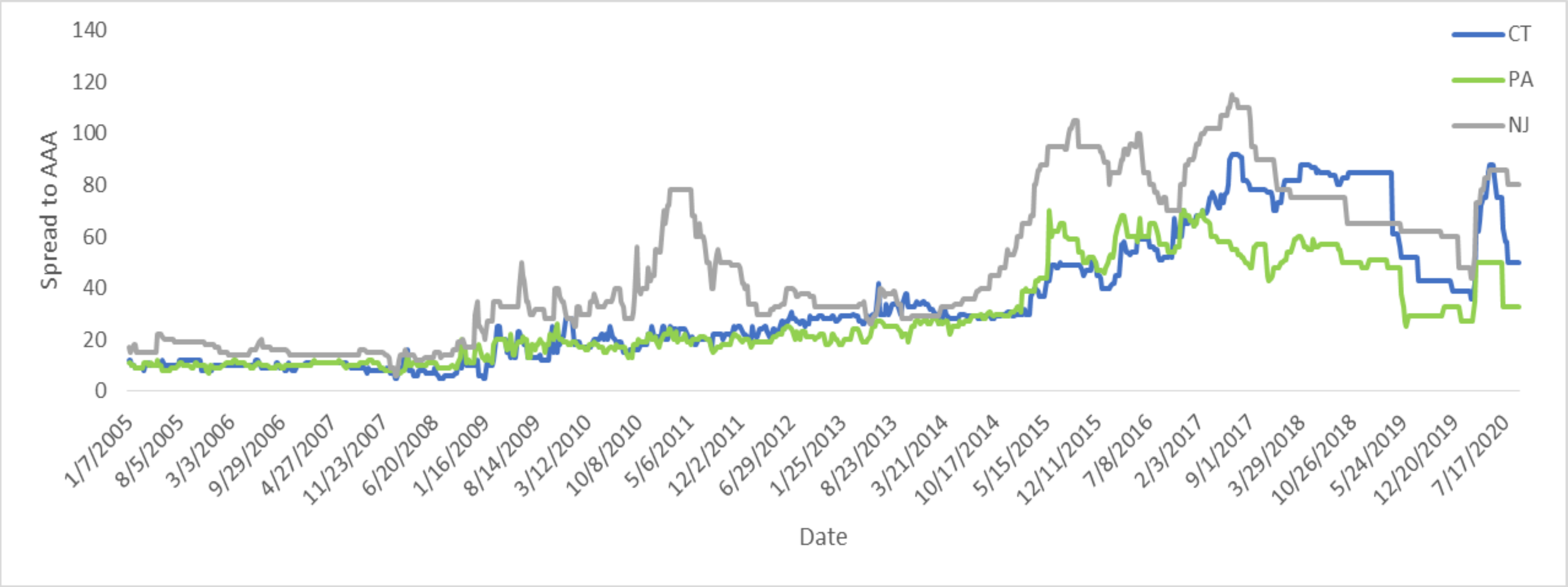
Spread to AAA
MMD Benchmark



Source: Refinitiv (formerly Thomson Reuters) TM3, Hilltop Securities

Trading Spread Analysis

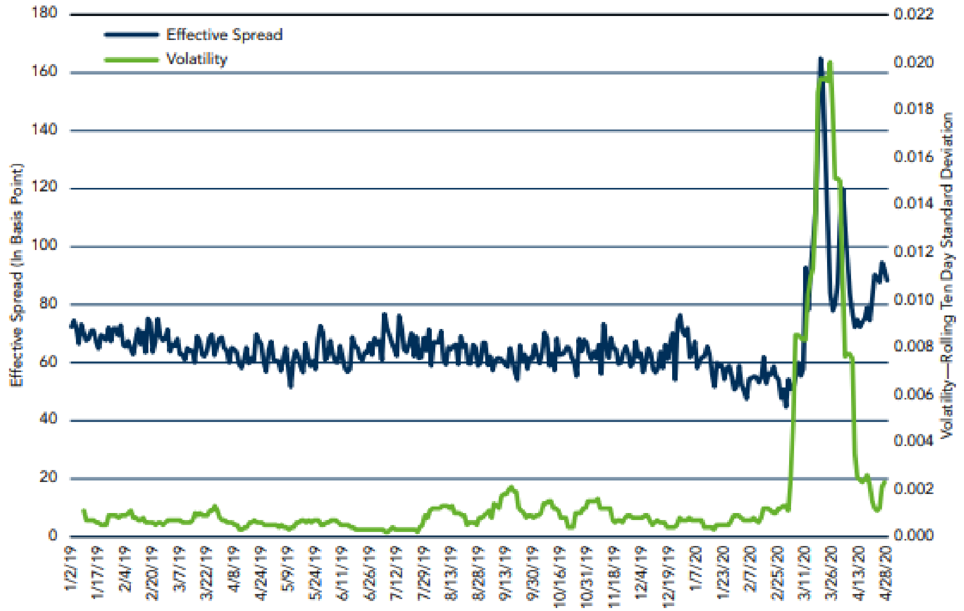
Spread to AAA
MMD Benchmark



Source: Refinitiv (formerly Thomson Reuters) TM3, Hilltop Securities

Transaction Costs During COVID-19

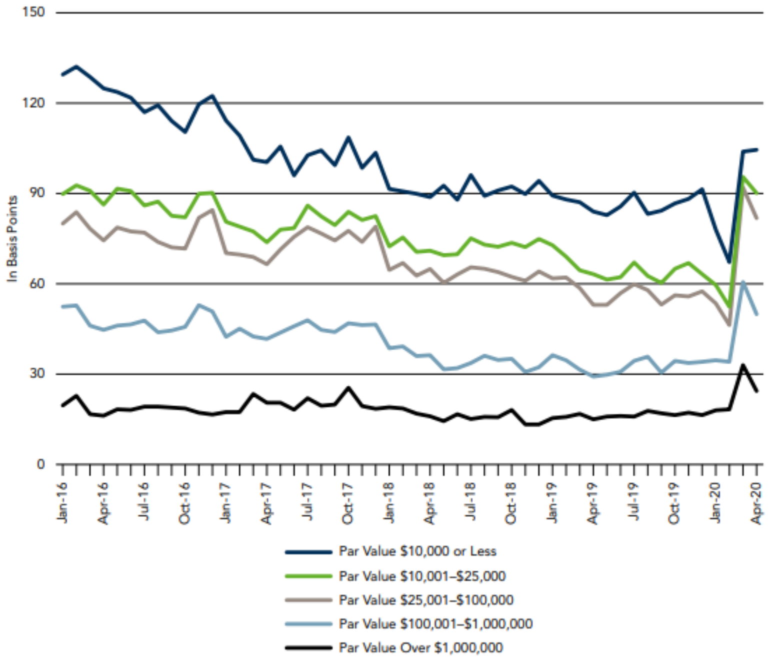
Chart 3. Effective Spread for Fixed-Rate Municipal Securities Customer Trades and Municipal Securities Price Volatility
(January 2019 – April 2020)



Source: MSRB analysis with data obtained from S&P Dow Jones Indices and MSRB's RTRS.

From the MSRB Report: When isolating the change in effective spread to the four-month period in 2020, Chart 3 shows that on certain trading days in mid-March and early April, the effective spread for fixed-rate municipal securities exceeded 100 basis points, with a peak of 165 basis points on March 20. Fluctuations in effective spread seemed to be correlated with the overall volatility of municipal securities price movements, as measured by the rolling 10-day standard deviation of the S&P Municipal Bond Index daily percentage change during the period. (The volatility itself was likely driven by other market factors, such as the liquidity crunch and uncertainty of pricing due to the potential elevated credit risks and other factors.) The volatility measure typically represents the level of risk and uncertainty in the marketplace, and data show it was significantly elevated in the one-month period between early March and early April.*

Chart 4. Effective Spread for Fixed-Rate Municipal Securities Customer Trades—By Trade Size
As a Percentage of Mid-Point Customer Trade Price (January 2016 – April 2020)



Source: MSRB analysis with data obtained from MSRB's RTRS.

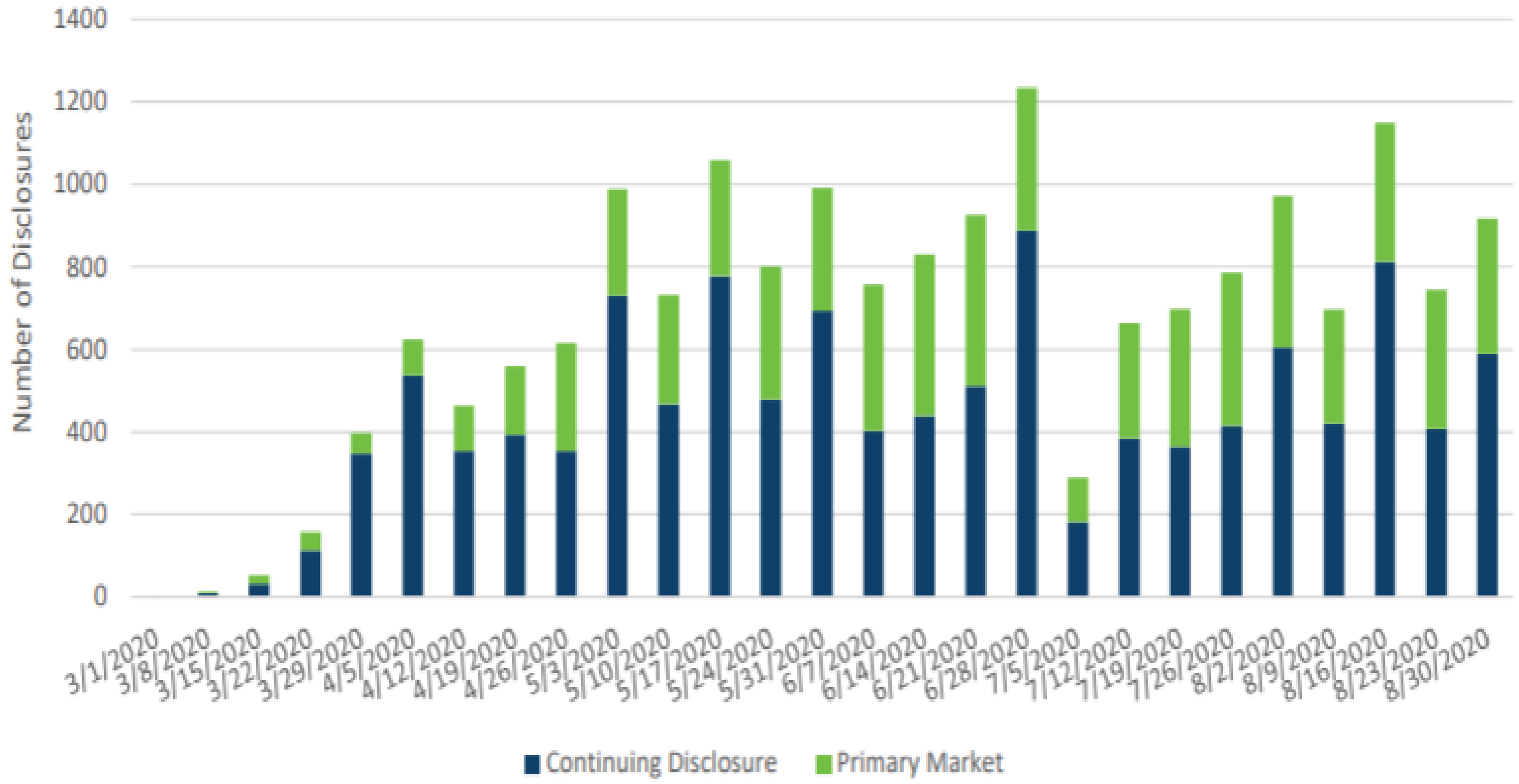
From the MSRB Report: **Chart 4** shows that, despite narrowing the gap, smaller-sized customer trades continued to be executed with a higher effective spread than larger-sized customer trades as of early 2020. That said, the sharp increase in effective spread triggered by the COVID-19 pandemic was apparent for all trade size groups, including the below $100,000 trade size groups where retail investors usually predominate.*.

*Source: MSRB, See MSRB report: [COVID-19 Crisis Drives Spike in Transaction Costs for Municipal Securities, May 2020] Hilltop Securities

Disclosures

COVID-19 Related Disclosures

By Week, Since March 2020

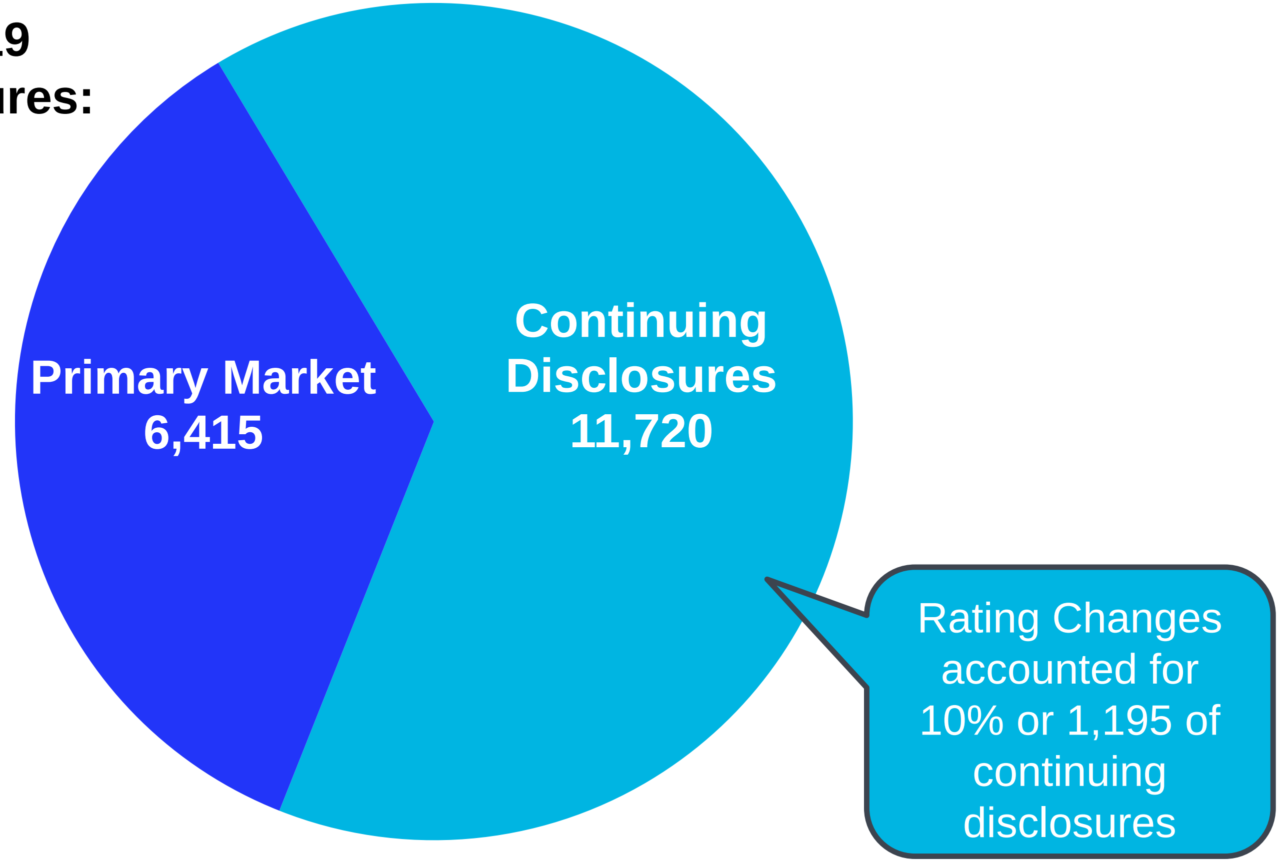


Source: MSRB

COVID-19 Related Disclosures

Primary Market and Continuing Disclosures

Total COVID-19 Related Disclosures: 18,135



Source: MSRB

New Issuance

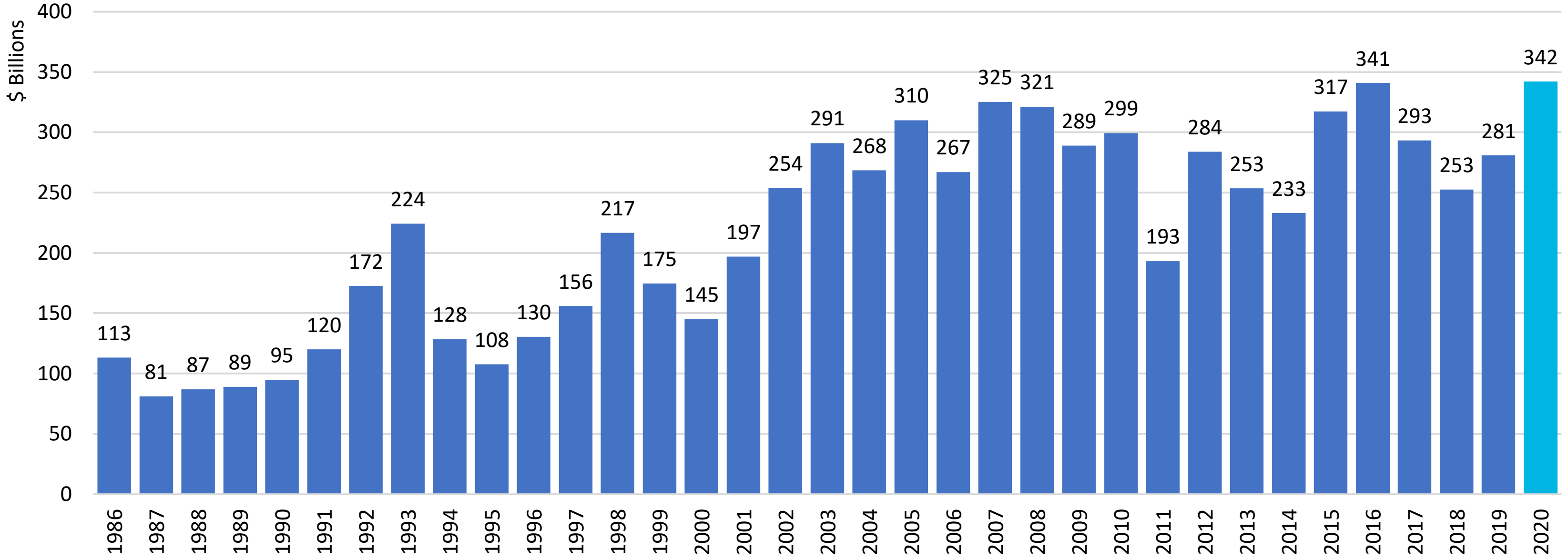
Issuance Volume (2008 vs. 2020)

- 2020 total issuance has been high through September, ranking 1st in total issuance volume over the past 35 years
- Highlights include:
  - Total 2020 tax-exempt volume is projected to be approximately $2 billion lower than in 2008, despite new money issuance being down due to the COVID-19 pandemic
  - Total 2020 taxable volume is projected to be over $118 billion higher than in 2008
  - Total 2020 issuance is projected to be $482 billion, approximately $116 billion higher than in 2008

Issuance Highlights (in $MM)
2008 Taxable Issuance: 24,252
2020* Taxable Issuance: 142,740

2008 Tax Exempt Issuance: 341,264
2020* Tax Exempt Issuance: 339,277

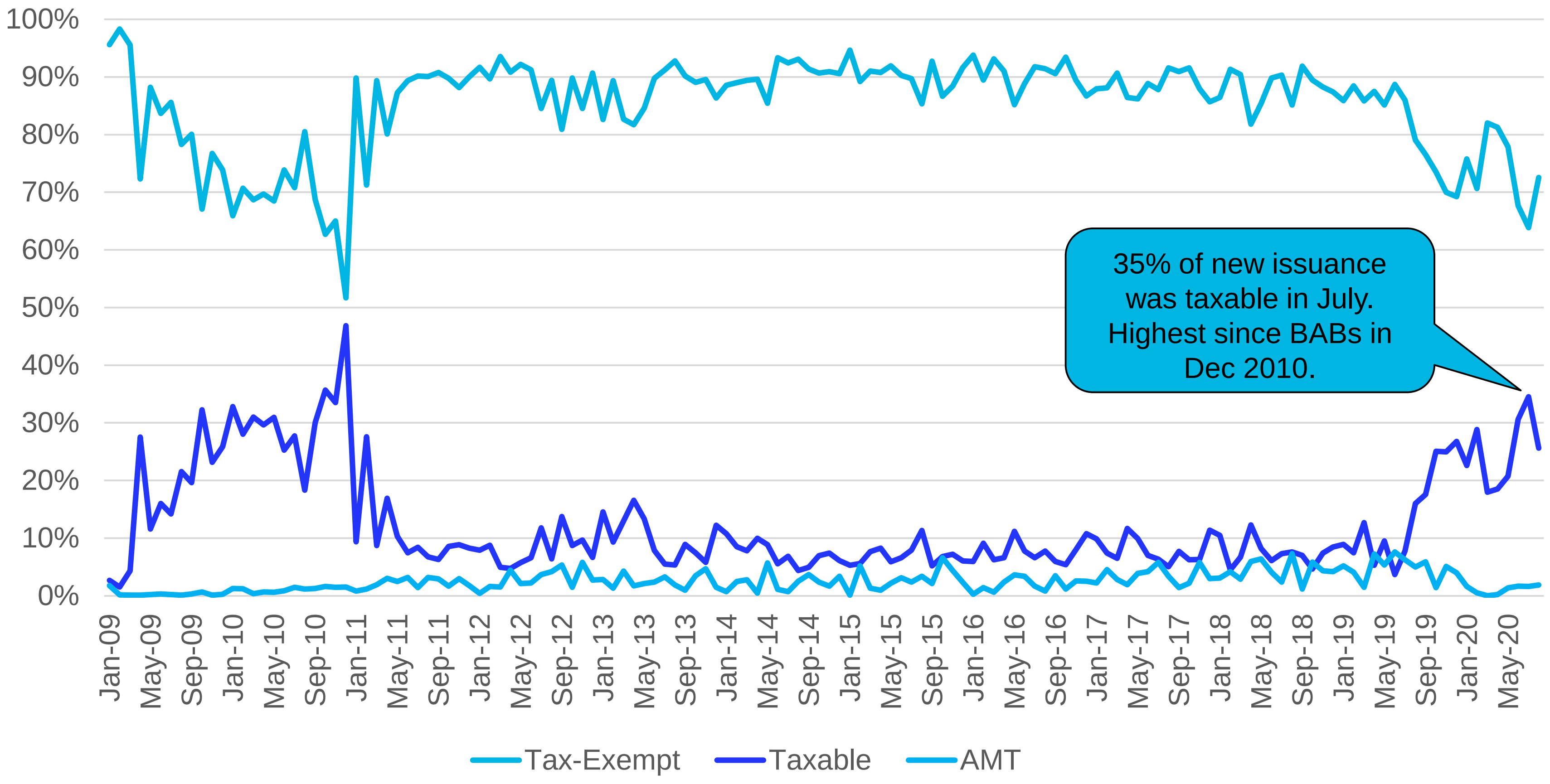
Annual Municipal Issuance Volume Through September



Source: Bond Buyer. Note 2020 Issuance is through September, Siebert Williams Shank & Co

Municipal New Issuance, 2009-Present

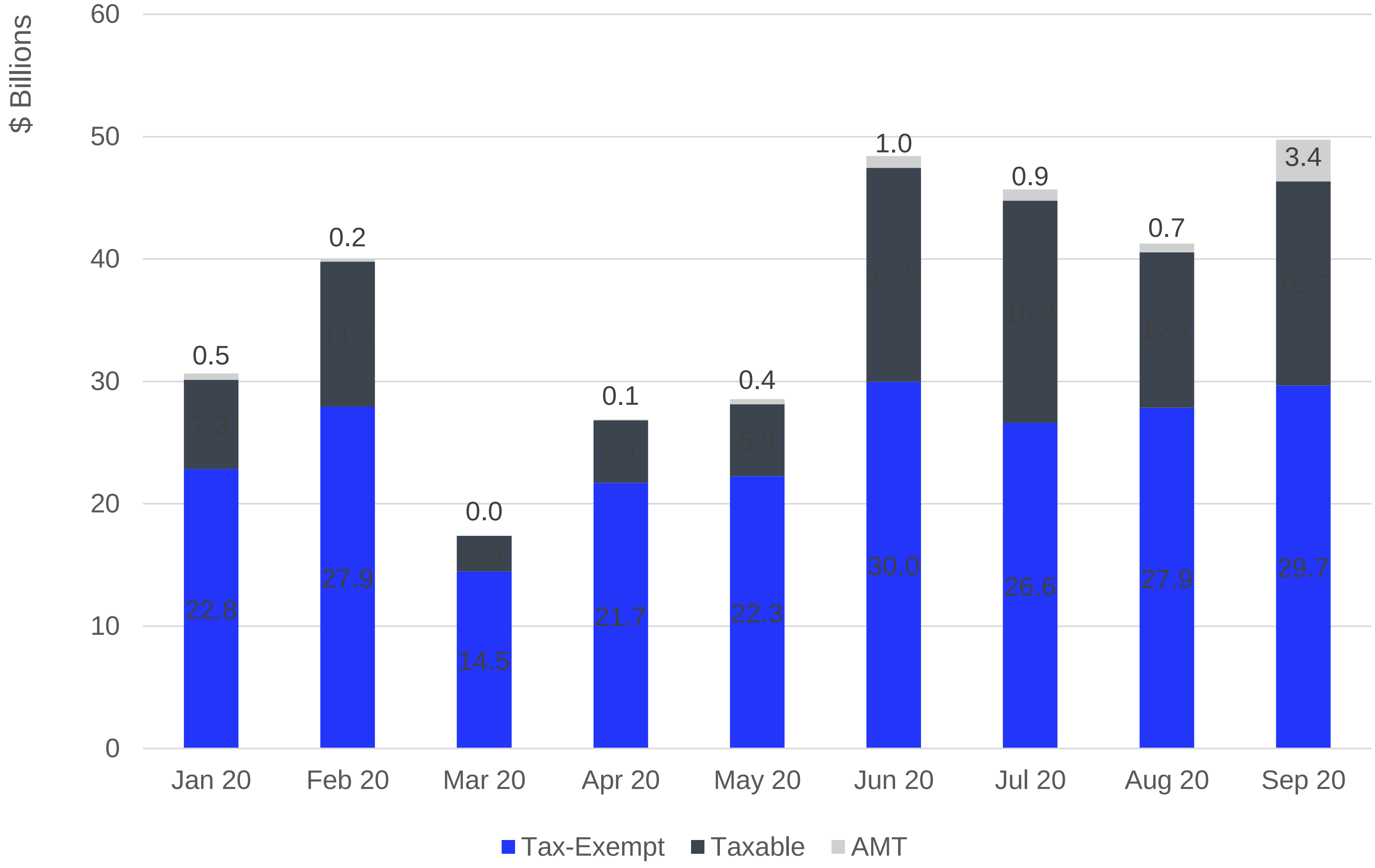
Tax Status as Percentage of the Market



Source: Siebert Williams Shank & Co

Municipal New Issuance in 2020

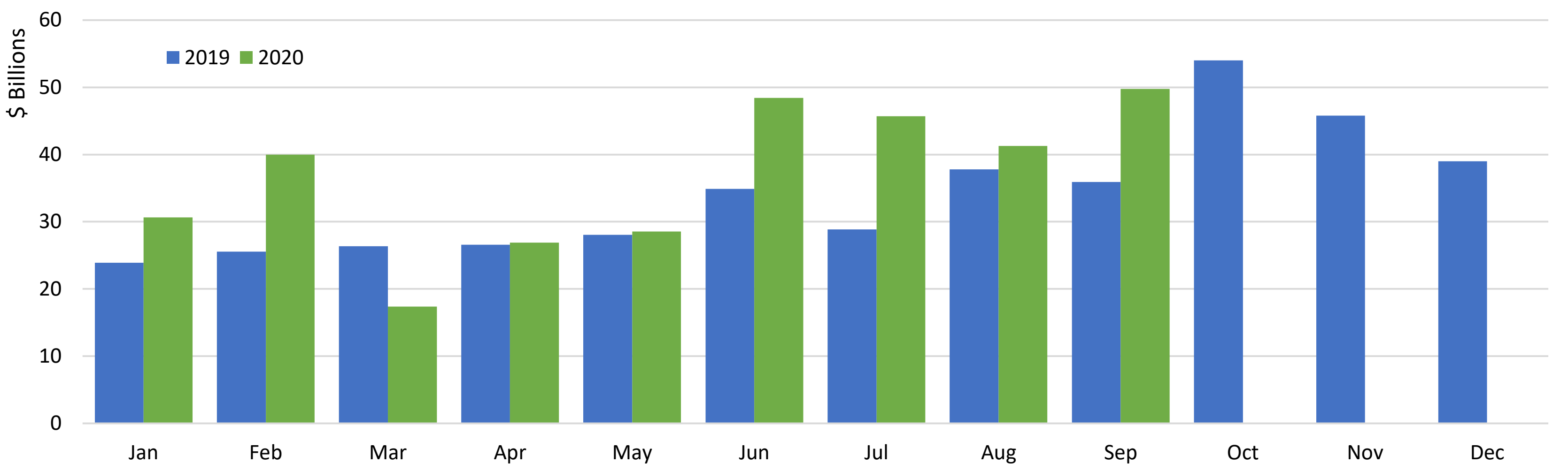
By Tax Status



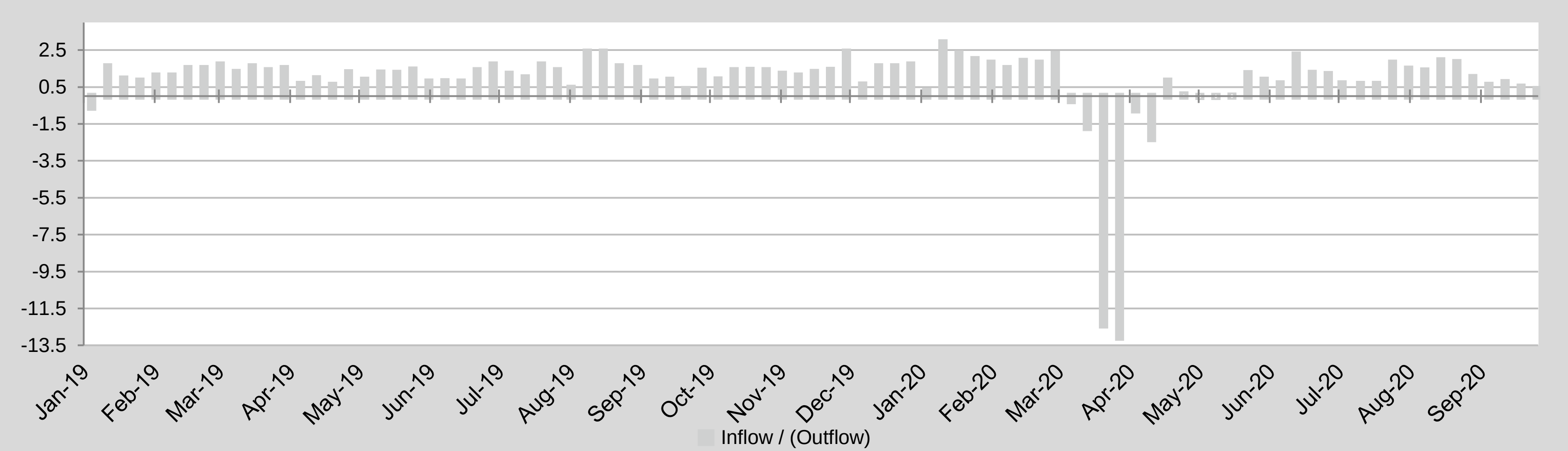
Source: Siebert Williams Shank & Co

2019-2020 Fund Flows and Issuance Volume

2019 vs. 2020 Municipal Issuance Volume by Month



Municipal Bond Mutual Fund Inflows and Outflows ($ billions)



Source:Thomson Reuters – SDC Platinum as of 10/1/2020 (Negotiated & Competitive Issuance); Lipper Fund Flows as of 9/24/20; Siebert Williams Shank & Co

Municipal Liquidity Facility (MLF) Update

The Fed has updated the terms and pricing of its Municipal Liquidity Facility (below shows amendments in italics)
It will charge issuers a premium as it is intended to be used as a last resort

Summary of Key Terms: Municipal Liquidity Facility (as of 8/11/2020)

- **Facility**: The Municipal Liquidity Facility will support lending to U.S. States and District of Columbia, U.S. Cities with populations *>250k*, U.S. Counties with populations *>500k, and Multi-State Entities*
- **Eligible Notes**: TANs, TRANS, BANs and other similar short-term notes that do not mature later than *36* months from the date of issuance
- **Eligible Issuers**: State, City or County (or instrumentality), *or Multi-State Entity*. Only one issuer per State, City, County
  - *Non-Multi-State Entity must be rated at least BBB-/Baa3 as of 4/8/20 by two or more major NRSROs and at least BB-/Ba3 at time of issuance*
  - *Multi-State Entity must be rated at least A-/A3 as of 4/8/20 by two or more major NRSROs and at least BBB-/Baa3 at time of issuance*
  - *If State, City, County or Multi-State Entity was rated by only one major NRSRO as of 4/8/20, it may be an Eligible Issuer if the rating was at least consistent with criteria above and it is rated by at least two major NRSROs at time of issuance*
- **Borrowing Limit**: 20% of the general revenue and utility revenue from own sources in FY2017 of State, City or County; *20% of Multi-State Entity's gross revenue as reported in FY2019 audit*
  - States may request borrowing in excess of the limit to assist political subdivisions and instrumentalities that are not eligible for the Facility
- ***Security**: Will depend on applicable constitutional and statutory provisions governing the Eligible Issuer and should be generally consistent with the source of repayment and strongest security typically pledged to repay publicly offered obligations of the Eligible Issuer*
  - *Eligible Notes issued by Non-Multi-State Entities will generally be expected to represent general obligations, or be backed by tax or other specified governmental revenues of State, City, or County*
  - *If the Eligible Issuer is an authority, agency, or other entity of a State, City, or County, such Eligible Issuer must either commit the credit of, or pledge revenues of, the State, City, or County, or the State, City, or County must guarantee the Eligible Notes issued by such issuer*
  - *If the Eligible Issuer is a Multi-State Entity, the Eligible Notes will be expected to be parity obligations of existing debt secured by a senior lien on the Multi-State Entity's gross or net revenues*

Source: SIFMA, Federal Reserve; as of 8/11/2020, Siebert Williams Shank & Co

MLF Borrowings

State of Illinois & NY MTA

State of Illinois MLF Borrowing

- In June, the State of Illinois became the first to use the Federal Reserve's MLF program
- **Size:** Illinois issued **$1.2 billion general obligation backed Notes**
- **Pricing:** The Notes priced as at a rate of 3.82% which represents a 380 basis point spread over the overnight swap index and 366 basis point spread over AAA MMD
- **Proceeds:** Proceeds are being used to bolster state liquidity and offset a portion of the tax hit from the COVID-19 crisis
- **Ratings:** The State is rated **Baa3/BBB-/BBB-** by Moody's, S&P and Fitch, respectively

Metropolitan Transportation Authority MLF Borrowing

- On Tuesday, August 18th, the New York Metropolitan Transportation Authority **rejected 20 bids on $465 million of Notes**, opting instead to sell the notes through the Fed's Municipal Liquidity Facility
- The 20 bids from 10 different banks averaged a True Interest Cost of 2.79%
- The Notes ultimately sold through the MLF pricing at a **True Interest Cost of 1.93%, resulting in savings of approximately 86 basis points compared to public market levels**
- The transaction closed on August 26th
- The MTA is currently projecting a *$12 billion deficit* through next year due to drastic declines in ridership as a result of the COVID-19 crisis

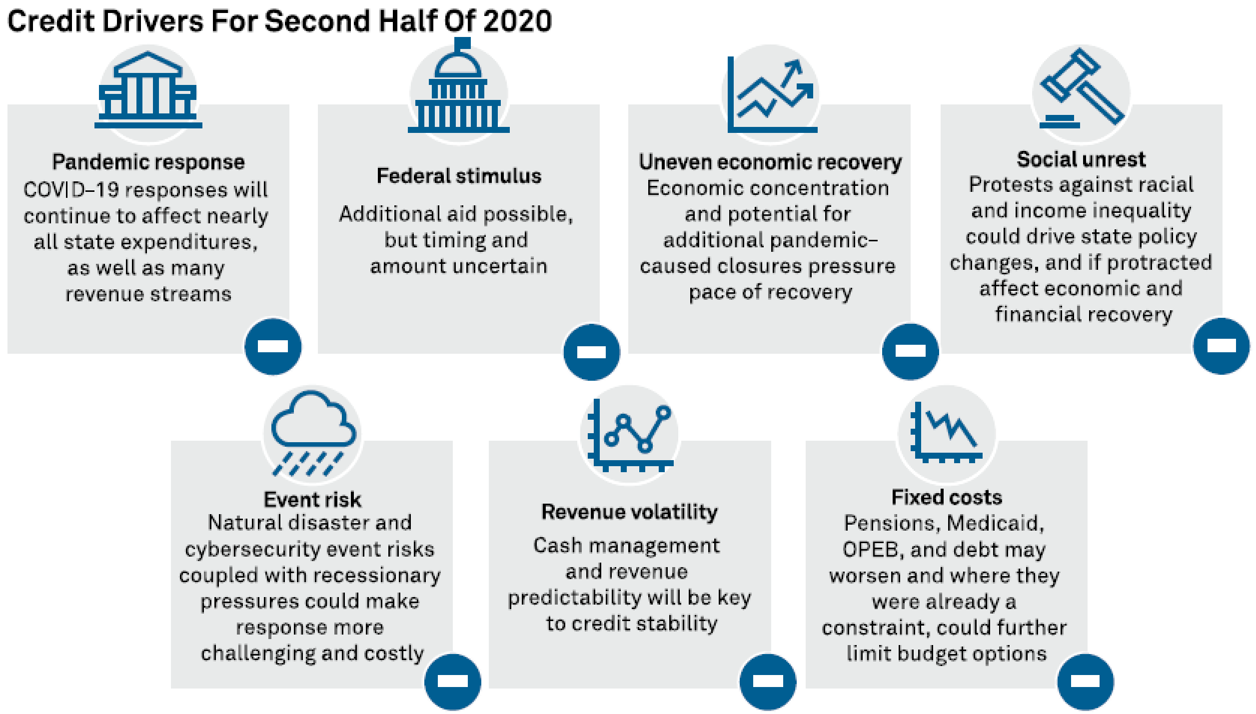
- **Credit** Transportation Revenue Bonds are rated **A2/BBB+/A+/AA+** by Moody's, S&P, Fitch, and Kroll
- **Par Size:** **$465 million Bond Anticipation Notes**
- **Maturity Date:** August 1, 2023
- **Pricing:** The Notes priced at a rate of 1.93% which represents a 178 basis point spread to AAA MMD
- **Proceeds:** Proceeds of the notes will be used to retire BANs maturing on September 1st

Source: BondBuyer and EMMA, Siebert Williams Shank & Co

Going forward

Anticipated Economic Climate – Q4 2020

- State and local governments will have to continue to tackle significant fiscal challenges in Q4
- S&P published a mid-year sector report for U.S. states with the expectation that rating stability in the 2nd half of 2020 remains negative
  - Leading factors that predict budgetary distress continue to include revenue volatility, weaker rainy day reserves (especially after COVID), and elevated fixed costs
  - In addition, many state budget decisions hinge on additional federal aid, but the amount and timing of this is uncertain
  - The following are the agency's key credit drivers for the 2nd half of 2020:



Source: S&P, Siebert Williams

Limitations

This presentation is not to be published, reproduced, copied, disclosed or used without the express written consent of Intercontinental Exchange, Inc. and/or its affiliates.

This presentation is provided for informational purposes only. The information contained herein is subject to change and does not constitute any form of warranty, representation, or undertaking. Nothing herein should in any way be deemed to alter the legal rights and obligations contained in agreements between Intercontinental Exchange, Inc. and/or any of its affiliates and their respective clients relating to any of the products or services described herein. Nothing herein is intended to constitute legal, tax, accounting, or other professional advice.

Intercontinental Exchange, Inc. and its affiliates, makes no warranties whatsoever, either express or implied, as to merchantability, fitness for a particular purpose, or any other matter. Without limiting the foregoing, Intercontinental Exchange, Inc. and its affiliates makes no representation or warranty that any data or information (including but not limited to evaluations) supplied to or by it are complete or free from errors, omissions, or defects.

Fixed income evaluations, continuous evaluated pricing, end-of-day evaluations, evaluated curves, model based curves, Fair Value Information Services and any other investment advisory services with respect to securities are provided in the US through ICE Data Pricing & Reference Data, LLC and internationally through ICE Data Services entities in Europe and Asia Pacific.

Securities products and services are offered through ICE Bonds Securities Corporation or ICE Bonds, member FINRA, MSRB, NFA and SIPC. The information found herein, has been prepared solely for informational purposes and should not be considered investment advice, is neither an offer to sell nor a solicitation of an offer to buy any financial product(s), is intended for institutional customers only and is not intended for retail customer use.

Index products and services are provided by ICE Data Indices, LLC.

Trademarks of Intercontinental Exchange, Inc. and/or its affiliates include: Intercontinental Exchange, ICE, ICE block design, NYSE, ICE Data Services, and New York Stock Exchange. Information regarding additional trademarks and intellectual property rights of Intercontinental Exchange, Inc. and/or its affiliates is located at www.intercontinentalexchange.com/terms-of-use. BofA is a trademark of Bank of America Corporation in the United States and other countries. Other products, services, or company names mentioned herein are the property of, and may be the service mark or trademark of, their respective owners.