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UNDERSTANDING MUNICIPAL MARKET INDICES, YIELD CURVES AND BENCHMARKS

Prepared by the MUNICIPAL SECURITIES RULEMAKING BOARD

MSRB
Municipal Securities Rulemaking Board

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While the municipal securities market is comprised of unique bond issues, each with their own specific structural characteristics, ratings and yields, market indicators provide sector-specific or broad market information about the general level of municipal interest rates. These indicators include indices, benchmarks and yield curves. Municipal securities issuers and investors may use these indicators to assist in the evaluation of a unique bond's yield or its performance relative to a particular sector or the market as a whole.

Indices, yield curves and benchmarks often are used by underwriters as a factor when determining the yield levels at which a new issue of municipal securities will be offered to investors. The following provides an overview and description of commonly used indicators in the municipal securities market.

WHAT IS AN INDEX?

An index is a statistical composite that can be used to measure changes in a market. An index measures market movement reflecting changes in prices or yields.

An index typically is used to measure changes in the value of a particular type of security, or in the case of bonds, changes in yields. Indices are often constructed by grouping similar securities together to create a particular statistic. Indices may include securities based on standardized criteria, such as issue size, credit rating, sector, geography or maturity date. The indices may be calculated as the simple average of selected securities prices or yields, or an index may be determined based upon a mathematical formula. The indices may also be weighted by larger and more frequent issuers that comparatively have significant levels of securities outstanding, or by transactions in larger lot sizes. As such, they may have a greater impact on the indices' performance and have a proportionally larger impact on the movements of an index.

Bond indices can be constructed by estimated yields rather than actual yield quotations or prices. Municipal bond traders may provide estimates of a current coupon bond for an issuer and the yield if the bond was sold at par value. It is important to note that some bond indices contain securities that may not be available for purchase.

WHAT IS A BENCHMARK?

A benchmark is the basis of measurement for an interest rate, an index or peer group of bond prices or other values that is used as a reference point.

For example the three-month LIBOR (London Interbank Offered Rate) yield is a benchmark that might be used to adjust a floating rate note in the municipal securities market. Similarly, the 30-year U.S. Treasury bond can be used as a benchmark to establish the yield on a taxable bond in the municipal securities market.

WHAT IS A YIELD CURVE?

A yield curve represents a set of interest rates for a series of maturity dates. When plotted on a graph, the compilation of these numbers produces a curve.

Yield curves, like indices, may be constructed uniquely for credits of various rating levels, sources of payments or specific states, among other characteristics. Yield curves are based either on yields of bonds actually trading in the market or estimates of yields for specific credits within the market. Yield curves indicate the intersection between market supply and market demand for securities, according to specific structural characteristics.

Generally, an "AAA" curve is derived from market estimates of yields for bonds with the highest ratings levels in the municipal market. The base interest rate in the municipal market – that is, the rate against which municipal securities are most often compared — is the yield on a "AAA" benchmark issue or index. The difference in yield between a particular municipal issue and the benchmark yield, at a particular point on the yield curve, is called a risk premium or yield spread. Among others, the following factors can influence yield spreads:

- Credit quality
- Security type and source of repayment
- Maturity of the securities
- Redemption or call features
- Tax status
- State specific supply and demand for securities
- Liquidity of the securities

WHAT ARE THE USES OF YIELD CURVES, INDICES AND BENCHMARKS AND WHAT DO THEY TELL YOU?

Yield curves, indices and benchmarks can be used for evaluating bond prices and yields. This information can support issuers in their preparations for and during the bond pricing process. Reviewing yield curves, benchmarks and indices as part of the bond pricing process provides issuers with baseline information when establishing offering yields on new issue securities. In addition, examination of yield curves, benchmarks and indices of comparative bond pricing since the last bond sale, the pricing of other new bond issues and changes in the market since the last sale are among the factors that can be used when assessing the appropriateness of the pricing of an upcoming municipal bond offering.

Yield curves, benchmarks and indices provide a relative snapshot of the market. They serve several purposes in the market place, including, but not limited to:

- As tools in establishing the appropriate yield of municipal securities;
- As a means of following broad trends in the market and examining the performance of the market over time;
- As a baseline for evaluating the performance of a bond or a particular set of bonds that share similar characteristics, including maturity, credit quality, size, etc.;
- As a method for computing the relative returns for the aggregate market or some component of the market over a specific period of time and for judging the performance of a portfolio;
- As a benchmark against the performance of a bond or a portfolio; or
- As the basis for comparison versus other investments such as a bond-indexed mutual fund or exchange-traded funds.

WHAT ARE THE MOST COMMONLY USED MUNICIPAL MARKET BOND INDICES, BENCHMARKS AND YIELD CURVES?

There are several indices, benchmarks and yield curves used in the municipal market that are produced by various organizations. The following provides general descriptions of several of the most commonly used indices, benchmarks and yield curves in the municipal market. Other indices, benchmarks and yield curves also are used in the municipal market, and the inclusion or exclusion of any such product is not indicative of the MSRB's views with regard to any such product. These descriptions, including the names and methodologies, are subject to change.

Barclays Capital Municipal Bond Index

The Barclay's Capital Municipal Bond Index currently contains approximately 46,200 bonds. To be included in the index, bonds must be rated investment-grade ("Baa3/BBB-" or higher) by at least two of the following ratings agencies: Moody's, Standard & Poor's and Fitch, if all three rate the bond. If only two of the three agencies rate the bond, the lower rating is used to determine index eligibility. If only one of the three agencies rates a bond, the rating must be investment-grade. To be included in the index, bonds must have an outstanding par value of at least $7 million and be issued as part of a transaction of at least $75 million. The bonds must be fixed rate, have a dated-date after December 31, 1990, and must be at least one year from their maturity date. Remarketed issues, taxable municipal bonds, bonds with floating rates and derivatives are excluded from the benchmark.

Bloomberg Valuation (BVAL) Benchmark Municipal Curve

The BVAL Benchmark curve is built to be a key building block of the Bloomberg valuation model. The curve, constructed hourly from current market observations, is the foundation of Bloomberg's municipal valuation process. Bloomberg's evaluation team continually monitors the constituent securities, whose trading activity is used as the input to construct the curve.

Criteria and methodology used in constructing the benchmark are:

- Securities that have traded recently (minimum trade par value size of $500,000 and all newly issued securities with an issue size >$100MM)
- Fixed-rate general obligation securities (with some exceptions, such as municipal securities issued by university obligors)
- Fully tax-exempt (i.e., not subject to AMT or federal taxes)
- Coupon >= four and a half percent if the security is non-callable
- Coupon ranging between five and five and a half percent for securities with call options

Trades in qualifying securities and qualifying size are used as inputs to produce an hourly snapshot of the benchmark curve.

Bond Buyer Municipal Bond Indices

The Bond Buyer, a daily newspaper covering the municipal bond market, publishes indices that estimate prices and/or yield levels for various groups of municipal securities. The Bond Buyer Municipal Bond Index (also known as The Bond Buyer Index, MBI, or BB40) has been published daily since 1985 and is designed to capture yields for 40 recently issued actively traded municipal bonds. The Municipal Bond Index served as the reference index for the municipal bond futures contract sold on the Chicago Board of Trade between 1985 and 1999. The index is anchored in a detailed series of bond-selection criteria. The Bond Buyer's editorial staff adjusts the components of the index twice monthly, adding all new issues that meet the selection criteria and deleting those whose secondary market trading has become less active.

The Municipal Bond Index levels are reported four ways: The index value, quoted in points and thirty-seconds, is derived from the average price of the components, adjusted to a standard six percent coupon. The Bond Buyer also reports the unadjusted average price of the components, as well as the average yield to maturity and yield to par call of the components. The prices for the components are obtained from Standard & Poor's Securities Evaluations Inc.

The Bond Buyer also publishes four yield indices on a weekly basis. These indices, based upon estimates from active traders and underwriters, reflect the yields that would be offered to investors if an issuer were to bring certain types of municipal securities to market at par on a given day. The indices represent theoretical yields rather than actual price or yield quotations. Contributing market participants are asked to estimate what a current-coupon bond for each issuer in the indices would yield if the bond was sold at par value. The indices are simple averages of the estimated yields of the bonds. These indices are updated weekly and are available via a subscription to The Bond Buyer.

20 Bond General Obligation Index
The 20-Bond Index consists of 20 state, city and county general obligation bonds that mature in 20 years. The average rating of the 20 bonds is roughly equivalent to Moody's Investors Service's (Moody's) "Aa2" rating and Standard & Poor's (S&P) "AA." The index provides an estimate of the yield that would be offered on 20-year general obligation bonds. The index has been calculated weekly since 1946. Less-frequent quotes are available dating to 1900.

11 Bond General Obligation Index
The 11-Bond Index uses a select, generally higher-rated group of 11 bonds from the 20-Bond Index. The average rating of the 11 bonds is roughly equivalent to Moody's "Aa1" and S&P's "AA+" and has the same 20-year maturity focus as the 20-bond index.

Revenue Bond Index
This index consists of 25 various revenue bonds that mature in 30 years. The average rating is roughly equivalent to Moody's "A1" and S&P's "A+." This index provides an estimation of the yield that would be offered on 30-year revenue bonds. The 25 issuers used for this index cover a broad range of types of issues (transportation, housing, hospital, water and sewer, pollution control, etc.). The revenue bond index was first calculated September 20, 1979.

One-Year Note Index
The one-year note index has been calculated since July 1989 and consists of 10 states and cities that are regular issuers of cash-flow notes.

Interactive Data Company Pricing and Reference Data

Interactive Data Corporation's Pricing and Reference Data business provides global securities pricing, evaluations and reference data designed to support financial institutions' and investment funds' pricing activities, securities operations, research and portfolio management. Interactive Data collects, edits, maintains and delivers data on over 10 million securities, including daily evaluations for approximately 2.8 million fixed income and international equity issues.

Interactive Data's services for municipal market professionals include evaluated pricing and reference data. Interactive Data's evaluated prices represent a good faith opinion of the price a buyer in the marketplace would pay for a security (typically in an institutional round lot position) in a current sale. The company's evaluated pricing covers approximately 1.1 million municipal issues and is included in many fixed income indices, such as the Barclays Capital Municipal Bond Index. Customers use Interactive Data's evaluated pricing, along with its listed markets pricing, for applications such as asset and portfolio valuation, including end-of-day mutual fund net asset values (NAVs), independent price verification and risk management. The company's Vantage web application provides transparency into the fixed income market and its evaluated prices while helping automate valuation and compliance processes.

Interactive Data's reference data covers approximately four million active and historical municipal bonds sourced from authoritative and official sources. Information includes basic descriptive data, expanded terms and conditions, default information, ratings, call and sinking fund schedules, use of proceeds, disclosure information and obligor information. Customers use the company's reference data for municipal securities to support a broad range of activities, including settlement processes related to purchases and sales of financial instruments, and for preparing reports and client account statements.

Municipal Market Advisors (MMA)

Median Par AAA General Obligation (G.O.) Daily Data Since August 1999

The MMA AAA Median yield data emanates from more than 30 institutions representing the variety of dealer and investor evaluations. The MMA AAA Median represents a "mid-market" yield (a "mid-market" yield represents the mid-point between the "bid" and "offered" side of the market) allowing for a more broadly applicable portrayal of cross-market spread relationships and clearing levels. Levels are based on a "Natural 'AAA' G.O. credit" (i.e. not pre-refunded or insured) with Maryland G.O. used as a general guide. The data is aggregated and outliers removed through a two-step process. Ranges of the input are distributed with the final median benchmark for better market understanding of the data and market conditions. The coupon rate has been held consistent as the current coupon rate since 1999 for historical analytical purposes. Call provisions are a standard 10-year par call. MMA AAA Median Data is currently available via Bloomberg, BondDesk, TheMuniCenter, Thomson Reuters and Knight Bondpoint. Data is made available by 3:30 p.m. eastern time to all market participants simultaneously.

MMA 5% AAA General Obligation — Daily Data Since February 2010

MMA's 5% "AAA" focuses on general obligation bonds and excludes pre-refunded or insured bonds. MMA yields are derived from evaluations from seven of the largest municipal underwriting firms of the current level of "AAA" yields based on secondary and primary market transactions. Each day, the participating municipal underwriting firms provide their assessment of bid-side yield to call levels for "AAA" five percent coupon, 10-year par call, tax-exempt municipal bonds based on trades in excess of $2 million. MMA receives a yield curve of 2 to 30-year maturities from each firm. The high and low for each maturity are dropped and the average of the remaining five underwriting firms is calculated. Coupon can be changed with consensus of participating firms to match market conditions. The MMA five percent data is available directly from MMA or via Bloomberg. Data is made available by 3:30 p.m. eastern time to all market participants simultaneously.

Thomson Municipal Market Data (MMD) AAA Curve

Thomson Reuters Municipal Market Data (MMD) AAA Curve is a proprietary yield curve that provides the offer-side of "AAA" rated state general obligation bonds, as determined by the MMD analyst team. The "AAA" scale (MMD Scale), is published by Municipal Market Data every day at 3:00 p.m. eastern standard time with earlier indications of market movement provided throughout the trading day. The MMD AAA curve represents the MMD analyst team's opinion of AAA valuation, based on institutional block size ($2 million+) market activity in both the primary and secondary municipal bond market. In the interest of transparency, MMD publishes extensive yield curve assumptions relating to various structural criteria which are used in filtering market information for the purpose of benchmark yield curve creation. MMD yield curves are available on a subscription basis from Thomson Reuters TM3.

Standard & Poor's (S&P)

S&P National AMT-Free Municipal Bond Index

The S&P National AMT-Free Municipal Bond Index is a broad, comprehensive, market value-weighted index designed to measure the performance of the investment-grade tax-exempt U.S. municipal bond market. The Index tracks over 8,500 bonds representing over $600 billion in par value. The S&P National AMT-Free Municipal Bond Index is rebalanced monthly and constituents are available through a subscription.

S&P Municipal Bond Index (Benchmark Index)

The S&P Municipal Bond Index is a broad, comprehensive, market value-weighted benchmark index designed to measure the performance of the U.S. municipal bond market. The Index tracks over 64,000 bonds representing over $1.3 trillion in par value. Municipal Bond Index is rebalanced monthly and contents are available through a subscription.

Securities Industry and Financial Markets Association (SIFMA) Municipal SWAP Index (SIFMA Index)

The SIFMA Index, also published by Thomson, is a seven-day high-grade market index comprised of tax-exempt variable rate demand obligations (VRDOs) from MMD's database. The SIFMA Index serves as a benchmark floating rate in a swap transaction. Designed to represent activity in the variable rate demand note market, the following criteria must be met for a reset to qualify for inclusion in the index:

- A weekly reset, effective on Wednesday (no lag resets considered);
- Not be subject to alternative minimum tax;
- Have an outstanding amount of $10 million or more;
- Have the highest short-term rating (VMIG1 by Moody's or A-1+ by S&P); and
- Pay interest on a monthly basis, calculated on an actual/actual basis.

In addition, only one quote per obligor per remarketing agent will be included in the SIFMA Index. Issues from all states are eligible for inclusion. The SIFMA Index is calculated on a weekly basis and released to subscribers on Thursday. The following criteria are considered in the SIFMA Index calculation:

- The standard deviation of the rates is calculated;
- Any issue falling outside of +/-1.0 standard deviations is dropped; and
- Each participating remarketing agent is limited to no more than 15% of the Index by an averaging method.

MMD's Variable Rate Demand Note Network is the primary source for information on VRDOs. Approximately 80 remarketing agents (representing more than 90 percent of the market) download daily rate change information for their issues to MMD's database. Interest rate and interest payment factor data is then retrieved electronically by portfolio managers, fund accountants, custodians, paying agents, and income collection departments. Data available includes current and historical rates, issue ratings, credit enhancements and detailed interest accrual specifications.

The SIFMA Index is comprised of actual issues. The actual number of issues that make up the SIFMA Index will vary in time as issues are redeemed, converted, and mature or are newly issued. In addition, if changes occur which violate the criteria or calculation methods, an issue will be dropped. Typically, the SIFMA Index has included several hundred issues in any given week. MMD's database contains extensive information for more than 15,000 active VRDOs. By applying the criteria mentioned above, MMD calculates the SIFMA Index.