

# BondWave's QCurves

## Quantitative, Transparent, Flexible, Comprehensive

BondWave's QCurves acknowledge that there are approximately 40,000 municipal bond trades per day from which to build quantitative yield curves. Using trades reported to the Municipal Securities Rulemaking Board's EMMA® system, QCurves are produced hourly and are available directly from BondWave. QCurves are constructed by ratings category, state or purpose classes. Custom QCurves can also be built.

### DATA (QUANTITATIVE)

- » QCurves utilize a variety of filters to ensure accuracy
  - Fixed coupon bonds with 5% coupons
  - For years to effective maturity  $\leq 10$ , non-callable bonds
  - For years to effective maturity  $> 10$ , exclude bonds with  $< 8$  years to next call
  - Within effective maturity and classification buckets a statistical dispersion outlier removal process is employed

### AVAILABLE FIELDS (TRANSPARENT)

- » Effective maturity bucket yields
- » Best fit yield curve calculated from effective maturity bucket yields
- » Number of trades per effective maturity bucket
- » Number of obligors per effective maturity bucket

### AVAILABLE QCURVES (FLEXIBLE/COMPREHENSIVE)

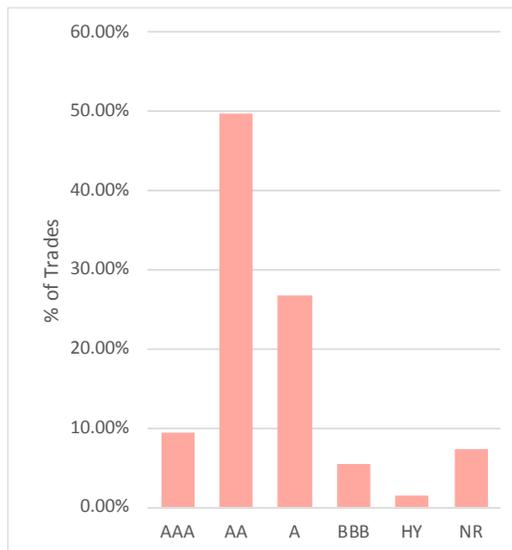
- |                    |                  |  |
|--------------------|------------------|--|
| » Rating Specific  | » State Specific | » Sector Specific                                |
| ▪ AAA Rated        | ▪ California     | ▪ Essential Revenue                              |
| ▪ AA Rated         | ▪ Florida        | ▪ Essential Unlimited General Obligation         |
| ▪ A Rated          | ▪ New Jersey     | ▪ Essential Limited General Obligation           |
| ▪ BBB Rated        | ▪ New York       | ▪ Essential Tax, Lease Revenue and Federal Grant |
| ▪ Investment Grade | ▪ Pennsylvania   | ▪ Nonessential Revenue                           |
|                    | ▪ Texas          |  |

# BondWave's QCurves

Quantitative, Transparent, Flexible, Comprehensive

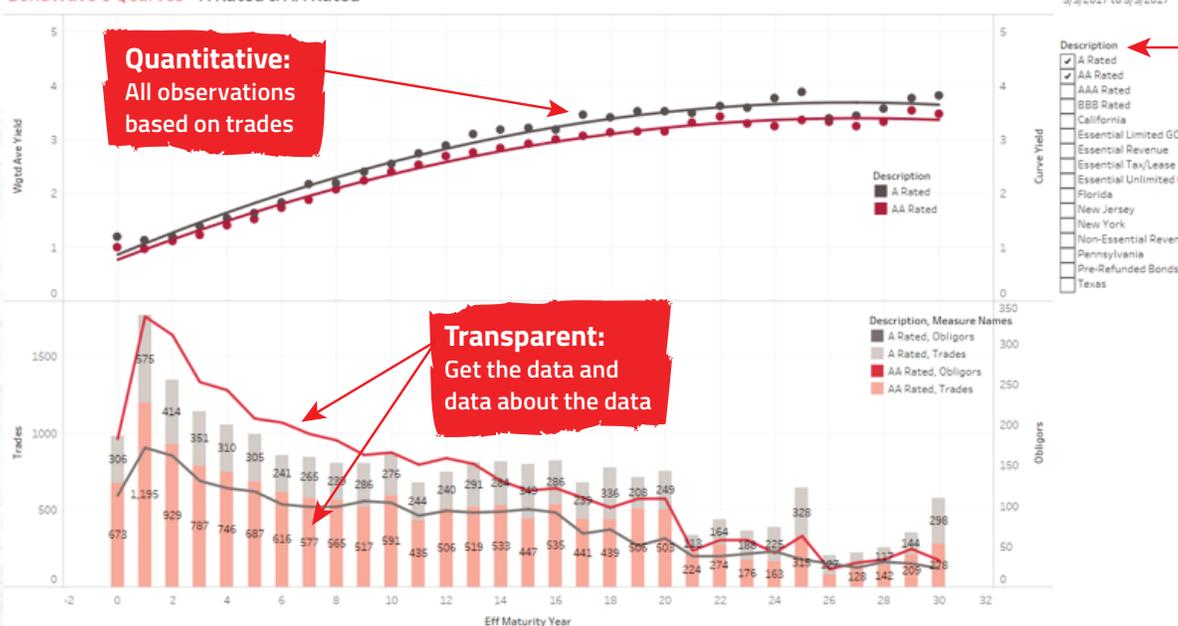
## AA QCURVE

The industry has become accustomed to a AAA curve for municipal bonds. This mirrors the corporate market where the Treasury curve, a proxy for the risk-free rate, is used to measure bond valuations. However, it does not mirror how municipal bonds trade. AAA municipal bond trading represent the least risky bonds in the view of the ratings agencies, but due to their under-representation in the universe of trades they do not represent the way the municipal market trades. AAA bonds account for less than 9% of all trades. Meanwhile, AA rated bonds represent more than 49% of all trades. When benchmarking it is best to use the category with the most data.



Source: MSRB Q1-Q3 2018

BondWave's QCurves - A Rated & AA Rated



Note: Example for illustrative purposes only.

# BondWave's QCurves

Quantitative, Transparent, Flexible, Comprehensive

## ABOUT BONDWAVE LLC

BondWave is a financial technology company specializing in fixed income solutions. We serve a wide range of customers, from small independent RIAs to some of the largest broker-dealers and custody providers in the financial services industry. Traders and advisors use our tools to provide a superior fixed income experience to their clients. By creating sophisticated, yet simple solutions for all stakeholders in the investment process, we help traders and advisors better leverage individual bonds as they work to achieve the investment objectives of their clients. Our tools enable strategy-based investing – including portfolio creation, monitoring and rebalancing – while greatly enhancing the communications between the trading desk, advisors and their clients. BondWave is liquidity and trade agnostic and our sole focus is to provide a simple, sophisticated user experience around individual bond investing.