



**PRICING
DATA**

BVAL Pricing Overview for Government, Supranational, Agency & Investment-Grade Corporate Bonds

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BVAL PRICING OVERVIEW FOR GOVERNMENT, SUPRANATIONAL, AGENCY & INVESTMENT-GRADE CORPORATE BONDS

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Bloomberg's BVAL Evaluated Pricing Service provides transparent and highly defensible prices for fixed income securities across the liquidity spectrum. The key to BVAL's methodology is its real-time access to market observations from a wealth of contributed sources. This accumulated mass of market data is the main driver of an innovative and quantitative approach that first corroborates market levels on actively traded bonds and then derives a comparable relative value price for those securities that are less liquid.

This methodology aligns with Bloomberg's trusted capabilities as the financial industry's leading analytics platform and source of fixed income information. In addition to sophisticated algorithms that generate evaluated prices, the BVAL methodology assigns a BVAL Score based on the amount and consistency of market data used in our models.

This BVAL methodology overview covers government, supranational, agency and investment-grade corporate bonds for bullet and callable as well as fixed- and floating-rate structures.

BVAL AT A GLANCE

The BVAL <GO> function, available on the Bloomberg Professional® service, enables clients to view BVAL Evaluated Prices, the BVAL Score, related metrics and useful information available to Bloomberg Data License clients via data feeds. Throughout the BVAL <GO> function, you can

examine how BVAL pricing methodologies are applied and the depth of data supporting the algorithms. The interface provides a level of transparency unavailable anywhere else. This visibility greatly assists our clients in making highly informed fixed income valuation decisions.

BVAL EVALUATED PRICING SCREEN – BVAL <GO>

BVAL's unique pricing transparency starts on the Terminal. Figure 1 shows BVAL's Evaluated Pricing screen, which summarizes all the information used in the pricing methodology of a unique bond ("Target Bond"). Simply load the Target Bond on your Bloomberg Terminal® and type BVAL <GO>.

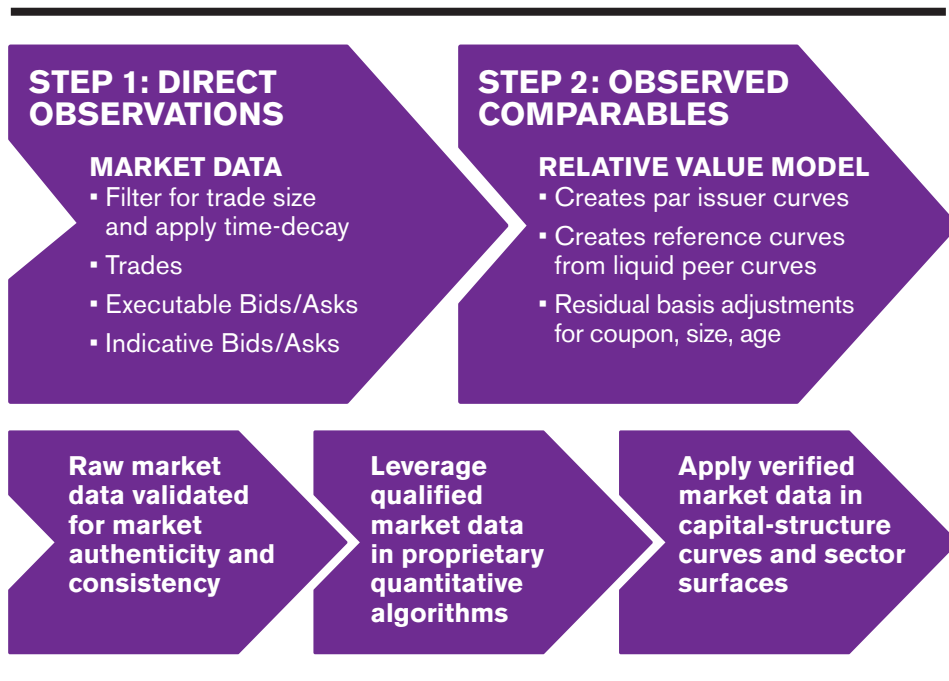
The Final BVAL Price is derived using a two-pronged approach based on a combined sequence of proprietary BVAL algorithms:

- **Step One – Direct Observations** uses trades, executable levels and indicative quotes on the Target Bond.
- **Step Two – Observed Comparables** uses direct observations on comparable bonds to derive a relative value price on the Target Bond when direct market observations on the Target Bond are insufficient.

To corroborate the results of each algorithm, market data is run through both steps. To derive a Final BVAL Price, the results are then appropriately weighted and aggregated based on the relative strength of each algorithm. In this way, BVAL produces a high-quality price for every Target Bond regardless of the quantity of market data available.



Figure 1 – BVAL Evaluated Pricing Screen – BVAL <GO>



STEP ONE – DIRECT OBSERVATIONS

Direct Observations uses Bloomberg's proprietary screening algorithm to analyze real-time market data received from BVAL's pricing contributors. This sophisticated algorithm works to include TRACE trades and indicative market quotes from global and regional banks, broker-dealers and exchanges as well as executable levels from Bloomberg's electronic trading platform. This contributed content is filtered and time-decayed to include only the highest-quality observations; if these observations are corroborated, they are used to compute an independent Direct Observations price. If trade data

received meets certain thresholds, the Direct Observations price will be heavily weighted by trades. The Direct Observations algorithm uses either price or spread over benchmark inputs according to asset-class convention to generate a bid, mid and ask price for every Target Bond.

DIRECT OBSERVATIONS SCREEN

Figure 2 shows the BVAL Direct Observations screen, which summarizes the information used to price a Target Bond in the Direct Observations model. Key highlights include the Final BVAL Price, the

Final BVAL Score (out of 10 — discussed in further detail below), the Direct Observations Price, the price and weights assigned to trades, executable bids/asks and indicative bids/asks, the number of weighted market observations used in the algorithm and their standard deviation. The market inputs used in the Direct Observations algorithm are clearly displayed in color code and time sequence for every Target Bond.

Mouse over any green square to get further trade details, including dealer buy/sell or dealer-to-dealer reporting entity, spread, size, date and time.

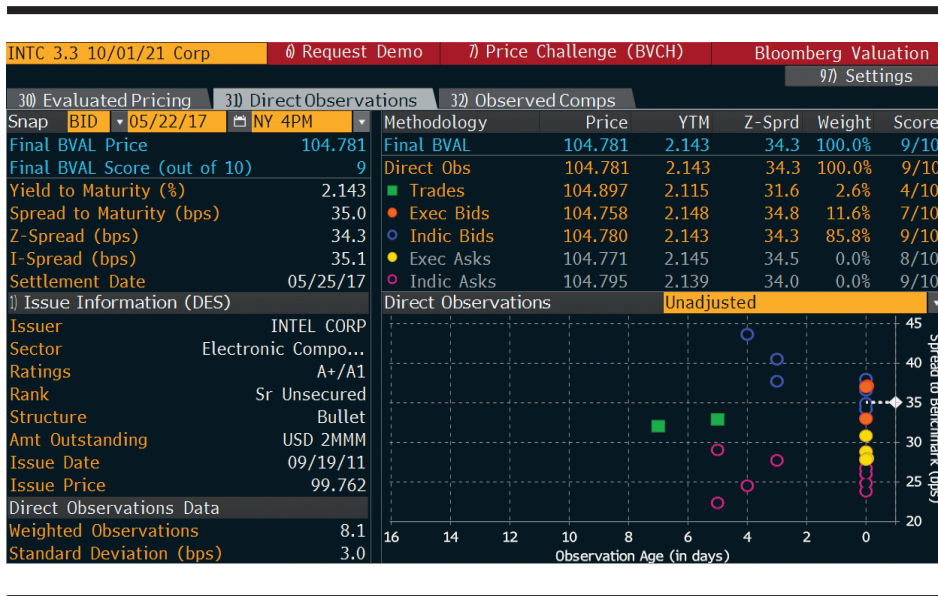


Figure 2 – Direct Observations Screen – Market Data

STEP TWO – OBSERVED COMPARABLES

Observed Comparables uses Bloomberg's proprietary relative value algorithm to price bonds with limited or no market observations. A Target Bond with insufficient market data is priced relative to comparable liquid bonds. In this final step, BVAL uses two different algorithmic approaches based on a Target Bond's asset class and technical characteristics:

Bullet Par Issuer Curve Model

Used for investment-grade bullet bonds (fixed and floating) across government, supranational, agency and investment-grade corporate sectors. This methodology first normalizes the Target Bond for technical characteristics, namely high coupon premiums, size of issue, age in the market and not-rated status. This information is then used to derive a bullet par issuer curve based on direct market observations across an issuer's term structure. A Target Bond with no market observation is algorithmically priced using the appropriate maturity point on its par

issuer curve. If a par issuer curve cannot be derived from direct market observations on bonds within the same issuer, then an appropriate reference curve is created using a combination of comparable liquid par peer curves within the same industry, credit quality and seniority rank in the capital structure.

Callable Option-Adjusted-Spread (OAS) Model

Used for agency, supranational and investment-grade callable bonds, this methodology uses the liquid bullet par issuer curve as the benchmark curve and quantitatively determines the OAS/Duration of the Target Bond. If a liquid bullet par issuer curve cannot be derived, an appropriate reference curve is created using a combination of comparable liquid peer curves within the same industry, credit quality and seniority rank in the capital structure. An OAS/Duration of the callable Target Bond is then calculated to derive an Observed Comparables price.

OBSERVED COMPARABLES SCREEN – BULLET PAR ISSUER CURVE MODEL

Figure 3 shows the Observed Comparables screen, which summarizes all the information used to price a Target Bond. Key highlights include the Observed Comparables Price, the Observed Comparables Score (out of 5 — discussed in further detail below), the weight of the Observed Comparables algorithm used in the Final BVAL Price, the bullet par issuer curve and corresponding reference curves, the derived point used to price the Target Bond, the Observed Residual and the Predicted Residual.

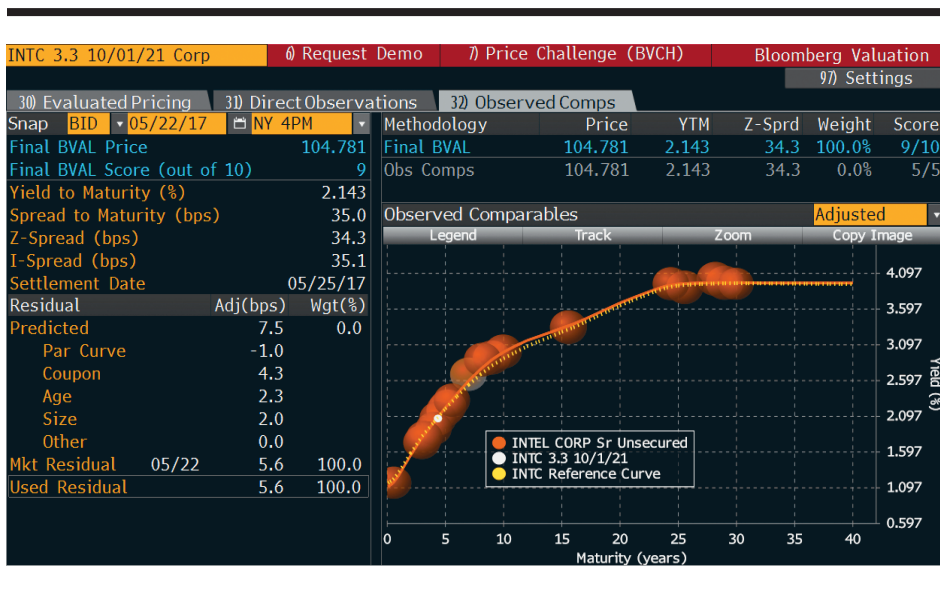


Figure 3 – Observed Comparables Screen (investment-grade bullet) – YTM

**OBSERVED COMPARABLES
SCREEN – CALLABLE
OAS MODEL**

Figure 4 shows the Observed Comparables screen, which summarizes the information used to price a Target Callable Bond. This is a robust two-pronged methodology that recognizes the OAS associated with a callable bond relative to an issuer's yield-to-maturity (YTM) bullet curve. To illustrate, the Observed Comparables screen is split to show the bullet reference curve and OAS to the benchmark reference curve for a Target Callable Bond. Additional key screen highlights include the Observed Comparables Price, the Observed Comparables Score (out of 5 – discussed in further detail below), the Observed Comparables Price Weight used in the Final BVAL Price, OAS, the Observed Residual and the Predicted Residual.

NOT-RATED BONDS

For bonds with no publicly available credit ratings ("Target NR Bond"), BVAL estimates credit quality using credit spreads on all comparable publicly rated bonds issued at the same time and within the same industry, region and currency. BVAL then uses its proprietary pricing methodology and factors in a spread premium to reflect the less-liquid nature of a Target NR Bond versus its publicly rated peers.

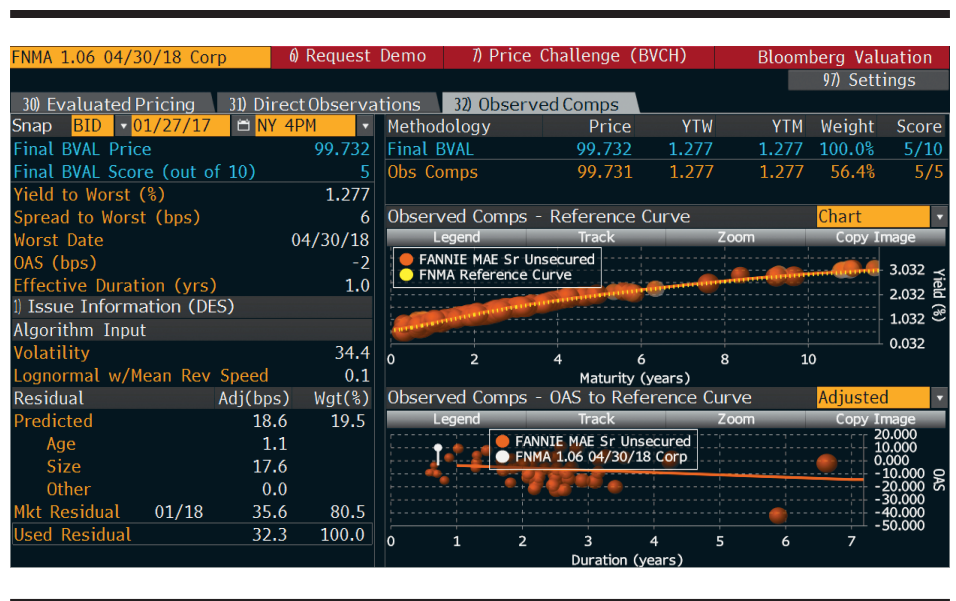


Figure 4 – Observed Comparables Screen (Agency callables) – OAS to Duration

PREVIOUS BVAL PRICE – STABILIZATION FACTOR

In addition to the two-pronged approach detailed above, BVAL has implemented a stabilization mechanism to reduce price volatility from one snapshot to the next. This factor is used only in connection with the Observed Comparables algorithm when the current snapshot has weaker market data relative to the previous Final BVAL Price. In these cases, the Previous BVAL Price is algorithmically weighted and combined with the newly derived Observed Comparables Price to appropriately manage price volatility on less-liquid bonds.

BVAL SCORE

The BVAL Score is a proprietary and innovative metric designed to gauge the level of market data used in constructing the Final BVAL Price. The BVAL Score measures the amount and consistency of market data used in our models. A BVAL Score is calculated for each algorithm — Direct Observations and Observed Comparables — which are then appropriately weighted to derive a Final BVAL Score. The Final BVAL Score is measured on a scale of 1 (the lowest) to 10 (the highest).

Given that the BVAL Score measures the amount and consistency of market data used, the Direct Observations methodology can receive a maximum BVAL Score of 10. Observed Comparables derives a price using comparable bond observations and can, therefore, receive a maximum BVAL Score of 5.

SUMMARY

The Final BVAL Price is a product of Bloomberg's proprietary quantitative approaches and methodologies. The algorithms used, along with Bloomberg's wealth of information, analytics and transparency, are all key features that set BVAL apart from its competitors. Distinct from a single-technique approach, BVAL is able to corroborate its pricing by employing multiple methodologies to produce separate prices for a Target Bond based on the amount of quality market data used in each step. These prices are ultimately combined to derive a Final BVAL Price.

BVAL's multi-method approach ensures that if market data is insufficient, the Target Bond will be priced nonetheless. The BVAL Score, which measures the amount and consistency of market observations used in the BVAL algorithms, is a valuable and unique concept created specifically by Bloomberg's evaluated pricing service. The transparency available on the Bloomberg Terminal via BVAL <GO>, the ability to integrate Bloomberg's Enterprise feed into our clients' infrastructure via Data License and the access to a global team of evaluators in New York, London and

Asia with significant capital markets experience are second to none. Quality pricing, broad-based asset-class coverage, timely distribution and full transparency establish BVAL as the highest standard in the evaluated pricing industry.

BLOOMBERG FOR ENTERPRISE

To succeed today, financial institutions must respond to challenges that are not addressed by traditional approaches. They require world-class solutions that integrate people, processes, information and technology for the front office, middle office and operations. Bloomberg partners with these institutions to protect and capitalize on data, manage risk, deliver transparency and control costs. Through enterprise-level expertise and three decades of deep industry experience, Bloomberg creates real value through the use of innovative technology that turns data into a strategic asset.

TAKE THE NEXT STEP

Learn more about how we can help your firm increase the rigor and transparency of pricing. Visit bloomberg.com/enterprise or reach us at bval@bloomberg.net.

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