Canadian Fixed Income Reference Pricing Service

Methodology Document

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CanDeal Data & Analytics (DNA) Canadian Fixed Income Reference Pricing Service offers valuations of a universe of over 95,000 Canadian fixed income securities at multiple snap times throughout the day.

Our unique partnership with the trading desks at the leading Canadian banks and dealers along with our proprietary quantitative techniques ensure that our Reference Prices are the most accurate representation of the Canadian wholesale fixed income market.

CanDeal DNA uses dealer-sourced pricing and terms and conditions data to provide industry practitioners with best-in-class independent, accurate and transparent pricing, enabling clients to better monitor, understand and manage their market exposure and optimize their models and analyses.

1. CanDeal Data & Analytics (DNA)

Along with CanDeal Markets and CanDeal Solutions, CanDeal DNA is part of CanDeal Group. CanDeal DNA was formed to provide market participants globally with wide coverage and the highest quality for Canadian fixed income pricing, reference data and analytics. Launched in 2001 by Canada's six largest banks, CanDeal Markets is the leading electronic marketplace for institutional trading in Canadian bonds, money market instruments and interest rate swaps. CanDeal Solutions is an internal incubator for developing innovative workflows and applications for trading, risk management and compliance including an industry collaboration for KYC and AML.

2. Pricing for the Canadian Fixed Income Universe

CanDeal DNA provides unparalleled coverage of the universe of Canadian fixed income securities, spanning highly liquid on-the-run bonds to highly illiquid mortgage pools and asset-backed securities. Using pricing inputs from Canada's leading banks and dealers, our contributors represent most of the trading activity in the Canadian OTC bond market.

CanDeal DNA publishes intraday prices for each security using dealer contributed price quotations and trade reports. We deploy proprietary methodologies developed in collaboration with our dealer partners ensuring accuracy, depth and breadth of coverage.

Rates
- Government of Canada
- Federal Agencies
- Real Return Bonds
- Related Bills & Strips

Credit

- Provincials & Agencies

- Municipals

- Canadian Corporates

- Project Finance

- Commercial Paper

- Maples

- Related Bills & Strips

Asset Backed

- NHA Mortgage Pools

- Canada Housing Trust

- Securitizations

- Asset-Backed Commercial Paper

- Commercial MBS

- Residential MBS

3. CanDeal DNA Data Processing and Platform

CanDeal DNA uses a fully automated cloud-based technology platform to acquire and process hundreds of thousands of securities quotations per day. Our highly scalable infrastructure allows us to utilize sophisticated algorithms for data validation while meeting our clients' stringent timelines for fast delivery of high-quality data products.

3.1. Data Acquisition

The foundation of our products is our unique ability to gather front-office trade and pricing data from Canada's leading fixed income dealers. Using **IOSCO principles**, CanDeal DNA has a *Data Submission Guide* setting out quality standards for our contributors, and oversight and transparency requirements. Our technology platform monitors compliance with these guidelines and provides feedback to contributors on data quality and timeliness, resulting in a continuous feedback loop and input improvement process.

3.2. Data Validation

CanDeal DNA aggregates detailed Trade Report feeds from our contributors. This information enables us to validate that our contributed price quotations accurately represent institutional trading in the OTC market.

Our comprehensive rules-based data quality solution verifies that contributed data is accurate, timely, and free of semantic errors such as crossed quotes, locked markets, and outliers.

Our input data set is composed of price quotations, trade reports, and reference data:

- **Price Quotations** are two-sided quotes for institutional-sized transactions, sourced directly from the primary pricing engine utilized by the dealing firm's front office traders. This provides CanDeal DNA with the same information that those traders use for instrument valuations and trade decision making.

- **Trade Reports** are the complete record of each contributing dealer's transactions across all channels and with all clients, including related parties.

- **Reference Data** is a direct feed of prospectuses and term sheets from the dealer's origination and syndication teams.

4. Composite Price Methodology

Composites of dealer sourced observable quotations are the core of CanDeal DNA's information advantage. Our proprietary Performance Filtered Composite (PFC) methodology uses cloud-based compute power to back-test each price contributor's quotes for fidelity to the trading history of each security in our Canadian fixed income universe. We filter composite contributions by the contributor's Tracking Error to trades in order to guarantee that our composites are built using prices proven accurate by the traded market. The Tracking Error calibrates each dealer's contributed prices against trades to confirm quote quality and rank for inclusion in the composite price against predetermined minimum thresholds. Using our unique methodology results in composite pricing for 30,000+ securities and sector and issuer yield curves populated with best available composite prices.

5. Trade Class

CanDeal DNA's Trade Class is our proprietary metadata tool that documents the power of our validation process on a security-by-security basis based on liquidity and traded prices.

6. Broad Coverage of the Canadian Fixed Income Universe

Characteristics of the Canadian fixed income market make it difficult to achieve accurate prices for the full depth and breadth of the market. CanDeal DNA has defined and implemented methodologies to optimize the contributor price inputs using quantitative tools and filters to enable us to produce Reference Pricing for over 95,000 securities.

6.1. Observable Prices

CanDeal DNA produces and identifies three types of observable composites in our data products: Each observable composite price is calculated using the average of validated dealer contributions. The composites are calculated using the following input hierarchy as defined below:

- **Performance Filtered Composites (PFC)** is our proprietary composite price that minimizes the Tracking Error metric to the traded market. Our goal is to represent the price that an institution would be quoted by the leading market makers in a security when negotiating a trade.

- **Average Composites (AVG)** represents the average of validated prices contributed by market makers in less liquid securities. The AVG is a reliable proxy for the price an institution would receive in response to a request for quote from dealers that provide liquidity in the security.

- **Single Dealer Prices (SDP)** offer indicative quotations for highly illiquid securities.

The bid-offer spread for composite prices is derived from observed and valid two-sided prices to ensure a positive spread that can be traced back to individual submitted two-sided quotes.

6.2. Evaluated Price Methodology

CanDeal DNA uses a proprietary evaluated pricing engine to ensure accurate and timely pricing on over 95,000 Canadian fixed income securities each day. We provide coverage of Canadian rates, credit and asset-backed instruments, including NHA mortgage pools, money markets, strips, municipals, and real return bonds using models specifically designed to reflect a trader's view of the market. Our pricing models have been designed in collaboration with Canada's leading traders.

To ensure both accuracy and coverage, our curve-based evaluated pricing model constructs a waterfall of curves by issuer/sector. Our curves are built using the highest quality composite prices available as inputs and subject to a daily stability framework that ensures the continuity of point values across time and is designed to measure and optimize the quality of fit.

6.3. IOSCO Principles

We have leveraged our unique relationship with Canada's banks to ensure prudent governance of our valuation practice. Our Evaluated Pricing Working Group includes representatives from the finance, valuation and market risk teams at all six major Canadian banks. Our Pricing Committee provides oversight from senior capital markets executives. We have documented and made transparent our methodologies and processes for managing price challenges and other requests for information.

7. Support

Our information advantage is not our only business advantage: we seek to be fully transparent in our processes, and to provide high-touch quantitative and operational support to our clients.

CanDeal's Data Operations team provides one-day responses to price challenges. Our standard response includes a full report on contributed prices, the impact of our data grooming process, and diagnostics on our evaluated pricing process. To initiate a price challenge, clients are asked to submit the date, time, security details and both DNA and expected price levels to **DNASupport@candeal.com**.

CanDeal DNA's technology is supported by the same team who operate CanDeal Markets trading services. Our cloud-hosted platform is scalable and secure.

7.1. Additional Resources

- **IOSCO Principles**

- **Price Challenge Procedures**

- **Complaints and Whistleblowing Policy**

7.2. Contact Us

To learn more about our CanDeal DNA solutions or to speak with a sales representative, contact us:

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