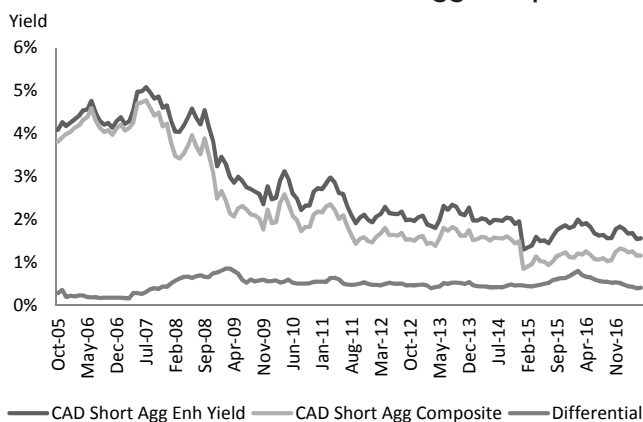# Canadian Short Aggregate Enhanced Yield Index

The Bloomberg Barclays Canadian Short Aggregate Enhanced Yield Index aims to achieve a higher yield than the short-end of the Bloomberg Barclays Canadian Aggregate Bond Index. Yield can typically be increased by shifting exposure along a number of different risk dimensions, including sector exposure (i.e., Treasury, agency, credit, securitized), interest rate risk (i.e., duration) and credit risk (i.e., spread). The index uses a rules-based approach to reweight the sub-components of the Canadian Short Aggregate Composite Index such that yield is maximized – subject to certain constraints – while the risk characteristics are broadly preserved. The Canadian Short Aggregate Composite Index is a market-value weighted combination of Treasury, government-related and corporate securities with 1-5 remaining years to maturity. Hence, the Canadian Short Aggregate Enhanced Yield Index risk is quantified as tracking error to the Canadian Short Aggregate Composite Index. The Canadian Short Aggregate Enhanced Yield Index was launched at the end of April 2017, with history backfilled to October 2005.

## Historical Average Yields – Canadian Short Agg Enhanced Yield vs Canadian Short Agg Composite



CAD Short Agg Enh Yield — CAD Short Agg Composite — Differential

## Canadian Short Aggregate Enhanced Yield vs Canadian Short Aggregate Composite*

|  | CAD Short Agg Enh Yield | Canadian Short Agg |
|---|---|---|
| Annualized Total Return Since Inception | 4.01% | 3.39% |
| Annualized Volatility Since Inception | 1.85% | 1.67% |
| Total Return / Volatility | 2.14 | 2.00 |
| Max Drawdown / Volatility | 0.64 | 0.64 |
| Realized Monthly TEV vs. Canadian Short Agg | 14bp | |
| Duration | 3.16 | 2.75 |
| Yield to Worst | 1.55 | 1.15 |
| Additional Yield to Worst vs. Canadian Short Agg | 40bp | |
| Avg Additional Yield to Worst Since Inception | 48bp | |

*Note: Data are as of May 2017. Annualized values shown through May 2017.

## Methodology & Weight Calculations

**Overview**

The index uses a rules–based approach to reweight the Canadian Short Aggregate Index such that yield is increased, while risk characteristics of the index are preserved. Four steps are used in the calculation of weights/ allocations and returns/statistics:

1. Specification of Buckets
2. Determination of Constraints
3. Determination of Bucket Weights
4. Calculation of Returns and Statistics

**Step 1:
Specification of Buckets**

The Canadian Short Aggregate Enhanced Yield Index reweights majors sub–components of the Canadian Short Aggregate Index (rather than individual securities) using 8 "buckets" (Figure 1). The buckets are chosen to allow for meaningful yield differentials between components based on their primary risk characteristics (sector, duration and credit quality), while retaining adequate size for liquidity and trading purposes. Individual securities within each bucket retain identical market value weights between the Canadian Short Aggregate Enhanced Yield and the Canadian Short Aggregate Composite Indices.

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## Methodology & Weight Calculations

**Figure 1**
**Buckets Comprising the Canadian Short Aggregate Enhanced Yield Index**

| Risk Dimension | Rates | | Spread | |
|---|---|---|---|---|
| Sector | Treasury | Government–Related | Corporate | |
| Bucket | Canadian Treasury 1–3 Years | Canadian Government–Related 1–3 Years | Canadian Corporate 1–3 Years A and Above | Canadian Corporate 1–3 Years Baa |
| | Canadian Treasury 3–5 Years | Canadian Government–Related 3–5 Years | Canadian Corporate 3–5 Years A and Above | Canadian Corporate 3–5 Years Baa |

| | |
|---|---|
| **Step 2:** **Determination of Constraints** | An optimizer is used to set the weight of each of the 8 buckets in the Canadian Short Aggregate Enhanced Yield Index with the objective of maximizing the yield of the index, subject to certain constraints that are designed to control risk and limit turnover. The optimizer is subject to the following constraints: <ul><li>The forecasted monthly tracking error volatility (TEV) of the Canadian Short Aggregate Enhanced Yield Index relative to the Canadian Short Aggregate Composite is less than or equal to 17.5bp per month.</li><li>The duration extension of the Canadian Short Aggregate Enhanced Yield Index cannot be more than 0.5 years longer than the duration of the Canadian Short Aggregate Composite.</li><li>The notional weight of each Canadian Short Aggregate Enhanced Yield Index bucket in Figure 1 cannot deviate from its weight in the Canadian Short Aggregate Composite by more than 15%.</li><li>The total notional weight of each of the asset classes in Figure 1 (Treasury, Government–Related, and Corporate) cannot deviate from their weights in the Canadian Short Aggregate Composite Index by more than 30%, 30%, and 30%, respectively.</li><li>The total notional weight of the Baa buckets in the Canadian Short Aggregate Enhanced Yield Index (Canadian Corporate 1–3 Years Baa, Canadian Corporate 3–5 Years Baa) cannot deviate from their total notional weight in the Canadian Short Aggregate Composite Index by more than 30% each month.</li><li>The portfolio turnover due to monthly reweighting of the buckets must be less than 5% per month.</li><li>In the event that the optimizer cannot find a solution given the above constraints, the monthly turnover limit shall be increased by 1% in a step–wise fashion until a solution is found.</li></ul> |
| **Step 3:** **Determination of Bucket Weights** | With all of the constraints simultaneously in place, the optimizer is run to determine the buckets' weights. |
| **Step 4:** **Calculation of Returns and Statistics** | Once the weights are derived for each of the 8 buckets, total return is calculated by multiplying the weight of the bucket by its month–to–date return and then summing these values. While total return is the official measure of performance of the index, excess return (return over duration neutral Treasuries) is also published. Several average statistics for the index are also calculated by multiplying the bucket weight by the corresponding statistic of that bucket. Average statistics published include: option–adjusted duration (OAD), yield, price, and option–adjusted spread (OAS). |

## Yield and Tracking Error Volatility Calculations

| | |
|---|---|
| **Yield Calculation** | Yields used in the optimization for determining the bucket weights are based on yield–to–worst. |
| **Determination of TEV** | The forecasted tracking error volatility ($TEV_i$) of each bucket in the Canadian Short Aggregate Enhanced Yield Index is a function of the deviation of the bucket's weight ($w_i$) from the Canadian Short Aggregate Composite and the forecasted covariance of its returns ($\sum$) with that of all the other buckets' returns. This can be expressed as the following: $TEV_i = (w^t\sum)_i w_i$. The TEV of the Canadian Short Aggregate Enhanced Yield Index is the sum of the TEV of each of the 8 buckets. <br> The forecasted covariance matrix of the buckets' returns is constructed from exponentially–weighted moving averages of the volatilities and correlations of the buckets' historical returns. Volatilities and correlations are forecasted separately to allow for slightly different models to be used to appropriately forecast the volatilities of different buckets as well as to reduce measurement error that can be present in joint estimation. <br> For all the buckets in the "Rates" asset class in Figure 1, volatility is forecasted from historical total return volatility. For the buckets in the "Spread" asset class Figure 1, we incorporate a forward–looking risk measure, DTS, to |

## Yield and Tracking Error Volatility Calculations

better forecast volatility. We first decompose the returns of these buckets into a rates component and a spread component. The volatility of the spread component, however, is forecasted using Duration Times Spread (DTS[1]). This measure incorporates current market information (spreads) and, thus, is more responsive to changes in market environments and risk than historical estimates.

## Rebalancing Rules

| | |
|---|---|
| **Frequency** | The weights of the components in the Canadian Short Aggregate Enhanced Yield Index are rebalanced on a monthly basis using data three days prior to the month–end date (T–3). This allows for three days advanced notice for any weighting changes among buckets. The new weights will be applied to the Projected (Forward) Universe on a T–3 basis. |
| | Within the components themselves, Bloomberg maintains two universes of securities: the Returns (Backward) and the Projected Universes. The composition of the Returns Universe is rebalanced at each month–end and represents the fixed set of bonds on which index returns are calculated. The Projected Universe is a forward–looking projection that changes daily to reflect issues dropping out of and entering the index but is not used for return calculations. On the last business day of the month (the rebalancing date), the composition of the latest Projected Universe becomes the Returns Universe for the following month. |
| **Index Changes** | During the month, indicative changes to securities (credit rating change, sector reclassification, amount outstanding changes, corporate actions, and ticker changes) are reflected daily in the Projected and Returns Universes of the index. These changes may cause bonds to enter or fall out of the Projected Universe of the index on a daily basis, but will affect the composition of the Returns Universe at month–end only, when the index is next rebalanced. |
| **Reinvestment of Cash Flows** | Intra–month cash flows from interest and principal payments contribute to monthly index returns but are not reinvested at a short–term reinvestment rate between rebalance dates. At each rebalancing, cash is effectively reinvested into the Returns Universe for the following month so that index results over two or more months reflect monthly compounding. |
| **New Issues** | Qualifying securities issued, but not necessarily settled on or before the month–end rebalancing date, qualify for inclusion in the following month's index if the required security reference information and pricing are readily available. |

## Pricing and Related Issues

| | |
|---|---|
| **Sources & Frequency** | Bonds are priced on a daily basis by Bloomberg's evaluated pricing service, BVAL. |
| **Pricing Quotes** | Bonds are quoted on a dollar basis. |
| **Timing** | 4pm (New York time) for all securities. On early market closes, prices are taken as of 1pm (New York time), unless otherwise noted. |
| **Bid or Offer Side** | Bonds in the index are priced on the bid side. |
| **Settlement Assumptions** | T+1 calendar day settlement basis for all bonds. At month–end, settlement is assumed to be the first calendar day of the following month, even if the last business day is not the last day of the month, to allow for one full month of accrued interest to be calculated. |
| **Verification** | Daily price moves for each security are analyzed by the index pricing team to identify outliers. Index users may also challenge price levels, which are then reviewed and updated as needed. |
| **Calendar** | The Canadian Short Aggregate Enhanced Yield Index follows the US bond market holiday schedule. |

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[1] Excess returns due to spread changes can be decomposed into duration times spread change, and further decomposed into DTS times the percentage spread change: $ER \cong -D * \delta S = -D * S * \frac{\delta S}{S} = -DTS * \frac{\delta S}{S}$. The volatility of percentage spread changes tends to be relatively stable; thus, excess return volatility is roughly proportional to DTS. Since DTS includes current spreads (i.e. the latest market information), the DTS-based forecast allows the model to be more responsive to changes in perceived risk.

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## Monthly Returns in CAD, 2005-2017 (%)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | CAD Sh Enh Yield YTD | CAD Sh Agg YTD |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|
| 2005 | – | – | – | – | – | – | – | – | – | −0.49 | 0.12 | 0.12 | −0.25 | −0.19 |
| 2006 | 0.17 | 0.12 | 0.22 | −0.02 | 0.27 | −0.16 | 1.22 | 0.93 | 0.61 | 0.24 | 0.69 | −0.08 | 4.26 | 4.04 |
| 2007 | 0.11 | 0.79 | 0.18 | −0.31 | −0.88 | 0.36 | 0.19 | 0.75 | 0.66 | 0.39 | 1.08 | 0.21 | 3.58 | 4.20 |
| 2008 | 1.45 | 1.14 | 0.49 | 0.05 | −0.18 | −0.22 | 1.09 | 0.78 | −1.00 | 0.51 | 1.51 | 1.66 | 7.50 | 8.92 |
| 2009 | −0.19 | 0.86 | 1.34 | 0.67 | −0.15 | 0.62 | 0.81 | 0.69 | 0.56 | 0.44 | 1.02 | −0.80 | 6.01 | 3.67 |
| 2010 | 1.36 | 0.15 | −0.90 | −0.25 | 0.77 | 1.40 | 0.69 | 1.08 | 0.31 | 0.22 | −0.77 | 0.25 | 4.38 | 3.34 |
| 2011 | 0.29 | −0.09 | 0.01 | 0.82 | 0.90 | 0.17 | 1.21 | 0.57 | 0.81 | −0.14 | −0.03 | 0.66 | 5.30 | 4.45 |
| 2012 | 0.46 | −0.17 | 0.09 | −0.05 | 0.66 | 0.28 | 0.33 | 0.12 | 0.87 | 0.18 | 0.37 | 0.01 | 3.18 | 1.98 |
| 2013 | 0.12 | 0.84 | 0.31 | 0.43 | −0.41 | −0.70 | 0.51 | −0.15 | 0.40 | 0.76 | 0.37 | −0.15 | 2.33 | 1.74 |
| 2014 | 1.26 | 0.27 | 0.05 | 0.32 | 0.53 | 0.06 | 0.25 | 0.30 | −0.11 | 0.31 | 0.66 | 0.15 | 4.12 | 3.01 |
| 2015 | 2.34 | −0.00 | −0.01 | −0.51 | 0.48 | 0.18 | 0.41 | −0.34 | −0.22 | −0.02 | 0.08 | 0.50 | 2.89 | 2.51 |
| 2016 | 0.11 | −0.25 | 0.65 | 0.11 | 0.41 | 0.48 | 0.32 | 0.15 | 0.36 | 0.09 | −0.52 | −0.00 | 1.92 | 0.86 |
| 2017 | 0.36 | 0.52 | 0.17 | 0.57 | 0.12 | – | – | – | – | – | – | – | 1.75 | 1.22 |

## Accessing Index Data

| | |
|---|---|
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| | • INDEX<Go> – The Bloomberg Indices landing page is a dashboard for index–related information on the terminal. Find daily and monthly index returns for key indices from each index family as well as index publications including methodologies, factsheets, monthly reports, updates and alerts. |
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| | • PORT<Go> – Bloomberg's Portfolio & Risk Analytics solution includes tools to analyze the risk, return, and current structure of indices. Analyze the performance of a portfolio versus a benchmark or use models for performance attribution, tracking error analysis, value–at–risk, scenario analysis, and optimization. |
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## Bloomberg Total Return Index Value Tickers: Canadian Short Aggregate Enhanced Yield and Related Indices

| Ticker (CAD Unhedged) | Index | Ticker (USD Unhedged) Index | |
|---|---|---|---|
| BDGSTRDU | Canadian Short Aggregate Enhanced Yield Index | BUASTRUU | US Short Aggregate Enhanced Yield Index |
| BDGLTRDU | Canadian Aggregate Enhanced Yield Index | BAYDTRUU | US Aggregate Enhanced Yield Index |
| LGCATRDU | Canadian Aggregate Index | LBUSTRUU | US Aggregate Index |

Total Return Index Values are available in other currencies and on a hedged basis. Attributes such as yield and duration are also available. Please refer to Accessing Bloomberg Barclays Index Data Using Bloomberg Tickers for a full list of tickers and attributes that are available.

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