



LDI Solutions

PENSION CURVE INSIDER

February 2019



Aaron Stonacek, FSA, CFA
Solutions Analyst
aaron_stonacek@troweprice.com
(410) 577-8128



Justin Harvey, ASA, CFA
Solutions Strategist
justin_harvey@troweprice.com
(410) 345-6847

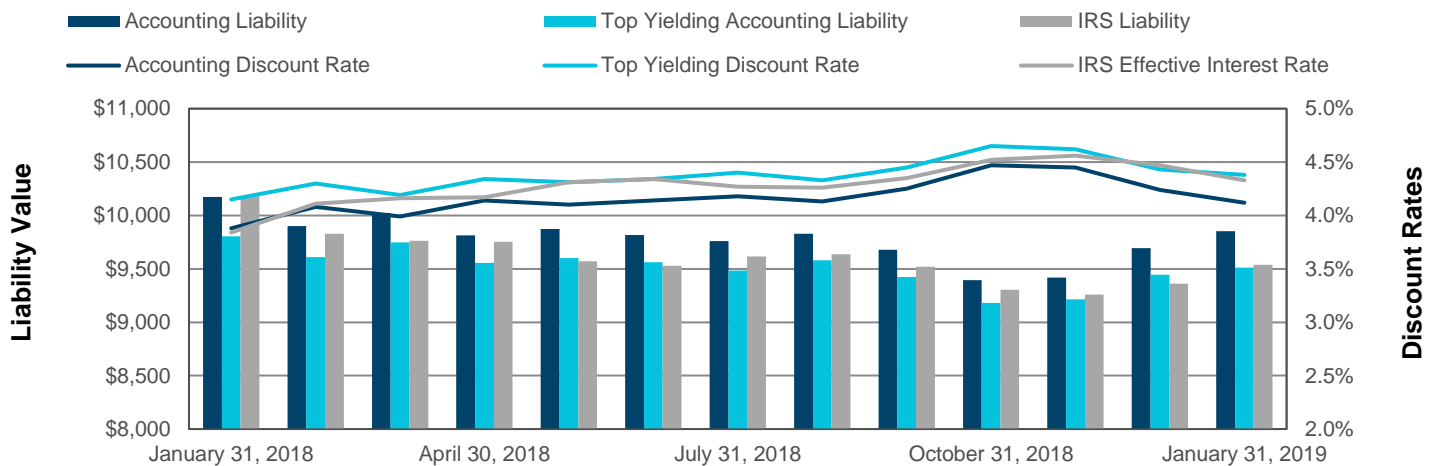
MONTHLY RECAP

Marked-to-market discount rates dropped modestly to start the new year as the Treasury curve shifted down across all tenors. The short and long ends of the curve fell modestly, between two and five basis points, while the belly of the curve dropped as much as 10 basis points. Discount rates generated using both the AA-rated spot and top-yielding curves followed suit. Investment grade spreads were mixed to start 2019 with AAA widening while A and AA spreads contracted. Discount rates based on the IRS curve, with its averaging methodology, also fell during the month.

Discount rates currently sit 24 basis points higher than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 18 basis points higher than January 2018 and provide 21 basis points of additional yield relative to the broader market.

January saw a pick up in turnover within the AA-rated index, as nearly 4% of the index changed eligibility via both entering and exiting issues. United Airlines' 12-year issue and a handful of new 5-year issues made a noticeable impact on the discount curve. A downgrade of Ontario and exiting issues from Chevron and Wal-Mart totaled about \$5B in market value and made a dent on the curve as well.

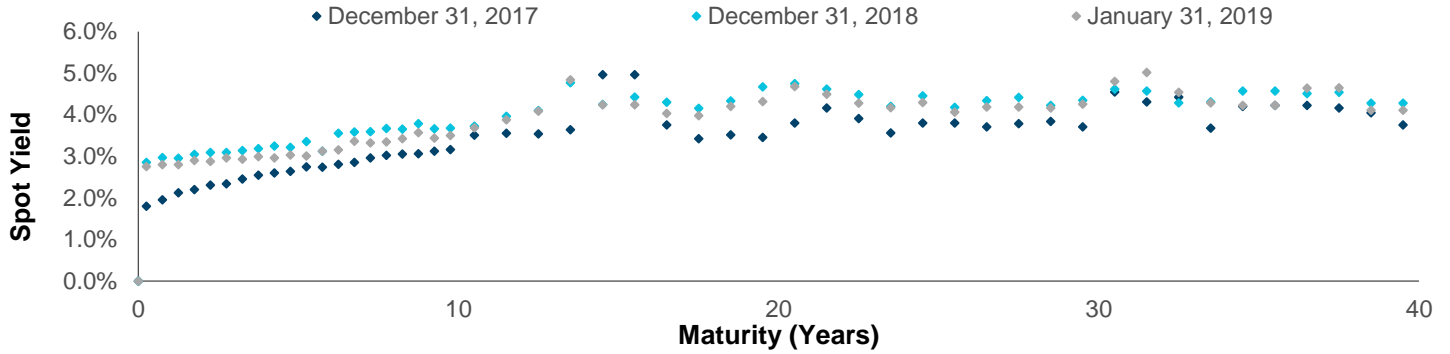
LIABILITY IMPACT



Yield Curve	Liability Value 1/31/19	Discount Rate 1/31/19	Liability Value 12/31/18	Discount Rate 12/31/18	Liability Value 12/31/17	Discount Rate 12/31/17
Accounting Yield Curve	\$9,852	4.12%	\$9,695	4.24%	\$10,386	3.73%
Top Yielding Accounting Curve	\$9,510	4.38%	\$9,446	4.43%	\$9,994	4.01%
IRS Yield Curve	\$9,538	4.33%	\$9,361	4.47%	\$10,310	3.76%

Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. IRS, and T. Rowe Price. Sample plan cash flows have a liability of \$10,000 at 4.0% discount rate.

ACCOUNTING CURVE



Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. T. Rowe Price.

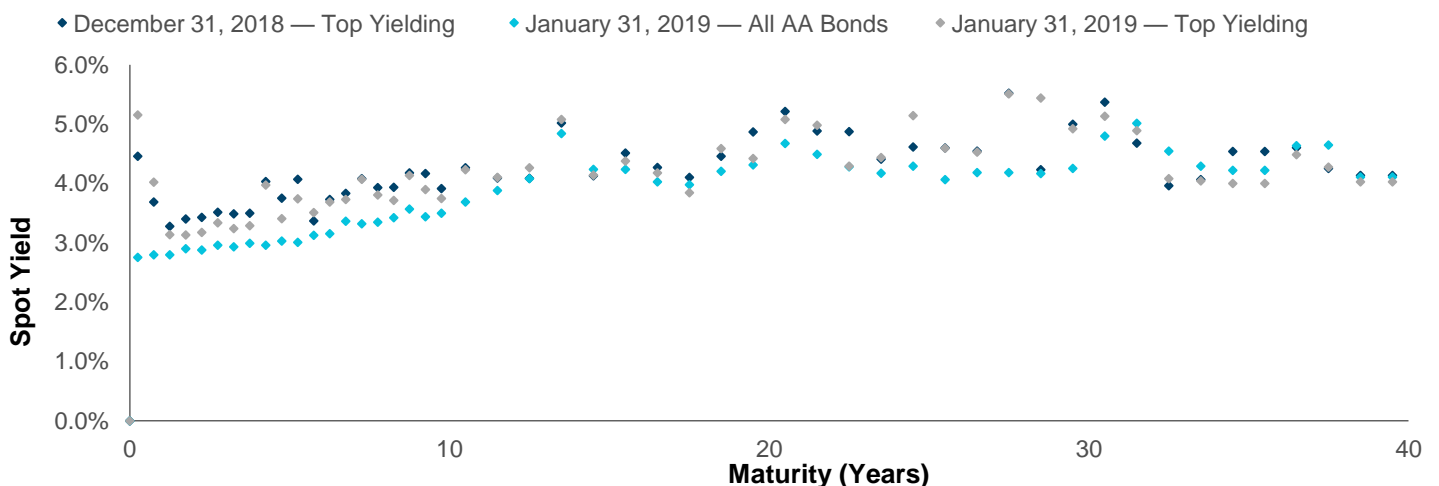
Issuer	Event	Curve Impact
United Airlines	New Issue (1 bond)	United Airlines issued one new bond to start the year, maturing at the 12-year point in 2031 and valued at about \$725M. While the AA-rated index saw larger new offerings during the month, United's hit the discount curve at a less-liquid point on the curve, shifting rates 18 basis points.
Ontario	Downgrade (1 bond)	Canada's Province of Ontario was downgraded during January, which saw the AA-rated index lose about \$2.5B in market value due to Ontario's 2023 bond. Along with other exiting bonds near the 5-year tenor, the discount curve shifted about 5 basis points due to the exiting securities.
Wal-Mart	Upcoming Call Option (1 bond)	The AA-rated index also lost a Wal-Mart bond maturing in 2024 due to a callability rule. The issue was valued at \$1.5B and made up over 10% of the month's exiting market value.

Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. T. Rowe Price.

	New Issues	Other Bonds Entering	Downgrades	Other Bonds Exiting
January 2019				
Count	12	0	2	10
Market Value (\$M)	\$11,487	\$0	\$3,585	\$8,850
Market Value (%)	1.78%	0.00%	0.56%	1.37%
2019 YTD				
Count	12	0	2	10
Market Value (\$M)	\$11,487	\$0	\$3,585	\$8,850
Market Value (%)	1.78%	0.00%	0.56%	1.37%

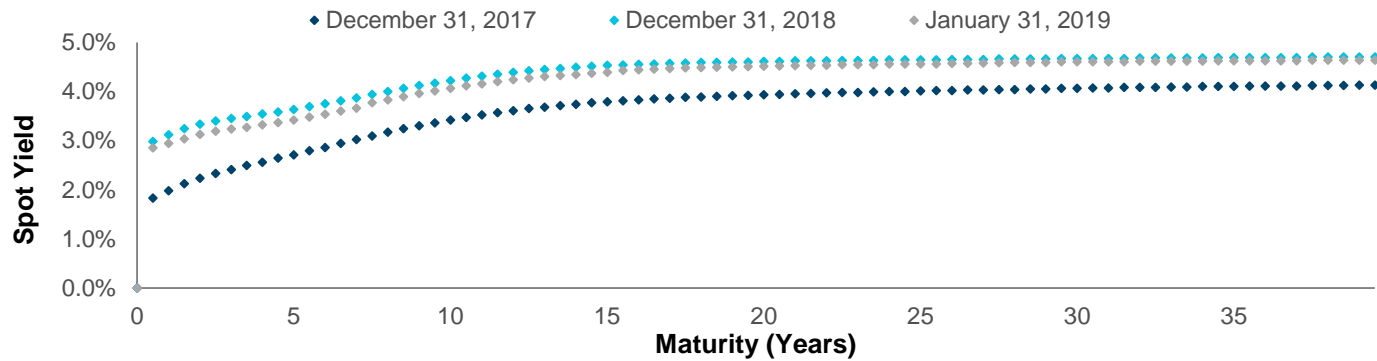
Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. T. Rowe Price.

TOP YIELDING ACCOUNTING CURVE



Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. T. Rowe Price.

IRS CURVE

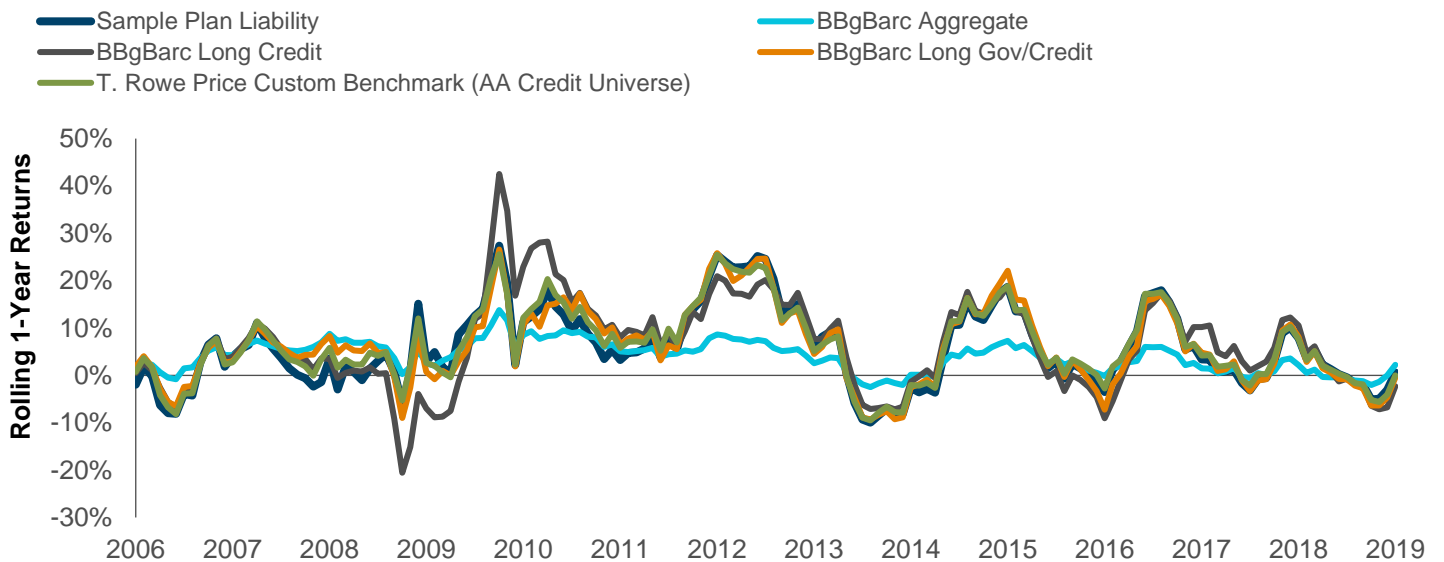


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
December Monthly Average	58	70	110
January 2, 2019	62	72	115
January 15, 2019	66	67	110
January 31, 2019	57	55	92
January Monthly Average	60	64	105

Sources: Bloomberg Barclays. Bloomberg Index Services Ltd. Copyright 2019, Bloomberg Index Services Ltd. Used with permission. T. Rowe Price.

ONE-YEAR ROLLING RETURNS AND TRACKING ERROR



	January 2019 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
Hypothetical Sample Plan Liability	1.94%	1.94%	NA	NA
BBgBarc Aggregate	1.06%	1.06%	6.47%	1.41%
BBgBarc Long Credit	3.46%	3.46%	4.53%	0.93%
BBgBarc Long Gov/Credit	2.24%	2.24%	3.12%	0.65%
Hypothetical T. Rowe Price Custom Benchmark	2.02%	2.02%	2.03%	0.32%

Sources: Bloomberg Index Services Ltd., T. Rowe Price; Analysis by T. Rowe Price. Performance shown in graph and tables above shown from February 1, 2005 through January 31, 2019.

Past performance cannot guarantee future results. Custom Benchmark returns do not reflect the deduction of management fees. Please refer to the disclosure at the end of the article for important additional information.

Copyright 2019, Bloomberg Index Services Ltd. Used with permission.

GLOSSARY

IRS Yield Curve: Plan sponsors of qualified defined benefit pension plans use this yield curve to determine funding requirements per IRS regulations. These funding requirements are disclosed on form 5500 annually. Yields on AAA, AA, and A corporate securities determine the yield curve for discounting purposes. The yield curve is not a marked-to-market curve representing any single date, but rather an average yield over the course of the entire month. For more information on the IRS methodology, please see [treasury.gov/resource-center](https://www.treasury.gov/resource-center) and [irs.gov/Retirement-Plans](https://www.irs.gov/Retirement-Plans).

Accounting Yield Curve: US GAAP requires pension plan sponsors to disclose pension obligations using “fixed-income debt securities that receive one of the two highest ratings given by a recognized ratings agency”. As a proxy for bonds useable for accounting purposes, we use the constituents of BBgBarc AA credit universe to develop the accounting yield curve shown. Please see [fasb.org](https://www.fasb.org) for more information.

Top Yielding Curve: Since the US GAAP rules allow the use of a fairly broad range of securities for accounting purposes, some plan sponsors use an optimized yield curve approach to value their pension liabilities on the disclosure dates. Bonds trading at higher yields than other bonds of similar maturity tend to be used for this purpose. To quantify the effectiveness of this approach, T. Rowe Price developed a yield curve using the highest yielding bonds designed to meet SEC requirements at each node.

Annual Tracking Error Relative to Liability: Calculated as the standard deviation of return differences between a fixed income index and a set of cash flows discounted using the accounting yield curve. The liability return has two components: an interest cost component analogous to roll return on a bond, and yield change component analogous to price return on a bond. The table shows annualized ex-post tracking error.

Average Monthly Return Difference: Similar to the tracking error metric, this metric demonstrates how closely a fixed income benchmark tracks a set of liability returns. We calculate this measure by simply averaging the difference in returns over the period shown.

Sample Plan Liability: Pension plan sponsors must account for the cost of their retirement plan on their financial statements. The amount of this liability can fluctuate over time based on several factors, including benefits earned, benefits paid out, mortality experience, and most significantly, interest rates. The Sample Plan is intended to be a representative defined benefit pension plan and does not reflect the cash flows from any specific plan.

T. Rowe Price Custom Benchmark: An index of fixed income securities created using T. Rowe Price proprietary methodology that attempts to replicate interest rate exposures embedded in a pension plan’s liability structure.

To learn more, please visit [troweprice.com](https://www.troweprice.com)

Important Information

This material is directed at institutional investors or advisors/consultants to institutional investors only and is not intended for distribution to retail investors. It has been prepared by T. Rowe Price Associates, Inc. for informational purposes and is not intended to be investment advice or a recommendation to take any particular investment action. This material should not be redistributed, in whole or in part, without prior consent from T. Rowe Price. The views and information contained herein are as of 31 January 2019 and are subject to change without notice.

The illustrations presented are hypothetical and used to demonstrate capabilities. Certain assumptions have been made for modeling purposes and with the benefit of hindsight and are unlikely to be realized. The specific issuers and bond issues mentioned in this document had significant impact on liability curves calculated using BBgBarc index universes. The modeling used for plan and benchmark development has certain inherent limitations. Benchmark construction may not reflect all material economic and market factors that could have impacted implementation or weighting decisions if the modeled plan actually existed during the time period presented. Actual T. Rowe Price Custom Benchmark characteristics, including (among other things) yield, annualized return, liability-relative tracking error and average monthly returns difference relative to plan liability may differ substantially from the hypothetical scenario presented.

T. ROWE PRICE, INVEST WITH CONFIDENCE and the bighorn sheep design are collectively and/or apart, trademarks of T. Rowe Price Group, Inc. © 2019 T. Rowe Price. All rights reserved.