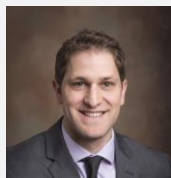




## LDI Solutions

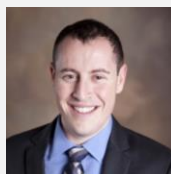
# PENSION CURVE INSIDER

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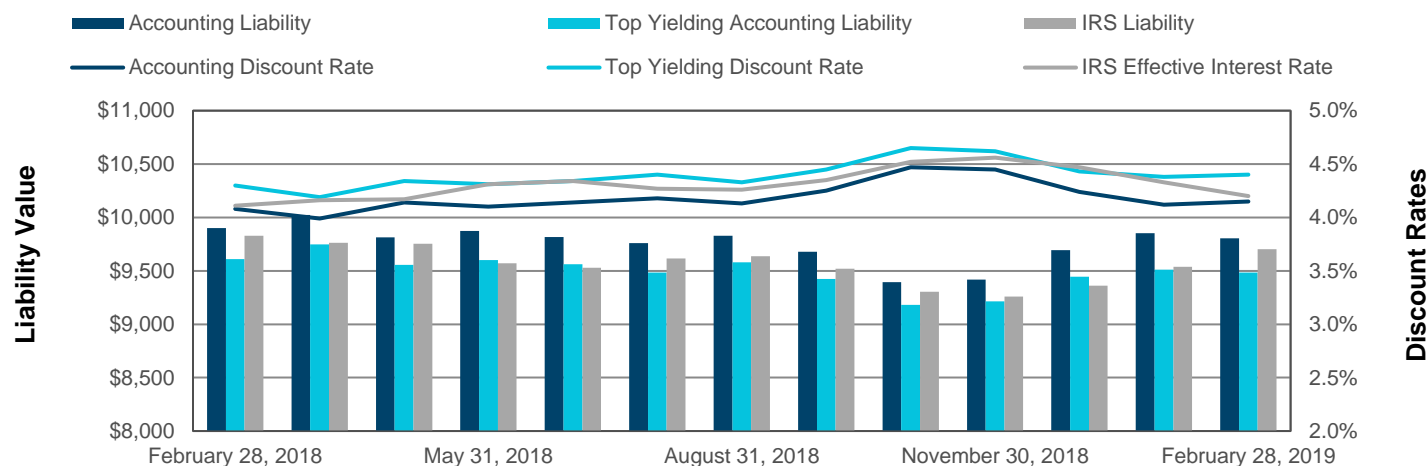
## MONTHLY RECAP

Marked-to-market discount rates nudged upward in February as the Treasury curve steepened. The short end of the curve was unchanged while the long end of the curve increased 10 basis points. Discount rates generated using the AA-rated spot and top-yielding curves rose by 3 and 2 basis points, respectively. The big action last month was in spreads. A-rated bonds led the way, contracting 16 bps, while AA's and AAA's came in 11 and 6 basis points, respectively. Discount rates based on the IRS curve, with its averaging methodology, dropped during the month.

Discount rates currently sit 7 basis points higher than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 10 basis points higher than February 2018 and provide 25 basis points of additional yield relative to the broader market.

Turnover maintained pace in February, with nearly 3% of the AA-rated index changing eligibility. Entries into the index made up most of the month's changing market value. Michigan State University and Florida Power & Light each issued long-dated bonds near the 30-year mark which had a noticeable impact on the discount curve due to the limited liquidity at such a lengthy tenor.

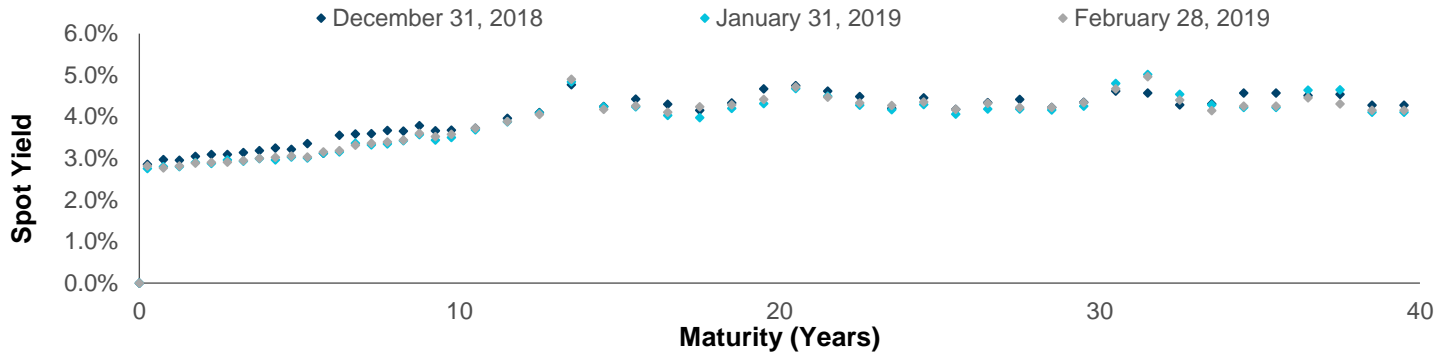
## LIABILITY IMPACT



Yield Curve	Liability Value 2/28/19	Discount Rate 2/28/19	Liability Value 1/31/19	Discount Rate 1/31/19	Liability Value 12/31/18	Discount Rate 12/31/18
Accounting Yield Curve	\$9,805	4.15%	\$9,852	4.12%	\$9,695	4.24%
Top Yielding Accounting Curve	\$9,485	4.40%	\$9,510	4.38%	\$9,446	4.43%
IRS Yield Curve	\$9,703	4.20%	\$9,538	4.33%	\$9,400	4.44%

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.

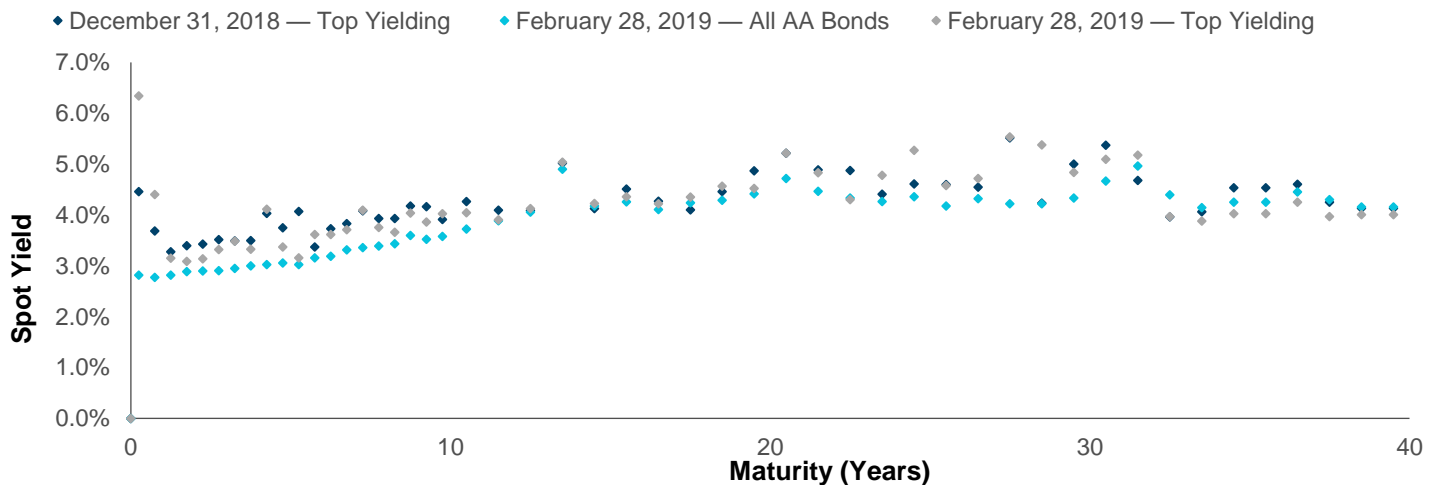
Issuer	Event	Curve Impact
<b>Michigan State University</b>	New Issue (1 bond)	Michigan State University issued one new bond in February, maturing in 2048, thus impacting the discount curve at the 29-year point. While the bond's market value was just over \$300K, the lack of issuance at that point on the curve played a role in the discount curve's shift.
<b>Florida Power &amp; Light</b>	New Issue (1 bond)	Similarly, Florida Power & Light issued a \$600K bond that matures in 2049. Despite accounting for less than 10% of the month's shifting market value, these two new issues helped move the discount curve 6 basis points at a less-liquid point on the curve.

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	New Issues	Other Bonds Entering	Downgrades	Other Bonds Exiting
<b>February 2019</b>				
Count	8	5	0	6
Market Value (\$M)	\$6,649	\$5,553	\$0	\$5,076
Market Value (%)	1.03%	0.86%	0.00%	0.79%
<b>2019 YTD</b>				
Count	20	5	2	16
Market Value (\$M)	\$18,135	\$5,553	\$3,585	\$13,927
Market Value (%)	2.81%	0.86%	0.56%	2.16%

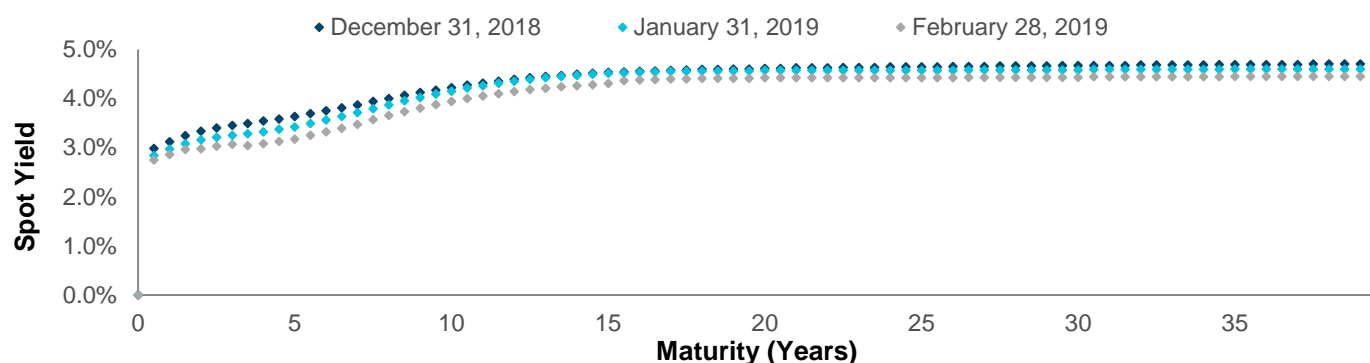
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## TOP YIELDING ACCOUNTING CURVE



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## IRS CURVE

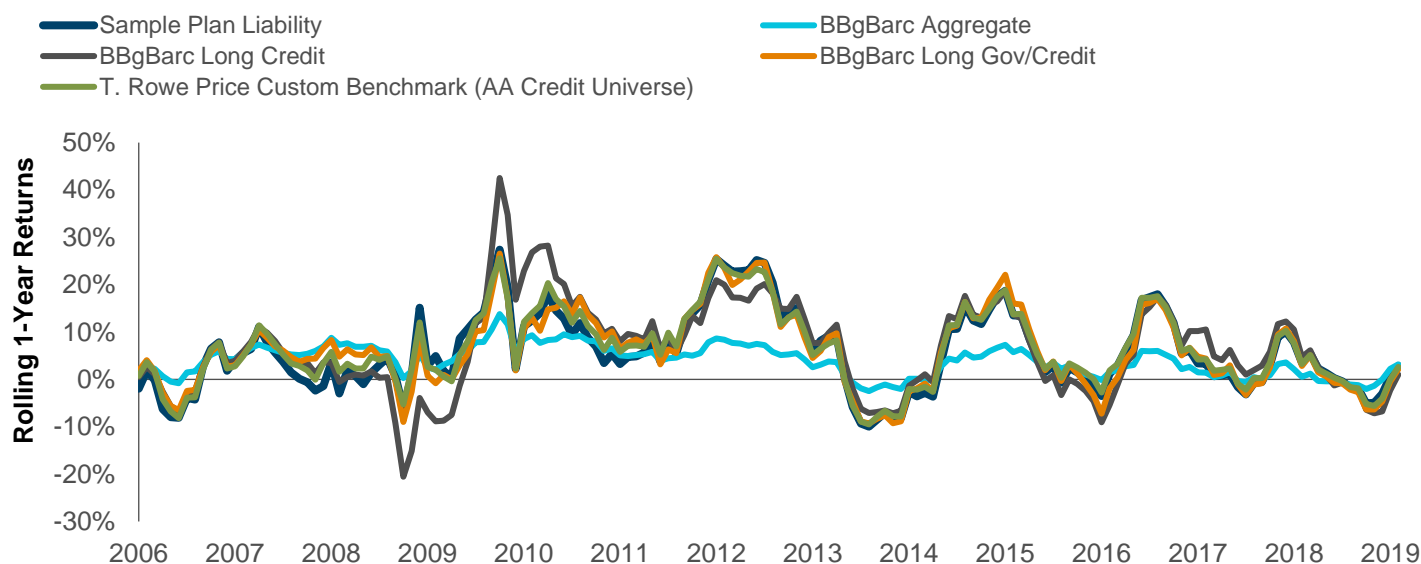


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
<b>January Monthly Average</b>	60	64	105
<b>February 1, 2019</b>	53	54	90
<b>February 15, 2019</b>	52	52	89
<b>February 28, 2019</b>	53	50	86
<b>February Monthly Average</b>	54	53	89

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



	February 2019 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
<b>Hypothetical Sample Plan Liability</b>	-0.17%	1.77%	NA	NA
<b>BBgBarc Aggregate</b>	-0.06%	1.00%	6.45%	1.40%
<b>BBgBarc Long Credit</b>	-0.07%	3.39%	4.52%	0.92%
<b>BBgBarc Long Gov/Credit</b>	-0.55%	1.68%	3.12%	0.64%
<b>Hypothetical T. Rowe Price Custom Benchmark</b>	0.19%	2.21%	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 February 28, 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.

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## 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://treasury.gov/resource-center) and [irs.gov/Retirement-Plans](https://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://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://troweprice.com)

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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.

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