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LDI Solutions

PENSION CURVE INSIDER

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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

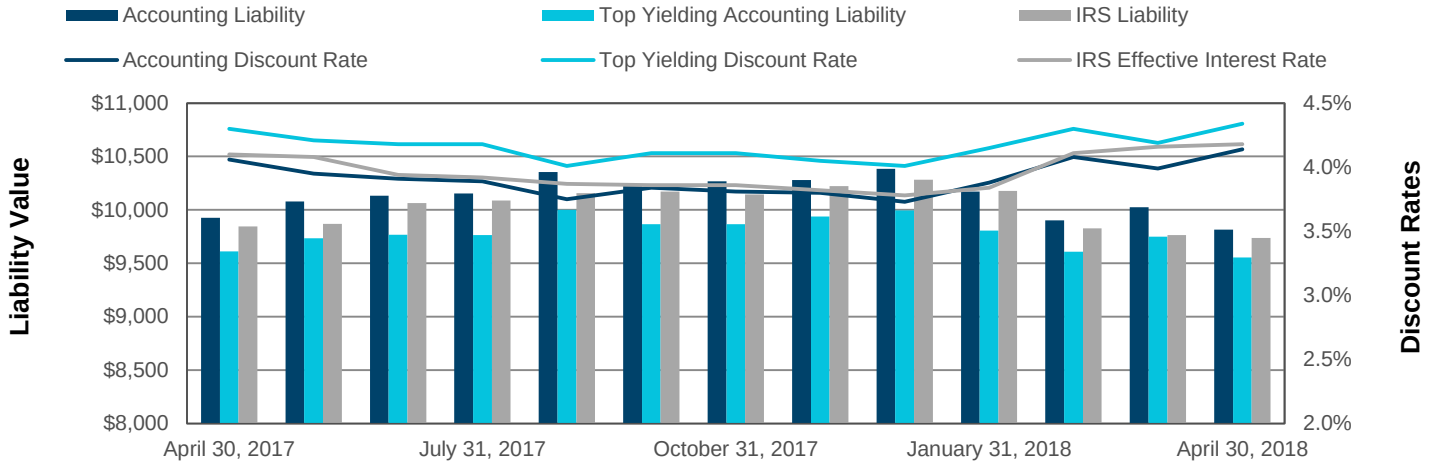
MONTHLY RECAP

Discount rates moved up in April as the full Treasury curve ticked up. As a result, both the AA-rated spot curve and the top-yielding curve rose 15 basis points from prior month-end. Treasury yields moved up across the curve but with a flattening bias. The 2 – 10 year maturities saw the most action, rising as much as 23 basis points during the month. Spreads remained mostly level across investment-grade qualities.

Discount rates now sit 8 basis points higher than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 4 basis points higher than April 2017, and provide 20 basis points of additional yield relative to the broader market.

Index turnover during April remained active in the AA-rated index as nearly 4.5% of index market value changed eligibility during the month. Entries into the AA index totaled about $7B while removals accounted for $26B. Coca-Cola's downgraded bonds had a particularly large effect on the AA-rated curve, totaling almost $15B in market value and spanning durations between 1 and 9 years. Of the bonds entering the AA-rated index, California's newly issued debt had the largest impact on the curve at the 15 and 20-year marks, moving the curve 4 and 6 basis points, respectively. New entries into the index included $1.3B of bonds with 30+ year maturities.

LIABILITY IMPACT



Yield Curve	Liability Value 4/30/18	Discount Rate 4/30/18	Liability Value 3/31/18	Discount Rate 3/31/18	Liability Value 12/31/17	Discount Rate 12/31/17
Accounting Yield Curve	$9,815	4.14%	$10,024	3.99%	$10,386	3.73%
Top Yielding Accounting Curve	$9,555	4.34%	$9,748	4.19%	$9,994	4.01%
IRS Yield Curve	$9,736	4.18%	$9,763	4.16%	$10,283	3.76%

Sources: Barclays POINT, IRS, and T. Rowe Price. Sample plan cash flows have a liability of $10,000 at 4.0% discount rate.

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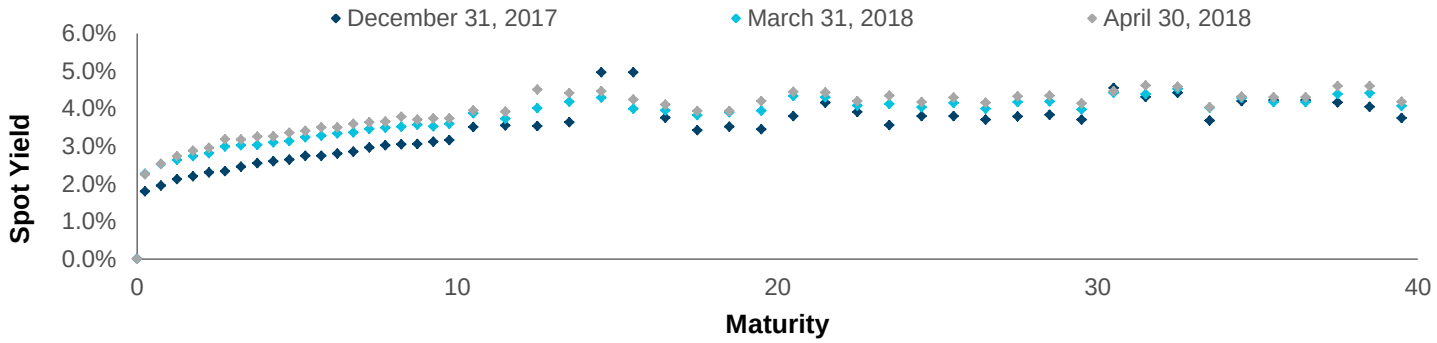
ACCOUNTING CURVE



Sources: Barclays POINT and T. Rowe Price

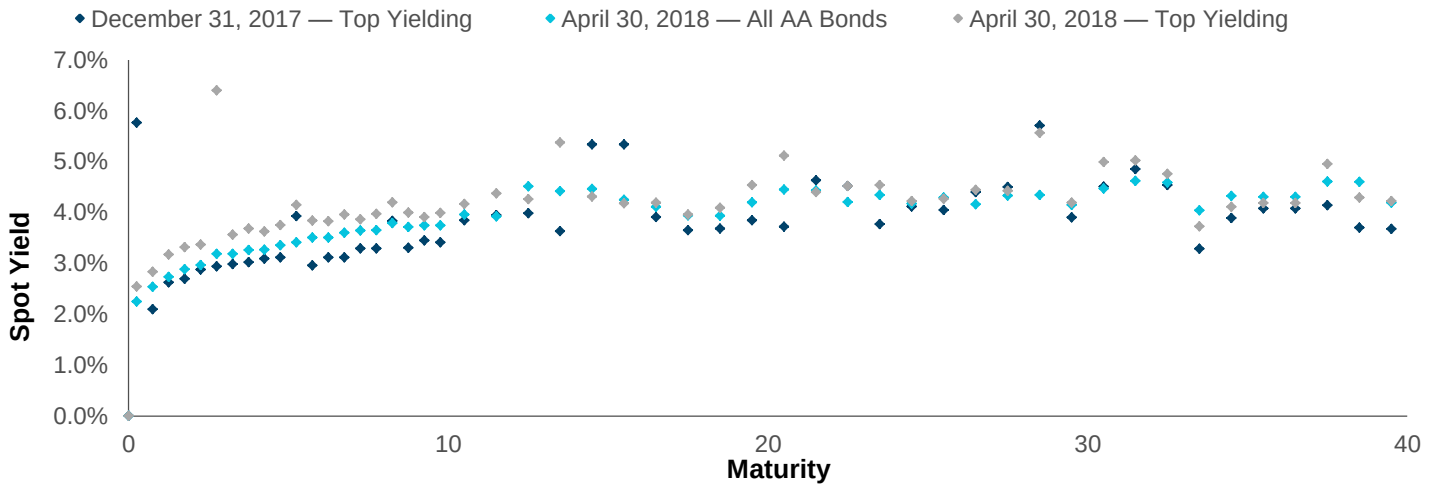
Issuer	Event	Curve Impact
Coca-Cola	Downgrade (14 bonds)	Coca-Cola was downgraded during April as 14 bonds exited the AA-rated index. The downgrade amounted to $14.5B in market value, or about 2.5% of the AA-rated index. Spanning 1-9 year maturities, the largest impact on the curve was at the 6-year mark, moving the curve up 3 basis points.
State of California	New Issue (5 bonds)	The State of California issued 5 new bonds in April, amounting to about $2B in market value. Maturities of the new issues ranged from 3-20 years, with the largest impact hitting the AA-rated curve at the 15 and 20-year points, as fewer bond issues exist at the longer end of the curve.
Multiple	New Issue /Upgrades (4 bonds)	The long-end of the AA-rated curve saw more activity in April as Hackensack Meridian Health issued two bonds maturining in 30 and 39 years, respectively. Additionally, Sutter Health and Indiana University each had 30-year bonds upgraded into the index. The total market value impact was $1.3B.

Sources: Barclays POINT and T. Rowe Price

	New Issues	Other Bonds Entering	Downgrades	Other Bonds Exiting
April 2018				
Count	11	3	14	2
Market Value ($M)	$6,101	$995	$14,527	$4,420
Market Value (%)	1.01%	0.16%	2.41%	0.73%
2018 YTD				
Count	33	5	18	12
Market Value ($M)	$28,983	$2,355	$16,720	$16,078
Market Value (%)	4.60%	0.38%	2.76%	2.57%

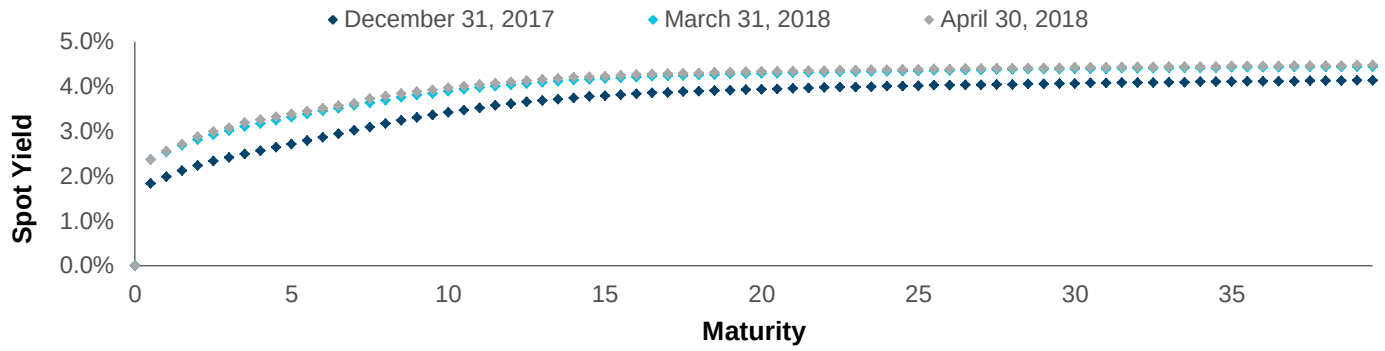
Sources: Barclays POINT and T. Rowe Price

TOP YIELDING ACCOUNTING CURVE



Sources: Barclays POINT and T. Rowe Price

IRS CURVE

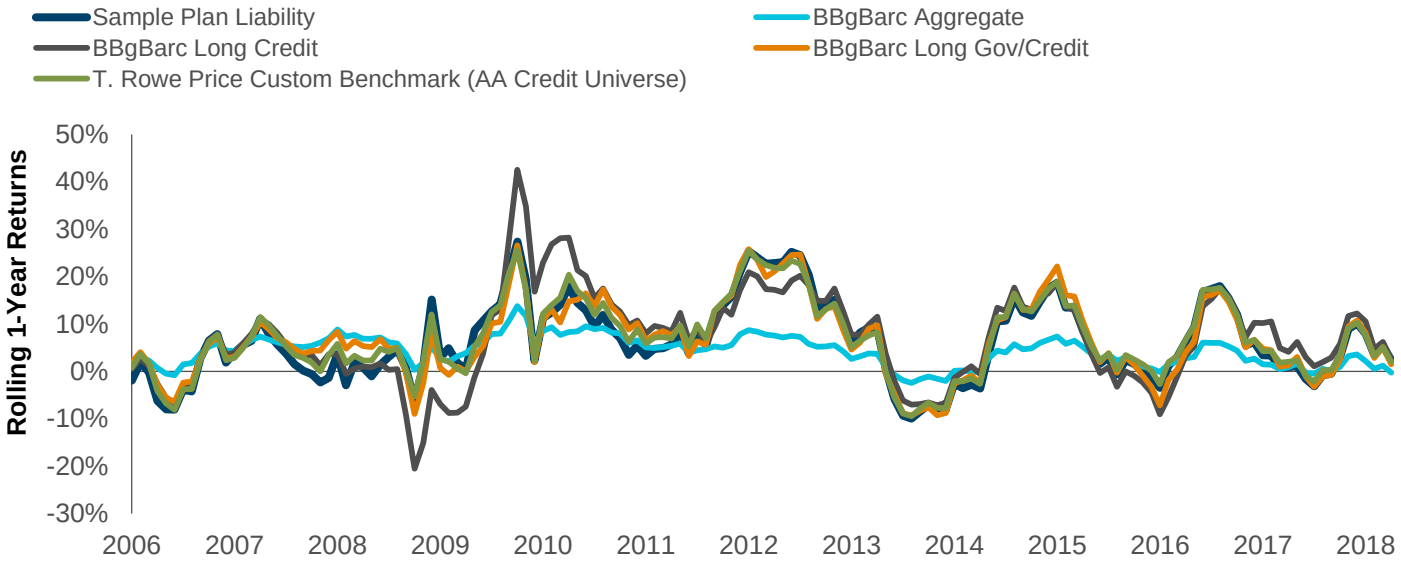


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
March Monthly Average	47	59	85
April 2, 2018	50	63	89
April 16, 2018	48	58	84
April 30, 2018	47	57	85
April Monthly Average	46	58	86

Sources: Barclays POINT and T. Rowe Price

ONE-YEAR ROLLING RETURNS AND TRACKING ERROR



	April 2018 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
Hypothetical Sample Plan Liability	-1.78%	-4.35%	NA	NA
BBgBarc Aggregate	-0.74%	-2.19%	6.61%	1.45%
BBgBarc Long Credit	-1.94%	-5.70%	4.58%	0.93%
BBgBarc Long Gov/Credit	-1.94%	-5.45%	3.20%	0.66%
Hypothetical T. Rowe Price Custom Benchmark	-1.55%	-4.59%	2.08%	0.33%

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 April 30, 2018.

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** and **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** 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**

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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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