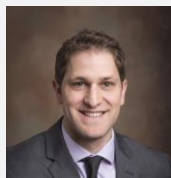




LDI Solutions

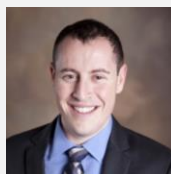
PENSION CURVE INSIDER

September 2018



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

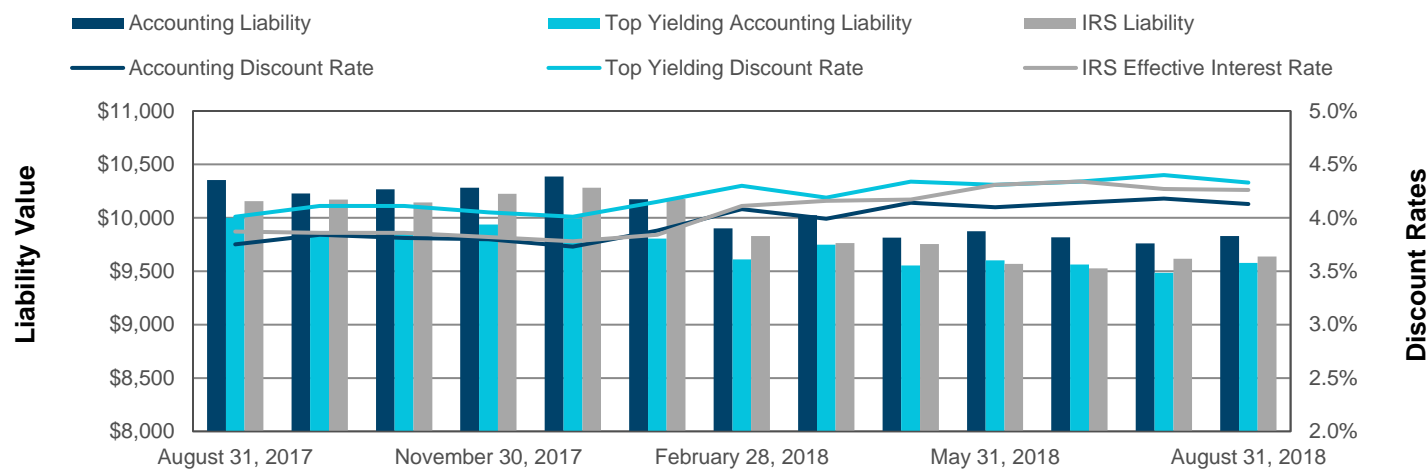
MONTHLY RECAP

Marked-to-market discount rates moved back down in August as Treasury yields continue to flatten. Both the AA-rated spot curve and the top-yielding curve fell from prior month-end. 3 and 6-month Treasuries rose the most (8 and 7 basis points, respectively) while the middle and long ends of the curve fell between 5-11 bps. Investment grade spreads finished the month lower again while discount rates based on the IRS curve, with its averaging methodology, also fell in August.

Discount rates currently sit 38 basis points higher than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 32 basis points higher than August 2017 and provide 20 basis points of additional yield relative to the broader market.

Turnover within the AA-rated index slowed significantly during the month as August saw only 1% of market value change eligibility. New entries made up much of the month's movement, while only totaling \$6B in market value. Berkshire Hathaway had the largest impact on the AA-rated index, adding a \$2.4B bond at the 30-year point. At the short end of the curve, Austria's OeKB Group added a \$1.5B Yankee bond issue, moving the curve 2 bps at the 3-year mark. Exiting bonds from the AA index during August did not meaningfully impact the curve.

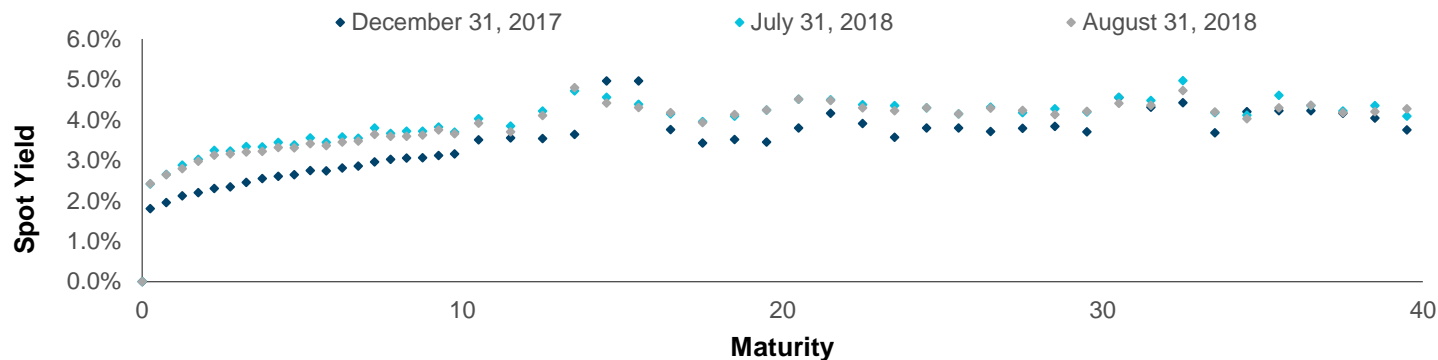
LIABILITY IMPACT



Yield Curve	Liability Value 8/31/18	Discount Rate 8/31/18	Liability Value 7/31/18	Discount Rate 7/31/18	Liability Value 12/31/17	Discount Rate 12/31/17
Accounting Yield Curve	\$9,828	4.13%	\$9,761	4.18%	\$10,386	3.73%
Top Yielding Accounting Curve	\$9,579	4.33%	\$9,484	4.40%	\$9,994	4.01%
IRS Yield Curve	\$9,638	4.26%	\$9,617	4.27%	\$10,310	3.76%

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

ACCOUNTING CURVE



Sources: Barclays POINT and T. Rowe Price

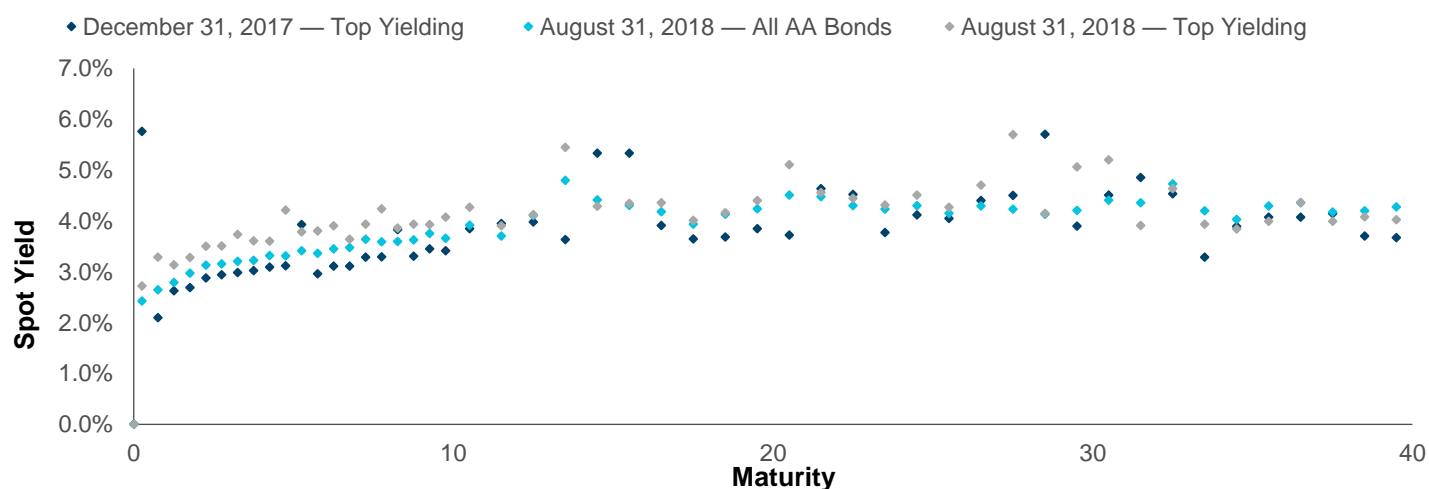
Issuer	Event	Curve Impact
Berkshire Hathaway	New Issue (1 bond)	Berkshire Hathaway's new 30-year issue in August was the single largest addition to the AA-rated index during the month. The \$2.4B issue accounted for nearly half of the month's new issues in terms of market value. The bond matures in 2048 and moved the AA-rated curve about 2 basis points by entering the index.
OeKB Group	New Issue (1 bond)	OeKB Group out of Austria also issued a new bond in August, adding about \$1.5B in market value to the AA-rated index and matures in 2021. OeKB's bond made up about a quarter of the month's new issues in terms of market value, while pushing the short-end of the curve down 2 basis points at the 3-year mark.

Sources: Barclays POINT and T. Rowe Price

	New Issues	Other Bonds Entering	Downgrades	Other Bonds Exiting
August 2018				
Count	6	0	0	1
Market Value (\$M)	\$5,296	\$0	\$0	\$1,007
Market Value (%)	0.89%	0.00%	0.00%	0.15%
2018 YTD				
Count	64	62	20	19
Market Value (\$M)	\$60,324	\$61,017	\$19,085	\$22,495
Market Value (%)	9.49%	9.49%	3.14%	3.57%

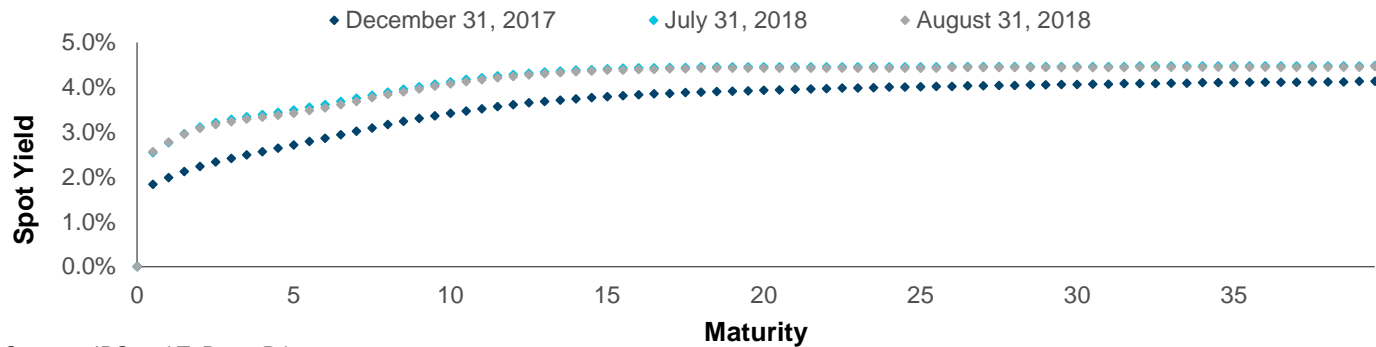
Sources: Barclays POINT and T. Rowe Price

TOP YIELDING ACCOUNTING CURVE



Sources: Barclays POINT. Analysis by T. Rowe Price

IRS CURVE

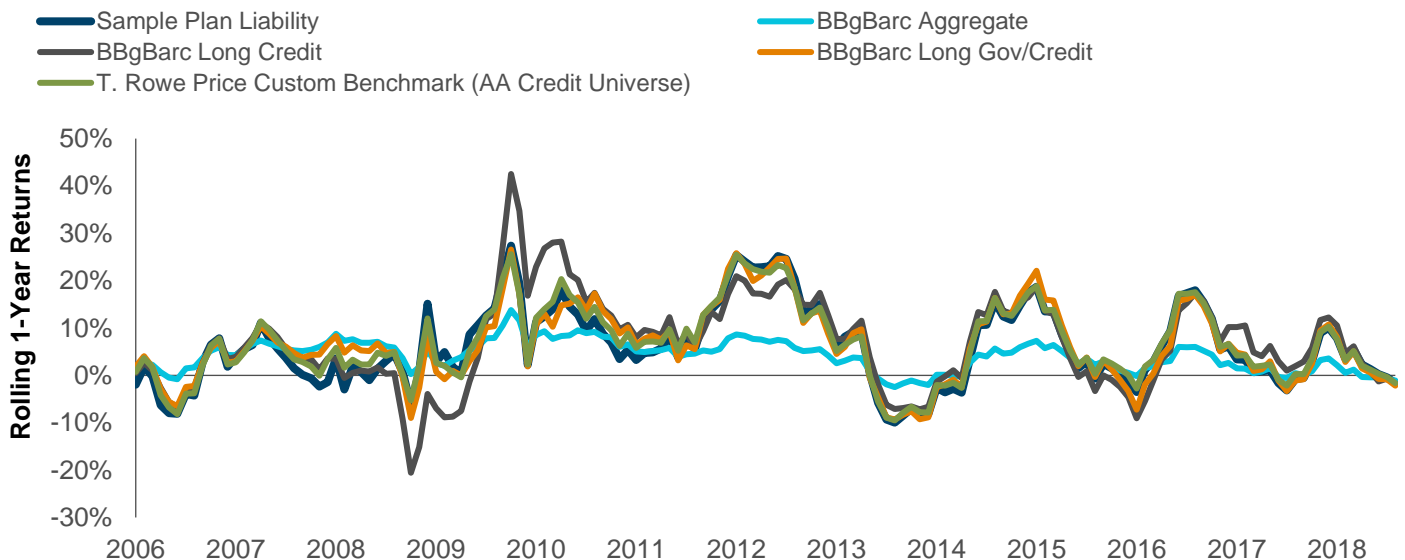


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
July Monthly Average	49	59	93
August 1, 2018	44	53	85
August 15, 2018	48	53	88
August 31, 2018	45	53	89
August Monthly Average	45	52	87

Sources: Barclays POINT. Analysis by T. Rowe Price

ONE-YEAR ROLLING RETURNS AND TRACKING ERROR



	August 2018 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
Hypothetical Sample Plan Liability	1.01%	-3.00%	NA	NA
BBgBarc Aggregate	0.64%	-0.97%	6.53%	1.42%
BBgBarc Long Credit	0.33%	-4.67%	4.56%	0.93%
BBgBarc Long Gov/Credit	0.85%	-3.92%	3.16%	0.65%
Hypothetical T. Rowe Price Custom Benchmark	0.98%	-3.05%	2.05%	0.32%

Source: 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 August 31, 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.

Copyright 2018, 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 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

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 August 2018 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. © 2018 T. Rowe Price. All rights reserved.