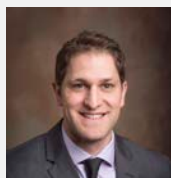




LDI Solutions

PENSION CURVE INSIDER

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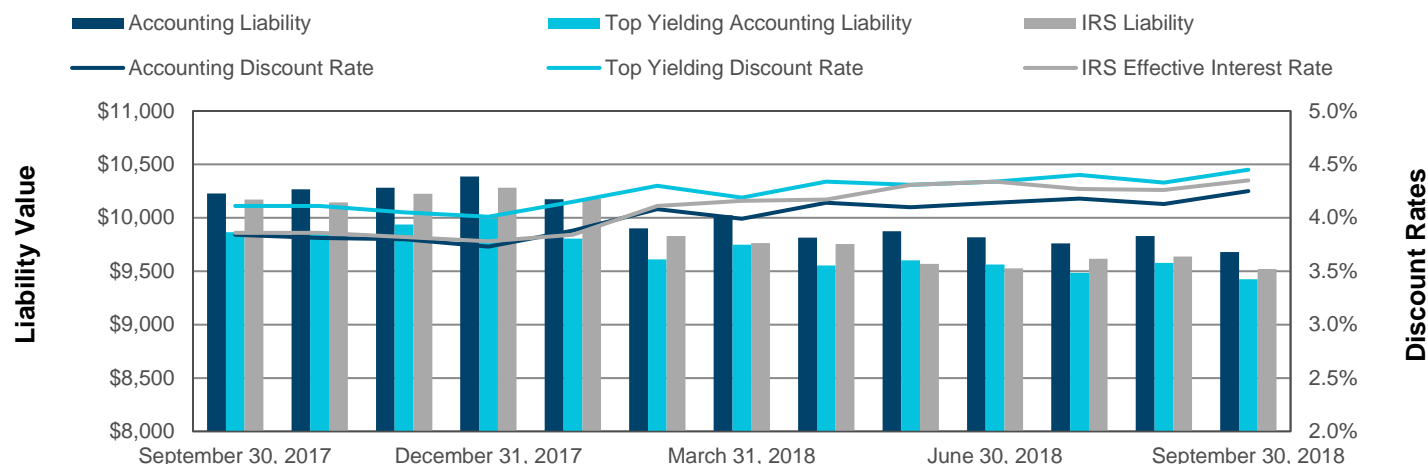
MONTHLY RECAP

Marked-to-market discount rates jumped in September as Treasury yields rose across the curve. Both the AA-rated spot curve and the top-yielding curve moved up from prior month-end. The middle and long end of the curve rose the most, around 20 basis points, while the short end only rose 8 bps. Investment grade spreads finished the month modestly lower while discount rates based on the IRS curve, with its averaging methodology, also rose during the month.

Discount rates currently sit 41 basis points higher than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 34 basis points higher than September 2017 and provide 20 basis points of additional yield relative to the broader market.

Turnover within the AA-rated index was on par with August as around 1.5% of the index changed eligibility. New issues made up most of the month's movement, totaling about \$6B in market value. The University of Chicago's issue, maturing in 2053, had the largest impact on the AA-rated index despite only adding a \$400M in market value. San Diego Gas & Electric made up nearly all exiting activity during the month as the issuer was downgraded to A. Six bonds, totaling nearly \$2.5B in market value and spanning maturities between 2021 and 2048, left the index.

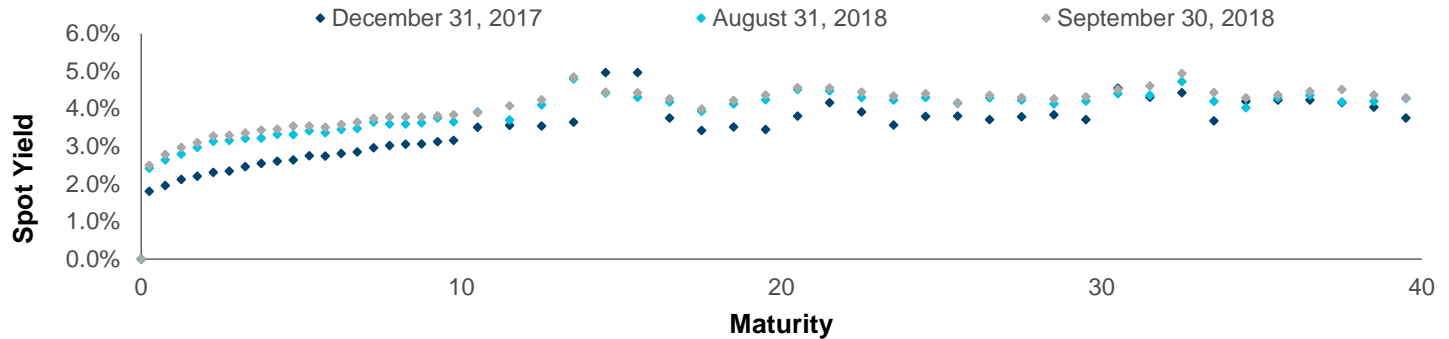
LIABILITY IMPACT



Yield Curve	Liability Value 9/30/18	Discount Rate 9/30/18	Liability Value 8/31/18	Discount Rate 8/31/18	Liability Value 12/31/17	Discount Rate 12/31/17
Accounting Yield Curve	\$9,679	4.25%	\$9,828	4.13%	\$10,386	3.73%
Top Yielding Accounting Curve	\$9,425	4.45%	\$9,579	4.33%	\$9,994	4.01%
IRS Yield Curve	\$9,520	4.35%	\$9,638	4.26%	\$10,310	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.

ACCOUNTING CURVE



Sources: Barclays POINT and T. Rowe Price

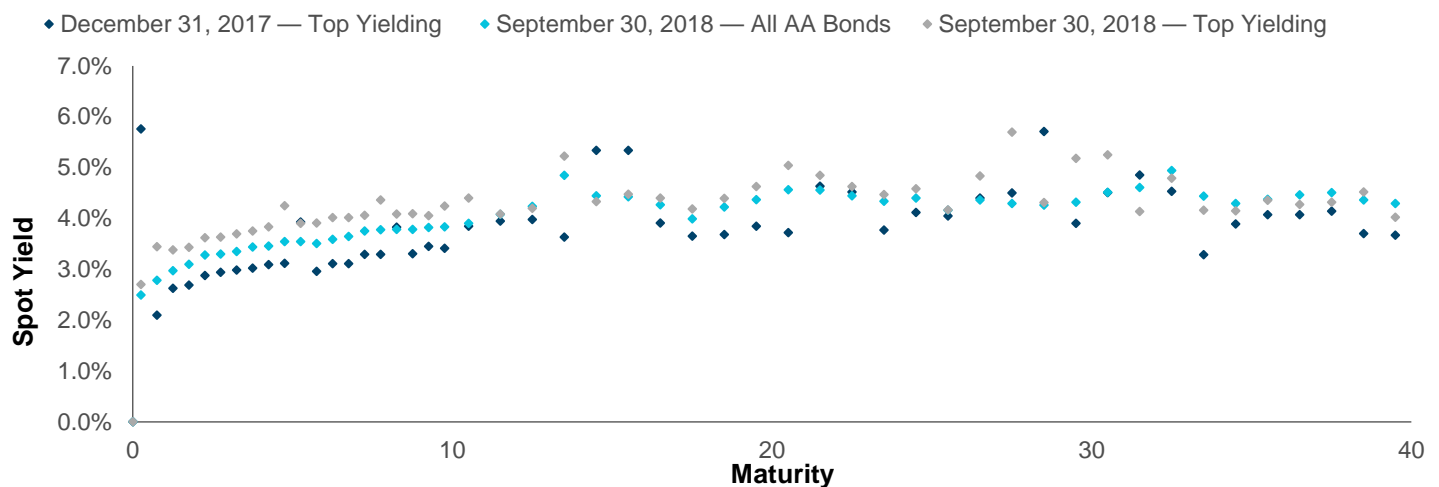
Issuer	Event	Curve Impact
University of Chicago	New Issue (1 bond)	The University of Chicago's 35-year new issue in September made up just 5% of the month's new entries into the AA-rated index, however it claimed the largest impact on the discount curve as compared to the month's other new issues. Due to the limited issuance at long durations, the university's \$400M issue moved the curve down 33 basis points at the 35-year mark.
San Diego Gas & Electric	Downgrade (6 bonds)	September saw San Diego Gas & Electric downgraded from AA to A, meaning nearly \$2.5B of its bonds left the AA-rated index. Maturities of the 6 affected bonds ranged between 3 and 30 years, impacting the middle and long-end of the discount curve. Only one of the bonds surpassed \$500M in market value so there was limited impact on the curve, moving just 1-2 basis points at various durations.

Sources: Barclays POINT and T. Rowe Price

	New Issues	Other Bonds Entering	Downgrades	Other Bonds Exiting
September 2018				
Count	8	2	6	1
Market Value (\$M)	\$5,696	\$2,338	\$2,467	\$515
Market Value (%)	0.86%	0.35%	0.37%	0.08%
2018 YTD				
Count	72	64	26	20
Market Value (\$M)	\$66,020	\$63,355	\$21,552	\$23,010
Market Value (%)	10.35%	9.85%	3.52%	3.65%

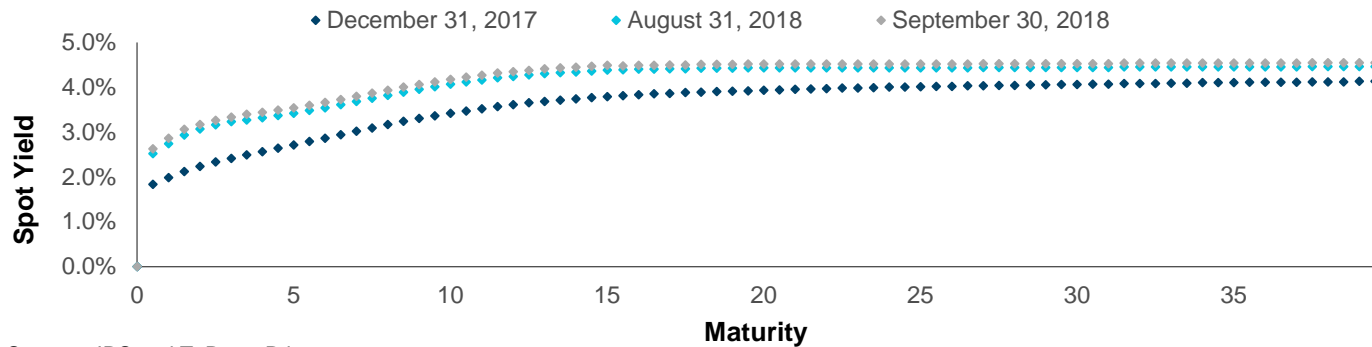
Sources: Barclays POINT and T. Rowe Price

TOP YIELDING ACCOUNTING CURVE



Sources: Barclays POINT and T. Rowe Price

IRS CURVE

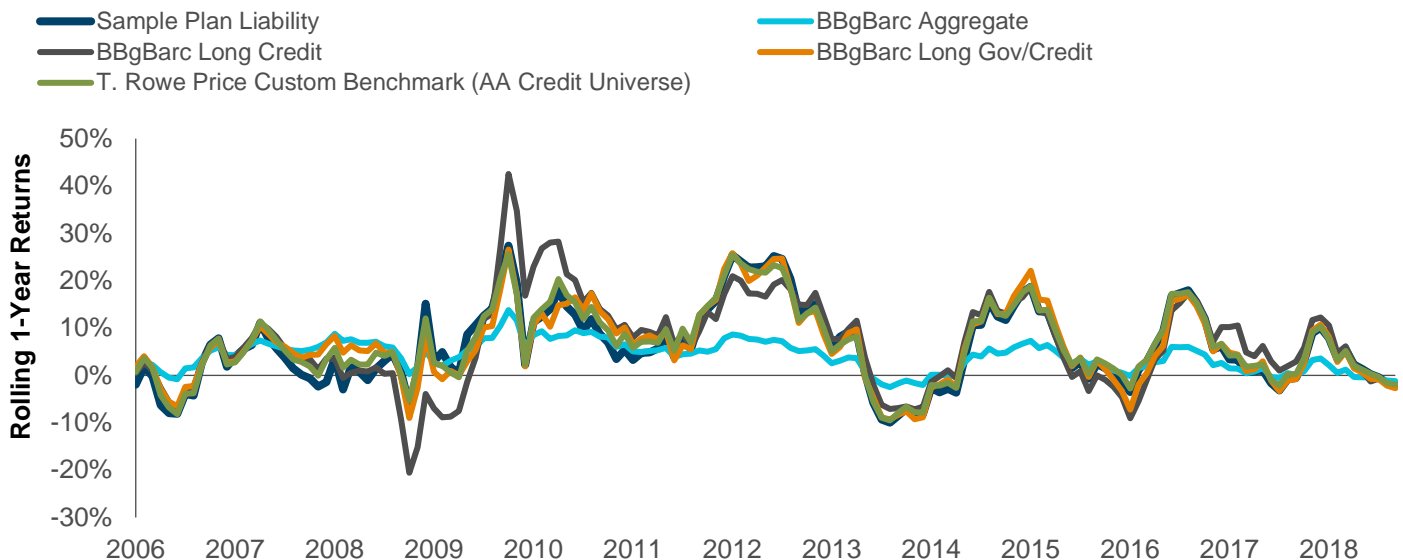


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
August Monthly Average	45	52	87
September 3, 2018	45	53	89
September 14, 2018	43	49	84
September 28, 2018	44	47	82
September Monthly Average	45	49	84

Sources: Barclays POINT and T. Rowe Price

ONE-YEAR ROLLING RETURNS AND TRACKING ERROR



	September 2018 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
Hypothetical Sample Plan Liability	-1.20%	-4.17%	NA	NA
BBgBarc Aggregate	-0.64%	-1.60%	6.51%	1.42%
BBgBarc Long Credit	-0.56%	-5.21%	4.55%	0.92%
BBgBarc Long Gov/Credit	-1.55%	-5.41%	3.15%	0.65%
Hypothetical T. Rowe Price Custom Benchmark	-1.31%	-4.32%	2.05%	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 September 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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