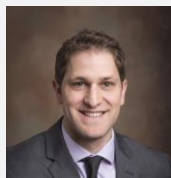




LDI Solutions

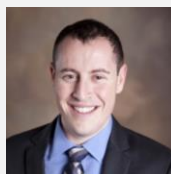
PENSION CURVE INSIDER

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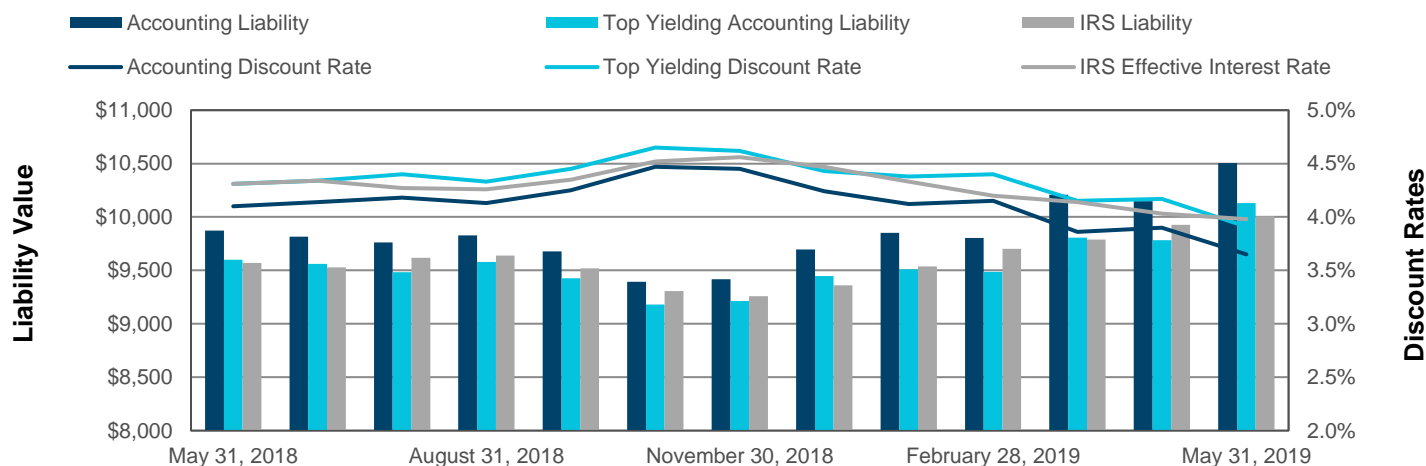
MONTHLY RECAP

Marked-to-market discount rates fell off in May as long Treasuries rallied. The short end of the curve fell by upwards of 10 basis points but the big action was at the long end, which dropped 30+ basis points. Discount rates generated using the AA-rated spot and top-yielding curves reacted by falling 25 and 26 basis points, respectively. Spreads reversed course from April, widening around 6 basis points. Discount rates based on the IRS curve, with its averaging methodology, also fell during the month.

After the move, discount rates now sit 45 basis points lower than a year ago, using the broad AA discount rate curve. Top yielding AA-rated bonds are 40 basis points lower than May 2018 and provide 26 basis points of additional yield relative to the broader market.

Amid the activity in rates, turnover also picked up in May, as over 4% of the AA-rated index changed eligibility during the month. Turnover was split evenly between entering and exiting bonds. Visa's upgrade from single-A made up most of the market value entering the AA-rated index, amounting to over \$11B entering at longer durations. Exiting bonds were spread across a range of issuers, however all occurring at the short end of the curve, leaving the AA-rated index longer than it started the month.

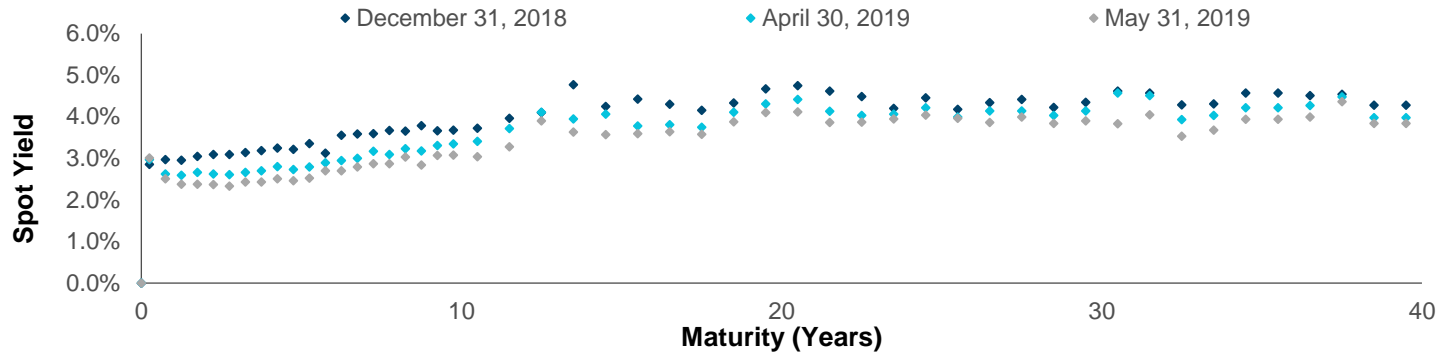
LIABILITY IMPACT



Yield Curve	Liability Value 5/31/19	Discount Rate 5/31/19	Liability Value 4/30/19	Discount Rate 4/30/19	Liability Value 12/31/18	Discount Rate 12/31/18
Accounting Yield Curve	\$10,504	3.65%	\$10,147	3.90%	\$9,695	4.24%
Top Yielding Accounting Curve	\$10,131	3.91%	\$9,784	4.17%	\$9,446	4.43%
IRS Yield Curve	\$10,008	3.98%	\$9,928	4.03%	\$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



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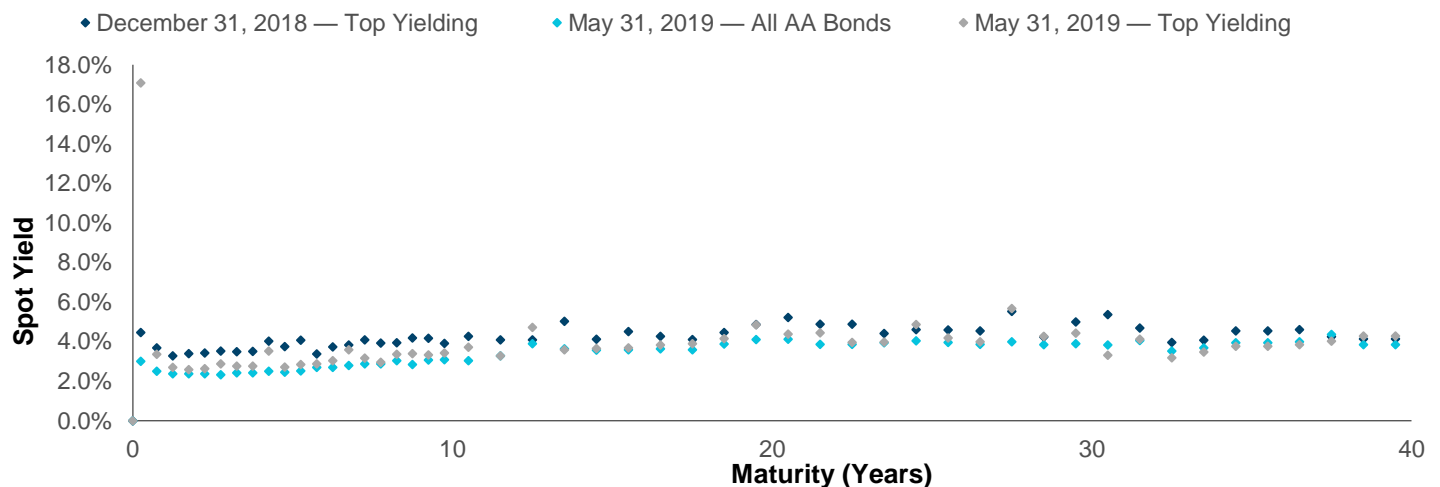
Issuer	Event	Curve Impact
Visa	Upgrade (5 bonds)	Visa's upgrade from single-A meant it saw 5 bonds enter the AA-rated index. Total market value totaled over \$11B and nearly 2% of the index market value. The impact on the discount curve was spread across tenors ranging 6 to 28 years, and totaled nearly 15 basis points in aggregate.
Multiple Issuers	Exiting Issues (12 bonds)	No single issuer dominated the exiting market value from the AA-rated index in May. However the tenor of the exiting issues last month was concentrated at the short end of the curve. 11 of 12 bonds exiting matured between 2019 and 2020, with a single exiting issue maturing in 2024. The discount curve impact was limited to 7 basis point drop in total.

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
May 2019				
Count	1	5	2	10
Market Value (\$M)	\$313	\$11,422	\$3,521	\$11,743
Market Value (%)	0.05%	1.76%	0.54%	1.81%
2019 YTD				
Count	36	10	7	28
Market Value (\$M)	\$32,568	\$16,976	\$10,479	\$27,898
Market Value (%)	5.02%	2.62%	1.62%	4.31%

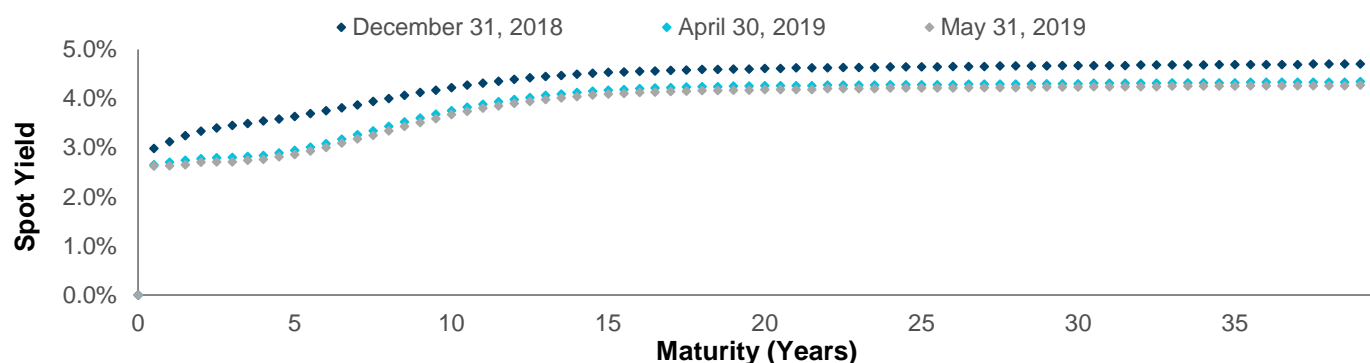
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TOP YIELDING ACCOUNTING CURVE



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IRS CURVE

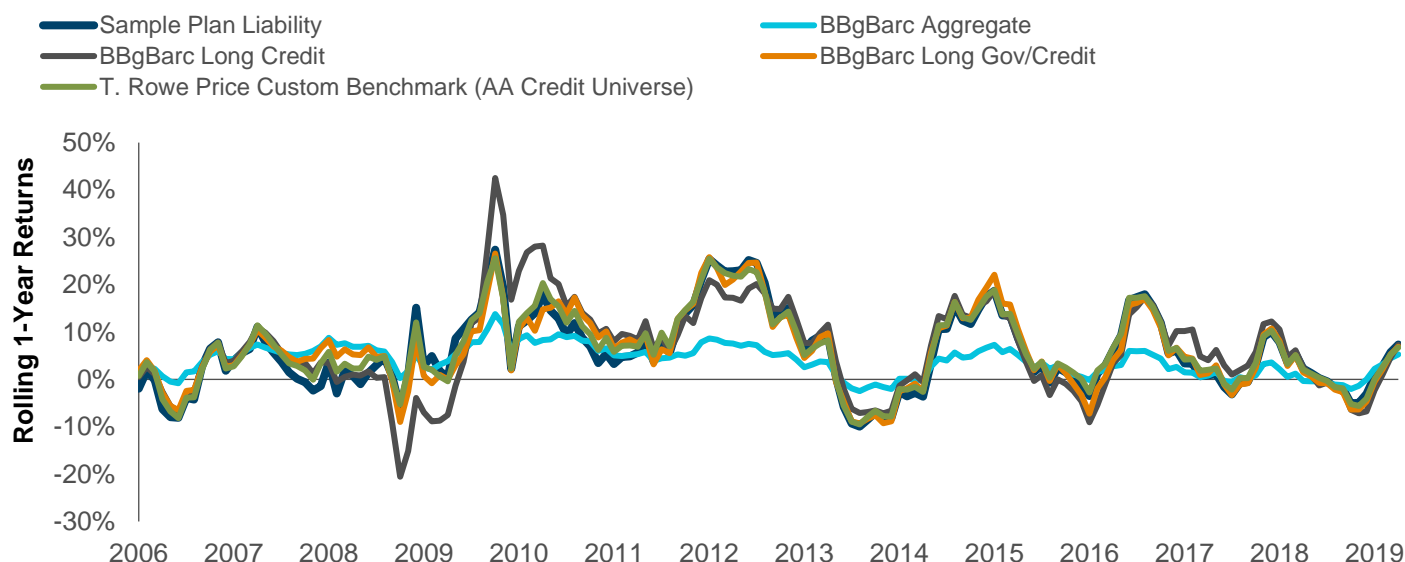


Sources: IRS and T. Rowe Price

Dates	AAA Corporate OAS	AA Corporate OAS	A Corporate OAS
April Monthly Average	54	48	81
May 1, 2019	53	48	81
May 15, 2019	59	51	88
May 31, 2019	63	57	96
May Monthly Average	60	51	88

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ONE-YEAR ROLLING RETURNS AND TRACKING ERROR



	May 2019 Return	YTD Total Return	Annual Tracking Error Relative to Liability	Average Monthly Return Difference from Liability
Hypothetical Sample Plan Liability	3.80%	9.95%	NA	NA
BBgBarc Aggregate	1.78%	4.80%	6.44%	1.40%
BBgBarc Long Credit	2.38%	11.11%	4.50%	0.92%
BBgBarc Long Gov/Credit	4.13%	10.41%	3.09%	0.64%
Hypothetical T. Rowe Price Custom Benchmark	3.62%	9.99%	2.02%	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 May 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.

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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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