LDI MONITOR

December 31, 2018

2018 LDI Environment Review

Rising discount rates drove increase in funded status – Corporate pension funded status increased by 2.3% to 89.9% during 2018, as rising discount rates outweighed the drag from risk assets' poor performance.

Discount rates climbed steadily higher over the course of the year – The FTSE Pension Discount Rate reached 4.45% during the fourth quarter before falling in December and ending the year 62bps higher at 4.22%.

- Long corporate yields touched 5% during November for the first time since the energy market was under stress in early 2016.

Long corporate spreads widened by 63bps to end the year at 200bps – Spread widening was largely driven by risk-market weakness in the fourth quarter.

- Credit curves remained largely unchanged on a year-over-year basis, as spreads generally widened across the curve.

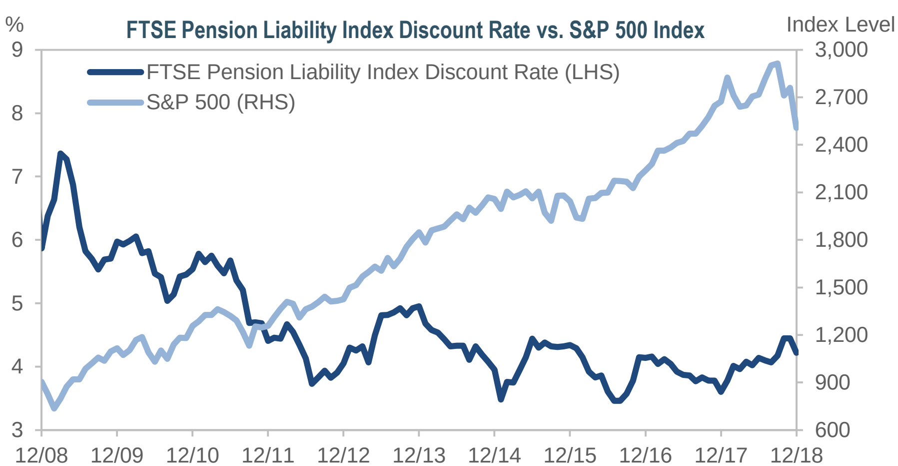
Long corporate issuance was down slightly – Although total long corporate issuance was down year-over-year at $261 billion, it comprised a greater portion of total corporate issuance during the year, at 23.5%.

- Supply from issuers rated AA or higher was less than 10%, and approximately 54% of total long-end supply came from BBB-rated issuers.

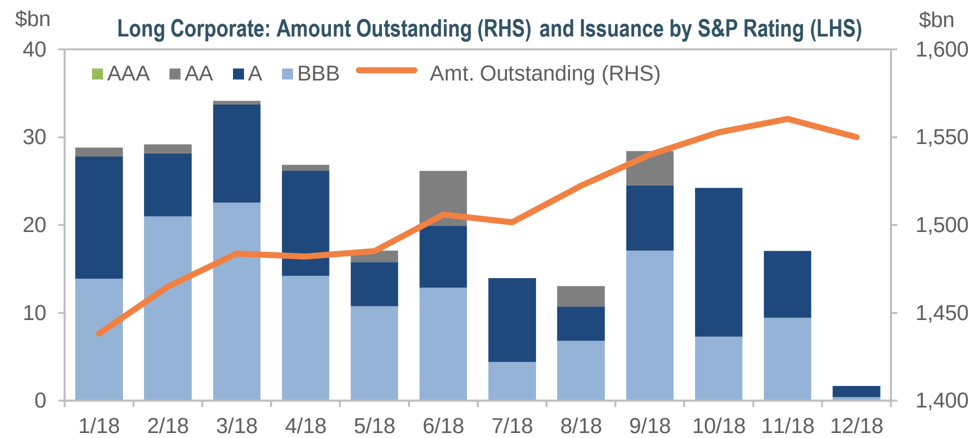
Equities acted as headwinds to funded status improvement – The S&P 500 Index and MSCI ACWI lost 13.5% and 13.1%, respectively, in the fourth quarter, pushing 2018 equity performance into negative territory, dragging on funded status.

- Equity markets spurned US economic data, which was strong, as quarter-over-quarter GDP grew at a 3.4% annualized rate.
- Year-over-year earnings growth remained solid at over 20% for 3Q18; expectations for fourth-quarter earnings growth are modest at roughly 6-7%.

Rates Monitor	12/31/18	11/30/18	12/31/17
FTSE Pension Liability Discount Rate (%)	4.22	4.45	3.60
Bloom Barc Long Corporate Yield (%)	4.91	5.05	4.02
Bloom Barc Long Corporate A+ Yield (%)	4.40	4.63	3.69
Bloom Barc Long Corporate BBB Yield (%)	5.36	5.50	4.37
30 Year Swap Spread (bps)	-17	-16	-20



Glidepath Monitor	12/31/18	11/30/18	12/31/17	12/31/14
Funded Status (%)	89.9	93.7	87.6	81.5
Long Corporate Spreads (bps)	200	184	137	186
Curve (Long Corp - Int. Corp) (bps)	69	67	64	79



Trailing 12 Month Long Corporate New Issuance (bn)

AAA	AA	A	BBB	*Total*
$0.0	$16.8	$103.1	$140.7	$260.7

Sources: Milliman (Historical numbers revised as of 3/31/18), FTSE Russell (formerly Citigroup), Bloomberg Barclays, Bloomberg, and JPMorgan

Fourth Quarter 2018 Corporate Issuance: Largest Long-Dated USD Investment Grade Deals

- As long corporate yields moved higher, and the tax deadline approached, there was strong demand for long credit and STRIPS.
  - Long-end issuance comprised approximately 23% of total issuance during 4Q18, which was in line with the longer-term average and slightly higher than the third quarter.
- For the longest deals, a strong risk-market backdrop buoyed the new issue market at the start of the fourth quarter. As the quarter progressed, risk-market turbulence and geopolitical tensions led to higher new issue concessions and lighter supply in December.

Ticker	Issuer Name	Maturity	Issue Date	Average Rating	Amount Issued ($bn)	Yield at Issue (%)	Spread at Issue (bps)	Concession to Outstanding (bps)	Order Book ($bn)	Oversubscription Level (times)
CMCSA	Comcast Corp	20	10/2/2018	A-	3.0	4.61	140	5	9.6	3.2x
		30	10/2/2018	A-	4.0	4.71	150	Flat	14.1	3.5x
		40	10/2/2018	A-	2.5	4.96	175	Flat	9.0	3.6x
DWDP	DowDuPont Inc	20	11/14/2018	BBB+	1.7	5.32	195	30	3.2	1.9x
		30	11/14/2018	BBB+	2.2	5.42	205	30	4.4	2.0x
CAG	Conagra Brands Inc	20	10/15/2018	BBB-	1.0	5.33	200	10	4.4	4.4x
		30	10/15/2018	BBB-	1.0	5.43	210	10	5.3	5.3x
MPLX	MPLX LP	30	11/7/2018	BBB-	1.5	5.64	220	15	5.0	3.3x
HD	Home Depot Inc	30	11/27/2018	A	1.5	4.61	128	10	5.9	3.9x
EPD	Enterprise Products Operating LLC	30	10/3/2018	BBB+	1.3	4.84	150	5	3.9	3.1x
UNH	UnitedHealth Group Inc	30	12/13/2018	A-	1.1	4.48	130	10	6.8	6.2x
TRPCN	TransCanada PipeLines Ltd	30	10/10/2018	BBB+	1.0	5.12	170	10	1.7	1.7x
DOW	Dow Chemical Co	30	11/28/2018	BBB	0.9	5.56	220	10	3.1	3.4x
GLW	Corning Inc	30	10/30/2018	BBB+	0.6	5.36	200	25	0.6	1.1x
		50	10/30/2018	BBB+	0.3	5.86	250	35	0.4	1.2x

Sources: Bloomberg and JPMorgan

LDI Environment from 2018 into 2019

We believe everything was working for the LDI market during the first eleven months of 2018. Through November, the combination of equity-market strength and discount rates that had climbed by over 80bps helped funded status reach multi-year highs. De-risking activity was spurred by increasing PBGC premiums and tax reform, which provided considerable incentives for plan sponsors to contribute to their plans, further reducing funded-status deficits. Throughout this period, credit spreads remained tight, so it was unsurprising to see a buoyant STRIPS market, as plan sponsors looked for alternative ways to de-risk. However, the last month of 2018 was a very different story, as discount rates fell and equity markets plummeted, leading to many sponsors seeing significant reductions in funded status in December.

2019 brings the potential for a slowdown in de-risking activity. Many plan sponsors took significant steps to de-risk their plans in 2018, and poor equity performance in December is unlikely to fuel further de-risking. However, widening credit spreads could provide an attractive entry point for plan sponsors looking to increase their credit exposure, with the potential for some of 2018's STRIPS demand to find its way to the long corporate markets.

Technical Factors

- US corporate pension plan demand may not be as strong as in previous years.
    - The tax benefit resulting from making plan contributions declined, and funded-status levels were only slightly higher over the course of 2018.
- Demand for US Treasury STRIPS set a monthly record in October, but tapered off toward the end of the quarter.
    - We will closely monitor STRIPS demand, as it may be an indicator of US corporate pension plan demand for long-duration assets.

In 2019, gross and net investment grade supply is estimated to drop by approximately 10% and 30%, respectively

Regulatory Environment

- In 2018, the reduction in the corporate tax rate saw many plan sponsors accelerate contributions in order to take advantage of higher deductions for the 2017 plan year.
- The September 2018 deadline for plan contributions may have been a blessing in disguise, as many sponsors used incoming contributions as the trigger to take de-risking action, hopefully reducing the impact of December's volatile equity returns.

Despite the lower incentives post tax-reform, increasing variable-rate premiums in 2019 may still provide a tailwind for plan contributions and further de-risking

Fundamental Factors

- Earnings growth estimates are coming down gradually as the tailwind from tax reform diminishes, and trade issues are moderating expectations for growth.
- Leverage remains elevated from a historical perspective, but has stabilized as earnings growth has offset debt growth.
    - Refundings are occurring at slightly higher costs, eating into coverage.
- Geopolitical tensions and domestic partisan divide are continued overhangs.
- Inflation remains manageable – energy prices have moderated, and we have yet to see significant wage pressures.

Earnings growth estimates are still in the 6-7% range, with top line 5-6%. Margins are close to peaks.

Portfolio Positioning For 2019

- Long corporate bond spreads grew consistently more appealing throughout the fourth quarter of 2018.
    - We moderately increased portfolio risk profiles by purchasing recent new issues with higher-than-normal price concessions.
    - Our buys were funded by sales of taxable municipals and lower beta corporates, both of which outperformed the broad universe.
- We remain overweight financials and underweight some of the more revenue-sensitive subsectors in the industrial space.

The credit cycle is turning, but we are in the early innings. It is important to be invested in durable, well-capitalized IG entities.

In 2019, IR+M worked with our LDI clients to help them better understand and manage the funded status volatility in their pension plans. As market volatility picks up, we will continue to help clients hedge their plan liabilities through our practical approach to LDI.

Sources: JPMorgan, FactSet