IR+M INCOME RESEARCH + MANAGEMENT

LDI MONITOR

December 31, 2019

2019 LDI Environment Review

Historically low discount rates drove a meaningful increase in liabilities – However, corporate pension funded status only decreased by 0.9% to 89% during 2019, as the impact of falling discount rates was muted by strong asset growth.

Discount rates steadily decreased over the course of the year – The FTSE Pension Discount Rate fell by 100bps, to end the year at 3.22%.

- Long corporate yields began 2019 at 4.91%, before falling to the lowest level on record of 3.48%, and closing the year at 3.60%.

Long corporate spreads tightened by 64bps, from 200bps to 136bps – Long corporate spreads reached post-crisis tights driven by supportive technicals, voracious investor appetite for risk, and solid fundamentals.

- Credit curves remained largely unchanged on a year-over-year basis, as spreads generally tightened to historically low levels across the curve.

Long corporate issuance increased – Total long corporate supply totaled almost $300 billion, ahead of 2018's total of $265 billion; the long-end comprised the highest portion of total corporate issuance since 2000, accounting for 27%.

- Issuers took advantage of low all-in yields to term out debt; net supply of long bonds was $289 billion versus negative $122 billion for bonds maturing in less than 5 years.

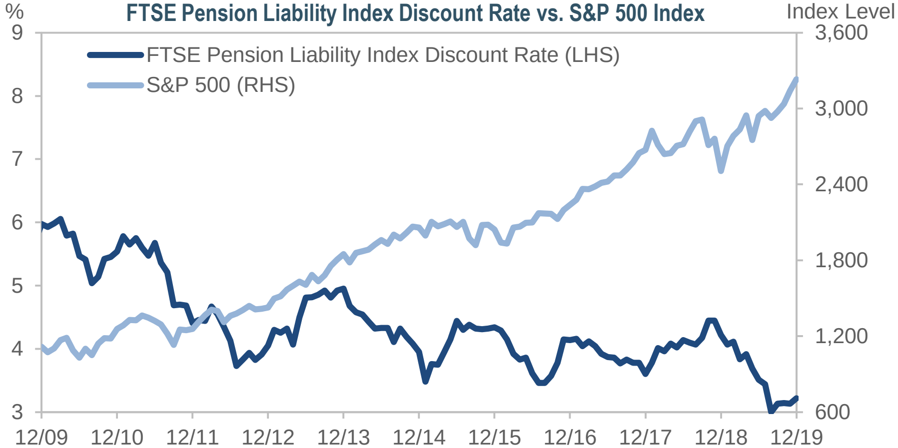
Strong equity returns were a tailwind to funded status improvement – Both domestic and global equities experienced strong performance in 2019, with the S&P 500 Index and the MSCI ACWI returning 29% and 24%, respectively.

- Global tensions stabilized, with a finalized phase-one trade deal between China and the US and the passage of the United States-Mexico-Canada Agreement.

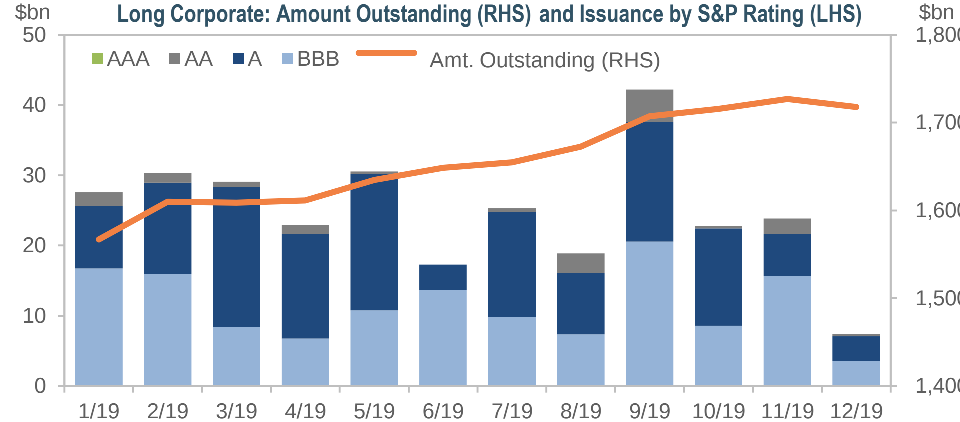
Rates Monitor	12/31/19	11/30/19	12/31/18
FTSE Pension Liability Discount Rate (%)	3.22	3.13	4.22
Bloom Barc Long Corporate Yield (%)	3.60	3.59	4.91
Bloom Barc Long Corporate A+ Yield (%)	3.25	3.20	4.40
Bloom Barc Long Corporate BBB Yield (%)	3.94	3.96	5.36
30 Year Swap Spread (bps)	-30	-33	-17

Glidepath Monitor	12/31/19	11/30/19	12/31/18	12/31/14
Funded Status (%)	89.0	86.9	89.9	81.5
Long Corporate Spreads (bps)	136	151	200	186
Curve (Long Corp - Int. Corp) (bps)	66	72	69	79

FTSE Pension Liability Index Discount Rate vs. S&P 500 Index



Long Corporate: Amount Outstanding (RHS) and Issuance by S&P Rating (LHS)



Trailing 12 Month Long Corporate New Issuance (bn)

AAA	AA	A	BBB	*Total*
$0.0	$16.6	$143.6	$137.9	$298.1

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

Fourth Quarter 2019 Corporate Issuance: Largest Long-Dated USD Investment Grade Deals

- Long corporate supply slowed in the fourth quarter, despite a continuation of the issuer-friendly environment.
  - Long-end supplied totaled $54 billion in 4Q19, ahead of the $43 billion priced in 4Q18, but below the $86 billion from 3Q19.
  - Net issuance of deals with maturities less than 5 year totaled -$38 billion, where net long supply totaled $51 billion.
- Demand for corporate bonds was strong throughout the fourth quarter evident by inaugural new deals, such as Cameron LNG LLC, which were multiple times oversubscribed.

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)
ABBV	AbbVie Inc	20	11/21/2019	BBB+	4.0	4.08	170	-15	12.3	3.1
		30	11/21/2019	BBB+	5.8	4.28	190	-15	16.4	2.9
CMCSA	Comcast Corp	20	11/5/2019	A-	1.4	3.26	93	3	3.4	2.5
		30	11/5/2019	A-	1.8	3.46	113	3	5.0	2.8
CAMLNG	Cameron LNG LLC	15	12/13/2019	A-	0.8	3.30	150	N/A	3.0	4.0
		18	12/13/2019	A-	0.5	3.40	160	N/A	1.6	3.8
		19	12/13/2019	A-	0.9	3.70	145	N/A	5.3	6.7
DHR	DH Europe Finance II Sarl	20	11/7/2019	A-	0.9	3.26	93	-7	3.3	3.7
		30	11/7/2019	A-	0.9	3.41	108	-7	4.3	4.8
INTC	Intel Corp	30	11/21/2019	A+	1.5	3.25	95	5	2.8	1.8
GLW	Corning Inc	30	11/19/2019	BBB+	0.4	3.92	160	20	1.1	2.8
		60	11/19/2019	BBB+	1.1	5.47	315	45	2.3	2.1
RDSALN	Shell International Finance BV	30	11/7/2019	AA-	1.3	3.21	95	7.5	3.0	2.4
NATMUT	Nationwide Financial Services Inc	30	11/21/2019	A	1.0	3.93	162	0	2.5	2.5
RCICN	Rogers Communications Inc	30	11/12/2019	BBB+	1.0	3.76	142	-1	3.4	3.4
KPERM	Kaiser Foundation Hospitals	30	10/23/2019	AA-	1.0	3.27	100	0	N/A	N/A
PEP	PepsiCo Inc	30	10/9/2019	A+	1.0	2.96	92	-3	2.1	2.1
EQNR	Equinor ASA	30	11/18/2019	AA-	1.0	3.33	97	7	1.9	1.9
D	Virginia Electric & Power Co	30	12/5/2019	A-	0.6	3.31	110	-3	1.4	2.5
	Dominion Energy Gas Holdings LLC	30	11/21/2019	BBB+	0.3	3.90	160	-3	1.6	5.3

Sources: Bloomberg and JPMorgan

LDI Environment from 2019 into 2020

2019 was a case study in the benefits of an LDI framework. The average corporate DB plan of old may have seen a plunge in funded status due to the 100bps decline in discount rates. However, we saw the average funded status remain around 90% year-over-year, thanks to larger and longer-duration bond portfolios as well as surprisingly strong US equity performance. At IR+M, we saw plan contributions abate following the tax cut-driven deluge of 2018. While regulatory and actuarial changes were muted, we stayed busy, partnering with our client base through further de-risking, PRT transactions, and a sharper focus on liability hedging with the use of custom benchmarks and interest rate derivatives.

The start of 2020 may bring more questions than answers. Yields are low, spreads are tight, and the never-ending credit cycle seems to be chugging along despite elevated leverage levels and continued economic uncertainty. We wouldn't be surprised to see de-risking activity pick up with the stock market at all-time highs and persistent cost headwinds of maintaining a pension plan. De-risking could take any form - augmenting hedge ratios through extension or asset allocation shifts from growth to hedging assets, full or partial PRT, lump sum offers, etc. We will continue to work with our clients to seek innovative ways to solve for their objectives.

Technical Factors

- Increased demand from pension plans in the near term is possible if plans were to move from equity to fixed income.
- Global yields are also low, enticing foreign buyers to the long corporate market.
- Demand for US Treasury STRIPS picked up materially in December, and only trailed October 2018 in terms of monthly activity over the last three years.
    - As a result of the strong demand for longer-duration assets, the STRIPS curve has recently become inverted.

In 2020, gross investment grade supply in the long end is estimated to drop by approximately 7%.

Regulatory Environment

- As pension funding relief continues to fade, sponsors who have deferred making cash contributions to their plans may experience higher and higher required contributions in 2020 and beyond.
- The costs of maintaining a plan (including PBGC premiums) and favorable insurer pricing continue to be drivers for pension risk transfer (PRT) activity.
    - US pension risk transfers are on track to exceed $11B in 2019.

Plans could look to make cash contributions or PRTs, in order to alleviate the higher expected costs of maintaining plans.

Fundamental Factors

- Estimates are for earnings growth to accelerate into 2020, as companies benefit from stabilizing global disputes and lower effective tax rates.
- Leverage remains elevated from a historical perspective, but has stabilized as earnings growth has offset debt growth.
- Despite progress, escalating global tensions are possible and could be a risk to company profits.
- 2020 is an election year, and a major disruption could impact several sectors such as Energy if certain candidates are elected.

Investment-grade corporate leverage has continued to climb at 2x, while leverage of BBB-rated corporates has leveled off.

Portfolio Positioning For 2019

- Long corporate bond spreads continued to tighten throughout the year.
    - We incrementally reduced idiosyncratic risk across long portfolios to take advantage of strong performance and attractive exit opportunities.
    - Our sales were used to fund purchases of taxable municipals, long securitized, lower beta corporates, and Treasuries, in order to help insulate portfolios from material spread widening to historical averages.
- We remain nominally overweight financials, however, are underweight spread duration relative to benchmarks.

With long corporate spreads at historically tight levels, active risk management is prudent.

As market unpredictability is expected to persist in 2020, we will continue to help clients hedge their plan liabilities and manage funded status volatility through our practical approach to LDI.

Sources: JPMorgan, FactSet, Pension & Investments