IR+M INCOME RESEARCH + MANAGEMENT

LDI MONITOR

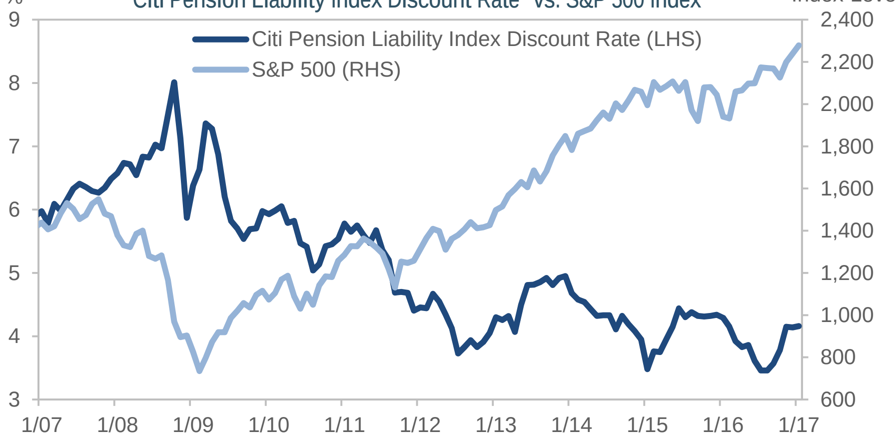
January 31, 2017

LDI Highlights

- Corporate pension funded status carried positive momentum into 2017, rising 0.6% to 81.6% during January.[1]
    - Slightly higher discount rates and positive equity market returns drove the increase.
- Corporate supply was robust across the curve in January, with $167 billion pricing, which is the second highest monthly total since 2000.[6]
    - Long AAA-rated issuance was driven by $5 billion of 30- and 40-year bonds issued as part of Microsoft's $17 billion deal.[4]
- Despite the sharp rise in issuance, long credit spreads were mostly unchanged, as strong demand from long-end buyers kept spreads from widening materially.

Rates Monitor	1/31/17	12/31/16	12/31/15
Citigroup Pension Discount Rate[2] (%)	4.16	4.14	4.34
Bloom Barc Long Credit Yield[3] (%)	4.55	4.55	5.02
Bloom Barc Long Corporate Yield[3] (%)	4.54	4.54	5.06
Bloom Barc Long BBB Corp Yield[3] (%)	4.92	4.93	5.60
30 Year Swap Rate[4] (%)	2.64	2.63	2.64
Long BBB Corp. Yield[3] – Citi Pension Discount Rate[2] (bps)	76	79	126

Citi Pension Liability Index Discount Rate[2] vs. S&P 500 Index[4]

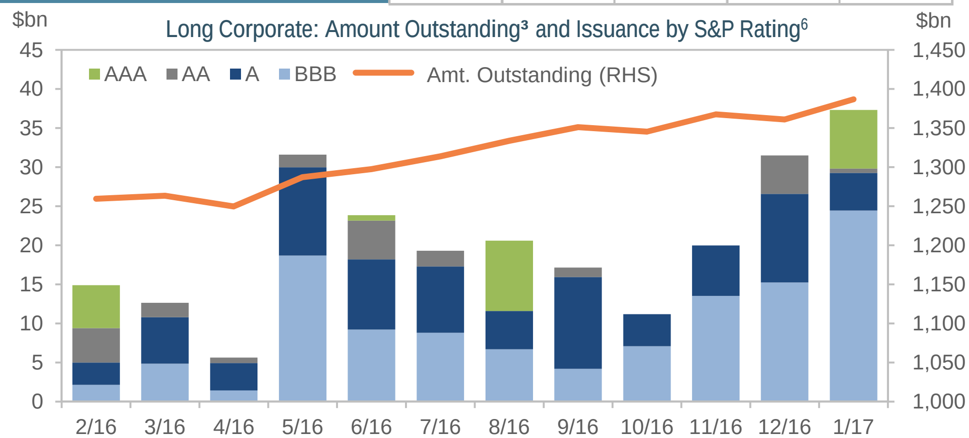


IR+M LDI Corner: Delivering Deleveraging

- While there are numerous definitions of leverage, a generally accepted meaning is when investors' market exposures exceed 100% of the value of their assets. The mere mention of leverage in a portfolio can evoke adverse reactions, since the tactic can involve undue risk-taking and the use of derivatives.
- Many plan sponsors choose not to employ leverage in their asset allocation. However, when assets and liabilities are viewed in combination, it is rare to find a plan that is not leveraged. The reason for this is the large, often unhedged, interest rate exposure inherent in the plans' liabilities. This type of exposure is akin to plans taking a short position in long corporate bonds.
- There are several ways to "de-lever" this unintended interest rate exposure. Additional assets may be allocated to the liability hedging portfolio or, for plans that wish to maintain growth asset exposure, the duration of the assets can be extended beyond that of the liabilities. Sponsors who are averse to using derivatives for duration extension may use STRIPS, which are a capital-efficient alternative for reducing the plan's overall interest rate sensitivity.

Glidepath Monitor	1/31/17	12/31/16	12/31/15	12/31/13	12/31/11
Funded Status[1] (%)	81.6	81.0	81.7	88.3	78.7
Long Credit Rates[5] (%)	4.55	4.55	5.02	5.23	4.99
Long Credit Spreads[5] (bps)	168	167	225	158	239
Curve[3] (Long Cred - Int. Cred) (bps)	183	180	210	283	201
Curve[3] (Long G/C - Agg) (bps)	133	134	161	226	170

Long Corporate: Amount Outstanding[3] and Issuance by S&P Rating[6]



Trailing 12 Month Long Corporate New Issuance[6] (bn)

AAA	AA	A	BBB	*Total*
$22.7	$22.2	$84.4	$116.3	*$245.6*

[1]Milliman; [2]Citigroup; [3]Bloomberg Barclays; [4]Bloomberg; [5]Long rates and long spreads represented by Bloomberg Barclays Long Credit Index yield and spread; [6]JP Morgan