IR+M INCOME RESEARCH + MANAGEMENT

LDI MONITOR

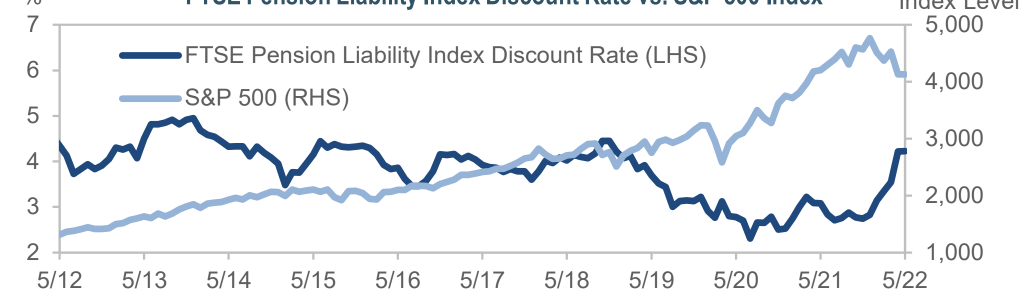
May 31, 2022

LDI Market Updates

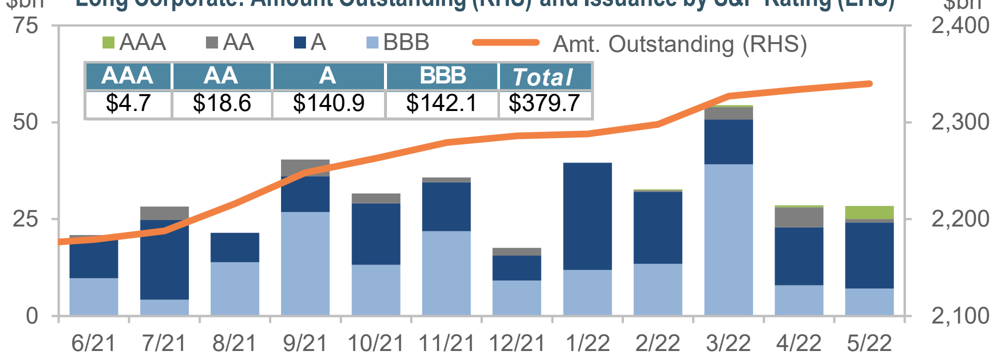
- Discount rates decreased by 0.05% in May, from 4.08% to 4.03%.
- Risk-off sentiment permeated the markets amid inflationary concerns and rising rates; however, spirits were lifted later in the month by positive economic data and the potential for the pace of rate hikes to slow later in the year.
- Long corporate issuance totaled roughly $28 billion; although spreads ultimately tightened 12bps over the month, from 174bps to 162bps, volatile market conditions and a largely risk-off sentiment weighed on issuance.

Rates Monitor	05/22	04/22	MoM Change	12/21	YTD Change
IR+M Average Plan Discount Rate (%)	4.03	4.08	(0.05)	2.61	1.42
Bloomberg Long Corp Yield (%)	4.75	4.80	(0.05)	3.10	1.65
Bloomberg Long Corp A+ Yield (%)	4.41	4.45	(0.04)	2.87	1.54
Bloomberg Long Corp BBB Yield (%)	5.09	5.14	(0.05)	3.32	1.77
Long Corp Spreads (bps)	162	174	(12)	130	32
Curve (Long Corp - Int Corp) (bps)	50	61	(11)	61	(11)

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



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



IR+M Funded Status Monitor

- Our sample Average Plan funded status decreased by 1.2% during May, closing at 101.3%; lower discount rates and negative growth asset returns pushed the funded status lower.

Funded Status (%)	05/22	04/22	MoM Change	12/21	YTD Change
Average Plan	101.3	102.5	(1.2)	101.9	(0.6)
End Stage Plan	105.4	105.8	(0.4)	106.8	(1.4)
Young Plan	93.7	95.4	(1.7)	92.2	1.5

Average Plan Funded Status Monthly Change

Other includes contributions, expenses, benefit accruals, and liability profile changes.

IR+M LDI Corner – There Are Stranger Things Than Being Upside Down

- The 20-year first surpassed the 30-year Treasury yield at the end of October 2021 and the relationship has remained inverted ever since. As of May 31st, the 20-year yielded 21bps more than the 30-year. What is driving this?
  - **Oversupply.** The Treasury quickly ramped up issuance of 20-year Treasury bonds shortly after re-introducing the tenor in May 2020, with 20-year supply on par with that of 30-year Treasury issuance.
  - **Slow market adoption.** This is evident in the recently established 20-year Treasury futures market – the average daily volume has been less than 1% of the ultra long bond contract daily volume since trading began.
  - **Lack of depth.** There are still liquidity differences across tenors and on-the-run vs. off-the-run bonds despite Treasuries being highly liquid. Heightened volatility has caused investors to favor the most liquid issues.
- From an LDI perspective, curve dynamics influence which key rate duration buckets we manage to. We are particularly focused on any "twisting" and non-parallel changes between the 20-year Treasury and 30-year Treasury yield.
- Overall, we think the inversion will eventually normalize as depth in that part of the curve deepens, pricing becomes more efficient, and issuance slows.

The single effective discount rate shown is for the IR+M Average Sample Plan, calculated from the FTSE Pension Discount Curve. 2022 long corporate issuance sourced from Bloomberg, all prior months sourced from JP Morgan. Totals may not sum due to rounding.

Disclosures:

Sources: Moody's PFaroe, Milliman, FTSE Russell (formerly Citigroup), Bloomberg, and JPMorgan. All data in the above commentary is as of 5/31/22. Yields are represented as of the aforementioned date and are subject to change. The views contained in this report are those of IR+M and are based on information obtained by IR+M from sources that are believed to be reliable but IR+M makes no guarantee as to the accuracy or completeness of the underlying third-party data used to form IR+M's views and opinions. This report is for informational purposes only and is not intended to provide specific advice, recommendations, or projected returns for any particular IR+M product. No part of this material may be reproduced in any form, or referred to in any other publication, without express written permission from Income Research + Management. "Bloomberg®" and Bloomberg Indices are service marks of Bloomberg Finance L.P. and its affiliates, including Bloomberg Index Services Limited ("BISL"), the administrator of the index (collectively, "Bloomberg") and have been licensed for use for certain purposes by IR+M. Bloomberg is not affiliated with IR+M, and Bloomberg does not approve, endorse, review, or recommend the products described herein. Bloomberg does not guarantee the timeliness, accurateness, or completeness of any data or information relating to any IR+M product. Moody's Analytics PFaroe® product used by IR+M includes market data and other information sourced from third parties under license. Certain licensors require Moody's Analytics to make disclosures to, or to obtain acknowledgements or agreements from, IR+M and parties receiving the information from IR+M, which is effected by the disclosures and disclaimers available at https://static.pfaroe.com/DisclosuresAndDisclaimers/index.html.

IR+M Funded Status Monitor Assumptions:

Detailed methodology and assumptions for the IR+M Funded Status Monitor can be found at:
https://www.incomeresearch.com/wp-content/uploads/2022/02/IRM-Funded-Status-Monitor-Whitepaper-2022.pdf.

	End Stage	Average	Young
Target Liability Duration (Years)	8-10	12-14	15-17
Funded Ratio at Inception (i.e., 12/31/2019)	100.0%	89.8%	80.0%

Asset Allocations	End Stage	Average	Young
US All Cap Equity	8%	27%	38%
International Equity	2%	17%	22%
US REITS	0%	2%	5%
Private Equity	0%	4%	5%
Growth Assets Allocation	10%	50%	70%
Long Government Fixed Income	5%	10%	10%
Long Credit Fixed Income	30%	25%	10%
Intermediate Government Fixed Income	5%	5%	5%
Intermediate Credit Fixed Income	50%	10%	5%
Fixed Income Allocation	90%	50%	30%