

LDI Market Updates

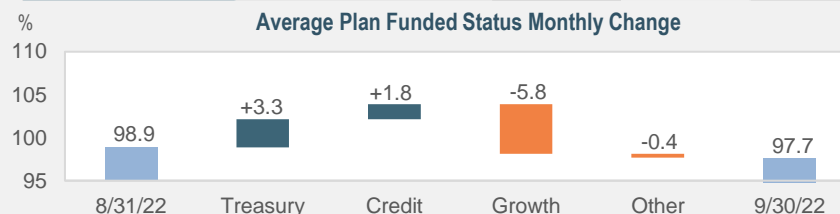
- Discount rates increased by 0.74% in September, from 4.32% to 5.06%.
- A broad risk-off sentiment swept global markets in September and pushed long corporate spreads 22bps wider, from 176bps to 198bps, a year-to-date wide.
- Issuance of long-bonds was heavier during the first two weeks of the month, as investors took advantage of borrower-friendly conditions; supply totaled roughly \$20 billion.

Rates Monitor	09/22	08/22	MoM Change	12/21	YTD Change
IR+M Average Plan Discount Rate (%)	5.06	4.32	0.74	2.61	2.45
Bloomberg Long Corp Yield (%)	5.91	5.17	0.74	3.10	2.81
Bloomberg Long Corp A+ Yield (%)	5.52	4.78	0.74	2.87	2.65
Bloomberg Long Corp BBB Yield (%)	6.31	5.56	0.75	3.32	2.99
Long Corp Spreads (bps)	198	176	22	130	68
Curve (Long Corp - Int Corp) (bps)	58	55	3	61	(3)

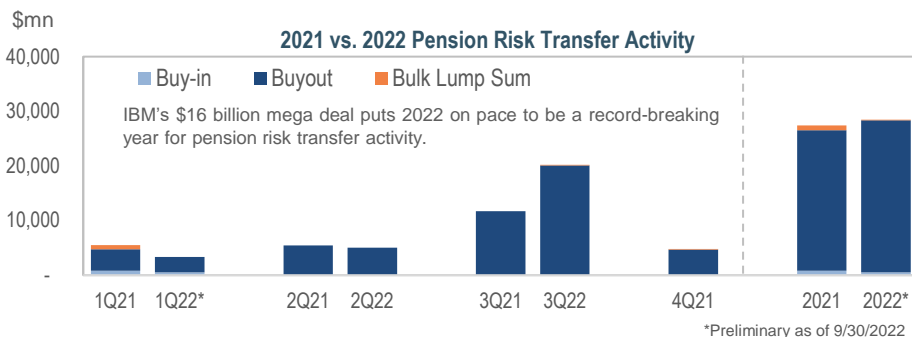
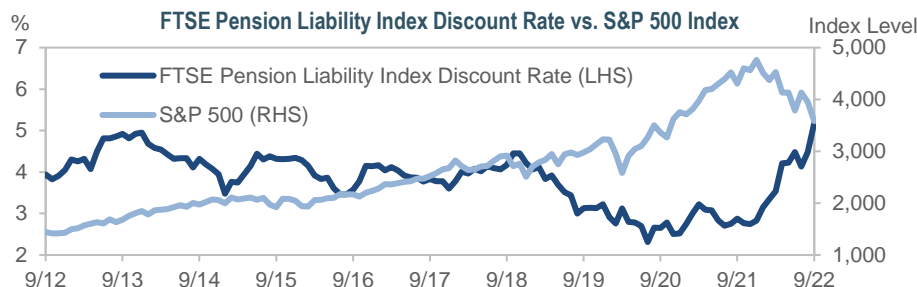
IR+M Funded Status Monitor

- Our sample Average Plan funded status decreased by 1.2% during September, closing at 97.7%; despite higher discount rates, negative growth asset returns pushed the funded status lower.

Funded Status (%)	09/22	08/22	MoM Change	12/21	YTD Change
Average Plan	97.7	98.9	(1.2)	101.9	(4.2)
End Stage Plan	104.7	104.9	(0.2)	106.8	(2.1)
Young Plan	89.5	90.3	(0.8)	92.2	(2.7)



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

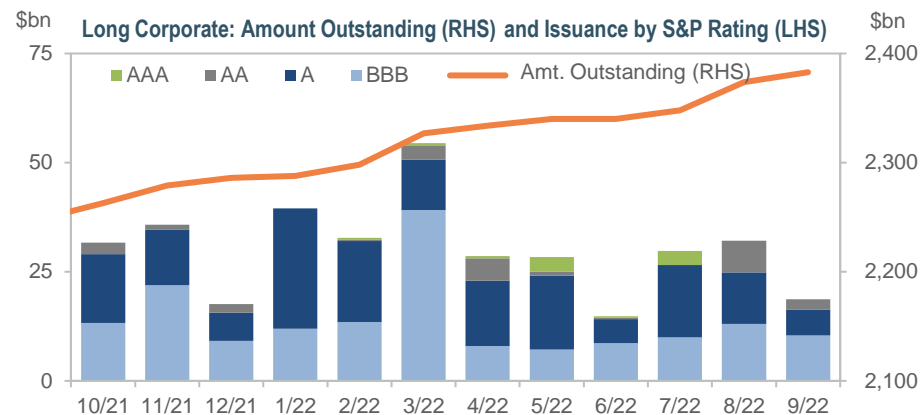


IR+M LDI Corner – The Good and Bad of Leveraged Pensions

- The recent UK rate rally has highlighted the risks of LDI strategies that employ derivatives. While not as prevalent in the US, we welcome the opportunity to help US pension sponsors evaluate if derivatives are appropriate given the goals and risk appetite of their LDI solutions. We typically see derivatives used to:
 - Extend Duration
 - + Deploying fewer physical assets to attain significant duration enhances capital efficiency and improves [hedge ratios](#).
 - As evidenced in the UK environment, these strategies will not benefit as much from rate rises because margin call increases can lead to forced sales and result in cash drag from higher margin buffers.
 - Manage Curve Risk
 - + Derivatives help fine tune according to the liability curve, perhaps via a completion overlay with measurable on-the-run fixed income benchmark(s).
 - An overlay would be managed against a custom liability benchmark, and a LDI manager could possibly achieve a similar curve fit using a custom physical bond portfolio. Physical bonds may be especially appealing for plans approaching termination looking to maximize asset-in-kind potential.

Third Quarter 2022 Corporate Issuance

- The pace of the new issue market was dictated by overall market sentiment, which soured with heightened volatility as the quarter progressed.
 - Issuers priced over \$81 billion in long bonds for the quarter, below the last few 3Q totals but still above historical averages.
 - September was notably slow with only \$20bn of issuance, roughly half of what was priced in September 2021.
- No bonds were issued with 20-year maturities given the curve inversion in the long-end of the Treasury curve.
 - The 20-year Treasury bond has a yield more than 30bps higher than the 30-year Treasury; this can be partly attributed to the relative liquidity of the two tenors.
- Demand from overseas buyers suffered from a strengthening US dollar relative to other countries, despite the unhedged yield of long corporates approaching 6%.



Trailing 12 Month Long Corporate New Issuance (bn)

AAA	AA	A	BBB	Total
\$8.3	\$25.5	\$164.4	\$165.9	\$364.0

Largest Long-Dated USD Investment Grade Deals

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)
META	Meta Platforms Inc	30	8/4/2022	A1	2.8	4.46	145	Debut	8.7	3.2
		40	8/4/2022	A1	1.5	4.66	165	Debut	6.0	4.0
AAPL	Apple Inc	30	8/1/2022	AA1	1.8	3.99	105	7	4.6	2.6
		40	8/1/2022	AA1	1.3	4.12	118	5	3.2	2.6
INTC	Intel Corp	30	8/2/2022	A1	1.8	4.91	185	25	4.2	2.4
		40	8/2/2022	A1	0.9	5.06	200	25	2.6	2.9
LOW	Lowe's Cos Inc	31	9/6/2022	BAA1	1.5	5.65	215	8	4.0	2.7
		40	9/6/2022	BAA1	1.0	5.85	235	15	2.8	2.8
TMUS	T-Mobile USA Inc	30	9/12/2022	BAA3	1.0	5.67	213	5	N/A	N/A
		40	9/12/2022	BAA3	0.8	5.84	230	8	N/A	N/A
DUK	Duke Energy Corp	30	8/8/2022	BAA2	1.2	5.03	202	10	3.5	3.0
AMGN	Amgen Inc	31	8/15/2022	BAA1	1.0	4.88	175	18	4.9	4.9
HD	Home Depot Inc/The	30	9/12/2022	A2	1.0	5.04	150	5	5.8	5.8

IR+M DISCLOSURE STATEMENT

Disclosures:

Sources: Moody's PFaroe, Milliman, FTSE Russell (formerly Citigroup), Bloomberg, JPMorgan and Pension & Investments. All data in the above commentary is as of 9/30/22. 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%