PGIM FIXED INCOME

Perspectives

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Liability-Driven Perspectives

A Tale of Two Recessions

The Effect of Credit Migration on Liability-Driven Investment Portfolios

U.S. corporate plan sponsors value their defined benefit liabilities using high-quality corporate bond rates for accounting purposes. In recent years, this valuation framework has led many plan sponsors to buy more long-dated U.S. corporate bonds in an effort to de-risk their portfolios and reduce the volatility of their plans' funded status. In this paper, we highlight a risk plan sponsors should consider as they implement this strategy, namely the effect of credit migration on the valuation of a plan's assets relative to its liabilities. And, given that a pension plan's benefit payments are not dependent on the performance of corporate bonds, we examine why "de-risked" does not mean "no-risked."

Liabilities Do Not Have Downgrade Risk, Bonds Do

Pension plan liabilities are effectively immune to the risk of a credit rating downgrade. When a bond in the liability discount rate universe (the rate used by plans to value their liabilities) falls below the minimum rating for inclusion, the current methodology removes the bond from the universe and the discount rate just becomes an average of the remaining bonds. But if the same downgraded bond is held in a plan's liability-driven investment (LDI) portfolio, any loss due to a credit rating downgrade causes the LDI portfolio to underperform the plan's liabilities.

Credit Migration Following the Two Most Recent Recessions[1]

To study the effect of rating migration on LDI portfolios, we examined two recent periods when credit rating downgrades notably increased. The first period followed the 2001 U.S. recession ("Scenario A"), and the second period followed the 2008/2009 recession ("Scenario B"). Given the tendency for credit agency ratings to lag bond market valuations, it should come as no surprise that these periods of heightened downgrades lagged the two recessions. Following the end of the 2001 recession, credit rating downgrades were still elevated two years later. Following the end of the 2008/2009 recession, rating downgrades remained elevated more than *four* years later.

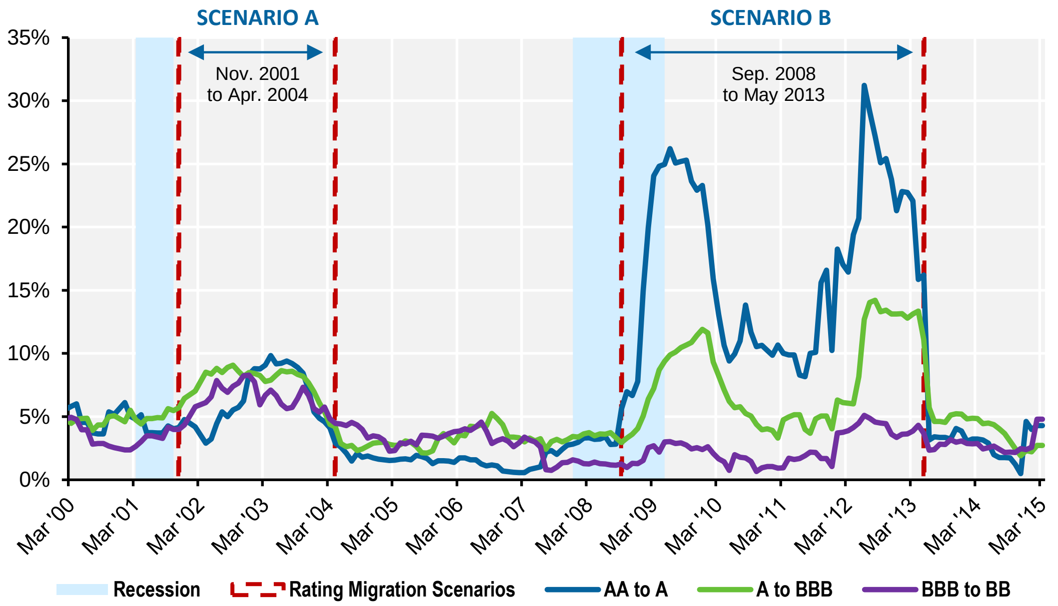
The following chart highlights the rating migration by credit quality following these two recessions. The time series for each credit quality segment represents a 12-month trailing credit migration rate. For example, the blue line on the following page represents the percentage of bonds beginning the preceding 12 months rated AA and ending the period rated A.

[1] *Source: National Bureau of Economic Research.*

As is illustrated in the chart, the two rating downgrade patterns are quite different. Following the 2001 recession, corporate downgrades rose across all investment grade credit quality segments. In contrast, the downgrades which followed the 2008/2009 recession were more heavily concentrated in AA and A-rated bonds, as indicated by the blue line rising from under 5% to a peak of over 30% during that period. Unlike the 2001 recession, this movement indicates the stress within the financial sector, with many financial companies losing the high-quality ratings they held prior to the financial crisis. Comparatively, credit rating downgrades generally rose less in other corporate sectors.

RATING MIGRATION BY CREDIT QUALITY FOLLOWING TWO MOST RECENT RECESSIONS

Trailing 12-Month Migration Rates



Sources: Moody's and PGIM Fixed Income. As of 30 June 2015. Shown for illustrative purposes only.

Credit Migration Incidence Within Each Scenario

In the next two charts, we present the total incidence of rating migration during the two above scenarios calculated using Moody's annual credit rating migration matrices. The matrices show the percentage of corporate bonds starting and ending the periods in each rating category. For example, the blue shaded boxes in the first chart indicate that during Scenario A, 76% of bonds began and ended the period with an A rating, and 16% of bonds rated A at the beginning of the period ended with a BBB rating. Similarly, in the second chart, the blue shaded boxes indicate that during Scenario B, 62% of bonds began and ended the period with an A rating, and 28% of bonds rated A ended with a BBB rating.

CREDIT MIGRATION SCENARIO A

November 2001 to April 2004

		Ending Rating							
		AAA	AA	A	BBB	BB	B	CCC	D
Beginning Rating	AAA	0.88	0.10	0.01	-	0.01	-	-	-
	AA	0.07	0.78	0.13	0.01	0.00	-	-	-
	A	0.00	0.05	0.76	0.16	0.02	0.00	0.00	0.00
	BBB	0.00	0.00	0.05	0.72	0.13	0.05	0.02	0.02
	BB	-	0.00	0.01	0.09	0.59	0.23	0.04	0.04
	B	-	-	0.00	0.01	0.07	0.59	0.17	0.16
	CCC	-	-	-	-	0.01	0.10	0.36	0.54

Sources: Moody's and PGIM Fixed Income. Shown for illustrative purposes only.

CREDIT MIGRATION SCENARIO B

September 2008 to May 2013

		Ending Rating							
		AAA	AA	A	BBB	BB	B	CCC	D
Beginning Rating	AAA	0.41	0.36	0.17	0.05	0.01	-	-	-
	AA	-	0.35	0.46	0.16	0.02	0.01	0.00	-0.00
	A	-	0.02	0.62	0.28	0.04	0.01	0.00	-0.02
	BBB	-	0.00	0.05	0.80	0.10	0.03	0.00	-0.02
	BB	-	-	0.00	0.14	0.50	0.24	0.05	-0.07
	B	-	-	-	0.02	0.11	0.49	0.14	-0.24
	CCC	-	-	-	0.00	0.01	0.08	0.14	-0.77

Sources: Moody's and PGIM Fixed Income. Shown for illustrative purposes only.

Not only does credit migration generally rise following recessions, but the scope, pace, and number of downgrades can vary based on overall market conditions and the underlying causes of the recession. Having reviewed these scenarios, we now look at how LDI portfolios can be constructed.

Many LDI Portfolios Invest in Bonds Rated Lower Than AA

A lack of high-quality, long-dated US corporate issuance often steers LDI portfolios toward a structural lower credit quality bias relative to the high-quality liability discount rate. Many LDI portfolios invest in shorter-dated bonds to improve issuer diversification, and then invest in U.S. Treasuries to replace the lost duration. However, the inclusion of shorter-dated bonds and U.S Treasuries may reduce the portfolio's spread duration, i.e., the sensitivity of the bonds' prices to a small change in credit spreads at each point along the spread curve. To achieve a neutral spread risk position versus a plan's liabilities, lower-quality, A and BBB-rated bonds, which have higher spread volatility, are often added to the portfolio.

To illustrate, we have shown the spread key rate durations of a sample LDI portfolio. As explained above, the sample LDI portfolio positions are not exclusively rated AA, despite the high-quality liability discount rate. In fact, more than 75% of the portfolio's spread duration is in A and BBB-rated bonds.

SAMPLE LDI PORTFOLIO: CORPORATE SPREAD KEY RATE DURATIONS

As of 30 June 2015

	2 Yr	3 Yr	5 Yr	10 Yr	20 Yr	30 Yr	Total %
AA	0.0	0.0	0.0	0.2	0.7	1.7	24%
A	0.0	0.0	0.1	0.4	1.9	2.7	46%
BBB	0.0	0.0	0.1	0.4	1.1	1.8	30%

Sources: Moody's and PGIM Fixed Income. Sample LDI portfolio illustrates a hypothetical portfolio for the investment strategy identified. Shown for illustrative purposes only.

This lower credit quality bias, combined with the absence of downgrade risk in pension liabilities, create the potential for an LDI portfolio's assets to underperform the liabilities when downgrades increase. Given this scenario, the question sponsors should ask their LDI asset manager is: *How large could this underperformance be when credit rating downgrades accelerate?*

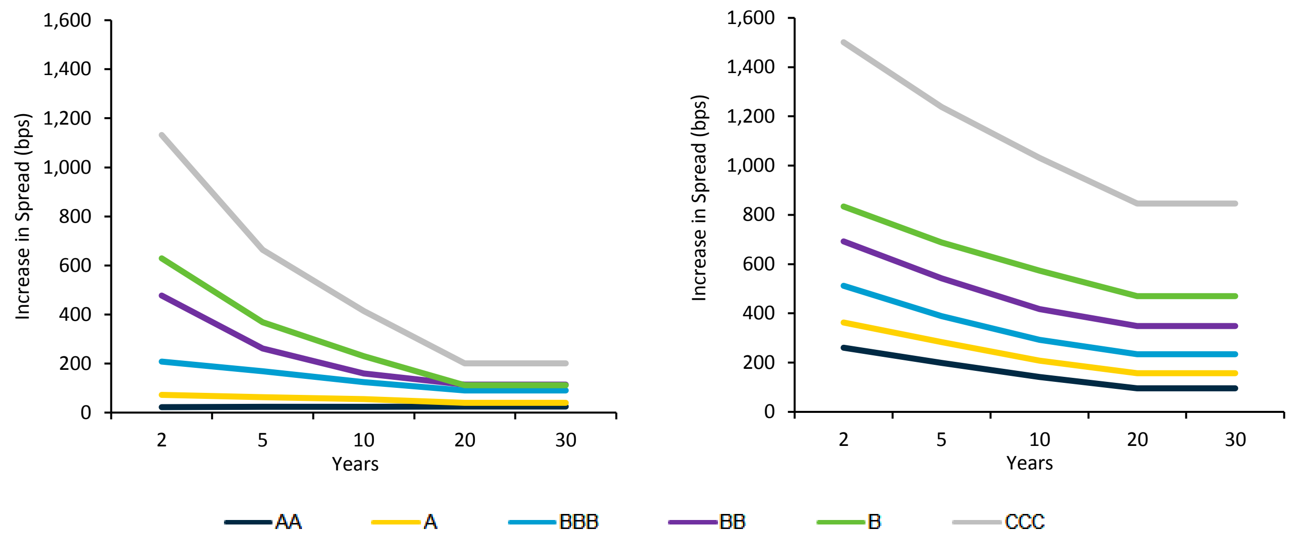
Measuring Credit Migration Risk

To answer this question, we subjected the sample LDI portfolio discussed above to the total downgrades experienced during Scenarios A and B using two different spread widening assumptions.

1) Base Assumption: In the base assumption, we isolated the impact of credit migration by keeping the current spread term structure constant, as illustrated in the Appendix.

2) Stress Assumption: In an actual adverse ratings downgrade scenario, it is likely that all credit spreads will widen. To assess this effect, we stressed the base spread widening assumption using the most stressful spread movements during each period.

2001 Recession Spread Stress | **Credit Crunch Recession Spread Stress**



Source: PGIM Fixed Income. As of 30 June 2015. Shown for illustrative purposes only.

Bringing this all together, to calculate the potential underperformance of assets to liabilities due to downgrades, we applied the credit migration incidence and the spread widening assumptions to the sample portfolio's spread key rate durations.

As the results below show, left unmitigated, credit rating downgrades can have a significant impact on the relative performance of an LDI portfolio versus a plan's liabilities. Keeping the current spread term structure constant, the Scenario A liability underperformance due solely to downgrades is 2.4%, while Scenario B underperformance due to downgrades is 4.0%.

However, when we stressed the base spread widening assumption, the underperformance due to downgrades rose to 3.1% in Scenario A and 7.9% in Scenario B.

POTENTIAL LOSS DUE TO CREDIT RATING MIGRATION

As of 30 June 2015

	Spread Duration		Base Spread Widening Assumption	Stress Spread Widening Assumption
	Liabilities	Asset Corporate Portfolio		
Scenario A *2001 to 2004*	15 yrs	11 yrs	2.4%	3.1%
Scenario B *2008 to 2013*	15 yrs	11 yrs	4.0%	7.9%

Sources: Moody's and PGIM Fixed Income. Shown for illustrative purposes only.

Mitigating the Credit Migration Drag

Despite the risks this paper highlights, if reducing a plan's funded status volatility is a high priority, we believe an LDI strategy remains among the best means to achieve that goal. To mitigate the impact of credit migration within an LDI portfolio, plan sponsors may wish to consider the two following actions:

1) Seek an Alpha Source Aligned with the Goal of Avoiding Downgrades

Over time, the LDI portfolio is likely to lag the liability performance due to credit rating downgrades—manager alpha is needed to close that gap. In addition, the downgrade effect is not a continual attrition, but concentrates in periods following recessions. As a result, if the LDI asset manager consistently emphasizes alpha generation from security selection through bottom-up, fundamental credit research, we believe the alpha source will be more closely aligned with the goal of avoiding downgrades.

Top-down fixed income managers who prefer to take active positions by expressing macroeconomic views through duration, spread, or currency positions can also offer alpha, just not when you may need it.

2) Diversify Spread Exposure by Including Non-Corporate Spread Products

We believe another way to mitigate corporate downgrade risk is to add spread products to the LDI portfolio that are correlated with general movements in corporate spreads, but which offer greater protection from corporate downgrades. Examples include the high-quality tranches of some structured products such as commercial mortgage-backed securities (CMBS) and/or collateralized loan obligations (CLOs). The collateralized structure of these assets means they are not directly exposed to some corporate risks (such as M&A activity) in the same manner as unsecured investment grade debt. These assets can also provide the excess spread needed by the LDI portfolio, as well as diversification from corporate credit rating downgrades.

Conclusion

In the current environment, downward credit rating migration is relatively low. But at some point in the future, there will inevitably be another recession, leading to an increase in credit rating downgrades.

Against this backdrop, we believe that plan sponsors who use LDI to hedge their accounting liability should fully understand the residual risks generated by credit migration. Given the uncertain timeframe for the next recession, plan sponsors may consider taking action now. Two mitigation options to consider are: 1) Seek an alpha source aligned with the goal of avoiding downgrades, and 2) Diversify spread exposure by including non-corporate spread products in LDI portfolios.

Appendix

Below are the corporate spread quality curves used in the base spread widening assumption on page 4.

CORPORATE SPREAD QUALITY CURVES

As of 30 June 2015

	2 Yrs	5 Yrs	10 Yrs	20 Yrs	30 Yrs
AA	19	58	95	115	122
A	66	98	130	148	154
BBB	111	155	208	238	247
BB	272	291	305	313	313
B	394	446	479	496	496
CCC	727	863	933	969	969

Source: PGIM Fixed Income. Shown for illustrative purposes only.

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as of 30 June 2015.

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