GUGGENHEIM

Managing Corporate Pension Plan Financial Risk

A Better Approach to Liability Driven Investing

Executive Summary

- Sponsors of fully funded corporate pension plans should consider a Liability Driven Investing (LDI) strategy as a means of maintaining funded status and controlling financial risk.
- LDI strategies linked too closely to "off-the-shelf" long-duration, fixed-income indices cannot produce perfect hedging and can even cause funded status to deteriorate over time.
- Since tracking error is inevitable, we believe better outcomes can be achieved by adopting a more sophisticated form of LDI, one that makes use of a broader range of fixed-income investments and relative-value opportunities.

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Are Traditional LDI Strategies Effective?

To hedge against movements in liabilities pension plans using an LDI strategy generally invest in long-duration bonds and may benchmark performance to a long-duration index as an investable proxy for pension liabilities. But does investing in this manner result in successful liability hedging or maintaining a fully funded status over time? The short answer is no.

We examined what would have happened if a fully funded, "typical" pension plan had invested in line with three different long-duration fixed-income indices for the ten-year period ending December 31, 2014. Specifically, we measured two things: 1) how closely aligned asset and liability movements were from month to month (i.e., tracking error); 2) the funded status at the end of the period. For this purpose we used the monthly "return" on the Citigroup Pension Liability Index-Intermediate[1] as a proxy for the pension plan's liability movement. Plan assets were assumed to be invested in the Barclays Long Government/ Credit Index, Long Credit Index, or the Long Corporate Index. As Exhibit 1 indicates, investing in any of these indices resulted in asset and liability movements that were NOT closely aligned, and a funding ratio substantially lower than the 100 percent level assumed at the beginning of the ten-year period[2].

Exhibit 1: Market Indices Fall Short as Liability Hedges

Returns, Tracking Error, and Funding Ratio: 12.31.2004 - 12.31.2014[3]

	"Typical" Pension Plan Liabilities	Barclays Long Government / Credit Index	Barclays Long Credit Index	Barclays Long Corporate Index
Total Return (Annualized)	8.1%	7.4%	7.1%	7.0%
Tracking Error		4.7%	4.3%	4.4%
Funding Ratio at end of period (mark-to-market basis)		93%	91%	90%

Source: Citigroup, Barclays, Guggenheim Investments. "Typical" Pension Plan is based on the Citigroup Pension Liability Index-Intermediate. Plan is assumed to be 100% funded on a mark-to-market basis at the beginning of the ten-year time period.

[1]The Citigroup Pension Liability Index – Intermediate is a publicly available index proxying how pension liabilities are valued for accounting purposes based on changes in market factors such as rates and spreads. [2]For the purposes of this paper, funded status is measured as applicable to financial accounting for Corporate pension plan sponsors. This measurement is on a mark-to-market basis. [3]Data based off a model. See disclosures at the end of the document.

Why Are Traditional LDI Strategies Ineffective?

Perfect hedging of pension plan liabilities is impossible for multiple reasons. We will show that:

- The methodology used to generate pension cash flow forecasts is "unhedgeable."
- The discount rate curve used to generate the present value of pension cash flows (i.e. the pension liability) is "uninvestable."
- There is a limited supply of high-quality long-duration investment-grade corporate bonds.
- The characteristics of "off-the-shelf" long-duration indices do not match those of pension liabilities.

Liability Estimation Process Creates Investment Challenges

By its very nature, the methodology used to measure pension liabilities (for accounting purposes) generates two sources of liability movement that are uninvestable. The first source comes from the way actuarial models produce pension plan cash flow forecasts; the second source comes from how these cash flow forecasts are discounted to a single liability number. The discounting methodology also contributes to why investing in one of the long-duration fixed-income indices identified in Exhibit 1 is likely to result in deterioration of funded status.

Cash Flow Forecasts Can Vary Significantly from Year to Year

A pension plan cash flow forecast is generated as of the valuation date, using the plan provisions defining the pension benefits payable, a census of plan participants, and a model that incorporates a set of actuarial assumptions such as mortality, retirement rate, turnover, and salary increases. When the next valuation is performed, typically a year later, this cash flow forecast is updated. If it differs from the original forecast, the result will be an unanticipated (and unhedgeable) change in the measured pension liabilities.

Unfortunately, it is always the case that pension plan cash flow forecasts differ from year to year, sometimes significantly. This can occur for several reasons:

- The actuarial assumptions never exactly predict the actual demographics and behavior of the people in the plan from year to year.
- The actuarial assumptions used may change from year to year. For example, the Society of Actuaries recently released an updated set of mortality tables. When the updated tables are adopted for valuation purposes, the forecast cash flows will increase materially.
- The pension plan may be amended, changing the amount of benefit payments payable to plan participants and/or when they are payable.

Replicating the Cash Flow Discounting Process is Impossible

Even if cash flow forecasts were held constant, our problem would not be solved because investors are subject to principal losses from credit events, while the factors used to discount cash flows are not.

Pension accounting rules require that liabilities be measured on a mark-to-market basis, using discount factors that are reflective of yields on AA-rated corporate bonds. Such discount factors are not directly observable. Rather, they are derived from the universe of AA-rated corporate bonds in existence as of the valuation date[4]. When the next set of discount factors (as of the next valuation date) is derived, bonds that were downgraded are simply dropped from the group of bonds being used.

The methodology of the cash flow discounting process makes it impossible to invest in a way that exactly mirrors the movement in discount factors. If you invest in the exact same group of bonds that is used to derive the discount factors (i.e., CUSIP match) and a bond is downgraded, you lose money on that bond, but the discount factors fail to account for the bond's higher yield following the downgrade.

[4]Several organizations produce discount factors used to evaluate pension liabilities. While there are differences in the specifics of how each organization generates these factors, they are very similar at a high level. In this paper, we are using the discount factors underlying the Citigroup Pension Liability Index as an example.

In fact, the discount factors will likely rise as the bond is dropped from the calculation. While this may sound like a mere technicality, the impact can be large. When Moody's downgraded several large banks in June 2012—causing them to fall out of the calculation universe—Citigroup estimated that the resulting reduction in the Citigroup Pension Liability Index discount rate was 20 basis points, which would translate to about a 3 percent increase in liability. The only way to avoid underperformance associated with this issue would be to have perfect insight into downgrades and the ability to act on this insight. A manager would literally have to sell the bond in question prior to its price dropping in anticipation of a downgrade while simultaneously reinvesting the proceeds into all the remaining bonds in the group.

Limited Supply of Corporate Bonds Creates Additional Risks

Despite the investment challenges presented by the liability estimation process, the traditional LDI approach is still focused on buying long-maturity, high-quality corporate bonds in an effort to match the changes of the discount rate. For a plan sponsor who discounts liabilities based on the Citigroup Pension Liability or similar index the options for implementing the traditional LDI approach actually create significant issuer and sector concentration risks.

A very conservative plan sponsor could choose to invest in only the AA-rated portion of the Barclays Long Corporate Index, which overlaps significantly with the bonds used to construct the Citigroup Pension Liability Index. However, there is a limited supply of high-quality long-duration corporate bonds. As of December 31, 2014, the Barclays Long Corporate Index had 114 bonds rated AA or higher, adding up to a market value of $91.7 billion, and consisting of just 34 distinct issuers. As a result, plan sponsors who restrict their investable universe to investments in the AA or better component of the Barclays Long Corporate Index would be exposed to downgrade event risk (described above in our discussion of the cash flow discounting process).

Given this quandary, many plan sponsors have expanded their reach to use other long maturity investment-grade bonds and have adopted the Barclays Long Government/Credit, Long Credit, or Long Corporate Index as proxies for the investable universe. Allowing the investment universe to include A-rated corporate bonds helps alleviate issuer concentration, but still makes it difficult to construct portfolios that properly hedge against liability movements. The sector composition of A-rated and higher issuers differs materially from the AA-rated and higher universe used in the Citigroup Pension Liability Index. As of December 31, 2014, it contains significantly higher exposure to Utilities and Telecoms and lower exposure to Financial Services and Banks. Finally, using the entirety of the indices (including nearly 50 percent in BBB-rated bonds) addresses concentration and industry diversification problems, but it exposes investors to additional credit quality risk and, along with it, tracking error.

Analytics Mismatches Will Exacerbate Tracking Error

Tracking error between pension liabilities and assets invested in these long-duration fixed-income indices will be exacerbated by mismatches in analytics such as duration, spread duration, and DTS. (Lower quality bonds are generally more sensitive to changes in the credit spread environment than higher quality bonds. "Duration Times Spread" is a risk metric designed to better reflect credit quality when measuring price sensitivity of a portfolio to credit spread movement.) Exhibit 2 illustrates these differences.

Exhibit 2: The Limitations of Generic Market Indices

Quality, Duration, Spread Duration, and DTS

	"Typical" Pension Plan Liabilities	Barclays Long Government / Credit Index	Barclays Long Credit Index	Barclays Long Corporate Index
Quality	AA	AA3/A1	A2/A3	A3/BAA1
Duration	15.3	14.7	13.5	13.8
Spread Duration	15.3	8.6*	13.2	13.4
DTS	16.6	15.1	23.7	24.2

Source: Citigroup, Barclays, Bloomberg, Guggenheim Investments. "Typical" Pension Plan is based on the Citigroup Pension Liability Index-Intermediate. *Spread duration calculated excluding any contribution by US Treasury securities. Assumes zero DTS on US Treasuries. DTS calculated as Option Adjusted Spread Duration times Option Adjusted Spread /100. As of 12.31.2014.

While the Barclays Long Government/Credit Index is the closest in quality and duration to the liabilities of a typical pension plan, the index has substantially lower spread duration because of its large exposure to U.S. Treasury securities. Even when DTS is used to measure sensitivity to credit spread movements for this index, there is still a meaningful difference. The Barclays Long Credit and Long Corporate Indices differ significantly from the pension plan in terms of quality, duration, and DTS. As a result of these mismatches, the performance of investments aligned with these long-duration indices will tend to deviate from the "returns" of the typical pension plan as proxied by the Citigroup Pension Liability Index –Intermediate[5].

Conclusion

Traditional LDI Approaches Are Ineffective

Given the nature of corporate pension accounting and traditional LDI benchmarks, the surface appeal of investing in a long-duration index breaks down under close scrutiny. Portfolios confined to the boundaries of generic long-duration indices will struggle as effective liability hedges. Even worse, a strategy of passively investing to replicate a long-duration index is likely to cause funded status to deteriorate over time because investors are subject to principal losses from credit events while the discount rate is not.

An Improved Approach to LDI: Match Characteristics, Not CUSIPs

Tracking error is inevitable in any LDI approach. Underperformance, however, should not be a foregone conclusion. To outperform traditional long-duration indices and better hedge pension liabilities, we believe LDI investors should look beyond corporate bonds and employ a strategy that actively assesses and benefits from relative-value opportunities of a broader range of securities and sectors. Doing so can enhance return in a risk-managed manner.

The U.S. fixed-income market has over $35 trillion in securities outstanding. Approximately half of these assets are not in a generic market index and many are under-researched. Owning long maturity corporate bonds is not the only way to reach spread or duration targets. For example, investments in ABS, RMBS and CMBS can offer a more attractive combination of yield and risk characteristics. It also helps investors avoid potentially high sector, industry, and issuer concentrations of LDI portfolios that focus only on corporate bonds. In addition, a portion of a portfolio's duration exposure can be obtained via highly-rated, long-duration securities such as military housing and municipal bonds, which have historically suffered fewer credit events than corporate bonds.

Embracing a wider investable universe can help deliver portfolios that are more aligned with the characteristics of a plan's liabilities and better positioned to outperform traditional long-duration indices. It also creates the ability to address spread and duration aspects of the portfolio separately, providing added flexibility in portfolio construction and likely improving performance. Derivatives can also be used to better control duration and spread exposure. Of course, embracing a broader opportunity set is only one part of the equation. Evaluating risk in under-researched sectors requires rigorous research, so having the expertise to source opportunities and conduct the appropriate level of due diligence is also critical.

Guggenheim Invests Across a Wider Spectrum of the Market

Guggenheim Investments has $141 billion in fixed-income assets. Performing rigorous bottom-up research across the full spectrum of fixed-income markets enables us to identify the sectors and securities with the most attractive relative value, regardless of whether they are included in an index or not. Our extensive credit research capabilities, built upon years of investing for insurance companies, focus on buying and holding securities. In addition to our strong track record in corporate bonds, we have extensive expertise in structured credit, particularly in sectors that are overlooked by other investors. For an LDI mandate, we believe this expertise allows us to more effectively manage the potential asset/liability mismatch caused by bonds dropping from the eligible pool used to determine the next set of discount factors. With our long-term focus and expertise in complex, under-researched sectors, we believe we can deliver portfolios that outperform traditional long-duration indices and better hedge pension liabilities.

[5]We also tested the performance of the Barclays indices against a Guggenheim-created custom pension plan with duration closer to that of the market indices. Tracking error was not meaningfully different from what is shown in Exhibit 1 and all indices still underperformed over the 10-year period.

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[2]Assets under management are as of 12.31.2014 and include consulting services for clients whose assets are valued at approximately $36 bn.

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