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Implementing Asset/Liability Management— A User's Guide to ALM, LDI and Other Three-Letter Words

by Anton Wouters

Editor's note: In September, ABN AMRO Asset Management held seminars on Liability-Driven Investing in Montreal, Toronto and Vancouver, Canada. Previously this article was published in the November 2007 Institutional Newsletter of ABN AMRO.

As we meet with pension plan sponsors and consultants across Canada we find that the subject of liability-driven investing (LDI) comes up repeatedly (even when we do not initiate the discussion). We also find that LDI seems to mean something different to each person we meet. Is LDI just a new name for asset/liability management (ALM)? Or is LDI just about hedging interest rate risks with fancy securities? Or is LDI something else again? In this article we describe a framework for understanding what LDI is, how it relates to ALM, and how it can be used to solve real-life problems for Canadian pension funds.

LDI as a Wider Risk Management Concept

By linking the plan's strategic asset mix to its liabilities, asset/liability management provides the foundation for the actual investment processes used by the plan. In our view, liability-driven investing is an approach to organizing those investment processes to manage plan-specific risks.

The outcome of the plan's ALM study is the input to the LDI strategy. LDI is a process for finding the "best" way to implement the ALM study's recommendations.

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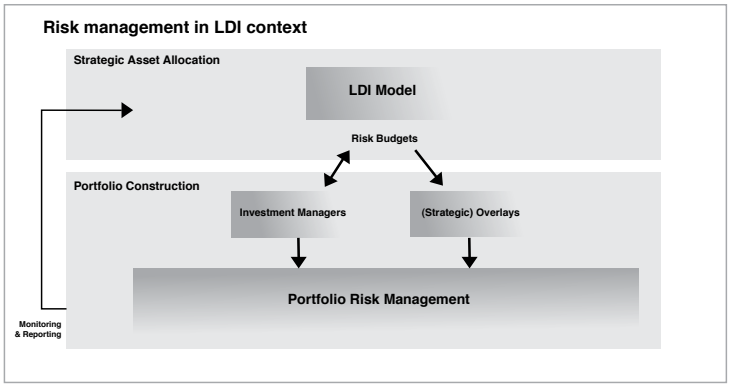
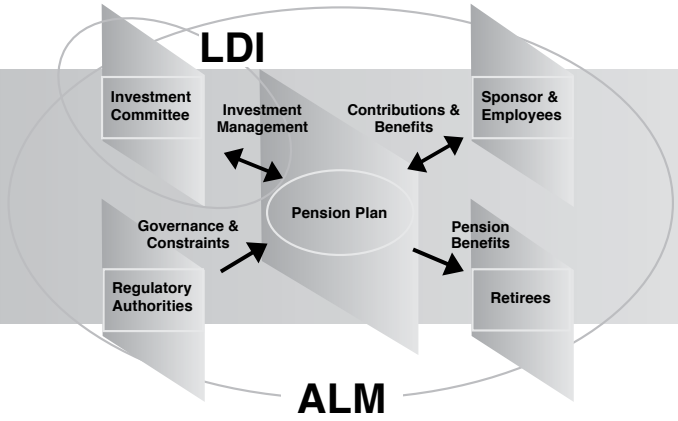
In this context, "best" means first defining what constitutes risk for the pension plan and then using a structured approach to managing that risk (or those risks) in the most effective manner. In order to do this, it is necessary to consider the plan's strategic beta exposures (i.e., its asset allocation and its interest rate sensitivities), the role of active management in providing additional, possibly non-correlated, returns, and the possible use of dynamic strategies to react to changing market conditions and pension fund characteristics.



An important point in this context is that using an LDI approach does not have to mean any significant changes to the overall investment strategy—rather it is a way of optimally implementing that strategy—so LDI can thus be combined very readily with the pension fund's overall view of active management. (Due to space limitations, we will not explore the active management aspect in further detail in this article.)



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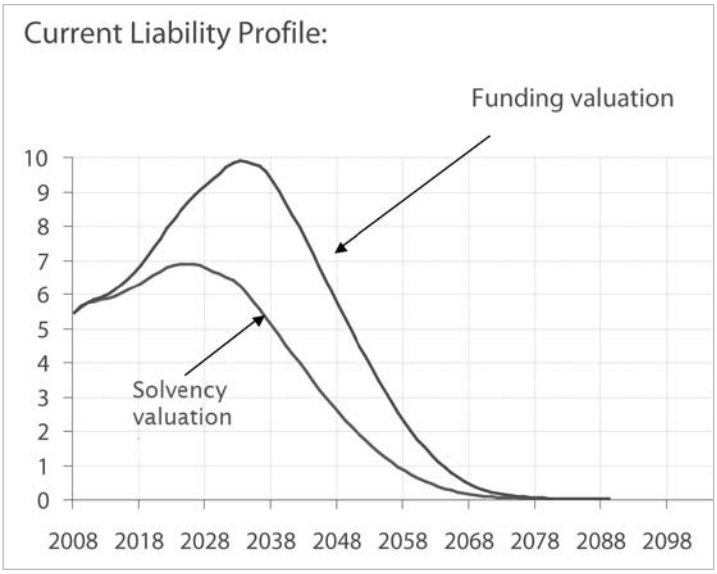
A Canadian Example

As an example, consider a typical Canadian corporate-sponsored defined benefit plan. Based on today's plan membership, this plan has liabilities representing an annual benefit payout stream stretching decades into the future. Because of Canadian pension rules, the plan's management and their actuary must in fact consider more than one future payout stream, as shown in the next chart: One stream will be based on the benefits accrued to date as if the plan was being wound up, and will be used for the solvency valuation. The other stream will take into account future benefit increases and accruals (based on the actuary's estimates) and will be used for the going-concern or funding valuation.



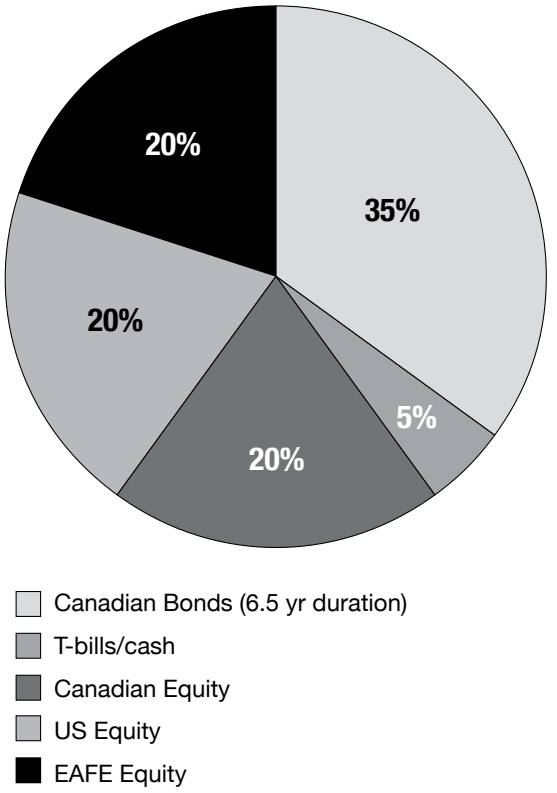
The plan in question has assets of $100 million (market value) and funding liabilities of $108 million, resulting in a funded ratio of 93 percent on a going-concern basis. The plan's solvency liabilities are $118 million, and so the solvency ratio is 85 percent.

Comparing the valuation results to the payout chart above may raise the question of why the lower solvency payouts generate a higher liability value. The answer of course lies in the discount rate used to calculate the present value of the payout streams. For solvency valuations, actuaries must use current long-bond yields, while funding valuations use an estimate of the plan's expected long-term investment returns. The discount rates and other valuation characteristics are shown in the table below:

Characteristics	Funding Valuation	Solvency Valuation
Discount rate	6.5%	4.4%
Asset value	100	100
Liability value	108	118
Funding ratio	93%	85%
Duration of liabilities	15	15

Based on an asset/liability study, this typical plan has, not surprisingly, a typical asset mix, shown below:

Current Asset Mix



What are the Risks Associated with this Plan?

One risk might well be the risk of a sizable drop in the solvency ratio over the next year, as this would have unpleasant consequences for the sponsor and possibly the members. By conducting Monte Carlo simulations it is possible to quantify this risk, as shown in the table below:

Characteristics at a 1-Year Horizon	Funding Valuation	Solvency Valuation
Expected funding/ solvency ratios	97%	90%
Lower bound of 95% confidence interval	81%	71%
Expected return of asset mix	6.6%	6.6%
Tracking error versus liabilities	10%	12%
Probability funding/ solvency ratio declines more than 10%	6%	9%

Looking at the "Solvency Valuation" column, we see that the **expected** solvency ratio for the plan a year from now is 90 percent (the increase from the present 85 percent is due to the plan receiving expected investment earnings and amortization payments). However, the bottom line of the table shows that there is a 9 percent chance that the solvency ratio will have fallen by more than 10 percent, to below 75 percent—a most undesirable outcome. Indeed, the second line of the table shows that there is a 2.5 percent chance that the solvency ratio will be as low as 71 percent. The expected increase is nice, but the risk of a bad outcome is significant enough that the plan sponsor may well wish to adjust the management of the plan.

Reducing the Solvency Ratio Risk

1. ***Increase Duration***

As a first step in trying to reduce the risk of a drop in solvency, the plan could increase the duration of its bond portfolio to bring it into line with the 15-year duration of the liabilities. Re-running the simulations shows that increasing the duration this way would leave the expected solvency ratio a year hence at 90 percent, and would also decrease the probability of a drop of more than 10 percent to 7 percent from the previous 9 percent—a modest move in the right direction.

2. ***Increase Bond Allocation***

To build further on the improvement above, the plan could also increase its allocation to bonds from 35 percent to 50 percent. In conjunction with the increased duration, this reduces the likelihood of a drop of 10 percent or more in the solvency ratio to 3 percent. However, because more of the portfolio is now allocated to bonds, the portfolio's expected return falls from 6.6 percent to 6.0 percent and the expected solvency ratio falls from 90 percent to 89 percent. So although the risk of a truly adverse event has been significantly reduced, there was a cost involved: the expected solvency situation of the plan, and thus its ongoing cost, have both deteriorated slightly.

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3. ***Use Interest Rate Swaps***

Using interest rate swaps instead of changing the plan's bond portfolio is a way to adjust the plan's interest rate sensitivity without significantly affecting the plan's underlying assets and hence its expected return. By using an interest rate swap overlay instead of steps 1 and 2 above we find that we are able to maintain the plan's expected solvency ratio in a year's time at 90 percent and its expected return of 6.6 percent, while delivering a 5 percent likelihood of a drop in solvency of more than 10 percent. While this last statistic is not as favourable as in item 2 above, it still represents a great improvement over the other cases we have examined so far.

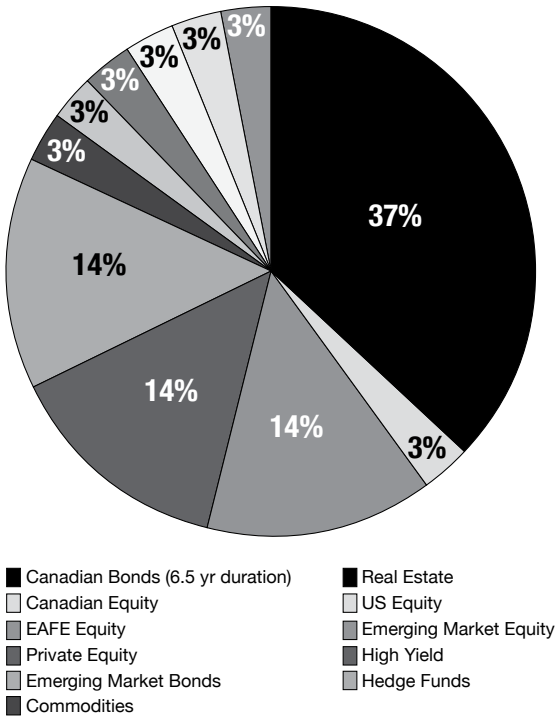
The results of these three possible actions are set out below in detail:

Characteristics at a 1-year horizon	Current Mix	Increase Duration FI	Increase Both Duration & Allocation to FI	Interest Rate Swaps
Expected solvency ratio	90%	90%	89%	90%
Lower bound of 95% confidence interval	71%	73%	76%	75%
Expected return of asset mix	6.6%	6.6%	6.0%	6.6%
Tracking error versus liabilities	12%	11%	8%	10%
Probability solvency ratio declines more than 10%	9%	7%	3%	5%

While doing this alone has very little impact on the likelihood of a 10 percent or greater drop in solvency—it reduces it from 9 percent in our base case to 8 percent—by combining this diversification approach with the interest rate swap overlay of item 3 above, we are able to reduce this risk to 3 percent while maintaining our expected return of 6.6 percent and our expected solvency ratio of 90 percent, as shown in the last column of the table on top of page 27.

4. ***Diversify the Asset Mix***

A different step the plan could take would be to diversify its asset mix, including such asset classes as private equity, emerging market equity and bonds, hedge funds and so on, while staying close to the broad asset mix developed in the asset/liability study. One possible mix is shown here:



Characteristics at a 1-year horizon	Current Mix	Interest	Diversification	Combination
Expected solvency ratio	90%	90%	90%	90%
Lower bound of 95% confidence interval	71%	75%	72%	76%
Expected return of asset mix	6.6%	6.6%	6.6%	6.6%
Tracking error versus liabilities	12%	10%	11%	9%
Probability solvency ratio declines more than 10%	9%	5%	8%	3%

Thus, by identifying the risks the plan wishes to manage and allocating risk budgets accordingly between a strategic overlay and a broader asset mix, our LDI approach has helped to reduce the risk while maintaining the expected return of the asset mix that was the outcome of the plan's asset/liability study.

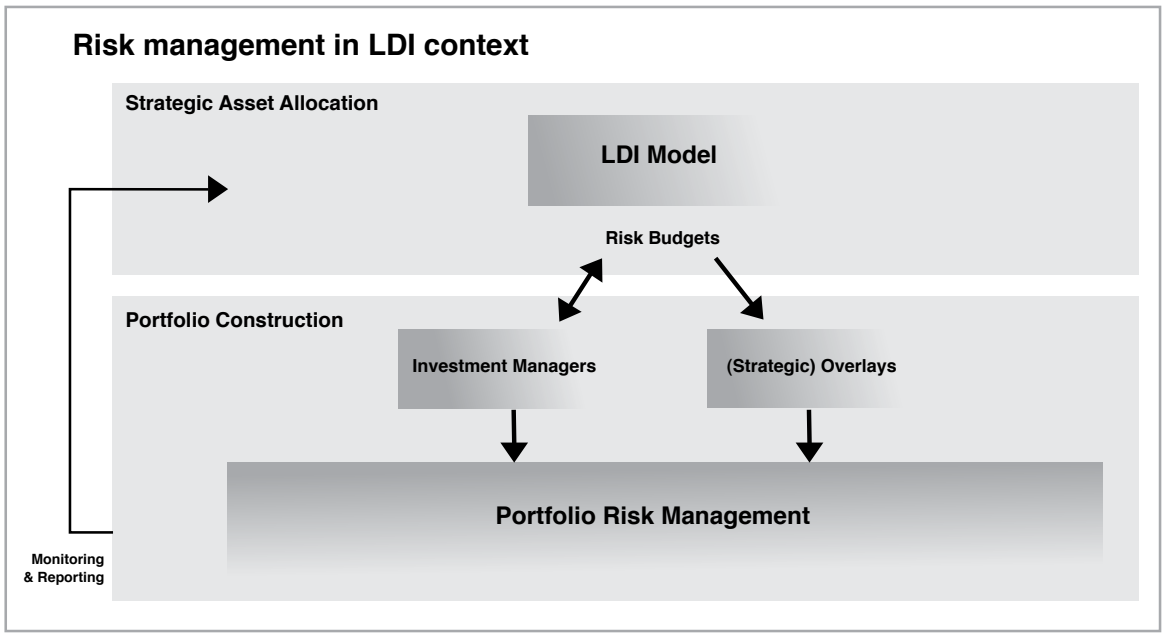
Dynamic LDI

All of the analysis in the example above occurred as at a single point in time. However, markets and plan liabilities shift over time. As our risk framework below suggests, the LDI manager will monitor these changes and adjust the portfolio structure accordingly.

In practice, this means considering the total portfolio as a combination of two sub-portfolios:

- A portion that is used for hedging purposes relative to the liabilities of the plan; and
- A portion that is used to generate upside potential strong enough to keep the pension expense within reasonable bounds.

Under this dynamic LDI approach, the manager increases the commitment to higher-yielding assets when the solvency level is higher, while increasing the commitment to the hedging portfolio when the solvency level is lower. In the Canadian context, it would also make sense to reduce the commitment to the higher-yielding portfolio again once a targeted



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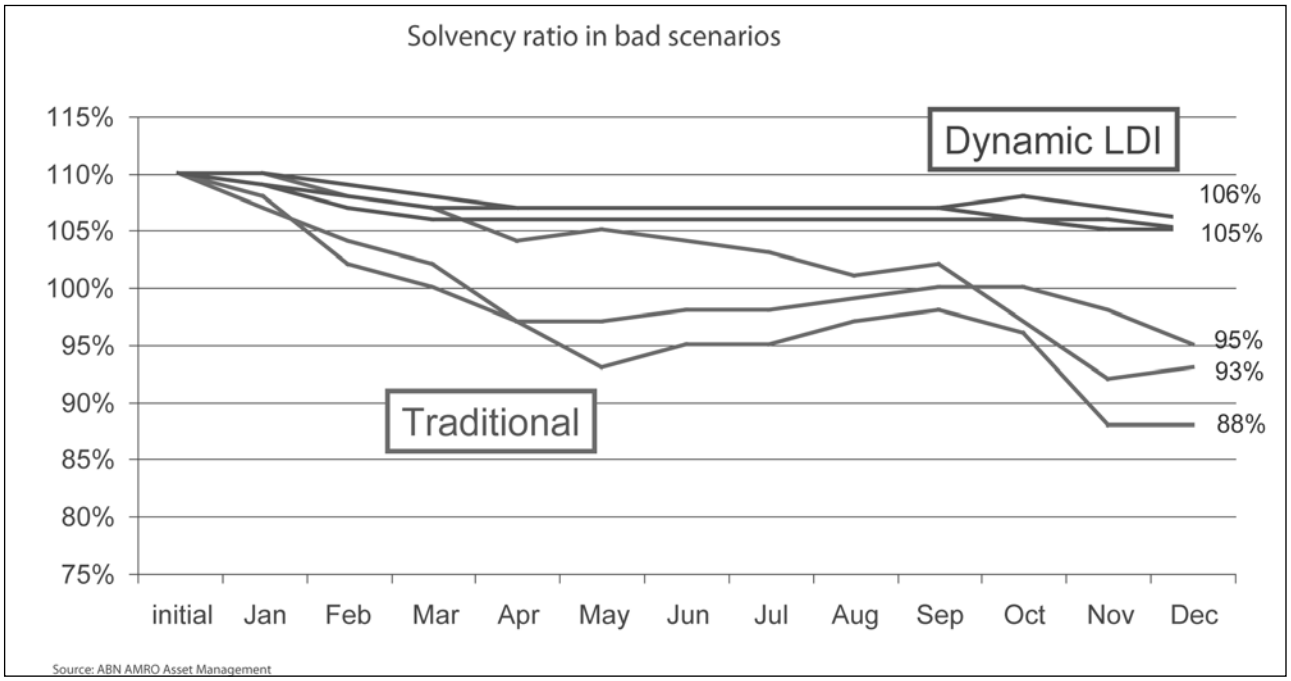
solvency level is neared in order to avoid building too large a surplus.

The ability of dynamic LDI to keep solvency ratios within a relatively tight band even in bad markets is illustrated below.

Conclusion

Liability-driven investing is a risk management framework for implementing asset/liability management. Beyond interest rate hedging, LDI also incorporates strategic asset allocation and risk budgeting, portfolio construction, and ongoing risk monitoring and reporting. It does not necessarily imply a major overhaul of the portfolio, and it can be implemented in more than one way.

In addition, LDI can provide a framework for incorporating appropriate active management into the portfolio, a subject we have not discussed in this newsletter due to space limitations.



Note: *All charts, diagrams, tables and statistics are sourced from ABN AMRO Asset Management. Past performance may not be repeated.*