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New Frontiers in Asset/Liability Management: Strategies to Stabilize Pension Expense

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Editor's Note: The author is affiliated with the ABN AMRO Global Equity Exposure Fund. The Society of Actuaries does not endorse investing in that fund or any other investment vehicle. Readers' response to the strategies described here are welcome.

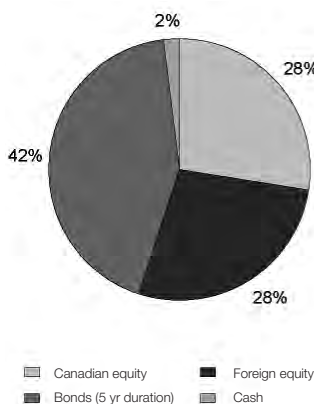
Diminished equity returns and historically low levels of interest rates are compelling plan sponsors to look at new ways of fulfilling their fiduciary responsibilities. In response, new frontiers in asset/liability management have arisen. This article will discuss strategies aimed at reducing the volatility of pension expense and decreasing the likelihood of significant funding deficits, all without increasing pension contribution rates.

The Problem—A Case Study

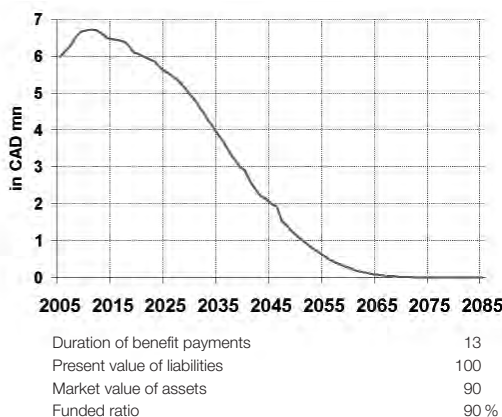
The best way to illustrate the current problem and outline solutions is through the use of a case study that I recently conducted that looked at a “typical” Canadian defined benefit pension fund. While this case study uses a Canadian plan, I have conducted similar studies in several countries worldwide with very similar results.

The current asset mix of the fund is shown below as well as projected future benefit payments.¹ The plan has a 90 percent funded ratio, and its asset mix is based on typical Canadian pension funds: 56 percent is invested in equities and 42 percent in universe bonds, with the remaining 2 percent in cash.

Current Asset Mix



Projected nominal benefit payments



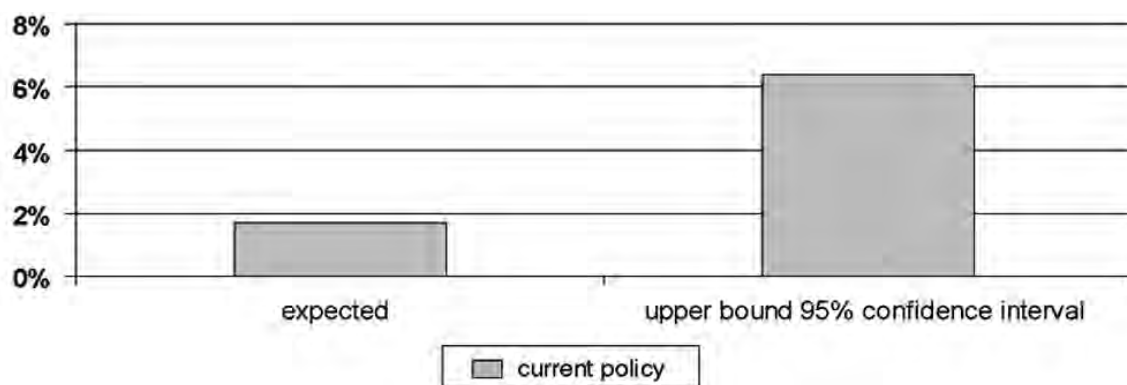
1) Please note that the focus of the study was on existing pension liabilities and existing assets. Future pension expenses due to newly acquired rights and indexation were not taken into account. As such, the absolute levels of contribution would be higher still in a “real” situation. The same relative results would apply however.

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Pension expenses first year	1.8% of liabilities
Expected funded ratio at year-end	91%
Lower bound 95% confidence interval of funded ratio at year-end	73%
Expected investment return	6.4%

Pension expense 2nd year



The stream of future benefit payments has a duration of 13 years. This implies that if interest rates decrease by 1 percent, the value of the pension liabilities will increase by 13 percent and vice versa. For future reference, note that this is quite different from the typical five-year duration of the plan's universe bond portfolio.

Using this asset mix and future benefit payment data, as well as the statistical properties of the various asset classes, numerous simulations of the plan's next two years were run under many different market scenarios in order to understand the likelihood of different pension expense levels and funded ratios emerging as the plan evolves. The results are set out in the table and chart above.

As the table shows, the pension expense for the first year is 1.8 percent of the plan's liabilities and the plan's expected funded ratio at year-end is 91 percent, a slight improvement since the beginning of the year when it was 90 percent.

However, as shown in the third line of the table, there is a 2.5 percent chance that the funded ratio will actually be 73 percent or less (i.e., the lower bound 95 percent confidence interval for the funded ratio is 73 percent). This may be more risk than the plan sponsor can actually bear, as it means there is a significant

chance that the plan will have a serious funding deficiency to be made up through additional payments, a point we will return to shortly.

Finally, the table also shows that the expected investment return based on the current asset mix is 6.4 percent.

Of course, the results after one year will have an impact on the pension expense in the second year as shown in the graph above. The expected pension expense for the second year is once again 1.8 percent. However, as the graph also shows, there is a 2.5 percent likelihood that the expense could be over 6 percent under adverse market conditions. This is a very wide range of possible pension expense levels so clearly, the fund's current policy produces a high degree of uncertainty regarding the pension expense that again would probably be unacceptable to the plan sponsor.

This wide degree of uncertainty in the level of the plan's pension expense and its funded status represents a genuine risk to the plan sponsor. It is also typical of the situation faced by many defined benefit plans today, and encapsulates the "pension funding crisis" that has been highlighted in the media over the past few years. It is a real and serious problem for defined benefit plans.

Solutions

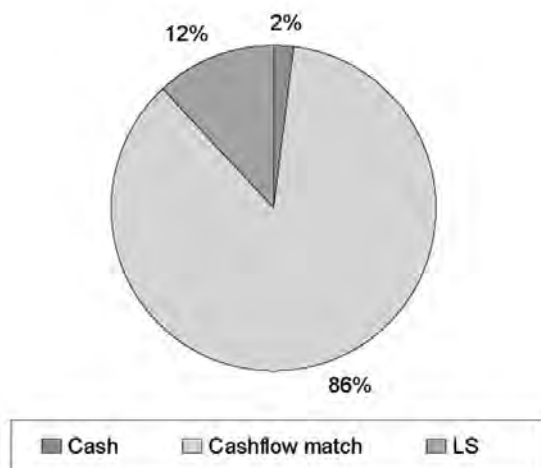
There are several different approaches one could take to reduce the fund's pension expense and funded ratio volatility. In the interest of brevity, one possible solution will be outlined in detail.

There are two well-known sources of volatility in the plan's pension expense and funded ratio: One is the difference in the duration, or interest rate sensitivity, of the fund's fixed income assets and its liabilities. The other is the downside risk inherent in the fund's equity portfolio.

To address the duration mismatch, the fixed income component of the fund should be invested in such a way that it will react in a similar fashion to the liabilities to changes in interest rates. This can be accomplished by replacing the fund's universe bond portfolio with a fixed income portfolio in which the cash flows match the pattern of the fund's projected benefit payments. This has the effect of reducing the interest rate risk.

With respect to the downside risk of the 56 percent of the fund invested in equities, a solution would be to have a smaller portion of the fund at risk in equities. But how does one do this without giving up the upside potential that equity markets have to offer?

Combination of LS and 86% cash flow matching



One approach to achieving this seemingly paradoxical result of full equity returns with fewer assets at risk is to use a carefully designed levered strategy. For this case study, ABN AMRO's Global Equity Exposure Fund was used as it gives levered exposure to global equity markets through an actively managed portfolio

of listed equity index futures and options. By looking at historical performance, our studies show that one dollar invested in this strategy is equivalent to three dollars invested in a "regular" global equity portfolio. Thus, such an instrument can be used to reduce the actual dollar value of assets invested in equities without sacrificing overall performance.

The use of a levered strategy gives the pension fund appropriate equity exposure with less downside risk as there is less actual money invested than there otherwise would be in equities.

In our example, in addition to replacing the bond portfolio with a cash flow matching portfolio, we also replaced the original equity exposure with a 12 percent weighting in units of the levered strategy, and a further 44 percent cash flow matching fixed income portfolio.

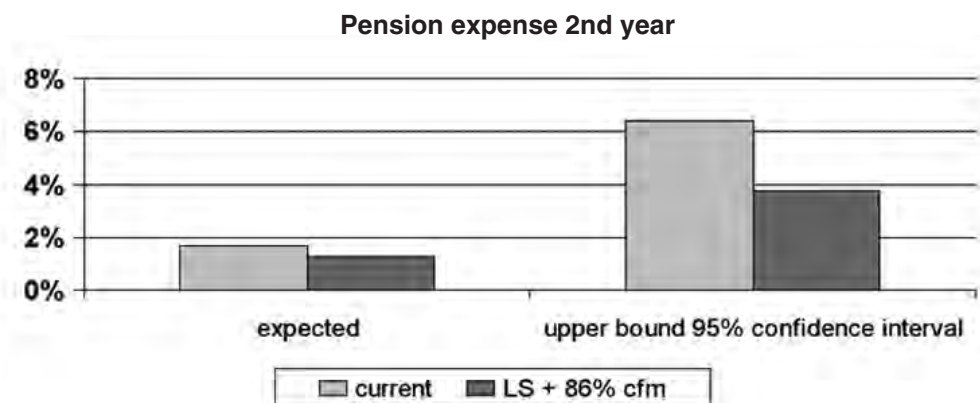
The use of a levered strategy gives the pension fund appropriate equity exposure (12 percent invested in this manner is equivalent to approximately 36 percent effective equity weight) with less downside risk as there is less actual money invested than there otherwise would be in equities (12 percent versus 56 percent).

The end result of this restructuring, as shown in the chart above, is that 86 percent of the fund is invested in fixed income which is cash flow matched, 2 percent of the fund remains in cash, and 12 percent is invested in the levered equity fund. (Note: In the charts LS stands for levered strategy).

	Current	LS + 86% CFM
Pension expenses first year	1.8%	1.5%
Expected funded ratio at year-end	91%	91%
Lower bound 95% confidence interval of funded ratio at year-end	73%	82%
Expected investment return	6.4%	7.0%

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As the table above shows, the new asset mix results in a lower expected pension expense during the first year. Moreover, the lower bound 95 percent confidence interval of the funded ratio at year-end is significantly improved, growing from 73 percent funded with the “typical” structure to 82 percent funded with the revised structure. Clearly, funding risk for the sponsor has genuinely decreased.

Finally, the expected investment return for the new asset mix has increased from 6.4 percent to 7.0 percent.

The graph above shows how the new asset mix benefits the pension expense in the second year. By matching the interest rate sensitivity of the assets and liabilities as well as rigorously reducing the risk of large losses on equity exposures through the use of a carefully designed levered strategy, we have

managed to sharply reduce the worst-case pension expense level while at the same time increasing the fund’s expected investment return.

Conclusion

Many plan sponsors are focusing on their ability to pay benefits and to smooth out volatility in pension contributions as single digit returns on assets become the norm after the heady returns of the 1990s. In response, asset managers have devised investment solutions that fit well within the framework of asset liability management. The aim is to provide investment solutions that will attain the plan sponsor’s goal of meeting benefit payments while keeping funding costs at an acceptable level. **■**

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