

LIVE LONG AND PROSPER

How to manage longevity risk in Canadian DB pension plans *By George Graziani*

Increased longevity poses a real risk to DB plans. Mortality improvement continues to trend upward, and this is particularly pronounced at older retirement ages. Recent historical mortality for retired Canadian males has improved from 1% to 4% annually, according to the October 2011 *Longevity Risk and Protection for Canada* report. There are similar trends for historical mortality for retired Canadian females, improvement ranges from -1% to 3% annually, as calculated from the Human Mortality Database (HMD).

Medical developments are having an amazing impact on life expectancy. The 2008 JUPITER study in the *New England Journal of Medicine* looked at the impact of statins on healthy lives (normally, statins are prescribed only to those with high cholesterol). The study showed that major cardiovascular events were reduced by about half. There is also a similar trend in mortality improvement for other specific impairments in Canada, such as prostate cancer in men and breast cancer in women.

“Only in Canada?” you ask? No. Increased life expectancy is a worldwide phenomenon. Globally, life expectancy at birth increased by four and a half months per year over the second half of the 20th century, according to Swiss Re’s *Sigma No. 3* study. This amounts to a change of more than 18 years. The same upward

trend is occurring in North America, Europe and Asia. And longevity risk, like systematic risk, is not reduced through diversification (i.e., combining a number of smaller DB plans into a single larger plan will not reduce the longevity risk).

In short, longevity risk is real, global and non-diversifiable. It also has a material financial impact on DB plans.

According to the HMD, an increased life expectancy of just one year—an increase in mortality improvement of 1% per year—can translate into a 4% change in plan value. In dollars, Canadian longevity exposure, which sits in excess of \$1 trillion, would increase by roughly \$40 billion.

Given actuaries’ focus on life insurance, perhaps it’s not surprising that life expectancy models have consistently and systematically underestimated human longevity. From a life insurance perspective, underestimating life expectancy is prudent and conservative; however, previous forecasts have consistently been too low.

For example, the U.K. Office for National Statistics’ projection for male life expectancy—performed every three to five years since 1971—shows a clear pattern of upward revision. Similarly, the Canada Pension Plan (CPP) has been consistently low in its estimation of life expectancy, as evidenced by the need in each of its most recent actuarial reports (2003, 2006 and 2009) to increase its life expectancy assumptions, according to OSFI’s actuarial reports on the CPP. It’s no wonder that pension plans are looking closely at longevity in an effort to get ahead of this revision trend.

Mitigating the Risk

Since longevity risk is non-diversifiable, any solution will involve risk transfer. Reinsurance companies are the natural holders of longevity risk, as they have an offset through their core mortality business: life insurance. So it’s not surprising that longevity risk is often transferred to reinsurance companies.

There are a variety of ways for DB plans to transfer this risk. The most common solutions are buyout, buy-in, indemnity longevity insurance and index longevity swaps. (The last two target longevity de-risking exclusively.)

Buyout - A buyout involves the transfer of all risks—not just longevity—away from the plan. The plan transfers the entire relationship with its members to an insurer, including all assets and liabilities. The insurer receives an upfront premium and provides an individual annuity to each plan member. Buyouts are definitely the most expensive way to de-risk longevity. According to the Mercer Pension Buyout Index for the U.K., the price of a full buyout is approximately 36% above the cost of the liabilities (as at April 2011).

Buy-in - This is a special case of longevity insurance. The plan purchases a bulk annuity with a single upfront payment. The liabilities and assets (apart from the upfront payment) remain in the plan. Generally, pricing on buy-ins is expected to be lower than on full buyouts.

Indemnity longevity insurance - As an indemnity contract, longevity insurance gives DB plans complete longevity risk transfer. It allows plan sponsors to exchange a series of uncertain payments for certain ones for the full term of the liabilities (generally, up to 60 years). Plan sponsors find longevity insurance attractive because there is no cash outlay, assets stay with the plan, and premium amounts are defined at the outset.

Index longevity swaps - In contrast, longevity swaps are not indemnity

agreements in that they do not compensate the plan for a specific loss. They are generally index-based derivative contracts, where the contract’s value is based on national population mortality. Here, the concept is that the plan’s longevity risk exposure can be proxied by the population mortality.

With a swap, there is not complete longevity risk transfer, as there will always be some basis risk reflecting the difference between the mortality experienced by the DB plan and that of the population index. This risk should be acknowledged when determining the effectiveness of the hedge, as it can be substantial. Longevity swaps tend to be synthetic contracts comprising combinations of underlying traded contracts with maturities of about seven years. So, in addition to basis risk, there is a maturity mismatch/liquidity risk, as DB pension liabilities extend well beyond seven years—often beyond 50.

The Reinsurer’s View

Of the publicly announced longevity risk transfer transactions, the majority have ended up on reinsurer balance sheets. In some cases, the risk was transferred directly; in others, it went through an investment bank, per the October 2011 *Longevity Risk and Protection for Canada* report.

Given the magnitude of longevity risk—per the OECD’s July 2011 *Pension Markets in Focus*, more than C\$20 trillion globally and more than \$1 trillion in Canada—there will come a point when reinsurer capacity is used up.

In addition to the natural offset that a reinsurer’s mortality business provides, other reinsurance lines—such as property damage and natural catastrophe—are uncorrelated to longevity risk. Thus, longevity risk, from a reinsurer’s perspective, offers some diversification benefits. Reinsurers ultimately have a finite capacity for longevity risk, since the diversification benefits for their balance

sheets diminish as more longevity is written. From a Canadian DB pension plan perspective, this dynamic creates a good incentive to look at longevity insurance sooner rather than later.

The Capital Market Solution

Capital market solutions for longevity risk transfer globally are currently in early development. To this end, the Life & Longevity Markets Association was formed in February 2010 to “promote a liquid traded market in longevity and mortality-related risk.” The association supports the development of consistent standards, methodologies and benchmarks to help build the liquid trading market necessary to support the future demand for longevity protection.

Increased longevity poses a material risk to individuals and DB plans

Reinsurance companies are working to develop capital market solutions for longevity risk transfer. The Kortis transaction is a good example of the early work being done in this area. Kortis Capital Ltd.—a Cayman Islands-domiciled special purpose vehicle—issued the first longevity trend bond, in which the issuer receives payments in the event of a large divergence between the mortality improvements experienced between male lives (ages 75 to 85) in England and Wales and male lives (ages 55 to 65) in the U.S. Investor returns are paid as a spread over collateral, and the bond is fully collateralized in AAA assets.

De-risk and Return

Traditionally, fund managers have focused on asset allocation decisions as a way to diversify across different risk classes. The 60/40 equity/fixed income allocation—and, at a more granular level, the sub-allocations by sector—reflect this desire to manage and limit exposure to specific risk types. For example, most fund managers would be able to articulate and adjust their exposure to, say, financial institutions. This is in stark contrast to the risk exposure associated with longevity risk, which is always at a full 100% level and envelops all DB liabilities, unless it is managed through risk transfer.

As DB plans take a more focused look at their liabilities and the impact that risks such as longevity have on their overall investment performance, it becomes clear that de-risking through longevity insurance actually increases risk-adjusted returns. For example, the impact of longevity insurance on a plan’s Sharpe ratio (risk-adjusted return on equity) can be very positive. For plans that are incorporating aspects of liability driven investing, longevity insurance is a logical early step. Managing assets to a fixed series of liability payments allows managers to focus on core competencies rather than having their strategies compromised by longevity risk.

The upward trend in longevity is a remarkable human achievement, in terms of our society’s behavioural changes (exercise, diet and not smoking) and medical advances. From a financial point of view, however, increased longevity poses a material risk to individuals and DB plans committed to providing benefits. The good news is that there are practical solutions available for DB pension managers to transfer longevity risk to reinsurers, which are better positioned to hold this risk. 

George Graziani is senior vice-president, client markets, with Swiss Reinsurance Company Ltd. in Toronto. george_graziani@swissre.com