Educational Note

Determination of Best Estimate Discount Rates for Going Concern Funding Valuations

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Committee on Pension Plan Financial Reporting

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Members should be familiar with educational notes. Educational notes describe but do not recommend practice in illustrative situations. They do not constitute Standards of Practice and are, therefore, not binding. They are, however, intended to illustrate the application (but not necessarily the only application) of the Standards of Practice, so there should be no conflict between them. They are intended to assist actuaries in applying Standards of Practice in respect of specific matters. Responsibility for the manner of application of Standards of Practice in specific circumstances remains that of the members in the pension practice area.

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Memorandum

To: All Fellows, Affiliates, Associates and Correspondents of the Canadian Institute of Actuaries

From: Tyrone G. Faulds, Chair
Practice Council

Gavin Benjamin, Chair
Committee on Pension Plan Financial Reporting

Date: December 21, 2010

Subject: **Educational Note – Determination of Best Estimate Discount Rates for Going Concern Funding Valuations**

This educational note is intended to assist actuaries in the selection of an appropriate best estimate discount rate for a going concern funding valuation of a pension plan.

A draft educational note on the same subject was issued on June 16, 2009. Standards of Practice for Revised Practice-Specific Standards for Pension Plans (Part 3000) (the "final Standards") were published by the Actuarial Standards Board on June 14, 2010 to be effective December 31, 2010. This educational note reflects relevant changes in the final Standards of Practice and comments received on the draft educational note.

In accordance with the Institute's Policy on Due Process for the Approval of Guidance Material other than Standards of Practice, this educational note has been prepared by the Committee on Pension Plan Financial Reporting (PPFRC) and has received final approval for distribution by the Practice Council on December 20, 2010.

As outlined in subsection 1220 of the Standards of Practice, "*The actuary should be familiar with relevant Educational Notes and other designated educational material.*" That subsection explains further that a "practice which the Educational Notes describe for a situation is not necessarily the only accepted practice for that situation and is not necessarily accepted actuarial practice for a different situation." As well, "Educational Notes are intended to illustrate the application (but not necessarily the only application) of the Standards, so there should be no conflict between them."

Questions regarding this educational note should be addressed to Gavin Benjamin at his CIA Online Directory address, gavin.benjamin@towerswatson.com.

TGF, GB

DETERMINATION OF BEST ESTIMATE DISCOUNT RATES FOR GOING CONCERN FUNDING VALUATIONS

The Standards of Practice (as effective December 31, 2010) include the following paragraphs pertinent to setting assumptions for a going concern funding valuation.

3230.01 *For a going concern valuation the actuary should*

> *. . . notwithstanding subsection 1740, select either best estimate assumptions or best estimate assumptions modified to incorporate margins for adverse deviations, as described in paragraph 1740.40, to the extent, if any, required by law or by the terms of an appropriate engagement, and . . .*

3230.02 For pension plans that are funded, in selecting the best estimate assumption for the discount rate, the actuary may either

> take into account the expected investment return on the assets of the pension plan at the calculation date and the expected investment policy after that date, or
>
> reflect the yields on fixed income investments, considering the expected future benefit payments of the pension plan and the circumstances of the work.

3230.03 In establishing the discount rate assumption, the actuary would assume that there will be no additional returns achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy except to the extent that the actuary has reason to believe, based on relevant supporting data, that such additional returns will be consistently and reliably earned over the long term.

3260.02 *For each going concern valuation undertaken by the actuary, the external user report should*

> *. . . describe the assumptions used to determine the actuarial present value of projected benefits, including the extent of any margin for adverse deviations included with respect to each such assumption, and provide the rationale for each assumption that is material to the actuary's advice,*
>
> *describe the rationale for any assumed additional returns, net of investment management expenses, from an active investment management strategy as compared to a passive investment management strategy, included in the discount rate assumption, . . .*

This educational note is intended to assist actuaries in selecting a best estimate discount rate assumption for a going concern funding valuation of a defined benefit pension plan.

Best estimate assumptions necessarily deal with future uncertainty and, therefore, are generally not uniquely determinable. Indeed, there is generally a range of reasonable best estimate assumptions. Accordingly, the selection of best estimate assumptions and also of margins for adverse deviations (if any) involves professional judgment. That said, there are principles that would be followed in establishing an appropriate best estimate discount rate assumption.

Approaches to Selection of Best Estimate Discount Rates

A best estimate discount rate is determined with reference to unbiased measurements and other information and without a margin for adverse deviations.

Two distinct approaches may be taken to the selection of best estimate discount rates for a going concern funding valuation,

- a discount rate may be based on the expected future investment return on the assets of the pension plan, or
- a discount rate may be based on the yields of investment grade debt securities which would reasonably match projected benefit cash flows, with an appropriately low level of risk, regardless of the plan's assets.

Basing the Best Estimate Discount Rate on Expected Future Investment Returns

If the actuary sets a discount rate that is based on a best estimate of the expected future investment return on the plan's assets over a relevant time frame, then the discount rate assumption is unbiased. Typically, this will be a long-term horizon such as 20–30 years but a shorter-term perspective may be needed for very mature plans.

The Building Block Approach

One accepted methodology for establishing a best estimate discount rate that reflects expected future investment returns is a building block approach, consisting of

- determining the best estimate of long-term, expected future investment returns for various asset classes,
- combining the best estimate long-term, expected future investment returns for different asset classes to reflect a plan's investment policy with consideration of the effects of diversification and rebalancing,
- considering inclusion of an allowance for additional return due to active versus passive management, where appropriate, and
- making appropriate provision for expenses.

Generally, when following such an approach, there is a range of reasonable assumptions for each component of the model. In determining an overall best estimate assumption, it would not be appropriate to select the most optimistic (or most pessimistic) point of the range for each component assumption.

Determining the Best Estimate of Expected Future Investment Returns for Various Asset Classes

In determining the best estimate of the expected future investment returns on the plan's assets, the actuary would consider a range of available information.

For a plan where assets are invested in part in treasury bills or bonds, and are expected to be invested that way indefinitely, the best estimate of the long-term investment return on that class of assets may be reasonably viewed as the market yield on the particular investments or the yield on a market index representative of such investments at the calculation date. Allowance would also be made for reinvestment and the effect of possible changes in interest rates on future investments, if appropriate.

Generally, pension funds have assets that are diversified and invested in a range of asset classes, and this may be attributed to a general belief among investors that higher risk asset classes will likely provide a higher future investment return than 'low risk' assets (such as investment grade debt securities) albeit with higher volatility of returns. The actuary may use this premise to provide a rationale for a best estimate assumption that is larger than one based on a 'low risk' portfolio. In other words, a 'risk premium' equal to the expected return on the plan assets in excess of the expected return on 'risk-free' assets may be included in the best estimate assumption.

Historical data regarding the return on a broad Canadian stock market index and long-term Government of Canada bonds are available from the annual Canadian Institute of Actuaries publication, Report on Canadian Economic Statistics. For example, over the longest reported period, the March 2010 report indicates an average annual equity premium of 3.82% from 1924 to 2009 (based on geometric returns of 9.91% for stocks netted on an arithmetic basis against a 6.09% return for long-term Government of Canada bonds). The June 2008 report indicates an average annual equity premium of 4.16% from 1924 to 2007 (based on geometric returns of 10.29% for stocks netted on an arithmetic basis against a 6.13% return for long-term Government of Canada bonds). These data show considerable variation for shorter time periods.

While historical data support the inclusion of a substantial assumed equity premium, there is no certainty that similar relationships will hold in the future. Indeed, there are wide variances of views in financial literature as to the extent of future equity premiums. Typically, for publicly-traded equity investments, the assumed future long-term expected return[1] includes a 'risk premium' in the range of two to four percent per annum over the yield on long-term government bonds.

If other categories of asset classes are part of the plan's assets, the 'risk premiums' would be determined in a consistent manner from class to class.

Considerable judgment by the actuary is often required since information on expected future investment returns can itself be based on the judgment of others. Furthermore, on occasion, similar information from more than one source may conflict with one another.

Investment Policy

Where the actuary has been provided with the pension plan's investment policy (whether it is formal or informal), the actuary may assume that the investment of the pension plan's assets will be guided by that policy indefinitely unless the actuary has information to suggest that the plan's investment policy will change after the calculation date.

[1] In this context, *expected return* refers to the geometric mean or the median of a probability distribution of annualized long-term rates of return. Generally, this will be lower than the arithmetic mean annual return based on the same probability distribution.

Rebalancing and Diversification

It is often assumed that plan assets are sufficiently diversified and rebalanced with some regularity among asset classes to avoid deviating too far from the 'target' asset mix. Where the average annual long-term rates of return for individual asset classes are calculated geometrically, i.e., by determining compound average annual rates of return over long periods, the long-term average rate of return for a diversified portfolio (that is regularly rebalanced) will exceed the weighted average of the long-term average rates of return on the individual asset classes. This is called the 'diversification effect'.

Assuming that a balanced portfolio is maintained reasonably closely to the original 'target' asset mix, the allowance for this 'diversification effect' would typically be in the range of 0% to 0.5% per annum, where 0% would apply in the situation where the investments are solely in one asset class (e.g., bonds). For portfolios which have some allocation to multiple asset classes, the 'diversification effect' would typically be 0.3% to 0.5% per annum, in addition to the weighted geometric average of expected returns of each asset class, weighted by the portfolio target percentages.

Value Added Returns from Active Management

Generally, plan administrators would employ active management policies in the expectation of achieving higher returns (or reducing risk). Consideration may be given to assuming added value for the effects of active investment management compared to passive management (investing in market index instruments).

It is generally reasonable to assume that active management will add value (provide returns above index returns) to the extent of the additional investment management fees associated with active management over those for passive management.

Any assumption of value added returns above the level of additional fees would require that the actuary has reason to believe, based on relevant supporting data, that such additional returns will be consistently and reliably earned over the long term. For this purpose, both historical and future considerations would be taken into account. Historic outperformance compared to relevant market indices by a particular active investment manager, and historic outperformance by the portion of the pension fund under active management over extensive periods and over different stages of the economic cycle, would be important considerations, but would not generally of themselves be sufficient to justify such an assumption. Further considerations might include detailed analysis of a particular manager's organization, people, and investment processes, conducted by a professional with the appropriate expertise and experience, and an assessment of the extent to which past performance and expected future performance can be attributed to these factors. The use of such analysis to justify a long-term added value assumption may be constrained by periodic changes within investment management firms. Further considerations would be the governance processes in place for the plan, as they relate to the hiring, monitoring and replacement of investment managers.

In order to avoid biases in the analysis, the actuary would consider periods of both positive and negative incremental returns due to active management when assessing historical experience and future expectations.

If the actuary determines that an allowance for added value for the effects of active management is warranted for a particular valuation, the actuary would monitor the value added at each future valuation and modify or remove the allowance for value added as appropriate.

Alternative Asset Classes

For some asset classes, e.g., private equity, hedge funds, infrastructure and real estate, and for certain investment strategies such as those involving derivatives or combinations of long and short positions in investments, it may not be practical to define a relevant market index or to distinguish active from passive management returns. In such cases, the actuary would make an assumption for the return from the particular asset class or investment strategy but, generally, would not assume that a particular investment manager would outperform other managers with a similar mandate.

Expenses

The actuary would take into account, somewhere within the valuation, appropriate allowance for future plan expenses that are expected to be paid from the pension fund. A best estimate discount rate may include a best estimate provision for payment of future expenses. The actuary is referred to the CIA educational note Expenses in Funding Valuations for Pension Plans for details on setting appropriate provisions for future expenses.

If an allowance for value added returns due to active management has been utilized in setting the best estimate discount rate, the actuary would make an allowance for the expected active management investment expenses. When an active investment management strategy is employed but no allowance for value added returns has been utilized in setting the best estimate discount rate, the actuary may assume, if appropriate based on the circumstances of a particular plan, that any additional active management fees are fully offset by additional value added returns. Accordingly, in such a case only an allowance for passive investment management fees would be recognized.

Rounding

Given the many uncertainties in establishing a discount rate, the actuary would exercise discretion in rounding the resulting assumption in a reasonable manner. Typically, rounding such a discount rate to the nearest 0.10% or 0.25% would be appropriate.

Illustrative Example

This section illustrates how an actuary might use a building block method, as described above, to establish a best estimate discount rate for a sample plan. This is an example only and other building block methods (e.g., using excess returns over inflation) may also be appropriate. In this case,

the plan's investment policy stipulates that the plan's target asset mix is

Short term/Cash equivalents	5.0%
Canadian bonds (universe)	17.5%
Canadian bonds (long-term diversified)	17.5%
Canadian equities	32.0%

U.S. equities	14.0%
International equities	14.0%

the plan's investment policy stipulates that the portfolio will be rebalanced regularly so that the asset mix will be maintained within a reasonable range of the target asset mix,

the plan employs an active management strategy for equities, but the actuary assumes no added-value returns from active investment management in excess of the associated additional investment management fees, and

provision for the plan's non-investment related administrative expenses are made by other means.

The best estimate discount rate is 6.00% per annum and is set by the actuary as follows.

The market yield on long-term Government of Canada bonds at the valuation date is 4.0% per annum.

The estimated long-term risk premia on a geometric basis (over long-term Government of Canada bonds) for each of the plan's asset classes are

Short term/Cash equivalents	-0.8% p.a.
Canadian bonds (universe)	0.2% p.a.
Canadian bonds (long-term diversified)	0.8% p.a.
Canadian equities	3.0% p.a.
U.S. equities	3.0% p.a.
International equities	3.0% p.a.

The weighted average of the above risk premia is 1.94% per annum. Added to the yield on long-term Government of Canada bonds, the estimated return of the plan's portfolio is 5.94% per annum.

The actuary concludes that, for this target asset mix, it is appropriate to add 0.40% per annum for the benefits of the 'diversification effect' to get to 6.34% per annum.

The actuary then deducts an allowance of 0.25% per annum for estimated investment expenses (reflecting only passive investment management costs) to get to a best estimate investment return of 6.09% per annum.

The actuary then rounds his result to the nearest 0.25% and sets the best estimate discount rate to be 6.00% per annum.

Stochastic Methodology

A more sophisticated variation of the above methodology is to use a logically constructed stochastic asset model that calculates a probability distribution of long-term investment returns by asset class. The asset model requires inputs of the assumed investment policy and assumptions about investment returns and standard deviations on each of the asset classes in that policy (and correlations between the investment returns on different asset classes). Such a model directly incorporates the effects of diversification and rebalancing. The best estimate asset return assumption to be used would normally be based on a percentile at or near the median of the distribution of long-term investment returns of the portfolio.

Discount Rate Based on Fixed Income Yields

A discount rate based on fixed income yields typically would reflect the yields on Government of Canada or other high-quality bonds, that would reasonably match projected benefit cash flows or have a duration comparable to that of the projected benefit cash flows. Select and ultimate rates may be used to approximate the effect of using a full yield curve.

For a plan where an immunized portfolio of fixed income investments is established to match projected benefit cash flows, it may be appropriate to base the discount rate assumption on the yield on the immunized portfolio. If the fixed income investments mature prior to the expected payment of all projected benefit cash flows, the actuary would consider making an allowance for reinvestment and the effect of possible changes in interest rates on future investments.

As described above, the actuary would take into account, somewhere within the valuation, appropriate allowance for future plan expenses that are expected to be paid from the pension fund.

Tax-sheltered Status of Assets

When selecting the discount rate, the actuary would consider the effect of tax payable on the investment returns of the assets, if applicable (e.g., for a plan funded through a retirement compensation arrangement trust fund). Unless the actuary has reason to believe otherwise, the taxable status of the assets may be assumed to remain unchanged indefinitely.

Reporting

Whatever methodology is used to establish a best estimate discount rate used for an external user report on funding, a rationale for the assumption and the rationale for any assumed additional returns that have been incorporated, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy would be provided in the report pursuant to paragraph 3260.02 of the Standards of Practice (as effective December 31, 2010).

If the actuary's discount rate assumption includes a margin for adverse deviations, the actuary would disclose the extent of such margin.