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Memorandum

To: Members in the Life Insurance Practice Area

From: Tyrone Faulds, Chairperson
Committee on Life Insurance Financial Reporting

Date: November 2006

Subject: **Guidance for the 2006 Valuation of Policy Liabilities of Life Insurers**

Document 206149

The purpose of this letter is to provide guidance to actuaries in several areas affecting the valuation of the 2006 year-end policy liabilities of life insurers for Canadian Generally Accepted Accounting Principles (GAAP) purposes. The guidance in this letter represents a majority view of members of the Committee on Life Insurance Financial Reporting (hereinafter referred to as CLIFR) of appropriate practice consistent with the CIA Standards of Practice (Standards). This letter has met the requirements of Policy on Due Process for Approval of Practice-Related Material other than Standards of Practice. However, in accordance with that policy, this letter is "not binding".

CLIFR has published the following educational notes this year:

CALM Implications of AcSB Section 3855 Financial Instruments – Recognition and Measurement (206077), June 2006.

Best Estimate Assumption for Expenses (206134), November 2006.

Approximations to Canadian Asset Liability Method (CALM) (206133), November 2006.

Valuation of Universal Life Policy Liabilities (206148), November 2006.

Margins for Adverse Deviations (206132), November 2006.

Use of Actuarial Judgment in Setting Assumptions and Margins for Adverse Deviations (206147), November 2006.

The actuary is asked to pay particular attention to the principles for setting best estimate assumptions and margins for adverse deviations set out in Section 1.3 of Educational Note: Use of Actuarial Judgment in Setting Assumptions and Margins for Adverse Deviations (MfAD) (206147), November 2006 which is reproduced below:

Principles

In setting best estimate assumptions and margins for adverse deviations, the following principles would be considered:

While assumptions and margins for adverse deviations are often based on historical data the appropriateness of these are justified on a prospective basis.

Maintaining an assumption or a margin for adverse deviations is subject to the same level of scrutiny as implementing a change.

The change in policy liabilities would not reflect a change in past experience that the actuary has sufficient reason to believe is temporary.

The change in expected assumption would be supported with evidence that indicates a need for change.

The change in the margin for adverse deviations would be supported by a change in the assessment of the level of risk.

The change in assumption would not be manipulative. Methods to determine assumptions are predetermined and are not subject to irregular or inconsistent application over time.

In addition, the following revisions to the Standards of Practice have been approved in the last 12 months.

Technical Amendments – Standards of Practice – Practice-Specific Standards for Insurers, Part 2000 (except section 2100) (206070), May 2006;

Standards of Practice – Practice-Specific Standards for Insurers, Subsections 2320 and 2330, Life and Health Insurance - to reflect the low interest environment;

Standards of Practice – Practice-Specific Standards for Insurers, Section 2100 (206075), June 2006, All Insurance - to provide improved guidance on establishing appropriate margins for adverse deviations.

Other recent CLIFR guidance includes:

Revision to Educational Note: Valuation of Segregated Fund Investment Guarantees (205111), October 2005;

Revision to Standards Section 2300: Revised Guidance on Establishing Appropriate Margins for Adverse Deviations (205042), June 2005;

Educational Note: Selection of Interest Rate Models (203106), December 2003;

Educational Note: Aggregation and Allocation of Policy Liabilities (203083), September 2003;

Educational Note: Future Income and Alternative Taxes (202065), December 2002;

Expected Mortality: Fully Underwritten Canadian Individual Life Insurance Policies (202037), July 2002.

For your convenience all of these educational notes can be found on the CLIFR website in the Members Section (Organization/Practice Council/Committees and Task Forces/Committee on Life Insurance Financial Reporting).

As outlined in subsection 1220 of the Standards of Practice, the "*actuary should be familiar with relevant educational notes and other designated educational material*," considering that a practice described "for a situation is not necessarily the only accepted practice for that situation and is not necessarily accepted actuarial practice for a different situation."

The guidance on deterministic scenarios provided last year in Section 3: Scenario Assumptions – Interest Rates and in Section 4: Scenario 7 has been deleted since this material is replaced by the guidance found in the changes to subsections 2320 and 2330 of the Standards of Practice. In addition, Sections 5: Reinvestment Strategies, 9: Policy Liabilities for Cyclical Risks, and 10: Selection of CTE Coverage Level, have been deleted because this material is replaced by the guidance in the educational notes on Use of Actuarial Judgment in Setting Assumptions and on Margins for Adverse Deviations.

Some guidance provided last year is still appropriate, and has been duplicated in this letter. Other guidance has been modified slightly either to reflect recent developments, or to add clarity. In addition, new guidance is provided on Considerations in the Valuation of Segregated Funds, expanding on the guidance previously provided on Balance Sheet Allowance for Segregated Funds and additional guidance is provided on the implications of AcSB Section 3855.

The topics covered are the following ones:

1. Insurance Mortality *(modified slightly)*

Currently no guidance is provided with respect to levels of future mortality improvement. CLIFR intends to publish such guidance in the near future and has commissioned a research study in concert with the Society of Actuaries (SOA) to help in this regard. Preliminary results of the SOA research were presented at the 2005 Seminar for the Appointed Actuary and are available on the CIA website (can be accessed at, http://www.actuaries.ca/members/resources/meetings/pdf/aa/2005/PD-8-Hardy.pdf).

Please note that paragraph 2350.06 of the Standards of Practice states that any reduction in policy liabilities related to insurance mortality improvement be off-set by a corresponding adjustment to the insurance mortality margin for adverse deviations.

In the Appointed Actuary's Report, the actuary is encouraged to document clearly the best estimate base mortality assumption, the best estimate mortality improvement, if any, and the level of margins for adverse deviations (MfAD), including the justification and support for such assumptions.

2. Annuity Mortality *(modified slightly)*

Paragraph 2350.11 of the Standards of Practice states, "It is prescribed that the actuary's best estimate includes a secular trend toward lower mortality rates as promulgated from time to time." Recent annuity mortality improvement studies have yielded significantly different and sometimes contradictory results. As such, the uncertainty around the mortality improvement assumption could be significant, particularly as the time period from the valuation date increases.

CLIFR has appointed a subcommittee to review the appropriateness of the mortality improvement scale AA. This scale is applicable to both individual and group annuitants. CLIFR has commissioned a research study in concert with the Society of Actuaries (SOA) to review mortality improvement rates. Results of the SOA research to-date, indicate that the future mortality improvement rates from the AA Scale are more than likely to be insufficient in Canada and CLIFR, therefore, continues to recommend using the AA Scale with a minimum improvement of 1.5% for attained ages up to 50, and 1% for attained ages between 51 and 80 as illustrated in Appendix A.

Paragraph 1740.05 of the Standards states: "The margin for adverse deviation in each assumption should reflect the uncertainty of that assumption and of any related data." The common practice in the industry is to apply an annuity mortality MfAD to the best estimate assumption, including the application of the improvement factors to the mortality table. The actuary is reminded that the margin for adverse deviations is intended to cover the uncertainty associated with both misestimation risk and mortality improvement risk. In light of the recent annuity mortality improvement studies, the actuary is encouraged to review the appropriateness of the MfAD for annuity mortality.

For markets other than Canada, the improvement scale to be used in conjunction with annuitant mortality would be at least as conservative as the scale used in Canada, unless experience indicates otherwise. For all jurisdictions, the use of higher rates of mortality improvement is appropriate if the experience indicates that higher rates are required.

3. Scenario Assumptions – Interest Rates *(modified)*

Revisions to subsections 2320 and 2330 were recently released. Modifications were made to the base scenario and seven prescribed scenarios. Two additional prescribed scenarios were also added.

Derivation of risk-free lower and upper bounds is now based on moving averages of Canadian risk-free bonds. An example showing the derivation of bounds and the resultant rates by scenario for a 20-year rate is provided in Appendix B.

Paragraph 2330.09.1 states that in the base scenario the risk-free interest rates effective after the balance sheet date are equal to the forward interest rates implied by the equilibrium risk-free market curve at that date, for the first 20 years after the balance sheet date. In order to determine the 20-year forward rates out to year 20, 40 years of spot rates are required. Risk-free interest rates are generally not observable in the market for very long terms (i.e., beyond 30 years) and are highly influenced by supply and demand toward the end of the observable horizon. It is, therefore, acceptable to retain the risk-free yield curve up to the point, in the long end (typically after 20 years), where the spot rate is at its peak ('the yield curve horizon'). Past the yield curve horizon, CLIFR recommends that the actuary assume a continuation of the last observed spot rate and calculate forward rates consistent with that assumption. An example of the process used to derive forward rates is presented in Appendix B.

CLIFR is concerned that the guidance on the selection of interest rate models for stochastic testing is limited[1] and that no calibration criteria have been established. This may result in an inappropriately wide range of practice.

In the context of stochastic testing, the Conditional Tail Expectation, CTE (60%) to CTE (80%) defines the range of policy liabilities (paragraph 2320.51). CLIFR is currently working on an educational note on interest rate risk modeling that will include calibration criteria. Pending its completion and adoption, CLIFR recommends that the actuary perform scenario testing using the nine prescribed scenarios in addition to the testing performed on a stochastic basis and consider holding actuarial liabilities at least equal to the result under the worst prescribed scenario.

The decision to establish a policy liability that is less than required under the worst prescribed scenario would be supported by a clearly documented rationale.

In this context, CLIFR recommends that the actuary ensure the following:

> the stochastic interest rate model including any parameters required is appropriately selected for use in determining policy liabilities for Canadian life insurance financial reporting purposes,
>
> the range of stochastic scenarios encompasses the nine prescribed scenarios,
>
> the model parameters are reviewed to confirm their appropriateness if the policy liabilities required under the worst prescribed scenario are greater than the policy liabilities at CTE (80%), and
>
> the policy liability is at least equal to the result under Prescribed Scenario 9.

4. Lapse Study - Universal Life *(modified slightly)*

The CIA published a study on the Lapse Experience under Universal Life Level COI Policies in June of 2003, and is currently gathering information for a new study. The scope of the study was limited to guaranteed Level COI coverages. This study has significant amounts of experience for the first 5-policy durations. Unfortunately, the study does not include analysis by UL-specific

[1] CLIFR recommends that the actuary be familiar with the educational note on the *Selection of Interest Rate Models* that was published in December 2003.

drivers (e.g., fund values, credited rates, interest environment, etc.). It is suggested that the actuary consider the applicability of this study to the business being valued.

Universal Life lapse-supported policies frequently exhibit some of the following characteristics,

minimum funded policies,

policies purchased for tax considerations,

joint last to die,

presence of persistency bonuses

and may experience ultimate lapse rates similar to stand alone T-100 products.

CLIFR suggests that the actuary review the degree of lapse support within its Universal Life portfolio and assess the applicability of the CIA lapse studies on lapse-supported products.

5. Considerations in the Valuation of Segregated Fund Annuities *(new)*

Key References:

Standards of Practice, paragraphs 2320.16 to 2320.27 inclusive, which define "Term of the liabilities",

Standards of Practice, paragraphs 2320.23 and 2320.24, in particular, define when it is appropriate to extend the "term" to offset acquisition expenses and identify criteria for amortization of deferred acquisition expenses, respectively, and

Educational Note: Aggregation and Allocation of Policy Liabilities" (203083), September 2003.

Balance Sheet Allowance for Acquisition Expenses

Acquisition expenses are expenses incurred in the acquisition and renewal of insurance policies and annuity contracts. They are expenses that are both primarily related to the acquisition of policies and contracts, and consistently allocated to new business in product pricing and internal company expense allocations.

For some types of contracts (e.g., segregated fund contracts), it may be reasonable to expect the insurer to recover acquisition expenses from revenue received beyond the term of the policy liabilities. In such circumstances, the cash flows for a policy may extend beyond the term of its policy liabilities, offsetting some or all of the remaining non-recovered portion of such acquisition expenses (Standards of Practice, paragraph 2320.23). These cash flows would be projected using valuation assumptions, including MfAD.

However, this extension would not result in a more favourable balance sheet position than would be the case if no acquisition expense had been incurred, and no extension of the cash flows beyond the term of the liability had taken place.

Paragraph 2320.22 defines the term of the liability at the policy level. However, such a determination may not be practical and some level of aggregation may be warranted. The key consideration for determining the appropriate level of aggregation is the homogeneity of policies with respect to key risk parameters (market performance, product features, lapse, mortality, guarantee resets behaviour, and so forth). Recoverability testing would usually be done at the same level of aggregation.

It is good practice to identify and document the net future cash flows generated by the selected grouping of policies to offset the deferred acquisition expenses of this grouping at issue, that is the allowance for acquisition expense (AAE). These cash flows are the basis for establishing a locked-in amortization schedule for the deferred acquisition expenses as per paragraph 2320.24. The amortization schedule would result in a write-down pattern that is reasonably matched with the net cash flows available to offset expenses at inception.

Going forward, recoverability would be tested at least annually as per paragraph 2320.24. Recoverable means that the present value of remaining cash flows identified to amortize the AAE is equal to or exceeds the remaining unamortized AAE balance. If the remaining unamortized AAE balance is not recoverable, then it is reduced to the level that is recoverable, with the result of such reduction being a charge to income and the remaining future amortization charges being proportionately reduced.

Liability Related to Segregated Fund Guarantees

Paragraph 2320.22 indicates that the term of the liability ends at the earlier of

> the first renewal or adjustment date at or after the balance sheet date at which there is no constraint, and
>
> the renewal or adjustment date after the balance sheet date which maximizes the policy liabilities.

It is CLIFR's view that, for contracts with any element of adjustability, the term of the liability ends at the balance sheet date if the liability would otherwise be negative. The corollary is that the liability for the guarantees (i.e., before AAE) would be floored at zero.

The considerations indicated above for determining an appropriate level of aggregation for setting and recoverability testing of the AAE would also apply when the contracts contain a guarantee. In particular, care would be taken to understand the possible effects of the application of the zero floor at the level of aggregation being considered.

A numerical example may be found on the CIA website in the slides for the CLIFR II presentation at the Seminar for the Appointed Actuary on September 22, 2006.

There are two ways to value additional benefits or guarantees associated with policies for which an AAE is being amortized.

> Bifurcated Approach: Determine the policy liability using appropriate aggregate methodology (for the selected grouping) and the net cash flows available excluding those allocated to amortize the remaining unamortized AAE, or
>
> Whole Contract Approach: First test the AAE balance for recoverability, as described above using all net cash flows available. Reduce the balance to a recoverable level, if necessary, with the reduction being a charge to income. Then determine the policy liability using appropriate aggregate methodology (for the selected grouping) and all net cash flows available. To the preliminary result produced, add the current remaining unamortized AAE balance to get the policy liability for the additional benefits and guarantees.

Hedging

Segregated fund guarantees have significant risk and may be hedged. However, application of a zero floor on the liability, as described above, can disrupt the parity between the asset and

liability sides of the balance sheet. The change in the fair market value of the derivatives flows through investment income and would generally be offset (not necessarily exactly) by a change in the liability. This balance can be disturbed by the zero floor on the liability side and can result in a balance sheet presentation which is inconsistent with the movement in markets over the reporting period.

CLIFR believes that it would be appropriate to consider both sides of the balance sheet in determining the term of the liability in the context of hedging. This suggests that a negative liability could be acceptable subject to constraints on the amount of profit capitalized, consistent with an unhedged position. More specific guidance will be developed in this area.

6. Currency Risks *(modified slightly)*

Paragraphs 2340.16 and 2340.17 address the determination of currency risk best estimates and margin for adverse deviations.

As further guidance, CLIFR continues to recommend the use of integrated multi-currency interest rate models to value portfolios with material currency mismatch. However, when such models are not available, CLIFR recommends that the exchange rate best estimate be based on currency forwards and, if not available, be determined based on interest rate differentials. Moreover, CLIFR recommends that the low and high ends for the margins for adverse deviations be 5% and 50%, respectively. Among other considerations, the low end would be appropriate for shorter maturities in currencies of highly integrated economies. Conversely, the high end would apply for longer maturities in currencies that are not well integrated or where one of the currencies is that of a developing country.

CLIFR is working on an educational note on currency risks that is expected to be released in the spring of 2007.

7. Long-Term Equity Returns *(modified)*

The Standards of Practice, paragraph 2340.11, bounds the upper limit of the best estimate of investment return on a non-debt instrument to a benchmark based on historical performance.

CLIFR has investigated how to define the most appropriate historical period to determine the best estimate of investment return and has concluded that the longest possible period would be the most appropriate because the projection period for valuations is often very long and possibly even longer than the longest reliable historical period. This approach provides for a more stable projection. It runs over multiple shock periods and shocks will no doubt recur although in an unexpected fashion. An ideal historical period would also cover both increasing and decreasing interest rate periods.

In the Canadian market, data prior to 1956 are limited. So, as a practical consideration, and for the reasons cited above, CLIFR recommends using January 1956 to current year data as the historical period to establish the upper limit on the best estimate return for Canadian equities. For other jurisdictions, the actuary would consider the quality and credibility of the historical return data, the relative sophistication of the economy during the period under study, and the correlation of the market in question with other global markets. For mature markets such as the United States, United Kingdom, Japan, and many countries in Western Europe, CLIFR recommends using a consistent historical period as that recommended above for Canadian equities. For less stable or emerging markets, the availability of reliable historical data spanning a sufficiently long

period is unlikely. In that case, the actuary would be cautioned against assuming a significant risk premium over the risk-free interest rates in the base scenario can be earned on equity instruments. However, it would be reasonable to assume risk premiums higher than those observed in North American markets where the market in question has exhibited higher volatility and where a higher margin for adverse deviations is assumed. In any event, the implied risk premium assumed by the actuary, reduced by the chosen margin for adverse deviations, would not exceed the equivalent result assumed for Canadian equities (see Appendix C).

The historical benchmark would be routinely updated at least annually.

When using deterministic scenarios, the historical benchmark return is the geometric average of historical returns over a sufficiently long period. It is appropriate to use the geometric mean rather than the arithmetic mean due to the asymmetric distribution of long-term returns.

When using stochastic scenarios, the historical benchmark return is the arithmetic average of historical returns over a sufficiently long period, as the stochastic process captures the asymmetric distribution directly. The actuary is reminded, however, that if the stochastic process is used to value segregated fund guarantees, then the actuary would ensure that the stochastic model returns meet the calibration criteria as specified in the March 2002 Report of the CIA Task Force on Segregated Fund Investment Guarantees that can be found on the CIA Members Site at http://www.actuaries.ca/members/publications/2002/202012e.pdf.

8. Value of Minimum Interest Guarantees and Embedded Options *(unchanged)*

With continuing low interest rates, it is suggested that actuaries assess and make appropriate provision for the potential cost of any minimum interest guarantees or other embedded economic options (e.g., guaranteed purchase options). These costs may not be appropriately captured in the deterministic base and prescribed scenarios within the standards, as these scenarios may continue to ascribe zero value to these features when in reality near to or in the money guarantees or options can have a substantial value. Stochastic modeling or option pricing techniques (stochastic or mathematical) could, therefore, ascribe material value to these features in the current interest environment. While the actuary is not required to model these features stochastically, he or she would review the exposure to minimum interest guarantees and other embedded options in the business being valued, and determine whether an increase in the policy liabilities is warranted.

9. Considerations for Amounts on Deposit and Claims Provisions under AcSB Section 3855 Financial Instruments (*new*)

Concerns have been raised with respect to the effect of the implementation of AcSB Section 3855 on liabilities for amounts on deposit and claims provisions, particularly if a company has been approximating the CALM liability by holding the amount expected to be paid without interest adjustment.

Paragraph 2320.01 of the Standards of Practice states that “The actuary should calculate policy liabilities by the Canadian asset liability method.”

Paragraph 2320.02 states that “The amount of policy liabilities by that method for a particular scenario is equal to the amount of supporting assets at the balance sheet date which are forecasted to reduce to zero at the last liability cash flow in that scenario.”

Feedback received suggests that further guidance is needed with regard to the term over which liability cash flows would be projected for amounts on deposit and claims provisions. This would include considerations on determining when an element of a policy would be treated separately from the other elements (i.e., bifurcated).

Paragraph 2320.16 states,

> If an element of a policy operates independently of the other elements, then it would be treated as a separate policy with its own term of liabilities. Examples are
>
> > a flexible premium deferred annuity where the interest guarantee and cash value attached to each premium are independent of those for the other premiums, and
> >
> > a certificate of voluntary non-contributory association or creditor group insurance.

Paragraphs 2320.17 to 2320.27 then follow with guidance on determining the term of the liability.

In CLIFR's view, important considerations in determining whether an element of a policy operates independently of another include the following:

> When risks on these elements are passed through to policyholders as part of the dividend policy, they would not be considered to be independent.
>
> Approximation techniques (e.g., estimating the impact of the claims lag as the value of incurred but not reported claims at a point in time) do not drive the treatment of the cash flow.
>
> Treatment for accounting purposes does not drive the treatment of the cash flow.
>
> When the provision for a claim is the recognition of a lag on a claim payment normally valued within the base liability it would not generally be considered independent.

Specific examples are as follows:

> Dividends on deposit included in a closed par fund where any gain/loss is reflected in future dividends would not be considered to be independent. The term of the liability for these amounts would be the same as that of the related participating policies and the actuary would value the dividends on deposit as a component of the cash flows in the Canadian Asset Liability Method (CALM) valuation.
>
> The term of the liability for medical and dental IBNRs would be close to zero, consistent with the term of the underlying contracts.
>
> The term of the liability for Group Long-Term Disability claims and their associated IBNRs would be longer, consistent with the expected timing of the claims terminations.

Effect of the Implementation of AcSB Section 3855

Because of the linkage under CALM between the value of the policy liabilities and the accounting value of the supporting assets, much of the period-to-period change in the accounting value of the assets under Section 3855 would be expected to be balanced by a corresponding change in the value of the liabilities, provided asset and liability cash flows are well matched and the held for trading designation is used.

Specific concerns have been raised with regard to situations where policy liabilities are determined to have a very short term, but management has chosen to invest longer. Under CALM valuation, this mismatch would be appropriately expected to result in a sensitivity of the surplus to changes in the interest rate environment and this result would be expected to continue under Section 3855 (i.e., the value of the policy liabilities would not respond completely to changes in the value of the underlying assets).

A final consideration relates to the balance sheet presentation of certain liabilities that have a mandated presentation on a separate line. Under these circumstances, the actuary would determine the appropriate CALM liability using the considerations outlined above. This liability would be presented by showing the mandated separate provision on the balance sheet with the balance of the CALM liability shown as part of the provisions for future policy benefits line in the balance sheet.

The following example is provided from Section 4.4. of the educational note CALM Implications of AcSB Section 3855.

"… suppose that the actuary has determined that the term of the liabilities for certain dividends on deposit is the same as the term of the liabilities for the related participating whole life insurance policies. The actuary would then value the dividends on deposit as a component of the cash flows of the participating policies making appropriate assumptions for credited interest, accumulated dividend withdrawals and so forth. The end result following CALM testing would be the appropriate policy liability for the participating policies including provision for the dividends on deposit. The mandated presentation requirement would then result in the accumulated value of the dividends on deposit being reported as a separate line item with the balance of the policy liability determined as above being reported as part of the provisions for future policy benefits line in the Balance Sheet."

10. Implications of AcSB Section 3855 Financial Instruments on Future Income and Alternative Taxes *(new)*

As mentioned in the Educational Note: CALM Implications of AcSB Section 3855 this change may create additional tax timing differences. This accounting standards change is not effective for 2006 year-end statements, however, the opening balance sheet for 2007 reporting would be restated. As of the time of this publication, an industry proposal has been made to the Department of Finance (through the CLHIA) but no formal response has been received. In the case where a formal response has not been received, and the opening balance sheet for the following financial period is required, caution would be used in projecting any favourable tax timing results as a result of the accounting changes.

Appendix A: AA Scale Modification

Attained Age	AA Scale		AA Scale modified as per section 2		Attained Age	AA Scale		AA Scale modified as per section 2	
	Male	Female	Male	Female		Male	Female	Male	Female
1	0.020	0.020	0.020	0.020	51	0.019	0.016	0.019	0.016
2	0.020	0.020	0.020	0.020	52	0.020	0.014	0.020	0.014
3	0.020	0.020	0.020	0.020	53	0.020	0.012	0.020	0.012
4	0.020	0.020	0.020	0.020	54	0.020	0.010	0.020	0.010
5	0.020	0.020	0.020	0.020	55	0.019	0.008	0.019	**0.010**
6	0.020	0.020	0.020	0.020	56	0.018	0.006	0.018	**0.010**
7	0.020	0.020	0.020	0.020	57	0.017	0.005	0.017	**0.010**
8	0.020	0.020	0.020	0.020	58	0.016	0.005	0.016	**0.010**
9	0.020	0.020	0.020	0.020	59	0.016	0.005	0.016	**0.010**
10	0.020	0.020	0.020	0.020	60	0.016	0.005	0.016	**0.010**
11	0.020	0.020	0.020	0.020	61	0.015	0.005	0.015	**0.010**
12	0.020	0.020	0.020	0.020	62	0.015	0.005	0.015	**0.010**
13	0.020	0.020	0.020	0.020	63	0.014	0.005	0.014	**0.010**
14	0.019	0.018	0.019	0.018	64	0.014	0.005	0.014	**0.010**
15	0.019	0.016	0.019	0.016	65	0.014	0.005	0.014	**0.010**
16	0.019	0.015	0.019	0.015	66	0.013	0.005	0.013	**0.010**
17	0.019	0.014	0.019	**0.015**	67	0.013	0.005	0.013	**0.010**
18	0.019	0.014	0.019	**0.015**	68	0.014	0.005	0.014	**0.010**
19	0.019	0.015	0.019	0.015	69	0.014	0.005	0.014	**0.010**
20	0.019	0.016	0.019	0.016	70	0.015	0.005	0.015	**0.010**
21	0.018	0.017	0.018	0.017	71	0.015	0.006	0.015	**0.010**
22	0.017	0.017	0.017	0.017	72	0.015	0.006	0.015	**0.010**
23	0.015	0.016	0.015	0.016	73	0.015	0.007	0.015	**0.010**
24	0.013	0.015	**0.015**	0.015	74	0.015	0.007	0.015	**0.010**
25	0.010	0.014	**0.015**	**0.015**	75	0.014	0.008	0.014	**0.010**
26	0.006	0.012	**0.015**	**0.015**	76	0.014	0.008	0.014	**0.010**
27	0.005	0.012	**0.015**	**0.015**	77	0.013	0.007	0.013	**0.010**
28	0.005	0.012	**0.015**	**0.015**	78	0.012	0.007	0.012	**0.010**
29	0.005	0.012	**0.015**	**0.015**	79	0.011	0.007	0.011	**0.010**
30	0.005	0.010	**0.015**	**0.015**	80	0.010	0.007	0.010	**0.010**
31	0.005	0.008	**0.015**	**0.015**	81	0.009	0.007	0.009	0.007
32	0.005	0.008	**0.015**	**0.015**	82	0.008	0.007	0.008	0.007
33	0.005	0.009	**0.015**	**0.015**	83	0.008	0.007	0.008	0.007
34	0.005	0.010	**0.015**	**0.015**	84	0.007	0.007	0.007	0.007
35	0.005	0.011	**0.015**	**0.015**	85	0.007	0.006	0.007	0.006
36	0.005	0.012	**0.015**	**0.015**	86	0.007	0.005	0.007	0.005
37	0.005	0.013	**0.015**	**0.015**	87	0.006	0.004	0.006	0.004
38	0.006	0.014	**0.015**	**0.015**	88	0.005	0.004	0.005	0.004
39	0.007	0.015	**0.015**	0.015	89	0.005	0.003	0.005	0.003
40	0.008	0.015	**0.015**	0.015	90	0.004	0.003	0.004	0.003
41	0.009	0.015	**0.015**	0.015	91	0.004	0.003	0.004	0.003
42	0.010	0.015	**0.015**	0.015	92	0.003	0.003	0.003	0.003
43	0.011	0.015	**0.015**	0.015	93	0.003	0.002	0.003	0.002
44	0.012	0.015	**0.015**	0.015	94	0.003	0.002	0.003	0.002
45	0.013	0.016	**0.015**	0.016	95	0.002	0.002	0.002	0.002
46	0.014	0.017	**0.015**	0.017	96	0.002	0.002	0.002	0.002
47	0.015	0.018	0.015	0.018	97	0.002	0.001	0.002	0.001
48	0.016	0.018	0.016	0.018	98	0.001	0.001	0.001	0.001
49	0.017	0.018	0.017	0.018	99	0.001	0.001	0.001	0.001
50	0.018	0.017	0.018	0.017	100	0.001	0.001	0.001	0.001
					Over 100	0.000	0.000	0.000	0.000

Appendix B: Example of Scenario Assumptions – Interest Rates

Prescribed Interest Rate Scenarios

Scenario	Description
0	Base Interest Rate Scenario (forward rates based on the current yield curve grading to long term average)
1	Move to 90% of Current by Year 1; to Prescribed Minimums by Year 20
2	Move to 110% of Current by Year 1; to Prescribed Maximums by Year 20
3	Yield Curve Movements In Full Cycles (Up/Down/Up/Down/Up/Down)
4	Yield Curve Movements In Full Cycles (Down/Up/Down/Up/Down/Up)
5	Inversions and Yield Curve Movements In Full Cycles (Up/Down/Up/Down/Up/Down)
6	Inversions and Yield Curve Movements In Full Cycles (Down/Up/Down/Up/Down/Up)
7	Move to 90% of Scenario 0 by Year 1; 90% of Scenario 0 thereafter
8	Move to 110% of Scenario 0 by year 1; 110% of Scenario 0 thereafter
9	Current yield curve persists

Prescribed Ultimate and Minimum Long Rate - Sample Calculation

Calculation as of September 30th, 2006

SELECTED GOVERNMENT OF CANADA BENCHMARK LONG-TERM (V122544) SEMI-ANNUAL BOND YIELDS - PERCENT

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996										7.12	6.75	7.09
1997	7.38	7.08	7.24	7.18	7.15	6.73	6.32	6.63	6.26	6.05	5.96	5.95
1998	5.81	5.78	5.70	5.76	5.61	5.52	5.61	5.83	5.32	5.45	5.47	5.23
1999	5.23	5.43	5.36	5.41	5.58	5.63	5.74	5.68	5.91	6.36	6.10	6.23
2000	6.27	5.83	5.84	5.92	5.63	5.61	5.55	5.51	5.67	5.61	5.51	5.56
2001	5.72	5.66	5.79	5.97	6.03	5.89	5.94	5.67	5.86	5.31	5.59	5.69
2002	5.68	5.69	5.98	5.92	5.78	5.74	5.73	5.58	5.43	5.63	5.58	5.42
2003	5.49	5.46	5.58	5.41	5.12	5.03	5.40	5.44	5.23	5.38	5.29	5.20
2004	5.23	5.09	5.04	5.31	5.32	5.33	5.29	5.15	5.04	5.00	4.90	4.92
2005	4.74	4.76	4.77	4.59	4.46	4.29	4.31	4.12	4.21	4.37	4.18	4.02
2006	4.20	4.15	4.23	4.57	4.50	4.67	4.45	4.20	4.07			

120 Month Average - Effective Annual*	5.58	* *Averages taken from annualized form of above rates.*
60 Month Average - Effective Annual*	5.10	*e.g. Sep 2006 rate = (1+0.0407/2)^2 = 4.11%.*
Average of 2 Averages	5.34	
Rounded To Nearest 0.10	5.30	<= Base Scenario 40+ Rate
90% and Rounded To Nearest 0.10	4.80	<= Prescribed Scenario Long Term Minimum

Appendix B: Example of Scenario Assumptions – Interest Rates (cont'd)

Generation of Forward Rates, given a set of spot rates

The theoretical spot-rate curve is constructed from the yield curve based on the observed yields of Treasury bills and Government of Canada Bonds. The spot rates are solved, such that the value of the Treasury coupon security is equal to the value of the package of zero-coupon Treasury securities that replicates the bond's cash flow.

Spot rates can be obtained from various sources, such as Bloomberg or JP Morgan, as well as the Bank of Canada website. Given a spot curve as of the valuation date, the implied forwards can be determined. A forward rate F(n,m) is the yield on a Treasury bill purchased "n" months from now and maturing in n+m months.

Define spot(m) as the yield (as of the valuation date) on a zero-coupon Treasury bill maturing in "m" months. The forward rate is defined by the formula:

$$F(n,m) = [\{[1+spot(m+n)]^{(m+n)}\} / \{[1+spot(n)]^{(n)}\}]^{(1/m)} - 1$$

Please refer to the attached spreadsheet which illustrates the sample calculation of 1 and 20 year forward rates, from the current spot curve. The calculation is done in five steps:

Illustration: 1-yr and 20-yr Forwards

Step 1: Obtain current spot curve from various data sources

Step 2: Interpolate the spot curve where spot rates are not directly available.

Step 3: Determine the yield curve horizon as the duration, 20 or later, where the spot rate has reached a maximum level.

Step 4: Extrapolate for durations past the horizon by setting the spot rate equal to the spot rate at the horizon.

Step 5: Determine the implied forwards using the formula above.

Notes

1. Observed 30-yr Rate: 4.126% ; since this is lower than the 20-yr observed, ignore.
2. For each term, the time-0 forward equals the observed spot for that term.
3. For each term, the ultimate forward equals the observed "horizon" spot and only the first 20 forwards are used in the Base Scenario.

Example: Rates as of Sept. 30, 2006

Year	Bloomberg Spots (annualized)	Implied Forwards 1-yr	Implied Forwards 20-yr
0		4.142%	4.157% [2]
1	4.142%	3.736%	4.158%
2	3.939%	3.933%	4.179%
3	3.937%	3.896%	4.190%
4	3.927%	3.968%	4.203%
5	3.935%	4.045%	4.213%
6	3.953%	4.082%	4.219%
7	3.972%	4.149%	4.222%
8	3.994%	4.193%	4.223%
9	4.016%	4.237%	4.221%
10	4.038%	4.169%	4.217%
11	4.050%	4.193%	4.216%
12	4.062%	4.217%	4.215%
13	4.074%	4.241%	4.212%
14	4.086%	4.265%	4.207%
15	4.098%	4.289%	4.202%
16	4.110%	4.313%	4.196%
17	4.122%	4.337%	4.188%
18	4.133%	4.361%	4.179%
19	4.145%	4.384%	4.169%
20	4.157%	4.157%	4.157% [3]
21	4.157%		
22	4.157%		
23	4.157%		
24	4.157%		
25	4.157%		
26	4.157%		
27	4.157%		
28	4.157%		
29	4.157%		
30	4.157% [1]		
31	4.157%		
32	4.157%		
33	4.157%		
34	4.157%		
35	4.157%		
36	4.157%		
37	4.157%		
38	4.157%		
39	4.157%		
40	4.157%		

Appendix B: Example of Scenario Assumptions – Interest Rates (cont'd)

(Insert Appendix Title)

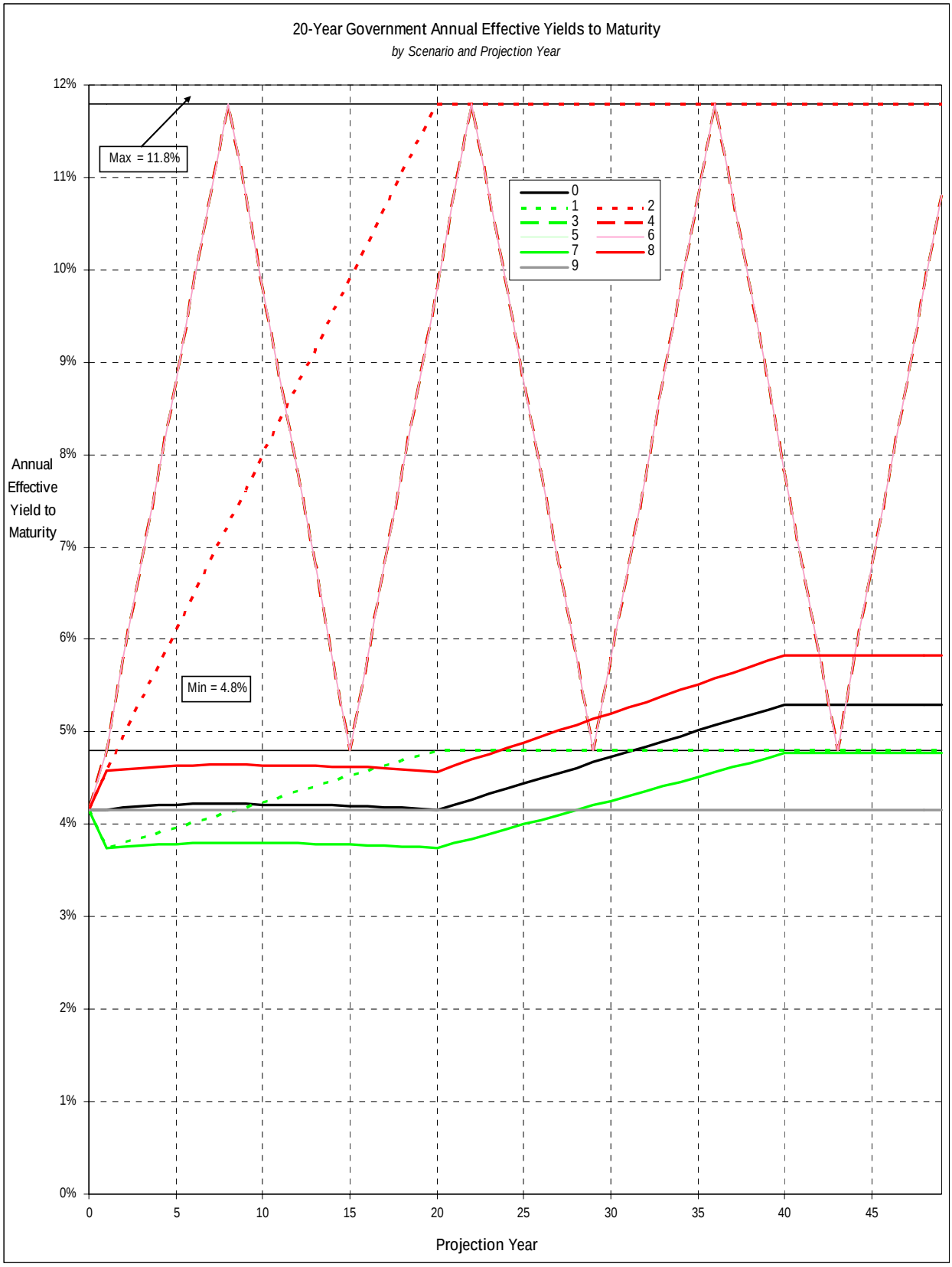
20-year Annual Effective Yields to Maturity
by Scenario and Projection Year

= Observed 20-yr rate @ valuation date
= 20-yr forwards implied by observed spots
= Smoothly interpolated rates
= Ultimate or nodal rate/spread

Assumptions	s.a.	a.e.
Observed 20-yr rate @ valn date:	4.12	4.16
Ultimate 20 Year Yield Rate:		5.30
Initial Spread:		0.50

Projection	Government Bond Yield Curves							Gross Spread over Governments					Gross Portfolio Bond Yields						
Yr (eoy)	0	1	2	3-6	7	8	9	0	1-6	7	8	9	0	1	2	3-6	7	8	9
0	4.16	4.16	4.16	4.16	4.16	4.16	4.16	0.50	0.50	0.50	0.50	0.50	4.66	4.66	4.66	4.66	4.66	4.66	4.66
1	4.16	3.74	4.57	4.80	3.74	4.57	4.16	0.50	0.48	0.45	0.55	0.50	4.66	4.22	5.05	5.28	4.19	5.12	4.66
2	4.18	3.80	4.95	5.80	3.76	4.60	4.16	0.50	0.45	0.45	0.55	0.50	4.68	4.25	5.40	6.25	4.21	5.15	4.66
3	4.19	3.85	5.33	6.80	3.77	4.61	4.16	0.50	0.43	0.45	0.55	0.50	4.69	4.28	5.76	7.23	4.22	5.16	4.66
4	4.20	3.91	5.71	7.80	3.78	4.62	4.16	0.50	0.40	0.45	0.55	0.50	4.70	4.31	6.11	8.20	4.23	5.17	4.66
5	4.21	3.96	6.09	8.80	3.79	4.63	4.16	0.50	0.38	0.45	0.55	0.50	4.71	4.34	6.47	9.18	4.24	5.18	4.66
6	4.22	4.02	6.47	9.80	3.80	4.64	4.16	0.50	0.35	0.45	0.55	0.50	4.72	4.37	6.82	10.15	4.25	5.19	4.66
7	4.22	4.08	6.86	10.80	3.80	4.64	4.16	0.50	0.33	0.45	0.55	0.50	4.72	4.40	7.18	11.13	4.25	5.19	4.66
8	4.22	4.13	7.24	11.80	3.80	4.65	4.16	0.50	0.30	0.45	0.55	0.50	4.72	4.43	7.54	12.10	4.25	5.20	4.66
9	4.22	4.19	7.62	10.80	3.80	4.64	4.16	0.50	0.28	0.45	0.55	0.50	4.72	4.46	7.89	11.08	4.25	5.19	4.66
10	4.22	4.24	8.00	9.80	3.80	4.64	4.16	0.50	0.25	0.45	0.55	0.50	4.72	4.49	8.25	10.05	4.25	5.19	4.66
11	4.22	4.30	8.38	8.80	3.79	4.64	4.16	0.50	0.23	0.45	0.55	0.50	4.72	4.52	8.60	9.03	4.24	5.19	4.66
12	4.21	4.35	8.76	7.80	3.79	4.64	4.16	0.50	0.20	0.45	0.55	0.50	4.71	4.55	8.96	8.00	4.24	5.19	4.66
13	4.21	4.41	9.14	6.80	3.79	4.63	4.16	0.50	0.18	0.45	0.55	0.50	4.71	4.59	9.31	6.98	4.24	5.18	4.66
14	4.21	4.47	9.52	5.80	3.79	4.63	4.16	0.50	0.15	0.45	0.55	0.50	4.71	4.62	9.67	5.95	4.24	5.18	4.66
15	4.20	4.52	9.90	4.80	3.78	4.62	4.16	0.50	0.13	0.45	0.55	0.50	4.70	4.65	10.02	4.93	4.23	5.17	4.66
16	4.20	4.58	10.28	5.80	3.78	4.62	4.16	0.50	0.10	0.45	0.55	0.50	4.70	4.68	10.38	5.90	4.23	5.17	4.66
17	4.19	4.63	10.66	6.80	3.77	4.61	4.16	0.50	0.08	0.45	0.55	0.50	4.69	4.71	10.73	6.88	4.22	5.16	4.66
18	4.18	4.69	11.04	7.80	3.76	4.60	4.16	0.50	0.05	0.45	0.55	0.50	4.68	4.74	11.09	7.85	4.21	5.15	4.66
19	4.17	4.74	11.42	8.80	3.75	4.59	4.16	0.50	0.03	0.45	0.55	0.50	4.67	4.77	11.44	8.83	4.20	5.14	4.66
20	4.16	4.80	11.80	9.80	3.74	4.57	4.16	0.50	0.00	0.45	0.55	0.50	4.66	4.80	11.80	9.80	4.19	5.12	4.66
21	4.21	4.80	11.80	10.80	3.79	4.64	4.16	0.50	0.00	0.45	0.55	0.50	4.71	4.80	11.80	10.80	4.24	5.19	4.66
22	4.27	4.80	11.80	11.80	3.84	4.70	4.16	0.50	0.00	0.45	0.55	0.50	4.77	4.80	11.80	11.80	4.29	5.25	4.66
23	4.33	4.80	11.80	10.80	3.90	4.76	4.16	0.50	0.00	0.45	0.55	0.50	4.83	4.80	11.80	10.80	4.35	5.31	4.66
24	4.39	4.80	11.80	9.80	3.95	4.82	4.16	0.50	0.00	0.45	0.55	0.50	4.89	4.80	11.80	9.80	4.40	5.37	4.66
25	4.44	4.80	11.80	8.80	4.00	4.89	4.16	0.50	0.00	0.45	0.55	0.50	4.94	4.80	11.80	8.80	4.45	5.44	4.66
26	4.50	4.80	11.80	7.80	4.05	4.95	4.16	0.50	0.00	0.45	0.55	0.50	5.00	4.80	11.80	7.80	4.50	5.50	4.66
27	4.56	4.80	11.80	6.80	4.10	5.01	4.16	0.50	0.00	0.45	0.55	0.50	5.06	4.80	11.80	6.80	4.55	5.56	4.66
28	4.61	4.80	11.80	5.80	4.15	5.08	4.16	0.50	0.00	0.45	0.55	0.50	5.11	4.80	11.80	5.80	4.60	5.63	4.66
29	4.67	4.80	11.80	4.80	4.20	5.14	4.16	0.50	0.00	0.45	0.55	0.50	5.17	4.80	11.80	4.80	4.65	5.69	4.66
30	4.73	4.80	11.80	5.80	4.26	5.20	4.16	0.50	0.00	0.45	0.55	0.50	5.23	4.80	11.80	5.80	4.71	5.75	4.66
31	4.79	4.80	11.80	6.80	4.31	5.26	4.16	0.50	0.00	0.45	0.55	0.50	5.29	4.80	11.80	6.80	4.76	5.81	4.66
32	4.84	4.80	11.80	7.80	4.36	5.33	4.16	0.50	0.00	0.45	0.55	0.50	5.34	4.80	11.80	7.80	4.81	5.88	4.66
33	4.90	4.80	11.80	8.80	4.41	5.39	4.16	0.50	0.00	0.45	0.55	0.50	5.40	4.80	11.80	8.80	4.86	5.94	4.66
34	4.96	4.80	11.80	9.80	4.46	5.45	4.16	0.50	0.00	0.45	0.55	0.50	5.46	4.80	11.80	9.80	4.91	6.00	4.66
35	5.01	4.80	11.80	10.80	4.51	5.52	4.16	0.50	0.00	0.45	0.55	0.50	5.51	4.80	11.80	10.80	4.96	6.07	4.66
36	5.07	4.80	11.80	11.80	4.56	5.58	4.16	0.50	0.00	0.45	0.55	0.50	5.57	4.80	11.80	11.80	5.01	6.13	4.66
37	5.13	4.80	11.80	10.80	4.62	5.64	4.16	0.50	0.00	0.45	0.55	0.50	5.63	4.80	11.80	10.80	5.07	6.19	4.66
38	5.19	4.80	11.80	9.80	4.67	5.70	4.16	0.50	0.00	0.45	0.55	0.50	5.69	4.80	11.80	9.80	5.12	6.25	4.66
39	5.24	4.80	11.80	8.80	4.72	5.77	4.16	0.50	0.00	0.45	0.55	0.50	5.74	4.80	11.80	8.80	5.17	6.32	4.66
40	5.30	4.80	11.80	7.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	7.80	5.22	6.38	4.66
41	5.30	4.80	11.80	6.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	6.80	5.22	6.38	4.66
42	5.30	4.80	11.80	5.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	5.80	5.22	6.38	4.66
43	5.30	4.80	11.80	4.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	4.80	5.22	6.38	4.66
44	5.30	4.80	11.80	5.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	5.80	5.22	6.38	4.66
45	5.30	4.80	11.80	6.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	6.80	5.22	6.38	4.66
46	5.30	4.80	11.80	7.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	7.80	5.22	6.38	4.66
47	5.30	4.80	11.80	8.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	8.80	5.22	6.38	4.66
48	5.30	4.80	11.80	9.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	9.80	5.22	6.38	4.66
49	5.30	4.80	11.80	10.80	4.77	5.83	4.16	0.50	0.00	0.45	0.55	0.50	5.80	4.80	11.80	10.80	5.22	6.38	4.66

Appendix B: Example of Scenario Assumptions – Interest Rates (cont'd)



Appendix C: Example of Equity Returns for Emerging Markets

Data, Assumptions and Comments

	Canada (50 yrs)	XYZ (20 yrs)
Historical return		
- capital growth (given)	9.50%	17.00%
- dividends (given)	2.50%	3.00%
Total	12.00%	20.00%
Risk-free rate (given)	4.00%	6.00%
Implied Spread:	8.00%	14.00%
Volatility (given - information only):	22%	37%
MfADs (given):		
- on dividends	10%	20%
- on capital growth	20%	20%
- shock (applied in year 5):	30%	40%

This exhibit illustrates how the actuary might test to ensure the best estimate assumption for equity returns for a geography with unreliable historical experience. Here, the actuary initially uses what data he has and chooses appropriate MfADs for dividend income and capital growth (including the shock at worst time per SOP 2340.13).

However, the resulting 'net' risk premium over risk-free rates is 4.22% compared to 2% for Canada. Recognizing this result to be inappropriate given the uncertainty around the data, he then reduces the best estimate capital growth assumption from 17% to 14.08%, which reduces the resulting net risk premium to 2%. Therefore, he would not use a capital growth assumption in excess of 14.08% for this market.

Test Projection

	0	1	2	3	4	5	6	7	8	9	10
Canada											
Capital Growth		7.60%	7.60%	7.60%	7.60%	7.60%	7.60%	7.60%	7.60%	7.60%	7.60%
Dividends		2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%	2.25%
Net Return (before shock)		9.85%	9.85%	9.85%	9.85%	9.85%	9.85%	9.85%	9.85%	9.85%	9.85%
Shock		0.00%	0.00%	0.00%	0.00%	-30.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cumulative (after shock)	1,000.00	1,098.50	1,206.70	1,325.56	1,456.13	1,119.69	1,229.98	1,351.13	1,484.22	1,630.42	1,791.01
Net Spread over Risk Free (incl. dividends)	2.00%										
XYZ (Initial, using unmodified empirical estimate of capital growth)											
Capital Growth		13.60%	13.60%	13.60%	13.60%	13.60%	13.60%	13.60%	13.60%	13.60%	13.60%
Dividends		2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%
Net Return (before shock)		16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%
Shock		0.00%	0.00%	0.00%	0.00%	-40.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cumulative (after shock)	1,000.00	1,160.00	1,345.60	1,560.90	1,810.64	1,260.20	1,461.84	1,695.73	1,967.05	2,281.78	2,646.86
Net Spread over Risk Free (incl. dividends)	4.22%										
XYZ (Revised)											
Revised b.e. capital growth assumption	14.08%										
Capital Growth		11.26%	11.26%	11.26%	11.26%	11.26%	11.26%	11.26%	11.26%	11.26%	11.26%
Dividends		2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%	2.40%
Net Return (before shock)		13.66%	13.66%	13.66%	13.66%	13.66%	13.66%	13.66%	13.66%	13.66%	13.66%
Shock		0.00%	0.00%	0.00%	0.00%	-40.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cumulative (after shock)	1,000.00	1,136.60	1,291.87	1,468.34	1,668.92	1,138.14	1,293.61	1,470.32	1,671.17	1,899.45	2,158.92