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Educational Note

Guidance for the 2013 Valuation of Insurance Contract Liabilities and Dynamic Capital Adequacy Testing for Property and Casualty Insurers

Document 213104

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Educational Note

Guidance for the 2013 Valuation of Insurance Contract Liabilities and Dynamic Capital Adequacy Testing for Property and Casualty Insurers

Committee on Property and Casualty Insurance Financial Reporting

December 2013

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Ce document est disponible en français

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.

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Memorandum

To: Members in the Property and Casualty Insurance Practice Area

From: Bruce Langstroth, Chair
Practice Council

Isabelle Périgny, Chair
Committee on Property and Casualty Insurance Financial Reporting

Date: December 3, 2013

Subject: **Educational Note – Guidance for the 2013 Valuation of Insurance Contract Liabilities and Dynamic Capital Adequacy Testing for Property and Casualty Insurers**

In accordance with the Canadian Institute of Actuaries' 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 Property and Casualty Insurance Financial Reporting, and has received final approval for distribution by the Practice Council on November 29, 2013.

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 that 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."

If you have any questions or comments regarding this educational note, please contact Isabelle Périgny at isabelle.perigny@lacapitale.com.

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INTRODUCTION

The Committee on Property and Casualty Insurance Financial Reporting (PCFRC) of the Canadian Institute of Actuaries (CIA) prepared this educational note to provide guidance to actuaries in several areas affecting the valuation of insurance contract liabilities and dynamic capital adequacy testing (DCAT) reporting for property and casualty (P&C) insurers. This educational note reviews relevant Standards of Practice and educational notes and discusses current issues affecting the work of the Appointed Actuary (AA). Links to all the CIA documents referenced in this educational note are provided in appendix A.

STANDARDS OF PRACTICE

While all of the Rules of Professional Conduct and Standards of Practice are important, your attention is directed to the following that are particularly relevant for AAs:

- Subsection 1340 – Materiality;
- Section 1500 – The Work;
- Section 1600 – Another Person's Work;
- Section 1700 – Assumptions;
- Section 1800 – Reporting;
- Section 2100 – Insurance Contract Valuation: All Insurance;
- Section 2200 – Insurance Contract Valuation: Property and Casualty Insurance;
- Section 2400 – The Appointed Actuary; and
- Section 2500 – Dynamic Capital Adequacy Testing.

The Standards of Practice are subject to revision from time to time. The most recent revisions of interest to AAs are described below. For additional information about these and other revisions, please refer to the CIA website.

On December 11, 2012, the Actuarial Standards Board (ASB) issued a memorandum approving changes to the wording of the Appointed Actuary's Report and related definitions. This was done in order to harmonize the Appointed Actuary's Report with International Accounting Standards Board (IASB) terminology. This memorandum can be found here.

The ASB published Final Standard Regarding the Revision of the Standard of Practice on Dynamic Capital Adequacy Testing (section 2500) in November 2011. The intent of the revision was to ensure consistency with OSFI's Guideline E-18 Stress Testing as well as changes arising from the adoption of International Financial Reporting Standards (IFRS).

The Standards of Practice for Recognizing Events in Work were revised September 2011. Revisions were made to section 1500 – The Work (specifically subsections 1515 and 1520) and section 1800 – Reporting. In response to these changes in the Standards of Practice, the PCFRC has modified the October 2008 draft educational note titled Subsequent Events. The final educational note was issued in the fall of 2012.

Materiality

Materiality is addressed in subsection 1340 of the Standards of Practice. As stated in paragraph 1340.02, "judgment about materiality pervades virtually all work". The AA would communicate

with the external auditor regarding materiality in accordance with the CIA/CICA Joint Policy Statement (subsection 1630).

The AA-selected materiality threshold for the valuation of insurance contract liabilities would generally not be greater than the external auditor's selected materiality threshold. The AA-selected materiality for the DCAT analysis would generally be greater than the materiality selected for the valuation of insurance contract liabilities. For further information on materiality, the AA is referred to the CIA Report on Materiality (2007).

Use of Another Person's Work

Section 1600 of the Standards of Practice discusses considerations when using another person's work. Paragraph 1610.07 notes that "the actuary may use and take responsibility for another person's work given confidence that such actions are justified". However, as indicated in paragraph 1610.08, "Failing such confidence, the actuary would not take responsibility for the other person's work." In this situation, the AA may still use another person's work, but, as stated in paragraph 1610.12, "If the actuary uses but does not take responsibility for another person's work, then the actuary would nevertheless examine the other person's work for evident shortcomings and would either report the results of such examination or avoid use of the work."

A particularly relevant example for AAs is the use of industry benchmarks related to Ontario automobile reforms. Similarly, the use of industry benchmark trend factors is another example. When using benchmarks developed by a third party, the AAs would consider the professional requirements set out in section 1600.

EDUCATIONAL NOTES AND OTHER CIA PUBLICATIONS

To assist AAs in their fiscal year-end valuation or DCAT work, the following educational notes and documents are valuable sources of information:

- Educational note: Dynamic Capital Adequacy Testing (November 2013);

  A revised DCAT educational note was released in September 2013. The revisions are intended to be consistent with the November 2011 revisions to section 2500 of the Standards of Practice referred to earlier.
- Educational note: Subsequent Events (September 2012);
- Educational note: Evaluation of the Runoff of P&C Claims Liabilities when the Liabilities are Discounted in Accordance with Accepted Actuarial Practice (June 2011);
- Educational note: Discounting (November 2010)[1];
- Research paper: Disclosure Requirements IFRS 4 – Insurance Contracts for P&C Insurers (October 2010);
- Educational note: Margins for Adverse Deviations for P&C Insurance (December 2009);

[1] In November 2010, the PCFRC released an educational note on Discounting, as indicated above. Section 4.2 of that note relates to "Selection of Discount Rate for Estimation of Net Present Value" and includes the following statement: "Unless the asset cashflow is consistent with the liability cash flow, the actuary would consider the effect of reinvesting positive net cashflow, or the effect of the liquidation of assets to address negative net cashflow."

In this context, "consistent" is intended to refer to an asset cashflow that provides sufficient but not excessive funds (through cash and certain receivables, payment of dividends and coupons, maturing values, or liquid assets) in each calendar period to cover the payment of claim and premium liabilities expected to require payment in those periods.

- Educational note: Classification of Contracts under International Financial Reporting Standards (June 2009);
- Report of the CIA Task Force on Materiality (October 2007);
- Report of the CIA Task Force on the Appropriate Treatment of Reinsurance (October 2007);
- Educational note: Consideration of Future Income Taxes in the Valuation of Policy Liabilities (July 2005); and
- Educational note: Valuation of Policy Liabilities P&C Insurance Considerations Regarding Claim Liabilities and Premium Liabilities (June 2003).

INTERNATIONAL FINANCIAL REPORTING STANDARDS

IFRS 4, which was adopted in Canada on January 1, 2011, and applies to insurance contracts, is an interim standard that allows insurers to mostly retain their current accounting policies for those contracts that meet the definition of insurance (Phase I).

The CIA published a research paper, Disclosure Requirements IFRS 4 – Insurance Contracts for P&C Insurers (October 2010), to assist actuaries in the information-gathering process and drafting of disclosure notes. The paper identifies the disclosures that are relevant to P&C insurers, analyzes the considerations of the disclosure requirements, and provides guidance for disclosure.

Phase II of IFRS 4 is intended to result in a single international standard for all insurance contracts. In June 2013, the IASB and Financial Accounting Standards Board (FASB) published their exposure drafts on insurance contracts. The deadline for comments was October 25, 2013. Two issues of ongoing interest to P&C insurers relate to risk diversification and the unwinding of the effect of discounting. The date for the adoption of Phase II has not yet been finalized.

REGULATORY GUIDANCE

We remind AAs to refer to updated communication from provincial and/or federal insurance regulators regarding insurance contract liabilities valuation and DCAT reporting.

OSFI Requirements

1. OSFI Annual Memorandum for Actuarial Reports on P&C Business

OSFI issues a memorandum for the AA on an annual basis. AAs would consult this memorandum for complete instructions from OSFI.

2. Capital Requirements

In this section, references to OSFI's Minimum Capital Test (MCT) for Canadian insurers are intended to encompass comparable requirements for Canadian branches of foreign insurers, i.e., the Branch Adequacy of Assets Test (BAAT).

Recent Changes to Capital Requirements

Changes to the current calculation of the MCT were effective January 1, 2013. The majority of these most recent changes were housekeeping, and included, but are not limited to:

- Interest rate shock factor increased from 0.50 percent to 0.75 percent; and

- Adjustments to capital available and required due to changes in the accounting treatment of defined benefit pension plans as a result of amendments to IAS 19 Employee Benefits.

AAs would be expected to incorporate these changes into their DCAT analyses.

Effective January 1, 2012, significant changes were introduced to the MCT guideline. Key changes in 2012 included, but were not limited to:

- Requirement for an audit opinion on the MCT;
- Removal of the capital requirement on the provision for adverse deviations (PfAD) portion of the carried unpaid claim provision; and
- Introduction of interest rate risk capital requirement.

As a result of the January 2012 changes, AAs are expected to provide calculations or guidance to the preparers and reviewers (such as external auditors and peer reviewers) of the financial statements on at least two elements of the revised MCT calculation:

- AAs are expected to provide the PfADs by line of business such that they could be removed from the carried unpaid claims provision for the purpose of calculating the capital requirement for unpaid claims; and
- In the calculation of the interest rate risk margin, an interest rate shock factor is applied to the fair value of interest rate sensitive assets and liabilities and their duration. AAs are expected to be involved in the calculation of the duration of liabilities (and possibly of assets). Appendix B presents considerations and examples to help AAs in calculating duration.

Expected Changes to Capital Requirements

No significant changes to OSFI's capital requirements are expected to be effective in 2014.

In May 2013, OSFI released its Discussion Paper on OSFI's Proposed Changes to the Regulatory Capital Framework for Federally Regulated Property and Casualty Insurers. As detailed in the paper, OSFI has revised many of the underlying risk factors, and in general has revised calculations to reflect more granular risk factors. In addition, OSFI has introduced the following components:

- An explicit risk charge for operational risk; and
- An explicit credit for diversification between insurance risk and the sum of credit risk and market risk.

The effect of all of these changes varies significantly from insurer to insurer, depending on many factors, including the insurer's corporate structure, the nature of the business written by the insurer, the composition of its capital, and the nature of its reinsurance arrangements.

OSFI is in the process of reviewing the industry response to this discussion paper, as well as the estimated capital impact of the proposed changes as measured through a quantitative impact study. OSFI expects to release a revised draft guideline in December 2013, with a final guideline to be issued in the summer of 2014, with an effective date of January 1, 2015.

Revisions to capital rules regarding earthquake exposures are expected to be integrated with the MCT guideline and be effective January 1, 2015.

The AA would be aware of these upcoming capital changes. Depending on when the guidelines are finalized and the timing of the work, the AA would consider appropriate disclosure. While OSFI is not expected to prescribe that 2014 DCAT reports include the proposed MCT before it is finalized, it is important that the DCAT be useful to the company and that the AA has done enough work to issue his or her opinion with confidence. A disclosure in the report of the proposed changes and of the expected impact for the company may be appropriate.

3. Stress Testing

OSFI Guideline E-18 Stress Testing states that, from time to time, OSFI may ask institutions to carry out standardized scenario tests to assess system-wide vulnerabilities. No such specific standardized test was requested during 2013.

The actuary is reminded that the company's performance in previous stress tests can be a useful consideration for the actuary when designing/selecting current year company-specific scenarios.

4. Guideline A-4 Internal Target Capital Ratio for Insurance Companies

In December 2012, OSFI published Guideline A-4 Regulatory and Internal Target Capital Ratios for insurance companies, effective January 2014. The guideline sets out OSFI's expectations with respect to the setting of insurer-specific target capital ratios and how such targets relate to the assessment of capital adequacy within the context of OSFI's supervisory framework. The guideline also notes that analysis supporting the setting and maintaining of an insurer's internal target capital ratio is to be clearly and formally documented, updated at least annually, and discussed with the insurer's board of directors or chief agent. The AA would generally be involved with and understand the company's process and assumptions used to select the target capital ratio.

5. Guideline E-15 Appointed Actuary: Legal Requirements, Qualifications, and Peer Review

In September 2012, OSFI published Guideline E-15, effective for the financial statements covering 2013, and for the DCAT prepared during 2013. The most significant change as compared to the original Guideline E-15, issued in 2003, pertains to annual reporting. While the peer review cycle continues to be three years, OSFI expects the reviewer to undertake a limited annual review, and to prepare and file a report annually. In addition, OSFI expects large and complex companies to engage a peer reviewer who is not a member of its external audit firm.

Requirements of the Autorité des marchés financiers (AMF)

1. AMF Annual Guidelines for Actuarial Reports on P&C Business

The AMF issues specific guidelines to AAs of Québec-regulated insurers for both the valuation of insurance contract liabilities and DCAT. The AA would consult these memorandums for the complete instructions from the AMF.

The AMF guideline regarding the mandatory insurance contract liabilities report is updated annually, usually in November, and covers regulatory requirements and the report's expected content and prescribed layout. The AMF guideline also mandates prescribed exhibits for reporting results of the AA's valuation of insurance contract liabilities. Prescribed exhibits include the unpaid claims and loss ratio exhibits for which specific instructions are available. AAs who wish to opt for the filing of a simplified database would refer to the AMF guideline.

The AMF also publishes a guideline for the preparation of the report on the insurer's financial condition (DCAT report). This guideline is updated annually, usually in March, and covers the same general aspects as the guideline on the valuation of insurance contract liabilities. When completing the DCAT report, AAs are advised to be aware of the latest developments in the calculation of the MCT ratio. The AMF requires the AA to disclose the insurer's target capital ratio and discuss the assumptions and calculations underlying the choice of the target.

2. Reinsurance Risk Management Guideline

In July 2013, the AMF published a revised version of its Reinsurance Risk Management Guideline that first came into effect in April of 2010. Most of the changes reflect minor issues, with the noticeable addition of an appendix where registered and unregistered reinsurance are defined. These definitions could previously be found in the AMF's Guideline on Capital Adequacy Requirements (MCT Guideline).

At the same time, the AMF published its Guide Respecting the Use of Guarantee Instruments that sets out the criteria respecting the use of guarantee instruments in connection with unregistered reinsurance contracts, in order for an insurer to benefit from credit offsets in respect of capital. The guide covers the use of trust deeds, hypothecs (also referred to as "mortgages" outside the province of Québec) and letters of credit. The AMF expects that AAs would be familiar with these criteria, especially with the requirement that a legal opinion be provided to the insurer for every guarantee instrument, excluding letters of credit.

3. Capital Requirements

Audit of the MCT

In October 2013, the AMF published a notice requiring an audit opinion on the MCT starting with financial periods ending December 31, 2013.

Recent Changes to Capital Requirements

Following the publication of the revised Reinsurance Risk Management Guideline and the new Guide Respecting the Use of Guarantee Instruments, a revised MCT Guideline was also published in July 2013. The newest edition reflects the changes and new requirements described in the previous section.

In January 2013, the AMF published a revised version of its MCT Guideline. Changes regarding the interest rate shock, IAS 19 Employee Benefits, and other minor issues are mainly the same as those made by OSFI for 2013. However, along with some other minor changes, the description of scenarios for determining target ratios was clarified by referring to "plausible" scenarios in the DCAT educational note.

AAs are expected to consider these changes and incorporate them, where applicable, into their DCAT analyses.

Expected Changes to Capital Requirements

Following the review of the comments by the industry on the discussion paper on the proposed changes to the capital framework, and of the estimated impact on capital as measured through the quantitative impact study, the AMF is expected to publish a revised draft MCT Guideline in January 2014 for consultation, with a final version to follow in the summer of 2014, with an

effective date of January, 1 2015. The changes that are being considered are harmonized with the changes that OSFI is currently contemplating for its MCT guideline.

A largely revised version of the AMF Guideline on Sound Management and Measurement of Earthquake Exposure was published in January 2013. The new version is now presented in a format that can be found in other AMF guidelines on sound and prudent management practices (principle-based approach). While actual earthquake capital requirements will remain the same through 2013 and 2014, AAs would be aware that new capital rules are expected to become effective January 1, 2015, and will be fully integrated within the MCT Guideline. These capital requirements are expected to be harmonized with OSFI.

AAs would be expected to be familiar with the revised capital requirements that are being considered. While the AMF will not prescribe that 2014 DCAT reports filed before the final MCT Guideline is published include the proposed MCT requirements, it is important that the DCAT be useful to the company and that AAs have done enough work to issue their opinion with confidence. Therefore, the AMF expects AAs to disclose the proposed changes and their expected impact for the company as an additional adverse scenario.

4. Stress Testing

From time to time, the AMF may ask institutions to carry out standardized scenario tests to assess system-wide vulnerabilities. No such specific standardized test was requested during 2013.

The actuary is reminded that the company's performance in previous stress tests can be a useful consideration for the actuary when designing/selecting current-year company-specific scenarios.

CURRENT OR EMERGING ISSUES AND OTHER CONSIDERATIONS

1. Auto Reforms

General

The AA would consider the potential effect that automobile product reforms might have on the valuation of insurance contract liabilities. The comments below pertain to the most significant recent product reforms by jurisdiction.

Ontario

At year-end 2013, the AA would be expected to consider the effect of the Ontario auto reforms effective September 1, 2010, on the valuation of insurance contract liabilities and DCAT analyses.

Before using post-reform claims experience for valuation purposes, the AA would consider the maturity of such claims experience. If the post-reform experience is not considered to be fully credible for the valuation of insurance contract liabilities and DCAT analyses, it would be reasonable to carry forward *a priori* assumptions regarding the estimated effect of product reforms, subject to consideration of rate changes, loss cost trend, and other on-level adjustments as appropriate.

Information on the new Statutory Accident Benefits Schedule (SABS) and transition rules is available on the Financial Services Commission of Ontario website.

During 2013, the Ontario government introduced an initiative to reduce Ontario private passenger automobile premium rates, along with the possibility of introducing potentially cost-saving measures such as a new definition of catastrophic impairment, and new anti-fraud measures.

The proposal released in August was to reduce auto insurance rates by 15 percent on average within two years with a 3 to 5 percent decrease by January 2014 and an average 8 percent reduction target by August 2014. The Ministry of Finance is expected to meet with the Insurance Bureau of Canada shortly to develop a plan for rate decreases that can be achieved as a result of continued reform of the product to lower claim costs for insurers.

Other Jurisdictions

On November 9, 2011, the Nova Scotia government introduced reforms to its automobile insurance regulations. The key aspects of the reforms contained:

- Enhanced no-fault mandatory medical-rehabilitation (med-rehab) limits of up to $50,000 from the previous limit of $25,000;
- Direct compensation (DC) for property damage;
- A new minor injury treatment protocol based on Alberta's current model; and
- An optional tort product for minor injuries.

The reforms are to be implemented in two phases. The first phase was effective April 1, 2012, and included enhanced medical-rehabilitation benefits. The second phase was effective April 1, 2013, and included the DC framework and the new minor injury treatment protocol. The second phase was to include the optional full tort (OFT) product, but implementation of the OFT was delayed following a recommendation of the Nova Scotia Utility and Review Board (UARB). A decision regarding the implementation of an OFT product now rests with the Nova Scotia Minister of Transportation and Infrastructure Renewal.

In January 2011, the Auto Insurance Working Group was established in New Brunswick. On June 28, 2012, the Government of New Brunswick announced the cap on non-pecuniary damage for a minor injury would be increased to $7,500 from $2,500 and that it would be indexed annually to the Consumer Price Index. On May 7, 2013, the Government announced that the increase in the cap will be effective on July 1, 2013. On that date, the definition of "minor personal injury" will change to align more closely with the Alberta and Nova Scotia definitions.

The AA would consider the effect of these changes on the valuation of insurance contract liabilities and the DCAT analysis.

2. Recent Judicial, Legislative, and Political Events

Regular communications with claims professionals is essential to the work of the AA. These discussions would encompass the potential effect of recent court decisions, judicial events and political events that may be relevant to the valuation of insurance contract liabilities. Recent examples of such events include the following, all of which relate to automobile claims in the Province of Ontario:

- *Scarlett v Belair* (2013)

  At issue in this case was whether the claimant had suffered an injury that falls within the Minor Injury Guideline (MIG) pertaining to automobile accidents in the Province of

Ontario. The Arbitrator found that the claimant had not suffered an injury that falls within the MIG. The decision is under appeal.

- *Henry v Gor*e (2012)

  At issue was the determination of what constitutes an incurred expense and an economic loss relating to an automobile accident in the Province of Ontario. The court found that economic loss is not defined in the regulations and that once a claimant passes a threshold finding for an incurred expense, then all reasonable and necessary attendant care expenses must then be paid, subject to the applicable maximum monthly amount.

- *Simser v Aviva* (2012)

  As with *Henry v Gore*, at issue was the determination of what constitutes an economic loss. The Arbitrator rejected the claimant's arguments to expand the meaning of economic loss, and rejected the threshold argument advanced by the court in the case of *Henry v Gore*. The decision is under appeal.

- *Pastore v Aviva* (2012)

  The Ontario Court of Appeal confirmed that the definition of "Catastrophic Injury" arising from automobile accidents in the Province of Ontario can be met by establishing one marked impairment in any of the four spheres of the mental and behavioural category, thereby expanding the definition. Prior to that appeal, two marked impairments were required.

- *Kusnierz v Economical* (2011)

  The Ontario Court of Appeal supported the position that it is appropriate to combine the physical and psychological components of automobile claims in the Province of Ontario in order to meet the 55 percent Whole Person Impairment rating.

3. Catastrophic Events

From time to time, "catastrophic" events occur that have the potential to affect an AA's estimate of claims liabilities and, in some cases, the premium liabilities. Events that are considered catastrophic on an industry-wide basis may not have a catastrophic effect on a given insurer, while smaller industry events may. The extent to which such events are significant in the context of a valuation of a specific insurer's insurance contract liabilities depends on the nature of the insurer's business, its exposure in the affected region, policy wordings, and, of course, the date on which the event occurred.

Below is a list of industry-wide catastrophic events that occurred during 2013:

- Alberta—Calgary flooding (June 2013);
- Québec—Lac-Mégantic train derailment (July 6, 2013); and
- Ontario—Toronto storm/flooding (July 8, 2013).

4. Sales Tax

Two recent changes relating to sales tax may affect the AA's estimate of insurance contract liabilities:

- The reversal of the 12 percent Harmonized Sales Tax (HST) introduced by the Government of British Columbia in July 2010, and the reinstatement of PST and GST, effective April 1, 2013.
- The Canada Revenue Agency (CRA) has taken the position that insurers must pay HST/GST on the "loading portion" of unlicensed related party reinsurance transactions, retroactive to 2005. AAs may be asked to provide assistance in separating the loading portion of such premiums, where the loading portion is attributable to a number of items including administrative expenses, profit margin, claims-handling costs, management fees, operating expenses, processing costs, and the types of costs or expenses incurred by the reinsurer.
- The Prince Edward Island PST has been harmonized with the federal goods and services tax to become the HST. Effective date is April 1, 2013.
- The HST rate applicable in Nova Scotia will be reduced to 14% on July 1, 2014, and to 13% on July 1, 2015.

GUIDANCE TO MEMBERS ON SPECIFIC SITUATIONS

From time to time, CIA members seek advice or guidance from the PCFRC. The committee strongly encourages such dialogue. CIA members are assured that it is proper and appropriate for them to consult with the chair or vice-chair of the PCFRC.

CIA members are reminded that responses provided by the PCFRC are intended to assist them in interpreting CIA Standards of Practice, educational notes, and Rules of Professional Conduct, and in assessing the appropriateness of certain techniques or assumptions. A response from the PCFRC does not constitute a formal opinion as to whether the work in question is in compliance with the CIA Standards of Practice and the Rules of Professional Conduct. Guidance provided by the PCFRC is not binding upon the member.

APPENDIX A

Here is a list of the CIA documents referenced in this educational note:

Standards of Practice

- Standards of Practice
- Rules of Professional Conduct
- Final Standards – Dynamic Capital Adequacy Testing – Section 2500 (November 2011)
- Final Standards – Recognizing Events in Work – Section 1500 (September 2011)

Task Force Reports

- Materiality (October 2007)
- Appropriate Treatment of Reinsurance (October 2007)

Educational Notes

- Discounting (November 2010)
- Consideration of Future Income Taxes in the Valuation of Policy Liabilities (July 2005)
- Valuation of Policy Liabilities P&C Insurance Considerations Regarding Claim Liabilities and Premium Liabilities (June 2005)
- Evaluation of the Runoff of P&C Claims Liabilities when the Liabilities are Discounted in Accordance with Accepted Actuarial Practice (June 2011)
- Accounting for Reinsurance Contracts under International Financial Reporting Standards (December 2009)
- Margins for Adverse Deviations for Property and Casualty Insurance (December 2009)
- Classification of Contracts under International Financial Reporting Standards (June 2009)
- Subsequent Events (September 2012)
- Dynamic Capital Adequacy Testing (September 2013)

Research Papers

- Disclosure Requirements IFRS 4 – Insurance Contracts for P&C Insurers (October 2010)

APPENDIX B

CALCULATION OF THE DURATION OF LIABILITIES

In the calculation of the interest rate risk margin, an interest rate shock factor is applied to the fair value of interest rate sensitive assets and liabilities and their duration. AAs are expected to be involved in the calculation of the duration of liabilities and possibly of assets.

Introduction

Instructions on the calculation of the interest rate risk margin are provided in chapter 5 of OSFI's Minimum Capital Test Guideline (or the AMF's equivalent guideline). The key points for the calculation of the duration are:

- AAs may use either the modified duration or the effective duration to calculate the duration of assets and liabilities. However, the same duration methodology would apply to all assets and liabilities under consideration. Moreover, the same methodology is to be used consistently from year to year.
- Effective duration is the preferred measure when interest rate changes may change the expected cash flows.
- The portfolio duration can be obtained by calculating the weighted average of the duration for the assets or liabilities in the portfolio.
- The formulas for calculating the durations are:

$$\text{Macaulay Duration} = \frac{1 \cdot \text{PVCF}_1 + 2 \cdot \text{PVCF}_2 + \ldots + n \cdot \text{PVCF}_n}{\text{Market Value}}$$

Note: the Macaulay duration is an intermediate step in the calculation of the modified duration and is *not* a measure of duration accepted by the regulator.

$$\text{Modified Duration} = \frac{\text{Macaulay Duration}}{(1+\text{yield}/k)}$$

Where:

k	=	number of periods, or payments, per year (e.g., k = 2 for semi-annual payments and k = 12 for monthly payments)
n	=	number of periods until maturity (i.e. number of years to maturity times k)
yield	=	market value yield to maturity of the cash flows
PVCF_t	=	present value of the cash flow in period t discounted at the yield to maturity

$$\text{Effective duration} = \frac{\text{Fair value if yields decline} - \text{Fair value if yields rise}}{2 \cdot (\text{initial price}) \cdot (\text{change in yield in decimal notation})}$$

$$= \frac{V_- - V_+}{2 \cdot V_0 \cdot \Delta y}$$

Where:

Δy = change in yield in decimal

V_0 = initial fair value

V_- = fair value if yields decline by Δy

V_+ = fair value if yields increase by Δy

Assets

AAs may be asked to calculate the duration of the interest rate-sensitive assets in the insurer's portfolio. Generally, the main classes of assets for most insurers are bonds and preferred shares. An example of the calculation for bonds is presented in this appendix.

In some cases, the insurer's investment specialists would provide the duration of assets. The AA would review the information for reasonableness and identify which duration formula was used to ensure consistency between assets and liabilities.

Claim and Premium Liabilities

When evaluating the duration of the claim and premium liabilities, AAs would consider the following:

- The duration calculation would be consistent with the discounting calculation.
- The duration may be calculated by line of business using the payout patterns used for discounting. The line of business durations would then be weighted to derive the total claim liabilities duration.
- Alternatively, the future payouts may be evaluated for all lines of business and the duration of the combined payout calculated on this aggregated payout.
- When the change in interest rate is small, the modified duration and effective duration are the same or approximately the same. Therefore, the effective duration can be used to assess the reasonableness of the calculation of the modified duration, or even as a proxy for modified duration if appropriate.
- For premium liabilities, the following additional considerations apply:
  - The cash flow would be discounted to the future accident date; and
  - The average accident date and estimated cash flows vary with policy term.
- The duration calculations would be net of reinsurance and net of salvage and subrogation.

The following examples are provided to help AAs in calculating durations for the purpose of the interest rate risk margin. They are intended to be illustrative, rather than prescriptive, and in accordance with OSFI and AMF guidelines.

Asset Duration

Year-end Information

Description	Bond #1	Bond #2	Bond #3
Maturity Date	2012/12/31	2013/06/30	2014/06/30
Rate	2.50%	6.60%	4.65%
Coupon # (k)	2	2	2
Par value	1,250	1,875	1,125
Market value	1,265	2,010	1,140
Coupon $	16	62	26
$i_{(2)}$	0.64%	0.86%	2.04%
Yield = $i_{(2)}$ * 2	1.29%	1.72%	4.08%

Step 1: Future payment for assets

	Cash flows		
Year	Bond #1	Bond #2	Bond #3
2012.5	16	62	26
2013.0	1,266	62	26
2013.5	-	1,937	26
2014.0	-	-	26
2014.5	-	-	1,151

Step 2: Calculation of duration for assets

Change in yield = 0.10%

	Year (1)	Lag (2)	Cash Flows (3)	PV factor (4)	Discounted Cash Flows (5)	Lag * Discounted Cash Flows (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Cash fl. w/ Δy Decrease in yield (11)	Discounted Cash fl. w/ Δy Increase in yield (12)
Bond #1	2012.5	0.5	16	0.9968	16	8	0.9973	0.9963	16	16
Yield =	2013.0	1.0	1,266	0.9936	1,258	1,258	0.9947	0.9926	1,259	1,256
1.29%	2013.5	1.5	-	0.9904	-	-	0.9919	0.9889	-	-
	2014.0	2.0	-	0.9872	-	-	0.9892	0.9853	-	-
	2014.5	2.5	-	0.9841	-	-	0.9865	0.9816	-	-
	Total				1,273	1,265			1,274	1,272
					(7) Macaulay duration	0.994			(13) Effective duration	**0.988**
					(8) Modified duration	**0.988**				

Change in yield = 0.10%

	Year (1)	Lag (2)	Cash Flows (3)	PV factor (4)	Discounted Cash Flows (5)	Lag * Discounted Cash Flows (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Cash fl. w/ Δy Decrease in yield (11)	Discounted Cash fl. w/ Δy Increase in yield (12)
Bond #2	2012.5	0.5	62	0.9957	62	31	0.9962	0.9952	62	62
Yield =	2013.0	1.0	62	0.9915	61	61	0.9925	0.9905	61	61
1.72%	2013.5	1.5	1,937	0.9873	1,912	2,868	0.9887	0.9858	1,915	1,909
	2014.0	2.0	-	0.9830	-	-	0.9850	0.9811	-	-
	2014.5	2.5	-	0.9789	-	-	0.9813	0.9764	-	-
	Total				2,035	2,960			2,038	2,032
					(7) Macaulay duration	1.455			(13) Effective duration	**1.442**
					(8) Modified duration	**1.442**				

Change in yield = 0.10%

	Year (1)	Lag (2)	Cash Flows (3)	PV factor (4)	Discounted Cash Flows (5)	Lag * Discounted Cash Flows (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Cash fl. w/ Δy Decrease in yield (11)	Discounted Cash fl. w/ Δy Increase in yield (12)
Bond #3	2012.5	0.5	26	0.9899	26	13	0.9904	0.9895	26	26
Yield =	2013.0	1.0	26	0.9800	26	26	0.9810	0.9790	26	26
4.08%	2013.5	1.5	26	0.9701	25	38	0.9716	0.9687	25	25
	2014.0	2.0	26	0.9604	25	50	0.9623	0.9585	25	25
	2014.5	2.5	1,151	0.9507	1,094	2,736	0.9531	0.9484	1,097	1,092
	Total				1,196	2,863			1,199	1,194
					(7) Macaulay duration	2.393			(13) Effective duration	**2.345**
					(8) Modified duration	**2.345**				

(4) PV factor = 1 / (1 + yield/k) ^ lag
(5) Discounted payment = (3) * (4)
(6) Lag * Discounted cash flows = (2) * (5)
(7) Macaulay duration = Sum of (6) / Sum of (5)
(8) Modified duration = (7) / (1 + yield/k)

(9) Δy Decrease in yield = 1 / (1 + yield/k - change in yield) ^ lag
(10) Δy Increase in yield = 1 / (1 + yield/k + change in yield) ^ lag
(11) Discounted cash flows w/ Δy Decrease in yield = (3) * (9)
(12) Discounted cash flows w/ Δy Increase in yield = (3) * (10)
(13) Effective duration = (sum(11) - sum(12)) / (2 * change in yield * sum(5))

Step 3: Weighted Duration of Assets

	Market Value	Modified Duration	Effective Duration
Asset #1	1,265	0.988	0.988
Asset #2	2,010	1.442	1.442
Asset #3	1,140	2.345	2.345
Total	4,415	**1.545**	**1.545**

Claims Liabilities and Premium Liabilities Duration

Year-end Information

Unpaid as at December 31, 2011

Accident Year	Property	Liability
2007	-	32
2008	-	86
2009	-	127
2010	16	186
2011	137	258

Payment Pattern

Age	Property	Liability
12	80%	35%
24	95%	68%
36	100%	80%
48	100%	85%
60	100%	90%
72	100%	95%
84	100%	99%
96	100%	100%

Yield = 1.75%
Unearned Premium Reserve (UPR) for Property = 550
UPR for Liability = 380
Maintenance Expense % = 3.5%

Expected Loss Ratio for Property (ELR) = 65%
ELR for Liability = 80%

Step 1: Future payment for claims liabilities

Property

		Paid in						
Accident Year	Unpaid	2012	2013	2014	2015	2016	2017	2018
2007	-							
2008	-							
2009	-							
2010	16	16	-	-	-	-	-	
2011	137	103	34	-	-	-	-	-
Total	153	119	34	-	-	-	-	-

payout for AY 2011 @ 2012 = 137 / (1-80%) * (95% - 80%)
payout for AY 2011 @ 2013 = 137 / (1-80%) * (100% - 95%)
payout for AY 2010 @ 2012 = 16 / (1-95%) * (100% - 95%)

Liability

		Paid in						
Accident Year	Unpaid	2012	2013	2014	2015	2016	2017	2018
2007	32	[illegible]	13	3				
2008	86	29	29	23	6			
2009	127	32	32	32	25	6		
2010	186	[illegible]	29	29	29	23	6	
2011	258	131	48	20	20	20	16	4
Total	689	277	150	107	80	49	22	4

payout for AY 2011 @ 2012 = 258 / (1-35%) * (68% - 35%)
payout for AY 2011 @ 2013 = 258 / (1-35%) * (80% - 68%)
payout for AY 2010 @ 2012 = 186 / (1-68%) * (80% - 68%)
etc.

Claims Liabilities and Premium Liabilities Duration

Step 2: Calculation of duration for claims liabilities

Property

Yield 1.75% Change in yield 0.10%

Year (1)	Lag (2)	Payment (3)	PV factor (4)	Discounted Payment (5)	Lag * Discounted Payment (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Payment w/ Δy Decrease in yield (11)	Discounted Payment w/ Δy Increase in yield (12)
2012	0.5	119	0.9914	118	59	0.9919	0.9909	118	118
2013	1.5	34	0.9743	33	50	0.9758	0.9729	33	33
2014	2.5	-	0.9576	-	-	0.9599	0.9552	-	-
2015	3.5	-	0.9411	-	-	0.9443	0.9379	-	-
2016	4.5	-	0.9249	-	-	0.9290	0.9208	-	-
2017	5.5	-	0.9090	-	-	0.9139	0.9041	-	-
2018	6.5	-	0.8934	-	-	0.8991	0.8877	-	-
Total		153		151	109			151	151
				(7) Macaulay duration	0.721			(13) Effective duration	**0.708**
				(8) Modified duration	**0.708**				

Liability

Yield 1.75% Change in yield 0.10%

Year (1)	Lag (2)	Payment (3)	PV factor (4)	Discounted Payment (5)	Lag * Discounted Payment (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Payment w/ Δy Decrease in yield (11)	Discounted Payment w/ Δy Increase in yield (12)
2012	0.5	277	0.9914	275	137	0.9919	0.9909	275	275
2013	1.5	150	0.9743	146	219	0.9758	0.9729	146	146
2014	2.5	107	0.9576	102	256	0.9599	0.9552	103	102
2015	3.5	80	0.9411	75	264	0.9443	0.9379	76	75
2016	4.5	49	0.9249	46	206	0.9290	0.9208	46	46
2017	5.5	22	0.9090	20	108	0.9139	0.9041	20	20
2018	6.5	4	0.8934	4	23	0.8991	0.8877	4	4
Total		689		667	1,213			669	666
				(7) Macaulay duration	1.818			(13) Effective duration	**1.786**
				(8) Modified duration	**1.786**				

(4) PV factor = 1 / (1 + yield) ^ lag
(5) Discounted payment = (3) * (4)
(6) Lag * Discounted payment = (2) * (5)
(7) Macaulay duration = Sum of (6) / Sum of (5)
(8) Modified duration = (7) / (1 + yield)
(9) Δy Decrease in yield = 1 / (1 + yield - change in yield) ^ lag
(10) Δy Increase in yield = 1 / (1 + yield + change in yield) ^ lag
(11) Discounted payment w/ Δy Decrease in yield = (3) * (9)
(12) Discounted payment w/ Δy Increase in yield = (3) * (10)
(13) Effective duration = (sum(11) - sum(12)) / (2 * change in yield * sum(5))

Step 2a: Average duration for claims liabilities

	PV of Unpaid Claims	PFAD	APV of Unpaid Claims	Modified Duration	Effective Duration
Property	151	5	156	0.708	0.708
Liability	667	115	782	1.786	1.786
Total	818	120	938	1.607	1.607

Claims Liabilities and Premium Liabilities Duration

Step 3: Future payment for premium liabilities

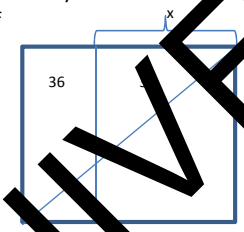
Expected Loss for Property = 550 * 65% 358
Expected Loss for Liability = 380 * 80% 304

Age	Average age for AY	Average age for PY[1]	Property Payment Pattern	Interpolated Payment Pattern for Property	Liability Payment Pattern	Interpolated Payment Pattern for Liability
12	0.5	0.7071	80%	83%	35%	42%
24	1.5	1.7071	95%	96%	68%	70%
36	2.5	2.7071	100%	100%	80%	81%
48	3.5	3.7071	100%	100%	85%	86%
60	4.5	4.7071	100%	100%	90%	91%
72	5.5	5.7071	100%	100%	95%	96%
84	6.5	6.7071	100%	100%	99%	99%
96	7.5	7.7071	100%	100%	100%	100%

[1] Assume that they are all 12-month policy with equal earning

To introduce lag, one possible method is as follows:

To calculate the average age for PY, assume x to be the time to end of the year from the average age of the UPR
The average age is the time that would split the UPR triangle to half
The area of the triangle is 72 (12 * 12 / 2)
To solve x, x^2/2 = 36
Thus x = 8.485 months, which is 0.7071 years



	Loss	Paid in 2012	2013	2014	2015	2016	2017	2018	2019
Property	358	297	46	14	-	-	-	-	-
Liability	304	127	87	32	15	15	15	10	2
Maintenance	33	33	-	-	-	-	-	-	-
Total	694	457	133	46	15	15	15	10	2

Maintenance Expense is 3.5% of the sum of the UPR and it should be paid during the time the UPR is being earned

Step 4: Calculation of duration for premium liabilities

Property

Yield 1.75% Change in yield 0.10%

Year (1)	Lag (2)	Payment (3)	PV factor (4)	Discounted Payment (5)	Lag * Discounted Payment (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Payment w/ Δy Decrease in yield (11)	Discounted Payment w/ Δy Increase in yield (12)
2012	0.2929	297	0.9949	296	87	0.9952	0.9946	296	296
2013	1.2929	46	0.9778	45	58	0.9791	0.9766	45	45
2014	2.2929	14	0.9610	14	31	0.9632	0.9588	14	14
2015	3.2929	-	0.9445	-	-	0.9475	0.9414	-	-
2016	4.2929	-	0.9282	-	-	0.9322	0.9243	-	-
2017	5.2929	-	0.9123	-	-	0.9170	0.9075	-	-
2018	6.2929	-	0.8966	-	-	0.9021	0.8910	-	-
2019	7.2929	-	0.8812	-	-	0.8875	0.8749	-	-
Total				354	176			355	354
			(7) Macaulay duration		0.497		(13) Effective duration		**0.489**
			(8) Modified duration		**0.489**				

Claims Liabilities and Premium Liabilities Duration

Liability

Yield 1.75% Change in yield 0.10%

Year (1)	Lag (2)	Payment (3)	PV factor (4)	Discounted Payment (5)	Lag * Discounted Payment (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Payment w/ Δy Decrease in yield (11)	Discounted Payment w/ Δy Increase in yield (12)
2012	0.2929	127	0.9949	127	37	0.9952	0.9946	127	126
2013	1.2929	87	0.9778	85	110	0.9791	0.9766	85	85
2014	2.2929	32	0.9610	31	71	0.9632	0.9588	31	31
2015	3.2929	15	0.9445	14	47	0.9475	0.9414	14	14
2016	4.2929	15	0.9282	14	61	0.9322	0.9243	14	14
2017	5.2929	15	0.9123	13	70	0.9170	0.9075	13	13
2018	6.2929	10	0.8966	9	58	0.9021	0.8910	9	9
2019	7.2929	2	0.8812	2	15	0.8875	0.8749	2	2
Total				296	469			296	295
			(7) Macaulay duration		1.588		(13) Effective duration		**1.561**
			(8) Modified duration		**1.561**				

Maintenance expenses

Yield 1.75% Change in yield 0.10%

Year (1)	Lag (2)	Payment (3)	PV factor (4)	Discounted Payment (5)	Lag * Discounted Payment (6)	Δy Decrease in yield (9)	Δy Increase in yield (10)	Discounted Payment w/ Δy Decrease in yield (11)	Discounted Payment w/ Δy Increase in yield (12)
2012	0.2929	33	0.9949	33	10	0.9952	0.9946	32	32
2013	1.2929	-	0.9778	-	-	0.9791	0.9766	-	-
2014	2.2929	-	0.9610	-	-	0.9632	0.9588	-	-
2015	3.2929	-	0.9445	-	-	0.9475	0.9414	-	-
2016	4.2929	-	0.9282	-	-	0.9322	0.9243	-	-
2017	5.2929	-	0.9123	-	-	0.9170	0.9075	-	-
2018	6.2929	-	0.8966	-	-	0.9021	0.8910	-	-
2019	7.2929	-	0.8812	-	-	0.8875	0.8749	-	-
Total				32	9			32	32
			(7) Macaulay duration		0.293		(13) Effective duration		**0.288**
			(8) Modified duration		**0.288**				

(4) PV factor = 1 / (1 + yield) ^ lag
(5) Discounted payment = (3) * (4)
(6) Lag * Discounted payment = (2) * (5)
(7) Macaulay duration = Sum of (6) / Sum of (5)
(8) Modified duration = (7) / (1 + yield)
(9) Δy Decrease in yield = 1 / (1 + yield - change in yield) ^ lag
(10) Δy Increase in yield = 1 / (1 + yield + change in yield) ^ lag
(11) Discounted payment w/ Δy Decrease in yield = (3) * (9)
(12) Discounted payment w/ Δy Increase in yield = (3) * (10)
(13) Effective duration = (sum(11) - sum(12)) / (2 * change in yield * sum(5))

Step 4a: Average duration for premium liabilities

	PV of Premium Liabilities	PFAD	APV of Premiun Liabilities	Modified Duration	Effective Duration
Property	354	12	366	0.489	0.489
Liability	296	51	347	1.561	1.561
Maintenance	32	-	32	0.288	0.288
Total	682	63	745	**0.979**	**0.979**

For line 38 of page 30.70

XYZ Company
Insurer

Appendix 5-A: Worksheet – Capital Required: Interest Rate Risk
MCT Guideline - Chapter 5 - Appendix 5A

Commencing January 1, 2012 the Δy interest rate shock factor is 0.50% (Δy = 0.005). Effective January 1, 2013 the Δy interest rate shock factor is 0.75% (Δy = 0.0075).

					Interest rate shock factor 0.00500		(0.00500)
	Fair Value (01)	**Modified or Effective Duration** (02)		Dollar Fair Value Change ($000) (03)=(01)x(02)xΔy		Dollar Fair Value Change ($000) (04)=(01)x(02)x(-Δy)
Interest Sensitive Assets						
Term Deposits				0		0
Bonds and Debentures	4,415	1.5451		34		-34
Commercial Paper				0		0
Loans				0		0
Mortgages				0		0
MBS and ABS				0		0
Preferred Shares				0		0
Other				0		0
Total			**A**	34	**A**	-34
Interest Sensitive Liabilities						
Net unpaid claims and adjustment expenses	938	1.60		8		-8
Net premium liabilities	745	0.[illegible]85		4		-4
Total	1,684		**B**	12	**B**	-12
Allowable interest rate derivatives	**Notional Value** (01)	**Effective Duration** (02)		Dollar Fair Value Change (Δy) (03)		Dollar Fair Value Change (-Δy) (04)
Long Positions						
Short Positions						
Total			**C**	0	**C**	0
Capital Requirement for Δy shock increase *D=Maximum (0,A-B+C)*			**D**	**22**		
Capital Requirement for -Δy shock decrease *E=Maximum (0,A-B+C)*					**E**	**0**
Interest Rate Risk Margin *F= Maximum (D,E)*			**F**			**22**

where Δy = interest rate shock factor