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Educational Note

Premium Liabilities

Committee on Property and Casualty Insurance Financial Reporting

November 2014

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

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Memorandum

To: Members in the property and casualty insurance area

From: Bruce Langstroth, Chair
Practice Council

Julie-Linda Laforce, Chair
Committee on Property and Casualty Insurance Financial Reporting

Date: November 4, 2014

Subject: **Educational Note: Premium Liabilities**

This educational note has been prepared by the Committee on Property and Casualty Insurance Financial Reporting in accordance with the Institute's Policy on Due Process for the Approval of Guidance Material other than Standards of Practice, and received final approval for distribution from the Practice Council on October 6, 2014.

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"*.

Questions or comments regarding this educational note may be directed to Julie-Linda Laforce at julielindalaforce@axxima.ca.

BL, JLL

1. INTRODUCTION

Appointed Actuaries (AA) for Property & Casualty (P&C) insurers in Canada are required to value insurance contract liabilities which include both claim liabilities and premium liabilities. Specifically the Standards of Practice (SOP) state that:

> 2130.01 The actuary should value the insurance contract liabilities and the reinsurance recoverables for the balance sheet and the changes in them for the income statement.

In actuarial literature, much attention is given to the definition of claim liabilities. Premium liabilities are often defined by exception. The SOP has the following definitions:

> 1110.27.2 Insurance contract liabilities in an insurer's statement of financial position are the liabilities at the date of the statement of financial position on account of the insurer's insurance contracts, including commitments, which are in force at that date or which were in force before that date.
>
> 1110.13 Claim liabilities are the portion of insurance contract liabilities in respect of claims incurred on or before the balance sheet date.
>
> 1110.37 Premium liabilities are the portions of insurance contract liabilities that are not claim liabilities.

The SOP provide additional details on premium liabilities in subsection 2230.

Specifically premium liabilities include the expected costs in connection with the unexpired portion of the in-force insurance contract (i.e., incurred after the valuation date) and all other liabilities related to premium development adjustments (e.g., retro-rated premium, contingent profit commissions, etc.).

Elements to consider when analyzing premium liabilities generally include the following:

- Unearned premium reserve;
- Policy liabilities in connection with unearned premium;
- Deferred policy acquisition expenses;
- Unearned (reinsurance) commission;
- Premium deficiency;
- Ceded deferred premium tax;
- Anticipated broker/agent commission;
- Expected adjustments (plus or minus) to swing rated policies;
- Expected changes to premiums as a result of audits, late reporting or endorsements; and
- Expected commission adjustments on policies with variable commissions.

Currently, premium liabilities are not shown explicitly in an insurer's financial statements. Some elements of the premium liabilities are calculated by the insurer and carried in the annual return, while others must be estimated by the AA.

It is the AA's responsibility to evaluate the gross and net policy liabilities in connection with the unearned premium, including the assessment of the need for a premium deficiency reserve, and the maximum amount of deferrable policy acquisition expense.

The main elements related to premium liabilities are included in the regulatory expression of opinion in the AA report (see Appendix A).

Minimum Capital Test (MCT) Calculation

Since 2012, the AA's estimate of premium liabilities is used in the calculation of the Interest Rate Risk Margin in the MCT. With the modifications to the MCT formula effective in 2015, estimated premium liabilities will also be used to derive the Insurance Risk Margin, replacing unearned premium as the basis for the calculation of a premium-related margin. The formula requires the Insurance Risk Margin to be calculated by class of insurance. In this context, "class of insurance" is intended to be consistent with definitions prescribed by the regulator for statutory financial reporting.

Definitions

Unearned Premium Reserve (UPR): the portion of the written premium associated with the exposure remaining under a contract of insurance. The UPR at the valuation date usually is established based on the written premium, the policy term, and an assumed earning pattern.

Earning pattern: Premiums should be earned on a basis consistent with the occurrence of losses. For most lines of business, losses are assumed to occur at a uniform rate during the year and premiums are earned on a pro-rata basis over the term of the policy. However, for some lines of business this assumption is not appropriate. For example, most motorcycle losses occur during the period April to October and the earning pattern would recognize the timing of the loss exposure. Similarly, extended warranty premiums would be earned according to the expected payment of losses: for a three-year warranty there may be no exposure in year one if there is a manufacturer's warranty in force. The exposure would be expected to increase in the second and third years.

Policy liabilities in connection with unearned premium: liabilities for future events consisting of the Actuarial Present Value (APV) on the unexpired portion of the policies inforce at the valuation date of:

- Future claims and adjustment expenses;
- Expected reinsurance costs (on a net basis only); and
- Maintenance costs: i.e., administrative costs of servicing.

Section 2 of this document discusses in more detail the estimation of policy liabilities in connection with the unearned premium.

Deferred Policy Acquisition Expenses (DPAE): proportion of prepaid expenses which relate to the unexpired portion of the policy. These expenses, also referred to as acquisition expenses, are incurred when the policy is issued and may include commissions, premium taxes, renewal costs, advertising, licenses and fees, associations and dues, etc.

The DPAE is an asset which recognizes the prepaid expenses over the policy period provided that such costs are recoverable from the equity in the net UPR, as evaluated by the AA.

Section 3 discusses the determination of the maximum deferrable policy acquisition expenses.

Unearned (Reinsurance) Commissions: Unearned (reinsurance) commissions arise from commission revenue on reinsurance ceded. Quota-share reinsurance agreements generally provide for reinsurance commissions to be paid to the insurer by the reinsurer on the ceded premium. The reinsurance commission relating to the unexpired portion of a policy (i.e., the reinsurance commission on the unearned ceded premium) is carried as a liability.

Equity in the gross UPR: amount by which the gross UPR exceeds the gross policy liabilities in connection with unearned premium.

Equity in the net UPR: amount by which the net UPR plus unearned (reinsurance) commissions exceeds the net policy liabilities in connection with unearned premium, also referred to as the *maximum deferrable policy acquisition expenses*.

Premium Deficiency: A provision that is determined by the AA when the equity in net UPR is negative. It is the amount which, when added to the net UPR and unearned (reinsurance) commissions, makes an appropriate provision for future costs arising from the unexpired portion of in-force policies.

2. POLICY LIABILITIES IN CONNECTION WITH UNEARNED PREMIUM

The largest component of the policy liabilities in connection with unearned premium relates to future claims and adjustment expenses. They are estimated by applying a selected expected loss ratio to the UPR. This evaluation is generally undertaken by line of business or using a business segmentation that is consistent with the analysis of claim liabilities.

In order to facilitate the MCT calculations referred to in Section 1, the AA may wish to use a business segmentation which gives estimated future costs that can be aggregated to an annual return class of insurance level.

Expected Losses

The evaluation of future expected loss ratios in connection with the unexpired portion of in-force policies is a critical aspect of determining the future expected losses. Many evaluation methods may be used depending on the complexity of the business segments and characteristics of the insurer. Projected loss ratios may be based on the AA's valuation of policy liabilities, on the insurer's budget, on the results of a ratemaking analysis or on an ad-hoc analysis, as considered appropriate. Generally, future expected losses are based on the insurer's recent experience adjusted to the period during which the unearned premium will be earned. The AA would consider the earning pattern underlying the calculation of the UPR, assess whether it reflects the exposure to risk and select assumptions accordingly.

Examples of adjustments to the historical experience would include, but are not limited to, the following:

- Loss trend: to bring historical experience to the cost level underlying the average accident date of the UPR;
- The impact of expected legislative changes (including mandated benefit changes);
- The impact of recent court decisions relating to insurance coverage;
- Changes in mix of business;

- Rate changes (on-level factors): to adjust historical experience to the rate level underlying the UPR;
- Catastrophes and large losses loadings;
- Seasonality: indicated expected loss ratios based on historical annual experience may need to be adjusted if the claims occurrence pattern is not uniform throughout the exposure period of the UPR (e.g., occurrences of hurricanes are seasonal). Depending on the line of business, the seasonality adjustment may not be significant. However, for some portfolios (e.g., property catastrophe treaty reinsurance) seasonality may be a meaningful consideration; and
- Policy term: the assumptions would take into account the term of the policy and the future period covered by the UPR. For example, for policies with a term longer than 12 months (such as warranties or multi-year contracts), assumptions for the expected loss ratio need to take into consideration trends that are expected over the remaining term of these polices.

Various considerations for claim liabilities and premium liabilities are listed in the educational note Valuation of policy liabilities - P&C insurance considerations regarding claim liabilities and premium liabilities.

Loss Adjustment Expenses

AAs may choose to include allocated loss adjustment expenses (ALAE) in their estimation of losses. If ALAE is not included with losses, an estimate of future ALAE would be derived by the AA by applying an approach similar to the expected loss approach, or on another suitable basis consistent with the AA's valuation of claim liabilities.

Similarly, AAs may choose to include unallocated loss adjustment expenses (ULAE) in their estimation of losses. If ULAE is not included with losses, an estimate of future ULAE would be derived by the AA on a suitable basis consistent with the AA's valuation of claim liabilities. A typical calculation is to apply a ULAE ratio based on historical experience reflecting any expected changes in claims practices to the expected losses.

In order to facilitate the MCT calculations referred to in Section 1, the AA may wish to consider the extent to which ALAE ratios and ULAE ratios might vary by annual return class of insurance.

Expected Reinsurance Costs

For the net policy liabilities in connection with unearned premium, in addition to the above considerations, the AA would also consider expected reinsurance costs. The manner to properly reflect reinsurance costs will depend on the type of reinsurance treaty and its terms and conditions.

For example: for a line of business covered by a proportional reinsurance treaty, the net unearned premium will be lower than the gross unearned premium and the loss ratio will be the same on a gross and net basis. For a line covered by an excess of loss treaty expiring at the valuation date, the gross and net unearned premium are the same and the ceded unearned premium is $0 at the end of the contract period. However, the cost of reinsurance in relation to the unexpired portion of the policies would be taken into account. The assumptions used would reflect the reinsurance

rates and expected recoveries consistent with the reinsurance structure in place over the exposure period of the unearned premium.

Maintenance Expenses

Maintenance expenses also need to be included to reflect the future cost of servicing the policies in force. These expenses include expenses associated with endorsements, mid-term cancellations, changes in reinsurance contracts, etc. Maintenance expenses are generally expressed as a percentage of gross UPR. They are usually evaluated as a portion of general expenses with typical ratios ranging from 25% to 50%. Maintenance expenses may vary by line of business and their determination would include the following considerations:

- The availability of expense information by line of business;
- Distribution model of the insurer;
- Characteristics of the insurer's portfolio (e.g. 2 year contracts); and
- Other considerations.

Maintenance expense assumptions are usually consistent from year to year; but may vary in the event of rapid growth or changes in the insurer's operations.

Discounting

Policy liabilities in connection with unearned premium should be calculated on an APV basis, consistent with the SOP. The APV includes the time value of money and explicit provisions for adverse deviations (claims development, investment return rates and recovery from reinsurance ceded). The educational note Discounting provides additional guidance on the selection of payment patterns.

The duration of policy liabilities in connection with unearned premium can be derived from the discounting calculation.

Margins for Adverse Deviations (MfAD)

The SOP state that (emphasis added):

> 2250.02 *The selected margin for adverse deviations should vary*
>
> ***between premium liabilities and claim liabilities****,*
>
> *among lines of business, and*
>
> *among accident years, policy years, or underwriting years, as the case may be,*
>
> *according to how those considerations so vary.*

The AA would consider different MfADs if premium liabilities and claim liabilities exhibit different levels of uncertainty. Generally there would be more uncertainty for claims that have yet to occur such as those underlying the unearned premiums.

The educational note Margins for Adverse Deviations for Property and Casualty Insurance provides additional guidance on the selection of MfADs.

Examples

Illustrative examples of the evaluation of future expected losses, gross and net, are presented in Sheets 2 and 3 of Appendices B, C and D.

The key concepts discussed above are illustrated in these exhibits including: the derivation of losses and ALAE by line of business, the addition of ULAE, the estimated cash flows on a discounted basis, and the addition of provisions for adverse deviations. In the net calculation of the amount of the expected loss and ALAE, the cost of reinsurance coverage in relation to the unexpired portion of the policies in force is explicitly subtracted from the UPR before applying the expected loss ratio.

Further details regarding the calculation of the expected loss ratios, maintenance expenses, discount factors and duration are presented in Appendix E.

These examples are for illustrative purposes only. Other approaches to estimate the various components of the policy liabilities in connection with unearned premium may be appropriate. For example, premium liabilities for a block of business that is renewing on a single date would have average payment dates different than in the examples presented.

3. PREMIUM DEFICIENCIES AND MAXIMUM DEFERRABLE POLICY ACQUISITION EXPENSES

The current presentation of the financial statements allows for the reporting of the premium deficiency on a net basis only. However, the calculation of the equity in the gross UPR provides valuable information and the AA would discuss such a result with management. The remainder of this section will refer to the calculation and presentation of the premium deficiency derived by assessing the equity in the net UPR.

A premium deficiency exists when the net policy liabilities in connection with unearned premium exceed the sum of net UPR and unearned (reinsurance) commissions. In this situation, a premium deficiency liability is established in the amount by which the estimated premium liabilities exceed the sum of the net UPR and unearned (reinsurance) commissions.

The maximum deferrable policy acquisition expenses are commonly referred to as the equity in the UPR. The AA is required to test the adequacy of premium liabilities in the insurer's financial statements, including all future costs arising from the unexpired portion of in-force policies. The AA may do so by considering whether the carried DPAE is less than or equal to the equity in the UPR. In the event of a carried DPAE greater than the maximum estimated, the DPAE would be reduced to the maximum estimated amount. In the event of negative equity in the UPR, the DPAE would be reduced to zero and a premium deficiency would be required.

The previous section demonstrates how the AA calculates the policy liability in connection with unearned premium. The maximum deferrable policy acquisition expenses (net) is defined as follows:

Net UPR

+ Premium deficiency

+ Unearned (reinsurance) commissions

– Net policy liabilities in connection with unearned premium

UPR, unearned (reinsurance) commissions and initial DPAE are usually provided by the insurer's accounting department.

The equity in unearned premium is usually calculated on an all lines combined basis. On an all lines combined basis, deficiencies in some lines are offset by redundancies in other lines. This approach is appropriate on a going concern basis to the extent that a company's mix of business does not change significantly from year to year. It is appropriate since it is unlikely that a company would stop writing its more profitable lines. However, the calculation can be done by line of business when segregation of different lines of business is desired. In that case, it is possible to record a premium deficiency on one line of business with a DPAE on the remaining lines of business.

Once the maximum deferrable policy acquisition expense is calculated it will be compared with the initial DPAE amount. If the initial DPAE is higher than the maximum deferrable, management is informed that the DPAE should be reduced to the maximum deferrable amount. In addition, any amount by which the net policy liabilities in connection with unearned premium exceeds the sum of the net UPR and unearned (reinsurance) commissions would be recorded as a premium deficiency.

Examples

Three examples in the Appendices demonstrate the general calculation of the maximum policy acquisition expenses deferrable and determination of the premium deficiency:

- Appendix B, Sheet 1 illustrates the most common situation in which the initial DPAE amounts are less than the maximum allowable, and therefore no action is necessary.
- Appendix C, Sheet 1 illustrates a situation where the initial DPAE amounts are in excess of the maximum allowable, and therefore would be reduced and booked at the maximum allowable amount.
- Appendix D, Sheet 1 illustrates a situation where a premium deficiency is indicated. In that instance, the initial DPAE would be reduced to zero and a premium deficiency reserve would be posted equal to the amount by which the net policy liabilities exceed the sum of the net UPR and unearned (reinsurance) commissions.

4. OTHER NET LIABILITIES AND UNEARNED (REINSURANCE) COMMISSIONS

"Other Net Liabilities" can be grouped into two major categories: those which relate to commission adjustments, and those which relate to premium adjustments.

Contingent commissions (profit sharing commissions) are commissions that insurers pay their agents or brokers based on the profitability and the volume of business of individual producers (agents/brokers). These agreements vary by company and are often established over one- to

three-year periods. Some commissions may be incurred as of the statement date, and may need to be accrued.

Swing-rated contracts generate premium adjustments between insurers and reinsurers which are payable based on a pre-determined "target" loss ratio and the actual loss ratio of the book of business reinsured. An example of a swing-rated contract giving rise to Other Net Liabilities is provided below:

> A reinsurance contract for a long-tail line of business incepting on October 31, 2012 has a 3% swing rate adjustment payable by the insurer to the reinsurer if the loss ratio exceeds 73% and a 3% swing rate adjustment payable by the reinsurer to the insurer if the loss ratio is below 67%. Payment is due three years following contract inception.
>
> Assuming the reinsurance premium subject to the 3% adjustment is $1,000,000, the maximum swing rate adjustment would be in the amount of $30,000.
>
> As at December 31, 2014 for example, the AA would evaluate the Other Net Liabilities related to this contract. If the AA evaluates that the ultimate loss ratio subject to the reinsurance contract is 75%, then the Other Net Liabilities would equal the future swing rate adjustment payable to the reinsurer of $30,000 and would be presented in the AA's opinion.

A provision for retro-rated policy liabilities is booked when insurers issue policies for which the premium is adjusted yearly based on the actual experience on the policy. The final premium is not known until all losses are reported and settled. The provision to be accrued is equal to the difference (either positive or negative) between the estimated final premium and the cumulative paid premium at the valuation date.

Other examples of premium development to be evaluated as part of the premium liabilities are the following:

- Audit premiums where the final premium is not known until the coverage expires;
- Premium development on reinsurance assumed; and
- Premium development on retro-rated reinsurance ceded.

The sources of development on reinsurance assumed or ceded to be considered include, but are not limited to, the following:

- Changes in subject matter premium which is usually unknown until the end of the contract period;
- Swing-rated excess of loss treaties which call for a rate adjustment based on the loss experience during the coverage period; and
- Reinstatement premium for catastrophic or other layer (additional premium to be paid when the limit of coverage provided by the layer has been partially used or exhausted unless netted from expected claims recovery).

Some insurers with large quota share treaties may have significant unearned (reinsurance) commissions on their ceded unearned premiums. The unearned (reinsurance) commissions are booked as a liability and are earned pro-rata over the terms of the policies.

Communication with the accounting department is needed to ensure that the AA's adjustments and the insurer's accounting policy are consistent.

5. SUBSEQUENT EVENT APPLICATION IN THE CASE OF PREMIUM LIABILITIES

A subsequent event is defined in the SOP as: "an event of which an actuary first becomes aware after a calculation date but before the corresponding report date." The treatment of a subsequent event in the AA's work is described as follows:

> 1520.02 For work with respect to an entity, the actuary should take a subsequent event into account (other than in a pro forma calculation) if the subsequent event
>
> provides information about the entity as it was at the calculation date,
>
> retroactively makes the entity different at the calculation date, or
>
> makes the entity different after the calculation date and a purpose of the work is to report on the entity as it will be as a result of the event.

Subsequent events need to be analysed in the context of claim liabilities and premium liabilities. Some subsequent events will be taken into consideration in the same manner in both claim and premium liabilities, while some events may only need to be taken into consideration in premium liabilities. For example, the educational note Subsequent Events discusses the case of the 1998 Ice Storm. The event occurred on January 5, 1998; it did not make the entity different at the valuation date of December 31, 1997 and therefore did not need to be recognized in claim or premium liabilities. However, it was recognized that the actual premium liabilities could be materially different from the expected premium liabilities and that this should be disclosed as a note to the financial statements.

APPENDIX A: EXPRESSION OF OPINION

I have valued the policy liabilities [and reinsurance recoverables] of [The Company] for its [consolidated] [statement of financial position] at [31 December XXXX] and their changes in the [consolidated statement of income] for the year then ended in accordance with accepted actuarial practice in Canada including selection of appropriate assumptions and methods.

I am satisfied that the data utilized for the valuation of these liabilities are reliable and sufficient. I verified the consistency of the valuation data with the company's financial records.

The results of my valuation together with amounts carried in the Annual Return are the following:

Claim Liabilities ($000)	**Carried in Annual Return**	**Actuary's Estimate**
(1) Direct unpaid claims and adjustment expenses		
(2) Assumed unpaid claims and adjustment expenses		
(3) Gross unpaid claims and adjustment expenses (1) + (2)		
(4) Ceded unpaid claims and adjustment expenses		
(5) Other amounts to recover		
(6) Other net liabilities		
(7) Net unpaid claims and adjustment expenses (3) – (4) – (5) + (6)		

Premium Liabilities ($000)	**Carried in Annual Return (col. 1)**	**Actuary's Estimate (col. 2)**
(1) Gross policy liabilities in connection with unearned premium		
(2) Net policy liabilities in connection with unearned premium		
(3) Gross unearned premium		
(4) Net unearned premium		
(5) Premium deficiency		
(6) Other net liabilities		
(7) Deferred policy acquisition expenses		
(8) Maximum policy acquisition expenses deferrable $[(4) + (5) + (9)_{\text{col 1}} - (2)_{\text{col 2}}]$		
(9) Unearned commissions		

In my opinion, the amount of policy liabilities [net of reinsurance recoverables] makes appropriate provision for all policy obligations and the [consolidated] financial statements fairly present the results of the valuation.

ABC Insurance Company of Canada

Appendix B

Sheet 1

Premium Liabilities Exhibit

As of December 31, 20XX

		Gross	Net
(1)	**Unearned Premium Booked**	123,000,000	117,000,000
(2)	**Actuarial Present Value of Loss & LAE**		
(2a)	Present Value of Loss & LAE	88,960,629	78,753,075
(2b)	PfAD for Claims Development	8,483,059	7,490,571
(2c)	PfAD for Investment Return Rates	1,448,109	1,173,161
(2d)	PfAD for Recovery from Reinsurance Ceded	0	102,076
(2e)	Actuarial Present Value of Loss & LAE	98,891,797	87,518,882
(3a)	**Expected Reinsurance Costs**		6,250,000
(3b)	**Maintenance Expenses (percentage of gross premium)**	3.0%	3.0%
(3c)	**Maintenance Expenses**	3,690,000	3,690,000
(4)	**Policy Liabilities in Connection with Unearned Premium**	102,581,797	97,458,882
(5)	**Equity in UPR**	20,418,203	19,541,118
(6)	**Unearned (Reinsurance) Commissions**		1,548,976
(7)	**Maximum Allowable DPAE**	20,418,203	21,090,094
(8)	**DPAE from Accounting Department**	20,000,000	20,000,000
(8a)	**Excess above Maximum DPAE**	0	0
(9)	**Booked DPAE**		20,000,000
(10)	**Premium Deficiency**	0	0

Notes:

(1) and (2) are from Sheets 2 and 3
(2e) = (2a) + (2b) + (2c) + (2d)
(3c) = [1 + (3b)]*(1) gross
(4) = (2e) + (3a) + (3c)
(5) = (1) - (4)

(6) = From Accounting Department
(7) = max[(1) - (4) + (6), 0]
(8) = From Accounting Department
(8a) = min (0, (8) - (7))
(9) = min [(7); (8)]
(10) = -min[(1) - (4) + (6), 0]
Once DPAE has been reduced to zero, a premium deficiency appears.

ABC Insurance Company of Canada

Premium Liabilities Exhibit

As of December 31, 20XX

Estimation of Gross Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	50,000,000	25,000,000	30,000,000	10,000,000	5,000,000	3,000,000	123,000,000
(2) Undiscounted ELR	70.0%	80.0%	68.0%	85.0%	75.0%		
(3) Undiscounted Expected Loss & ALAE	35,000,000	20,000,000	20,400,000	8,500,000	3,750,000		
(4) ULAE Ratio (% of Loss & ALAE)	4.50%	4.50%	4.50%	4.50%	4.50%		
(5) ULAE	1,575,000	900,000	918,000	382,500	168,750		
(6) Undiscounted Expected Loss & LAE	36,575,000	20,900,000	21,318,000	8,882,500	3,918,750	2,800,000	94,394,250
(7) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(8) Discount Factor	0.920	0.930	0.980	0.986	0.925		
(9) Present Value of Loss & LAE	33,649,000	19,437,000	20,891,640	8,758,145	3,624,844	2,600,000	88,960,629
(10) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(11) PfAD for Claims Dev.	3,701,390	1,943,700	1,462,415	613,070	362,484	400,000	8,483,059
(12) MfAD for Reinsurance Ceded							
(13) PfAD for Reinsurance Ceded							
(14) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(15) Discount Factor	0.940	0.950	0.990	0.989	0.940		
(16) PfAD for Investment Return Rates	731,500	418,000	213,180	26,648	58,781		1,448,109
(17) Actuarial Present Value of Loss & LAE	38,081,890	21,798,700	22,567,235	9,397,863	4,046,109	3,000,000	98,891,797

Notes:
(3) = (1) x (2)
(5) = (3) x (4)
(6) = (3) + (5)
(7) Illustrative examples are provided in Appendix E, Sheet 3 for Property and Liability
(9) = (6) x (8)
(11) = (9) x (10)
(15) Illustrative examples are provided in Appendix E, Sheet 4 for Property and Liability
(16) = (6) x [(15) - (8)]
(17) = (9) + (11) + (13) + (16)
Facility assessments are assumed to be discounted and to include provisions for adverse deviation.

ABC Insurance Company of Canada

Appendix B

Premium Liabilities Exhibit

Sheet 3

As of December 31, 20XX

Estimation of Net Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	49,000,000	22,000,000	29,500,000	9,500,000	4,000,000	3,000,000	117,000,000
(2) Expected Reinsurance Costs	3,000,000	1,500,000	1,000,000	500,000	250,000		6,250,000
(3) Adjusted Unearned Premium	46,000,000	20,500,000	28,500,000	9,000,000	3,750,000		
(4) Undiscounted ELR	68.0%	76.0%	67.0%	86.0%	73.0%		
(5) Undiscounted Expected Loss & ALAE	31,280,000	15,580,000	19,095,000	7,740,000	2,737,500		
(6) ULAE	1,575,000	900,000	918,000	382,500	168,750		
(7) Undiscounted Expected Loss & LAE	32,855,000	16,480,000	20,013,000	8,122,500	2,906,250	2,800,000	83,176,750
(8) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(9) Discount Factor	0.925	0.935	0.980	0.986	0.940		
(10) Present Value of Loss & LAE	30,390,875	15,408,800	19,612,740	8,008,785	2,731,875	2,600,000	78,753,075
(11) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(12) PfAD for Claims Dev.	3,342,996	1,540,880	1,372,892	560,615	273,188	400,000	7,490,571
(13) MfAD for Reinsurance Ceded	1.00%	1.00%	1.00%	1.00%	1.00%		
(14) PfAD for Reinsurance Ceded	32,581	40,282	12,789	7,494	8,930		102,076
(15) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(16) Discount Factor	0.940	0.950	0.995	0.997	0.955		
(17) PfAD for Investment Return Rates	492,825	247,200	300,195	89,348	43,594		1,173,161
(18) Actuarial Present Value of Loss & LAE	34,259,278	17,237,162	21,298,616	8,666,241	3,057,586	3,000,000	87,518,882

Notes:

(3) = (1) - (2)

(5) = (3) x (4)

(6) = Sheet 2, Line (5)

(7) = (5) + (6)

(10) = (7) x (9)

(12) = (10) x (11)

(14) = (13) x [Sheet 2, Line (9) - (10)]

(17) = (7) x [(16) - (9)]

(18) = (10) + (12) + (14) + (17)

Facility assessments are assumed to be discounted and to include provisions for adverse deviation.

ABC Insurance Company of Canada Appendix C

Premium Liabilities Exhibit

Sheet 1

As of December 31, 20XX

		Gross	Net
(1)	**Unearned Premium Booked**	123,000,000	117,000,000
(2)	**Actuarial Present Value of Loss & LAE**		
(2a)	Present Value of Loss & LAE	97,385,941	87,259,985
(2b)	PfAD for Claims Development	9,397,696	8,431,243
(2c)	PfAD for Investment Return Rates	1,630,984	1,316,584
(2d)	PfAD for Recovery from Reinsurance Ceded	0	101,260
(2e)	Actuarial Present Value of Loss & LAE	108,414,621	97,109,071
(3a)	**Expected Reinsurance Costs**		13,000,000
(3b)	**Maintenance Expenses (percentage of gross premium)**	3.0%	3.0%
(3c)	**Maintenance Expenses**	3,690,000	3,690,000
(4)	**Policy Liabilities in Connection with Unearned Premium**	112,104,621	113,799,071
(5)	**Equity in UPR**	10,895,379	3,200,929
(6)	**Unearned (Reinsurance) Commissions**		1,548,976
(7)	**Maximum Allowable DPAE**	10,895,379	4,749,905
(8)	**DPAE from Accounting Department**	20,000,000	20,000,000
(8a)	**Excess above Maximum DPAE**	9,104,621	15,250,095
(9)	**Booked DPAE**		4,749,905
(10)	**Premium Deficiency**	0	0

Notes:

(1) and (2) are from Sheets 2 and 3
(2e) = (2a) + (2b) + (2c) + (2d)
(3c) = [1 + (3b)]*(1) gross
(4) = (2e) + (3a) + (3c)
(5) = (1) - (4)

(6) = From Accounting Department
(7) = max[(1) - (4) + (6), 0]
(8) = From Accounting Department
(8a) = min (0, (8) - (7))
(9) = min [(7); (8)]
(10) = -min[(1) - (4) + (6), 0]
Once DPAE has been reduced to zero, a premium deficiency appears.

ABC Insurance Company of Canada Appendix C

Premium Liabilities Exhibit

Sheet 2

As of December 31, 20XX

Estimation of Gross Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	50,000,000	25,000,000	30,000,000	10,000,000	5,000,000	3,000,000	123,000,000
(2) Undiscounted ELR	85.0%	85.0%	68.0%	85.0%	75.0%		
(3) Undiscounted Expected Loss & ALAE	42,500,000	21,250,000	20,400,000	8,500,000	3,750,000		
(4) ULAE Ratio (% of Loss & ALAE)	4.50%	4.50%	4.50%	4.50%	4.50%		
(5) ULAE	1,912,500	956,250	918,000	382,500	168,750		
(6) Undiscounted Expected Loss & LAE	44,412,500	22,206,250	21,318,000	8,882,500	3,918,750	2,800,000	103,538,000
(7) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(8) Discount Factor	0.920	0.930	0.980	0.986	0.925		
(9) Present Value of Loss & LAE	40,859,500	20,651,813	20,891,640	8,758,145	3,624,844	2,600,000	97,385,941
(10) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(11) PfAD for Claims Dev.	4,494,545	2,065,181	1,462,415	613,070	362,484	400,000	9,397,696
(12) MfAD for Reinsurance Ceded							
(13) PfAD for Reinsurance Ceded							
(14) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(15) Discount Factor	0.940	0.950	0.990	0.989	0.940		
(16) PfAD for Investment Return Rates	888,250	444,125	213,180	26,648	58,781		1,630,984
(17) Actuarial Present Value of Loss & LAE	46,242,295	23,161,119	22,567,235	9,397,863	4,046,109	3,000,000	108,414,621

Notes:

(3) = (1) x (2)

(5) = (3) x (4)

(6) = (3) + (5)

(7) Illustrative examples are provided in Appendix E, Sheet 3 for Property and Liability

(9) = (6) x (8)

(11) = (9) x (10)

(15) Illustrative examples are provided in Appendix E, Sheet 4 for Property and Liability

(16) = (6) x [(15) - (8)]

(17) = (9) + (11) + (13) + (16)

Facility assessments are assumed to be discounted and to include provisions for adverse deviation.

ABC Insurance Company of Canada

Appendix C

Premium Liabilities Exhibit

Sheet 3

As of December 31, 20XX

Estimation of Net Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	49,000,000	22,000,000	29,500,000	9,500,000	4,000,000	3,000,000	117,000,000
(2) Expected Reinsurance Costs	5,000,000	4,000,000	1,000,000	2,000,000	1,000,000		13,000,000
(3) Adjusted Unearned Premium	44,000,000	18,000,000	28,500,000	7,500,000	3,000,000		
(4) Undiscounted ELR	90.0%	95.0%	70.0%	86.0%	85.0%		
(5) Undiscounted Expected Loss & ALAE	39,600,000	17,100,000	19,950,000	6,450,000	2,550,000		
(6) ULAE	1,575,000	900,000	918,000	382,500	168,750		
(7) Undiscounted Expected Loss & LAE	41,175,000	18,000,000	20,868,000	6,832,500	2,718,750	2,800,000	92,394,250
(8) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(9) Discount Factor	0.925	0.935	0.980	0.986	0.940		
(10) Present Value of Loss & LAE	38,086,875	16,830,000	20,450,640	6,736,845	2,555,625	2,600,000	87,259,985
(11) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(12) PfAD for Claims Dev.	4,189,556	1,683,000	1,431,545	471,579	255,563	400,000	8,431,243
(13) MfAD for Reinsurance Ceded	1.00%	1.00%	1.00%	1.00%	1.00%		
(14) PfAD for Reinsurance Ceded	27,726	38,218	4,410	20,213	10,692		101,260
(15) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(16) Discount Factor	0.940	0.950	0.995	0.997	0.955		
(17) PfAD for Investment Return Rates	617,625	270,000	313,020	75,158	40,781		1,316,584
(18) Actuarial Present Value of Loss & LAE	42,921,783	18,821,218	22,199,615	7,303,795	2,862,661	3,000,000	97,109,071

Notes:

(3) = (1) - (2)

(5) = (3) x (4)

(6) = Sheet 2, Line (5)

(7) = (5) + (6)

(10) = (7) x (9)

(12) = (10) x (11)

(14) = (13) x [Sheet 2, Line (9) - (10)]

(17) = (7) x [(16) - (9)]

(18) = (10) + (12) + (14) + (17)

Facility assessments are assumed to be discounted and to include provisions for adverse deviation.

ABC Insurance Company of Canada Appendix D

Premium Liabilities Exhibit

Sheet 1

As of December 31, 20XX

		Gross	Net
(1)	**Unearned Premium Booked**	123,000,000	117,000,000
(2)	**Actuarial Present Value of Loss & LAE**		
(2a)	Present Value of Loss & LAE	113,100,129	100,038,525
(2b)	PfAD for Claims Development	11,041,219	9,753,009
(2c)	PfAD for Investment Return Rates	1,970,609	1,516,961
(2d)	PfAD for Recovery from Reinsurance Ceded	0	130,616
(2e)	Actuarial Present Value of Loss & LAE	126,111,957	111,439,112
(3a)	**Expected Reinsurance Costs**		6,250,000
(3b)	**Maintenance Expenses (percentage of gross premium)**	3.0%	3.0%
(3c)	**Maintenance Expenses**	3,690,000	3,690,000
(4)	**Policy Liabilities in Connection with Unearned Premium**	129,801,957	121,379,112
(5)	**Equity in UPR**	-6,801,957	-4,379,112
(6)	**Unearned (Reinsurance) Commissions**		1,548,976
(7)	**Maximum Allowable DPAE**	0	0
(8)	**DPAE from Accounting Department**	20,000,000	20,000,000
(8a)	**Excess above Maximum DPAE**	20,000,000	20,000,000
(9)	**Booked DPAE**		0
(10)	**Premium Deficiency**	6,801,957	2,830,136

Notes:

(1) and (2) are from Sheets 2 and 3
(2e) = (2a) + (2b) + (2c) + (2d)
(3c) = [1 + (3b)]*(1) gross
(4) = (2e) + (3a) + (3c)
(5) = (1) - (4)

(6) = From Accounting Department
(7) = max[(1) - (4) + (6), 0]
(8) = From Accounting Department
(8a) = min (0, (8) - (7))
(9) = min [(7); (8)]
(10) = -min[(1) - (4) + (6), 0]
Once DPAE has been reduced to zero, a premium deficiency appears.

ABC Insurance Company of Canada

Appendix D

Premium Liabilities Exhibit

Sheet 2

As of December 31, 20XX

Estimation of Gross Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	50,000,000	25,000,000	30,000,000	10,000,000	5,000,000	3,000,000	123,000,000
(2) Undiscounted ELR	100.0%	120.0%	68.0%	85.0%	75.0%		
(3) Undiscounted Expected Loss & ALAE	50,000,000	30,000,000	20,400,000	8,500,000	3,750,000		
(4) ULAE Ratio (% of Loss & ALAE)	4.50%	4.50%	4.50%	4.50%	4.50%		
(5) ULAE	2,250,000	1,350,000	918,000	382,500	168,750		
(6) Undiscounted Expected Loss & LAE	52,250,000	31,350,000	21,318,000	8,882,500	3,918,750	2,800,000	120,519,250
(7) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(8) Discount Factor	0.920	0.930	0.980	0.986	0.925		
(9) Present Value of Loss & LAE	48,070,000	29,155,500	20,891,640	8,758,145	3,624,844	2,600,000	113,100,129
(10) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(11) PfAD for Claims Dev.	5,287,700	2,915,550	1,462,415	613,070	362,484	400,000	11,041,219
(12) MfAD for Reinsurance Ceded							
(13) PfAD for Reinsurance Ceded							
(14) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(15) Discount Factor	0.940	0.950	0.990	0.989	0.940		
(16) PfAD for Investment Return Rates	1,045,000	627,000	213,180	26,648	58,781		1,970,609
(17) Actuarial Present Value of Loss & LAE	54,402,700	32,698,050	22,567,235	9,397,863	4,046,109	3,000,000	126,111,957

Notes:

(3) = (1) x (2)

(5) = (3) x (4)

(6) = (3) + (5)

(7) Illustrative examples are provided in Appendix E, Sheet 3 for Property and Liability

(9) = (6) x (8)

(11) = (9) x (10)

(15) Illustrative examples are provided in Appendix E, Sheet 4 for Property and Liability

(16) = (6) x [(15) - (8)]

(17) = (9) + (11) + (13) + (16)

Facility assessments are presented as reported to the company.

ABC Insurance Company of Canada

Premium Liabilities Exhibit

As of December 31, 20XX

Estimation of Net Expected Losses and LAE

	Auto TPL	Auto AB	Auto Other	Property	Liability	Facility	Total
(1) Unearned Premium Booked	49,000,000	22,000,000	29,500,000	9,500,000	4,000,000	3,000,000	117,000,000
(2) Expected Reinsurance Costs	3,000,000	1,500,000	1,000,000	500,000	250,000		6,250,000
(3) Adjusted Unearned Premium	46,000,000	20,500,000	28,500,000	9,000,000	3,750,000		
(4) Undiscounted ELR	98.0%	115.0%	67.0%	86.0%	73.0%		
(5) Undiscounted Expected Loss & ALAE	45,080,000	23,575,000	19,095,000	7,740,000	2,737,500		
(6) ULAE	2,250,000	1,350,000	918,000	382,500	168,750		
(7) Undiscounted Expected Loss & LAE	47,330,000	24,925,000	20,013,000	8,122,500	2,906,250	2,800,000	106,096,750
(8) Selected Discount Rate	3.50%	3.50%	3.50%	3.50%	3.50%		
(9) Discount Factor	0.925	0.935	0.980	0.986	0.940		
(10) Present Value of Loss & LAE	43,780,250	23,304,875	19,612,740	8,008,785	2,731,875	2,600,000	100,038,525
(11) MfAD for Claims Dev.	11.00%	10.00%	7.00%	7.00%	10.00%		
(12) PfAD for Claims Dev.	4,815,828	2,330,488	1,372,892	560,615	273,188	400,000	9,753,009
(13) MfAD for Reinsurance Ceded	1.00%	1.00%	1.00%	1.00%	1.00%		
(14) PfAD for Reinsurance Ceded	42,898	58,506	12,789	7,494	8,930		130,616
(15) MfAD for Investment Return Rates	0.75%	0.75%	0.75%	0.75%	0.75%		
(16) Discount Factor	0.940	0.950	0.995	0.997	0.955		
(17) PfAD for Investment Return Rates	709,950	373,875	300,195	89,348	43,594		1,516,961
(18) Actuarial Present Value of Loss & LAE	49,348,925	26,067,744	21,298,616	8,666,241	3,057,586	3,000,000	111,439,112

Notes:
(3) = (1) - (2)
(5) = (3) x (4)
(6) = Sheet 2, Line (5)
(7) = (5) + (6)
(10) = (7) x (9)
(12) = (10) x (11)
(14) = (13) x [Sheet 2, Line (9) - (10)]
(17) = (7) x [(16) - (9)]
(18) = (10) + (12) + (14) + (17)
Facility assessments are assumed to be discounted and to include provisions for adverse deviation.

ABC Insurance Company of Canada Appendix E

Premium Liabilities Loss Ratio - Gross Basis

Sheet 1

As of December 31, 20XX

Liability

Accident Year	(1) Incurred Losses	(2) IBNR	(3) Ultimate Losses	(4) Trend Factor @ 3.00%	(5) Trended Ultimate Losses	(6) Earned Premium	(7) On-Level Factor	(8) On-Level Premium	(9) Ultimate Loss Ratio
20XX - 4	8,626,000	1,200,000	9,826,000	1.152	11,321,506	10,017,392	1.125	11,271,495	100.4%
20XX - 3	6,446,000	2,000,000	8,446,000	1.119	9,448,031	10,641,993	1.103	11,739,502	80.5%
20XX - 2	4,974,000	2,400,000	7,374,000	1.086	8,008,591	11,026,636	1.071	11,809,528	67.8%
20XX - 1	3,516,000	4,500,000	8,016,000	1.054	8,452,272	11,460,217	1.020	11,689,421	72.3%
20XX	268,000	6,000,000	6,268,000	1.024	6,416,638	11,561,787	1.000	11,561,787	55.5%
Total	23,830,000	16,100,000	39,930,000		43,647,039	54,708,025		58,071,733	75.2%

Seasonality Factor : 1.000 (10)

Adjusted LR: 75.2% (11)

Selected **75.0%**

Property

Accident Year	(1) Incurred Losses	(2) IBNR	(3) Ultimate Losses	(4) Trend Factor @ 4.00%	(5) Trended Ultimate Losses	(6) Earned Premium	(7) On-Level Factor	(8) Adjusted Total Premium	(9) Ultimate Loss Ratio
20XX - 4	14,301,000	225,000	14,526,000	1.207	17,530,125	18,450,000	1.192	22,000,961	79.7%
20XX - 3	18,342,000	450,000	18,792,000	1.160	21,806,132	18,819,000	1.147	21,577,865	101.1%
20XX - 2	16,929,000	562,500	17,491,500	1.116	19,516,384	19,195,380	1.103	21,162,906	92.2%
20XX - 1	13,365,000	675,000	14,040,000	1.073	15,062,812	19,579,288	1.050	20,558,252	73.3%
20XX	18,972,000	1,575,000	20,547,000	1.032	21,196,006	19,970,873	1.010	20,170,582	105.1%
Total	81,909,000	3,487,500	85,396,500		95,111,460	96,014,541		105,470,567	90.2%

Seasonality Factor : 0.950 (10)

Adjusted LR: 85.7% (11)

Selected **85.0%**

Notes:

(3) = (1)+(2)

(4) = (1+trend)^(Appendix E, Sheet 3, Column (10) + 0.5)

(5) = (3) x (4)

(7) = Cumulative successive rate changes going back in time from current levels

(8) = (6) x (7)

(9) = (5) / (8)

(10) = Judgment based on loss pattern of line of business

(11) = Total(9) x (10)

ABC Insurance Company of Canada

Premium Liabilities Policyholder Maintenance Expenses

As of December 31, 20XX

Accident Year	(1) General Expenses	(2) Trend Factor @ 3.00%	(3) Trended General Expenses	(4) Adjusted Total Gross Premium	(5) Adjusted Expense Ratio
20XX - 4	24,370,495	1.152	28,079,657	200,347,839	14.0%
20XX - 3	24,401,002	1.119	27,295,929	212,839,864	12.8%
20XX - 2	25,781,333	1.086	28,000,021	220,532,727	12.7%
20XX - 1	26,459,399	1.054	27,899,457	229,204,335	12.2%
20XX	21,046,940	1.024	21,546,042	231,235,738	9.3%
Total	122,059,168		132,821,106	1,094,160,503	12.1%

Ratio of Policy Servicing Cost	25.0%	(6)
Indicated Policyholder Maintenance Expense Ratio	3.0%	(7)
Selected Policyholder Maintenance Expense Ratio	**3.0%**	

Notes:

(2) = (1+trend)^(Appendix E, Sheet 3, Column (10)+0.5)

(3) = (1) x (2)

(4) = Company total on-level premiums

(5) = (3) / (4)

(6) assumption that 25% of general expenses are used for servicing policies

(7) = Total (5) x (6)

ABC Insurance Company of Canada

Discounting of Premium Liabilities - Gross Basis

As of December 31, 20XX

Yield = 3.50%

Claim Liabilities

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Property		Liability			Property	Liability
Age (Months)	Claims Average Payment (Years)	Cumulative Payment Pattern	In Year Payment	Cumulative Payment Pattern	In Year Payment	Present Value Factor	Discounted to Time Zero	Discounted to Time Zero
12	0.5	85.0%	85.0%	20.0%	20.0%	0.9829	0.836	0.197
24	1.5	99.0%	14.0%	55.0%	35.0%	0.9497	0.133	0.332
36	2.5	100.0%	1.0%	70.0%	15.0%	0.9176	0.009	0.138
48	3.5	100.0%	0.0%	75.0%	5.0%	0.8866	-	0.044
60	4.5	100.0%	0.0%	80.0%	5.0%	0.8566	-	0.043
72	5.5	100.0%	0.0%	85.0%	5.0%	0.8276	-	0.041
84	6.5	100.0%	0.0%	92.5%	7.5%	0.7996	-	0.060
96	7.5	100.0%	0.0%	100.0%	7.5%	0.7726	-	0.058
					Discount Factor at Time Zero		**0.978**	**0.913**

Premium Liabilities

(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
		Property		Liability			Property	Liability
Age (Months)	Claims on Unearned Premium Average Payment (Years)	Interpolated Cumulative Payment Pattern	In Year Payment	Interpolated Cumulative Payment Pattern	In Year Payment	Present Value Factor	Discounted to Valuation Date	Discounted to Valuation Date
12	0.2929	87.9%	87.9%	27.2%	27.2%	0.9900	0.870	0.270
24	1.2929	99.2%	11.3%	58.1%	30.9%	0.9565	0.108	0.295
36	2.2929	100.0%	0.8%	71.0%	12.9%	0.9242	0.007	0.119
48	3.2929	100.0%	0.0%	76.0%	5.0%	0.8929	-	0.045
60	4.2929	100.0%	0.0%	81.0%	5.0%	0.8627	-	0.043
72	5.2929	100.0%	0.0%	86.6%	5.5%	0.8335	-	0.046
84	6.2929	100.0%	0.0%	94.1%	7.5%	0.8053	-	0.060
96	7.2929	100.0%	0.0%	100.0%	5.9%	0.7781	-	0.046
					Discount Factor for Claims in Connection with Unearned Premium		**0.986**	**0.925**

Notes:

(2) Assume that all policies have 12-month terms with equal earning

(3), (4), (5), (6) From claim liabilities analysis

(7) = 1/(1+yield) ^ (2)

(8) = (4) * (7)

(9) = (6) * (7)

(10) To adjust average payment date for UPR exposure, assume x to be the time to end of the year from the average payment of the UPR. The average payment is the time that would split the UPR triangle in half. The area of the triangle is 72 (12 * 12 / 2).
To solve for x, x^2/2 = 36
Thus x = 8.485 months, which is 0.7071 years
So from the beginning of the year the average payment is at 1-x or 0.2929 years.

(11) = (3) interpolated for average payment
Claims will occur on average 0.2929 years after the December 31 valuation date. At the end of the first calendar year, claims in connection with unearned premium will be 1.0000 - 0.2929 = 0.7071 years old on average. The cumulative payment pattern for these claims is therefore interpolated between a cohort of claims that are 0.5 years old (assumed payment pattern at 12 months) and 1.5 years old (assumed payment pattern at 24 months). The cumulative payment pattern is linearly interpolated as follows:
[(0.7171 - 0.5)/(1.5 - 0.5)] x (99% - 85%) + 85%
The linear interpolation is similar in subsequent years.

(12) = (11) - (11) prior

(13) = (5) interpolated for average payment similarly as in (11)

(14) = (13) - (13) prior

(15) = 1/(1+yield) ^ (10)

(16) = (12) * (15)

(17) = (14) * (15)

ABC Insurance Company of Canada

Discounting of Premium Liabilities - Gross Basis

As of December 31, 20XX

Yield = 2.75%

Claims Liabilities

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Property		Liability			Property	Liability
Age (Months)	Claims Average Payment (Years)	Cumulative Payment Pattern	In Year Payment	Cumulative Payment Pattern	In Year Payment	Present Value Factor	Discounted to Time Zero	Discounted to Time Zero
12	0.5	85.0%	85.0%	20.0%	20.0%	0.9865	0.839	0.197
24	1.5	99.0%	14.0%	55.0%	35.0%	0.9601	0.134	0.336
36	2.5	100.0%	1.0%	70.0%	15.0%	0.9344	0.009	0.140
48	3.5	100.0%	0.0%	75.0%	5.0%	0.9094	-	0.045
60	4.5	100.0%	0.0%	80.0%	5.0%	0.8851	-	0.044
72	5.5	100.0%	0.0%	85.0%	5.0%	0.8614	-	0.043
84	6.5	100.0%	0.0%	92.5%	7.5%	0.8383	-	0.063
96	7.5	100.0%	0.0%	100.0%	7.5%	0.8159	-	0.061
					Discount Factor at Time Zero		**0.982**	**0.930**

Premium Liabilities

(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
		Property		Liability			Property	Liability
Age (Months)	Claims on Unearned Premium Average Payment (Years)	Interpolated Cumulative Payment Pattern	In Year Payment	Interpolated Cumulative Payment Pattern	In Year Payment	Present Value Factor	Discounted to Valuation Date	Discounted to Valuation Date
12	0.2929	87.9%	87.9%	27.2%	27.2%	0.9921	0.872	0.270
24	1.2929	99.2%	11.3%	58.1%	30.9%	0.9655	0.109	0.298
36	2.2929	100.0%	0.8%	71.0%	12.9%	0.9397	0.007	0.121
48	3.2929	100.0%	0.0%	76.0%	5.0%	0.9145	-	0.046
60	4.2929	100.0%	0.0%	81.0%	5.0%	0.8901	-	0.045
72	5.2929	100.0%	0.0%	86.6%	5.5%	0.8662	-	0.048
84	6.2929	100.0%	0.0%	94.1%	7.5%	0.8431	-	0.063
96	7.2929	100.0%	0.0%	100.0%	5.9%	0.8205	-	0.049
					Discount Factor for Claims in Connection with Unearned Premium		**0.989**	**0.940**

Notes:

(2) Assume that all policies have 12-month terms with equal earning

(3), (4), (5), (6) From claim liabilities analysis

(7) = 1/(1+yield) ^ (2)

(8) = (4) * (7)

(9) = (6) * (7)

(10) To adjust average payment date for UPR exposure, assume x to be the time to end of the year from the average payment of the UPR. The average payment is the time that would split the UPR triangle in half. The area of the triangle is 72 (12 * 12 / 2).
To solve for x, x^2/2 = 36
Thus x = 8.485 months, which is 0.7071 years
So from the beginning of the year the average payment is at 1-x or 0.2929 years.

(11) = (3) interpolated for average payment
Claims will occur on average 0.2929 years after the December 31 valuation date. At the end of the first calendar year, claims in connection with unearned premium will be 1.0000 - 0.2929 = 0.7071 years old on average. The cumulative payment pattern for these claims is therefore interpolated between a cohort of claims that are 0.5 years old (assumed payment pattern at 12 months) and 1.5 years old (assumed payment pattern at 24 months). The cumulative payment pattern is linearly interpolated as follows:
[(0.7171 - 0.5)/(1.5 - 0.5)] x (99% - 85%) + 85%
The linear interpolation is similar in subsequent years.

(12) = (11) - (11) prior

(13) = (5) interpolated for average payment similarly as in (11)

(14) = (13) - (13) prior

(15) = 1/(1+yield) ^ (10)

(16) = (12) * (15)

(17) = (14) * (15)

ABC Insurance Company of Canada Appendix E

Duration of Premium Liabilities - Gross Basis

Sheet 5

As of December 31, 20XX

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Property			Liability	
Age (Months)	Claims on Unearned Premium Average Payment (Years)	Present Value Factor	In Year Payment	Discounted Payment	Premium Average Payment x Discounted Payment	In Year Payment	Discounted Payment	Premium Average Payment x Discounted Payment
12	0.2929	0.9900	0.879	0.870	0.255	0.272	0.270	0.079
24	1.2929	0.9565	0.113	0.108	0.140	0.309	0.295	0.382
36	2.2929	0.9242	0.008	0.007	0.017	0.129	0.119	0.274
48	3.2929	0.8929	-	-	-	0.050	0.045	0.147
60	4.2929	0.8627	-	-	-	0.050	0.043	0.185
72	5.2929	0.8335	-	-	-	0.055	0.046	0.243
84	6.2929	0.8053	-	-	-	0.075	0.060	0.380
96	7.2929	0.7781	-	-	-	0.059	0.046	0.337
Yield =	3.5%	(10) Macaulay duration			0.417			2.193
		(11) Modified duration			0.403			2.118

Notes:

(2), (3), (4), (7) From Appendix E, Sheet 3

(5) = (4) x (3)

(6) = (5) x (2)

(8) = (7) x (3)

(9) = (8) x (2)

(10) Macaulay duration = Sum of (6) / Sum of (5) for Property, Sum of (9) / Sum of (8) for Liablity

(11) Modified duration = (10) / (1 + yield)