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A Study Note on the Actuarial Evaluation of Premium Liabilities

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Abstract‡

Several approaches have been used to estimate premium liabilities. The emphasis of these approaches has been on unearned premium and deferred policy acquisition expenses (DPAE), as such items represent the largest components of premium liabilities. The purpose of this paper is to provide a framework for the evaluation of premium liabilities and to augment the actuarial literature. We define and review the individual components of premium liabilities as well as the regulatory requirements and Canadian Institute of Actuaries recommendations and standards of practices related to premium liabilities. We also present an actuarial approach for estimating equity in the unearned premium, the premium deficiency, and DPAE. The approach here accords with Canadian Institute of Actuaries recommendations and standards of practice as well as statutory requirements as of December 31, 1997.

Key words and phrases: *unearned premium, deferred policy acquisition expenses, reinsurance, standards of practice, premium deficiency*

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1 Introduction

Since 1985, under Canada's Insurance Companies Act, the board of directors of each federally registered insurance company[1] has the duty to appoint an actuary, called an *appointed actuary*,[2] to perform the following duties:

- Value annually the policy liabilities of the company or other matters required by law;
- Monitor the financial position of the company;
- Report annually to the board of directors on the financial position and condition of the company; and
- Report to the board of directors on any transactions that may jeopardize the financial condition of the company.

Policy liabilities include both claim liabilities and premium liabilities.

There was no regulatory requirement in the United States for an actuarial opinion on premium liabilities until 1998. Several states now require an actuarial opinion on the adequacy of the unearned premium reserve for certain types of policies with terms exceeding 12 months.

Over the years several papers have been written and standard actuarial techniques have been developed to estimate claim liabilities and the various components of claim liabilities. Premium liabilities have, however, received little attention in the actuarial literature.

The Canadian Institute of Actuaries (CIA) standard of practice entitled *Recommendations for Property-Casualty Insurance Company Financial Reporting* provides a definition of premium liabilities as well as factors to consider in the evaluation of premium liabilities. Several approaches have been used to estimate premium liabilities, but none have been documented to date. The emphasis of these approaches has been on unearned premium and on deferred policy acquisition expenses (DPAE), as such items represent the largest components of premium liabilities. In particular, discussions between actuaries and some regulators have focused on the treatment of investment income in assessing equity in the unearned premium. Other components of premium liabilities (such as contingent commissions, retro-rated policies, and reinsurance adjustments) have received little attention.

[1] The terms *insurance company* and *insurer*, as used throughout this paper, include stock insurance companies and mutuals.

[2] An actuary is defined under the act as a Fellow of the Canadian Institute of Actuaries. Note that for provincially registered companies (except in Quebec) the requirements are different, and the actuary is referred to as a *valuation actuary*.

The evaluation of premium liabilities encompasses more than assessing the adequacy of the excess of the pro-rata unearned premium over DPAE. It consists of examining all related assets and liabilities to ensure proper provision is made for the anticipated net costs incurred to discharge an insurer's obligations with respect to its insurance and reinsurance contracts, except its claim liabilities.

The purpose of this paper is to provide a framework for the evaluation of premium liabilities and to fill a gap in the actuarial literature. This paper defines and reviews the individual components of premium liabilities as well as the regulatory requirements and CIA standards of practice related to premium liabilities. It also presents an actuarial approach for estimating equity in the unearned premium, the premium deficiency, and DPAE.

The approach here accords with CIA recommendations and standards of practice as well as statutory requirements as of December 31, 1997.

2 Definition of Premium Liabilities

Premium liabilities generally have been defined as the cost of running off the unexpired portion of an insurer's policies and reinsurance contracts.

The following definition from the CIA standards of practice *Recommendations for Property-Casualty Insurance Company Financial Reporting* is broader, as it does not restrict premium liabilities to policies inforce. Therefore, liabilities can arise from policies already expired:

> Premium liabilities represent all the anticipated net costs to discharge the insurance company's obligations with respect to its insurance policies and reinsurance contracts except its claim liabilities.[3]

According to this definition, premium liabilities consist of all assets and liabilities resulting from an insurer's policies (direct, assumed, and ceded) other than those resulting from the collection of premiums currently due or payment of claims already incurred.

For most companies, premium liabilities, which are found on either side of the balance sheet (asset and liability), are composed of the following items:

[3]The Canadian Institute of Actuaries' *Recommendations for Property-Casualty Insurance Company Financial Reporting*, Part 4, Section 4.0.1.

- Unearned premiums (UP);
- Premium deficiency;
- Deferred policy acquisition expenses (DPAE);
- Provision for retro-rated policies;
- Earned but not recorded premiums (EBNR);
- Audit premiums;
- Premium development on reinsurance assumed;
- Ceded reinsurance retro-rated contracts (swing-rated contracts/sliding scale);
- Provision for contingent commissions; and
- Unearned reinsurance commissions.

In practice, these items can be grouped into these four larger categories:

- Future claims and adjustment expenses on inforce policies;
- Administrative costs of servicing inforce policies (maintenance costs);
- Anticipated premium adjustments; and
- Anticipated reinsurance expense (or commission) adjustments.

A simplified view of the balance sheet, highlighting the elements of premium liabilities, is shown in Table 1. Other elements of the balance sheet also are impacted by the various premium liability elements. For instance, a decrease in the unearned premium may increase the assets or the surplus of the company. The largest component of premium liabilities is the future claims and adjustment expense. For companies with large quota-share reinsurance, the unearned reinsurance commissions also may be a significant item on their balance sheet.

The provision for premium liabilities is not shown explicitly on the balance sheet of a Canadian insurer's annual statement (PC-1 or PC-2). Premium liabilities are the net total of the unearned premium, DPAE, and other related assets and liabilities on the balance sheet.

Finally, the equity in unearned premiums (EQUP) is defined as the expected profits on the unexpired policies. An example of a fictitious company is provided in Section 6, and the details of the EQUP are illustrated in Sections 7–10.

Table 1
Balance Sheet Items

Premium Liability Element	Asset	Liability	Surplus
Unearned premiums	Ceded unearned premium	Gross unearned premium	
Premium deficiency		Premium deficiency	
Deferred policy acquisition expenses (DPAE)	Deferred policy acquisition expenses		
Provision for retro-rated policies	*	*	
Earned but not recorded premiums (EBNR)		Gross unearned premium (negative amount)	
Audit premiums		Gross unearned premium (negative amount)	
Premium development on reinsurance assumed Ceded reinsurance retro-rated contracts	Reinsurance receivables *	 *	
Provision for contingent commissions		Provision for contingent commissions	
Unearned reinsurance commissions		Unearned reinsurance commissions	
	Cash		Additional policy reserve
	Investment		Contributed surplus
	Receivables	Payables	Earned surplus

Notes: An * denotes that, depending on the adjustment, this can be either an asset or a liability item.

3 Deferred Policy Acquisition Expenses (DPAE or DPAC)

The policy liabilities of an insurer, which include claim liabilities and premium liabilities, also can be thought of in terms of liabilities for past events and liabilities for future events. Liabilities for past events are provided by the unpaid claim provision (outstanding case provision, IBNR, and supplemental provision), the accounts payable (expenses), and premium or commission adjustments on policies that are expired. Liabilities for future events are the expected losses and maintenance expenses on the unexpired portion of the policies inforce at the end of the year. The unearned premium provides for these future liabilities. In the event that the unearned premium is less than the liabilities for future events, then a premium deficiency exists.

Premiums should be earned on a basis consistent with the occurrence of losses. For most lines, this translates into earning the premiums on a pro-rata basis. For some lines, however, earning premiums evenly throughout the year is not appropriate. For example, motorcycle premiums cannot be earned evenly over the year, as the bulk of the exposure is from April to October. Similarly, extended warranty premiums should be earned as losses are incurred, i.e., the risk increases with the elapsed time on the warranty. (For example, a three-year warranty will have more exposure to losses in the third year and may not have any exposure in year one, as manufacturers may provide coverage for that year). In those instances, the actuary should ensure that the unearned premiums for these lines reflect their exposure to risk, i.e., the potential incurral of losses.

An insurer's income is recognized on a pro-rata basis over the term of a policy, e.g., a 12-month policy written on July 1 is 50 percent earned at December 31. The expenses are also pro-rated over the term of the policy. Claims are accounted for as they occur. Some expenses are incurred over the term of the policy, e.g., endorsements, changes to coverage, mid-term cancellations, changes in reinsurance programs. All prepaid expenses (i.e., all the front-end expenses incurred by an insurer to write business and issue policies) are incurred at the time the policy is issued. These expenses, also referred to as acquisition expenses, include commissions, taxes, renewal costs, advertising, licenses and fees, associations and dues, etc.

The deferred policy acquisition expense (DPAE) provision is an asset that amortizes the prepaid expenses over the policy period, provided that such costs are recoverable from expected profits. This results in

Table 2
Two Scenarios on July 1, 1997

	Scenario 1	Scenario 2
Premium	$100	$100
Claims & LAE*	$60	$70
Prepaid expenses	$20	$20
Maintenance expenses	$10	$20
Profit/(loss)	$10	($10)

Notes: *LAE = Loss Adjustment Expenses.

a better match of income (premiums) and expenses. The DPAE provision cannot exceed the expected profits on the unexpired policies, i.e., it cannot exceed the equity in the unearned premiums. The deferred expenses are equal to the proportion of prepaid expenses, which relates to the unexpired portion of the policy (unearned).

Therefore, if a profit is expected, it is declared on a pro-rata basis in the income statement and the balance sheet. If a loss occurs, however, it is declared immediately. This is consistent with conservative accounting principles.

A simple example will illustrate this concept. Assume a policy that is written July 1, 1997 for a 12-month term, under the two scenarios given in Table 2.[4]

Table 3 shows how the various cash flows associated with this policy for Scenario 1 are accounted for in the income statement and in the balance sheet. The top part of Table 3 represents the policy's income statement, which shows that half of the premium, half of the losses (Claims & LAE), and half of the maintenance expenses are incurred by year-end, six months after the inception. The bottom part of Table 3 provides a view of the balance sheet item related to the policy after six months. Because the EQUP or expected profit of $15 (= $50 − $30 − $5) is higher than the portion of prepaid expenses that are deferrable $10 (= 50% × $20), the DPAE is equal to $10.

[4]Further assume that claims and adjustment expenses are incurred evenly over the term of the policy.

Table 3
Income Statement and Balance Sheet Items Under Scenario 1

Income Statement Cash Flows

	July 1–Dec. 31 1997	Jan. 1–June 30 1998	July 1–Dec. 31 1998
Premium (Revenue)	$50 (Earned)	$50 (Earned)	
Claims & LAE	$30 (Incurred)	$30 (Incurred)	
Expenses	$5 (Maintenance) $20 (Prepaid)	$5 (Maintenance) $0 (Prepaid)	

Issue
July 1, 1997

Expiry
June 30, 1998

Balance Sheet

	December 31, 1997	December 31, 1998
Premium	$50 (Unearned)	$0 (Unearned)
Claims & LAE	$30 (Expected Future Losses)	
Expenses	$5 (Future Maintenance) $15 (Equity in UP) $10 DPAE	$0 DPAE

Table 4
Insurer's Profit or Loss Under Scenario 1

	Dec. 31, 1997	Dec. 31, 1998
Earned premium	$50	$50
Less incurred claims & LAE	$30	$30
Less incurred expenses*	$25	$5
Plus change in DPAE**	$10	($10)
Profit/(loss)	$5	$5

Notes: * Includes maintenance and prepaid expenses; ** DPAE at year-end less DPAE at the beginning of the year.

The profit or loss for the insurer is shown in Table 4. The $10 profit is recognized pro-rata over the term of the policy. Without the provision for DPAE, there would be a loss of $5 recorded at December 31, 1997 and a profit of $15 recorded at December 31, 1998. The deferral of expenses results in a better match between revenue and expenses.

In Scenario 2, the expected profit on this policy is a loss of $10. Table 5 shows how the various cash flows associated with the policy are accounted for in the income statement and in the balance sheet. DPAE is decreased to the expected profit of $5 even though the deferrable expenses amount to $10 (= 50%×$20). Prepaid expenses can be deferred only to the extent they are recoverable from expected future profits.

The profit/(loss) by year under Scenario 2 is shown in Table 6. Note that a loss is declared in the first year under Scenario 2 compared to a profit under Scenario 1, using the accounting principle that a premium deficiency first should be recognized by writing-off any deferred acquisition costs. If insurance accounting were done on a policy year basis, no DPAE provision would exist. All premiums would be earned when the policy is inforce; thus all expected claims and all future expenses would have to be recognized in the liabilities and all commissions, taxes, and other issuing costs would be expensed immediately.

The DPAE provision is equal to the unearned acquisition costs. These can be approximated by:

$$\text{DPAE Provision} = \frac{\text{Paid Acquisition Costs}}{\text{Written Premium}} \times UP$$

where UP is the unearned premium.

Table 5
Income Statement and Balance Sheet Items Under Scenario 2

Income Statement Cash Flows

	July 1–Dec. 31 1997	Jan. 1–June 30 1998	July 1–Dec. 31 1998
Premium (Revenue)	$50 (Earned)	$50 (Earned)	
Claims & LAE	$35 (Incurred)	$35 (Incurred)	
Expenses	$10 (Maintenance) $20 (Prepaid)	$10 (Maintenance) $0 (Prepaid)	

Issue
July 1, 1997

Expiry
June 30, 1998

Balance Sheet

	December 31, 1997	December 31, 1998
Premium	$50 (Unearned)	$0 (Unearned)
Claims & LAE	$35 (Expected Future Losses)	
Expenses	$10 (Future Maintenance) $5 (Equity in UP) $5 DPAE	$0 DPAE

Table 6
Insurer's Profit or Loss Under Scenario 2

	Dec. 31, 1997	Dec. 31, 1998
Earned premium	$50	$50
Less incurred claims & LAE	$35	$35
Less incurred expenses*	$30	$10
Plus change in DPAE**	$5	($5)
Profit/(loss)	($10)	$0

Notes: * Includes maintenance and prepaid expenses; ** DPAE at year-end less DPAE at the beginning of the year.

The insurer calculates the DPAE amount usually equal to commissions and taxes. These are prepaid and easy to calculate. Some insurers also include additional prepaid expenses in their DPAE. These expenses, however, are more difficult to determine. The insurers may complete detailed reviews of the general expenses by categories and assign a portion of each category that may be deferrable to estimate these other costs. In practice, insurers approximate them.

The actuary's role is to determine if the DPAE as calculated by the insurer is recoverable from expected future profits, i.e., the actuary's role is to determine if the equity in the unearned premium (i.e., expected future profits) is sufficient to cover the calculated DPAE.

There is no regulatory limitation on the DPAE asset. But DPAE cannot exceed EQUP.

4 Other Components

The largest component of premium liabilities is future claims and adjustment expense. The importance of other components varies by insurer, depending on the book of business or the reinsurance programs.

These other components can be grouped into two major categories: those that relate to commission adjustments and those that relate to premium adjustments.

Although some practitioners may not consider some of these items (e.g., contingent commissions) as premium liabilities, they are liabilities related to the insurer's business. Thus, they should be included in the calculation. Moreover, the Office of the Superintendent of Financial

Institutions (OSFI) requires that the actuary comment on all actuarial liabilities, other than claims and premiums, which include all of the items below.

Contingent commissions: These commissions are what insurers pay their agents or brokers based on the results and volume of business of individual producers (agents/brokers), i.e., they are profit-sharing commissions. These agreements vary by company and are often established over one-year or three-year periods. If the agreement is over a three-year running period, then some commissions may be incurred as of the statement date, and they should be accrued. Contingent commissions are often not accrued in the balance sheet, but these liabilities can be significant.

Unearned commissions: Some insurers with large quota share treaties may have significant unearned commissions on the ceded premiums. These commissions may vary depending on the ultimate loss ratios of the business. The actuary should assess the calculated unearned commissions using his/her estimate of the loss ratios. The unearned commissions are booked as a liability and are earned pro-rata over the terms of the policies.

Provision for retro-rated policies: A liability provision for retro-rated policies is required 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 paid premium at the date of the statement.

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

EBNR premiums: In some instances the insurers will be at risk on insurance contracts but the transactions are processed only after the effective date of the policy. This may happen because of reporting or processing delays or because of the nature of the insurance product. These earned but not recorded premiums (EBNR) are also part of the premium liabilities. This item is usually small and mostly arises from reinsurance assumed business.

Audit premium and other: For audit premiums, the final premium is not known until the coverage expires. Sources of premium development on reinsurance assumed or ceded contracts include the

following: (i) changes in subject matter premium[5] (usually unknown until the end of the contract period), (ii) swing-rated excess of loss treaties[6] with a rate adjustment based on the loss experience during the coverage period, and (iii) reinstatement premium for catastrophe treaty, i.e., additional premium to be paid when the limit of coverage provided by the layer has been exhausted.

5 CIA Recommendations and Regulatory Requirements

In previous sections we have introduced the concept of premium liability and discussed its components. We now turn our attention to regulatory requirements specific to premium liabilities. This section will focus on items where differences exist between regulatory requirements and CIA standards of practice.[7]

DPAE asset: Federally and provincially registered insurers (except provincial insurers in Alberta) may establish a DPAE asset up to the equity in unearned premium. Alberta regulators require insurers to record 80 percent of the unearned premiums in their balance sheet, which is equivalent to having an asset for DPAE equal to 20 percent of UP. The actuary is responsible for determining that 80 percent of UP is sufficient to cover future losses and maintenance expenses on the unexpired policies. If not, then an additional liability should be recorded for the difference.

Investment income: The CIA standards of practice requires actuaries to recognize the time value of money in evaluating the policy liabilities, except when regulators do not allow discounting. Under CIA requirements the expected losses should be discounted not only up to the average occurrence date of the losses arising from the unearned premiums, but to the average payment date of all future losses.

[5] *Subject matter premiums* are the annual direct written premiums related to the business subject to the reinsurance arrangement for that contract year.

[6] A *swing-rated excess of loss treaty* is one where the reinsurance premium rate or commission rate is adjusted based on the actual experience on the treaty. For example, the commission rate increases if the loss ratio is lower than anticipated.

[7] We refer the reader to the *Consolidated Standards of Practice* and to the *Recommendations for Property-Casualty Insurance Company Financial Reporting* that are listed in the references below.

OSFI does not currently allow discounting of claims liabilities (except for some lines, e.g., accident benefits). For premium liabilities, OSFI allows limited recognition of discounting.

Under OSFI guidelines, investment income can be included in determining equity on the unearned premium only if the unearned premium reserve is sufficient to cover future undiscounted claims and expenses (i.e., if there is no premium deficiency). OSFI guidelines allow for investment income to be recognized only from the valuation date to the average earning date of the unearned premium (or average accident date of future claims). For one-year policies this results in approximately four months of investment income. (Some Canadian practitioners might not agree with these guidelines.)

The Inspecteur General des Institutions Financieres (IGIF) has different rules for Quebec provincially registered companies. IGIF's position on the issue is that actuaries should follow the CIA recommendations, thus effectively accepting discounting.

This issue will disappear only when all regulators allow discounted policy liabilities in the balance sheet.

For statutory purposes (and except for Quebec provincially registered insurers) the calculation of premium liabilities should recognize investment income on the unearned premium only for the period between the valuation date and the average earning date (or the average occurrence date of losses on the unexpired policies), i.e., three to four months.

Other liabilities versus premium liabilities: The actuarial opinion prescribed by OSFI shows other policy liabilities as a separate item.[8] This opinion is shown in Appendix H, Sheet 1. The actuarial opinion required from IGIF is shown in Appendix H, Sheet 2. At this time IGIF and OSFI have different views on what constitutes premium liabilities versus other liabilities.

The CIA definition, and the one we adopt in this paper, is the broad definition. Premium liabilities include all assets and liabilities related to future costs arising from all insurance or reinsurance contracts of an insurer. These contracts can either be inforce or expired.

At this time we understand that OSFI includes only liabilities related to the unexpired portion of the policies inforce. OSFI's po-

[8]See OSFI's *Instructions for Actuarial Reports on Property Casualty Business.*

sition is that the unearned premiums should not be charged with future costs or development on policies/contracts that are already expired. Instead, a separate item (other policy liabilities) should be shown for those premium liabilities that are not related to unearned premiums. IGIF, on the other hand, uses the broad definition. Although we agree that future liabilities related to expired policies should not be charged against the inforce policies when calculating the equity in unearned premiums, these liabilities (assets) should be part of total premium liabilities as they relate to the insurance (reinsurance) contracts of the insurer.

All lines combined versus by line equity: For regulatory purposes equity in unearned premiums may be calculated on an all lines combined basis. This means that deficiencies in some lines are offset by redundancies in other lines. This approach is appropriate on an ongoing concern basis when a company's mix of business does not change significantly from year to year. It is appropriate because it is unlikely that a company would stop writing its more profitable lines.

A more rigorous and conservative approach consists of evaluating the equity by line of business, split in a manner consistent with the way the insurer acquires business and measures profitability.

The current position of some regulators on the recognition of investment income in calculating the equity in UPR creates a mismatch between expected future costs and premiums, however, especially for long-tail lines. Thus, insurers with large portfolios of long-tail risks would be penalized using a by line approach. For the long-tail line, full recognition of investment income needs to be accepted before using a by-line calculation because investment income is an important pricing consideration for these products.

Subsequent Events: The major Quebec ice storm of January 1998 raised the issue of subsequent events and their treatment with regard to premium liabilities in the actuarial opinion.

CSOP Section 4.6 (second exposure draft, May 1997) offers the following guidelines.

> The actuary should correct any data defect or calculation error, which a subsequent event reveals.
>
> For work with respect to an entity, the actuary should take a subsequent event into account in the selection of

methods and assumptions for a calculation, other than a pro forma calculation, if the subsequent event:

- Provides information about the entity as it was at the calculation date, or
- Retroactively makes the entity a different entity at the calculation date, or
- Makes the entity a different entity 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.

The actuary should not so take the subsequent event into account if it makes the entity a different entity after the calculation date and a purpose of the work is to report on the entity as it was at the calculation date, but the actuary should report that event.

According to this guideline, each subsequent event must be analyzed separately. No general rule can be applied. The first step is to classify the event according to the three criteria listed above:

- Does it provide information about the entity as it was?
- Does it retroactively make the entity different?
- Does it make the entity different after the calculation date?

Reporting a claim incurred on or before the statement date provides information about the insurer as it was. On the other hand, reporting a claim incurred after the statement date, especially when it cannot be expected, makes an entity different after the fact.

In the case of the ice storm, although the actual premium liabilities are likely to be much larger than the premium liability anticipated at December 31, 1997 (due to the ice storm), the calculation should not reflect the impact of the ice storm. The actuarial guidance was that the appropriate course of action was to disclose the impact of the ice storm in the notes to financial statements, but make no changes to the premium liabilities calculation.

The considerations leading to this conclusion were that:

- The ice storm did not make the insurance company different retroactively, and
- The purpose of the actuarial report was to report on the insurance company as it was at December 31st.

A storm that would be predicted to occur or continue after the statement date should be considered in the premium liabilities on the basis that it provides information on the insurer as it was at December 31, 1997.

An example of a subsequent event that was considered in the evaluation of premium liabilities was the implementation of a new automobile compensation system—Bill 164 in Ontario on January 1, 1994. In this case, the key event was the announcement of Bill 164 effective date, which definitively occurred in 1993 and was known in advance at the time of calculating the premium liabilities. It was thus taken into account in the December 31, 1993 evaluation.

Each event is different, and no general rule can be applied to the treatment of such events. One criterion remains, however—the potential size of claims resulting from the event must exceed the materiality level.[9]

6 Data for the Example

Dubois Fire & Casualty Insurance Company (DF&C) is a federally registered insurance company writing business primarily in Ontario. It is wholly owned by Kosciuzsko Insurance Company (KIC), which is also federally registered. DF&C's book of business comprises automobile insurance [split among third party liability (TPL), accident benefits (AB), and physical damage (PD) coverages], personal property (PP), and general liability (GL) exposures. Its book is split 70 percent/30 percent between one-year and six-month policies, respectively. DF&C also underwrites aviation business but cedes it all to TupolevInsure (TvI), a specialty aviation writer for which DF&C acts as a fronting company.[10]

DF&C is reinsured under two different treaties:

- Proportional reinsurance for all lines with 75 percent retention.
- Excess-of-loss treaty for general liability covering losses in excess of $250,000 up to $1,000,000. The applicable reinsurance rate is 1.25 percent of the subject written premiums.

[9]According to CIA recommendations, "A difference is material if it is significant to the user of the financial statements. The member should choose a standard of materiality which will reasonably satisfy each normal user of the financial statements."

[10]Dubois Fire & Casualty Insurance Company, Kosciuzsko Insurance Company, and TupolevInsure are fictitious financial entities. Any resemblance to real companies is purely coincidental.

DF&C and KIC have entered into an intercompany reinsurance arrangement whereby KIC assumes 40 percent of DF&C's exposures (net of all reinsurance) and cedes 25 percent of its exposures to DF&C (also net of all reinsurance). To simplify the calculation, we have assumed that internal adjustment expenses and maintenance expenses are ceded on the same basis.

DF&C has a contingent commission agreement with its independent brokers. Under this agreement, commissions are adjusted on a three-year rolling average basis.

Finally, DF&C participates in the facility association and in the risk sharing pool. The facility association (FA), risk sharing pool (RSP), and plan de répartition des risques (PRR) are residual market pools for automobile insurance in Canada.

Residual markets have been established primarily to ensure insurance availability to high-risk insureds who otherwise would be unable to find affordable insurance. Under the RSP and the PRR, insurers transfer risks written at the insurer's own rates to the pool and receive from the pool a share of all insurers' cessions based on their market share. These are risks that the insurer deems unacceptable according to its own criteria. The business ceded to these pools is subject to a maximum percentage of direct written exposures or premiums. Under FA, risks are underwritten by the FA servicing carriers at FA rates, and losses and expenses are allocated to insurers licensed to write automobile insurance based on their market share.[11]

In the following sections we present an actuarial approach for determining equity in the unearned premium (EQUP). This calculation, in turn, determines the premium deficiency and DPAE. We believe the method and calculations covered represent approaches currently in use by actuaries in their actuarial evaluation.

Section 7 outlines a step by step approach to calculate EQUP for DF&C as of December 31, 1997. Considerations and assumptions involved in the calculations (expected loss ratios, future expenses, contingent commissions, etc.) are discussed in detail.

Later sections deal with discounting, gross premium liability calculations, and the treatment of assumed business in calculating EQUP.

[11] For further information, see Facility Association's *Plan of Operations* and the PRR's *Procedures Manual.*

7 Equity in the Unearned Premium

7.1 Overall Calculations

Exhibit 1 illustrates the process of calculating the equity in the net unearned premium. Similar calculations (shown in Exhibit 4) are done to obtain EQUP on a gross basis.[12] These calculations are in accordance with the CIA standards of practice.

The process starts with unearned premiums. To the extent possible, premiums should be adjusted for retro-rated policies, reinsurance assumed and ceded, or for any other future development on unexpired policies. These adjustments should be done on a line by line basis.

An expected loss ratio, including external (allocated) adjustment expenses (ALAE), by line of business is estimated based on historical experience and current considerations. This calculation and the related assumptions are covered in Section 7.2.

The unearned premium is converted to expected losses by multiplying the unearned premium by the overall estimated ultimate loss ratio. Internal (unallocated) adjustment expenses (IAE), maintenance expenses, and contingent commission adjustments, as well as all other cost adjustments (such as reinsurance costs) are added to the total estimated expected losses. In cases where ALAE is not included in the loss ratio, it should be added to the total as well.

EQUP is calculated as the difference between the unearned premiums and the expected losses and expenses (IAE, ALAE, maintenance expenses, contingent commissions, etc.). Investment income is factored in by discounting future claims and expenses. The maximum allowable DPAE asset is equal to the equity in unearned premium.

In cases where EQUP is negative (i.e., a premium deficiency exists), DPAE must be reduced by the amount of the deficiency. If DPAE is reduced to zero and EQUP remains negative (in other words, if the absolute value of negative EQUP exceeds the deferrable expenses), a premium deficiency must be booked as a liability for the remaining deficiency. Negative EQUP indicates that the unearned premium reserve will not be sufficient to cover future claims and expenses on the unexpired portion of the inforce policies.

Under current OSFI requirements, investment income can be included in the equity calculation only if there is no premium deficiency. We have included the statutory calculations in Exhibit 1.

[12] Exhibits are located after the references and immediately before the appendices.

7.2 Estimated Ultimate Loss Ratio

Exhibit 2 shows the estimation of ultimate loss ratios, including ALAE, for third party liability (TPL). Calculations for the other lines of business are shown in Appendix A, Tables A1–A5. The starting point is the company's historical experience. Because losses tend to be cyclical and the experience of a single year is too small to be reliable, our selection is based on the latest three calendar/accident years. The historical loss ratios are adjusted to the current and expected conditions for the period over which the unearned premium will be earned. These adjustments are discussed below.

For small, volatile, or new lines of business, industry experience can be used to select the loss ratios, with appropriate adjustments for differences between the insurer's operations and industry averages.

On-Level Factors: Premiums are adjusted to their current rate level using on-level factors. These factors are derived from the insurer's rate change history.

In April 1995 DF&C increased accident benefits (AB) rates 30 percent. Following the introduction of Ontario's Bill 59 (Automobile Insurance Rate Stability Act) in 1996 DF&C decreased its rates for both accident benefits (AB) and physical damage (PD) automobile coverages and increased its rates for TPL. The resulting on-level factors exceed 1.00 for TPL and are below 1.00 for AB (except in 1995) and PD coverages.

Catastrophe (CAT) Loading: Historical loss ratios need to be adjusted for catastrophic losses. These losses are rare but large and can significantly distort loss ratios. The losses are smoothed by removing the actual CAT losses from the historical data and adding an appropriate loading. The CAT loading is derived from the experience over a long time period to account for the infrequent nature of these losses. This loading, which varies by line of business, increases the historical loss ratio for each year.

As shown in Exhibit 2, DF&C experienced CAT losses of $435,000 during 1996. We removed this amount from the incurred losses before developing them to ultimate. For TPL, a judgmental loading of 0.3 percent was selected and added to ultimate losses. The CAT losses were not developed to ultimate. We assumed that, because of their unusual nature, case reserves are adequate.

Historical loss ratios also should be adjusted for the impact of large, noncatastrophic losses. A procedure similar to the one described above may be used whereby a judgmental threshold is

set. Individual losses in excess of that threshold are considered large losses, and the amount in excess is removed from historical losses before computing the loss ratios. Selected thresholds ideally should reflect the time value of money and be detrended for older years. For example, assuming a $200,000 threshold for general liability for 1997 and a 10 percent loss trend, the thresholds for 1996 and 1995 should be $181,818 and $165,289, respectively.

Loss Development Factor (LDF): These factors are used to develop reported losses to the ultimate. It is appropriate and often practical to select the reporting pattern implied by IBNR projections, as long as the pattern reflects future claims reporting development.

Trend Factors: Trend factors that reflect inflation in the cost of claims need to be taken into account when projecting ultimate loss ratios. Although business plans may be used to estimate trends, industry data or the company's historical data are probably a better starting point because these data are unbiased and cannot be distorted by pessimistic or optimistic assumptions used by management. Alternatively, trend factors used for ratemaking purposes also can be used.

The smoothed ultimate loss ratios are trended to the average accident date of losses arising from unearned premiums. For one-year policies, the average accident date (AAD) is six months after the policy inception date. The same logic can be applied to determine the accident date of losses that will arise from the unearned premium. Calculations, shown in Appendix F, result in average accident dates of May 1, 1998 and March 1, 1998 for one-year and six-month policies, respectively, assuming premiums are written evenly throughout the year.

Trends are assumed to impact losses uniformly over the year. Losses are trended from the experience period's AAD (July 1) to the AAD of losses arising from the unearned premium (May 1). The last leg of the trending period may not cover a full year (but most likely covers about ten months). Even if some lines could exhibit seasonal trends, it is unlikely that selected trends would be materially different if seasonality were considered.

Loss trends under Bill 59 are expected to differ from those under Bill 164. As a result, DF&C uses two trends for each coverage. Selected TPL trends for Bill 164 and Bill 59 are 5.0 percent and 0.0 percent, respectively. The accident-year 1995 trend factor of

1.068 was calculated by first bringing losses from the average accident date (July 1, 1995) to the effective date of Bill 59 (November 1, 1996) using the 5.0 percent trend. From there, losses were trended for an additional 17 months at 0.0 percent, to the average accident date of the unearned premium (May 1, for one-year policies).

Historical premiums also should be trended to the average writing date (AWD) of the unearned premium, which is September 1, 1997 for one-year policies (November 1, 1997 for six-month policies).[13] The premium trends account for rate group drifts (physical damage), change in insured value (personal property), and policy limit drifts (third party liability). We assume the impact of these factors is not material.

Benefit Changes: Bill 59, which became effective November 1, 1996, introduced significant changes in benefits for Ontario automobile drivers. Assuming that premiums were adjusted to reflect the full impact of Bill 59 on loss costs, the historical loss ratios do not need to be adjusted. In those instances where premium changes do not keep up with loss cost changes, however, historical loss ratios should be adjusted accordingly.

Other Adjustments: There are several other adjustments, including:

- Seasonality—Most of the unearned premium is earned from January to June, with a large portion being earned during the winter months. Seasonal variations in loss ratios impact our selections as the claims level varies by quarter. For example, there are usually more automobile collision claims during the winter months than during the summer months.

  Appendix B shows the distribution of expected loss ratios by month. Table B1 shows that, using the 24th method, the average loss ratio applicable to the unearned premium for automobile is 79.6 percent. The average loss ratio, assuming no seasonality or exposure growth, is 80.4 percent (simple average of the monthly ratios). This implies that a seasonality adjustment factor of 0.990 (79.6 percent/80.4 percent) is applied to the selected loss ratios to account for the difference in the loss ratio levels by month. This reflects the fact that, on average, unearned premiums will generate lower loss

[13] Appendix F shows how these dates were derived.

ratios than if premiums were earned evenly throughout the year.

- Policy Term—Another factor relates to the composition of the insurer's portfolio. The bulk of policies are still 12-month terms. There are companies, however, that primarily offer three-month and six-month policies. For example, niche companies targeting higher risk insureds typically offer three-month and six-month policies. This mix should be taken into account as it impacts trending periods, on-level factors, and seasonality adjustments, among others.
- Changes in Reinsurance Program—For reinsurance contracts made on an accident-year basis, consideration also should be given to changes in the insurer's reinsurance program. Most reinsurance contracts are effective at the beginning of the calendar year. Losses occurring during 1998, arising from a policy underwritten during 1997 (hence attributable to unearned premiums), will be subjected to the 1998 reinsurance program. Adjustment should be made to the historical loss ratios to reflect the prevailing reinsurance program conditions.

  For example, DF&C might decide to double its excess-of-loss (XOL) retention from $250,000 to $500,000, effective January 1, 1998. Assume a $350,000 loss occurs January 15 on a policy that was underwritten during 1997. Under the previous treaty, DF&C's liability was limited to $250,000; under the 1998 terms, DF&C is liable for the full amount. Therefore, the increased retention may or may not increase the loss ratio on the unearned premium depending on the terms of the contract. The selected loss ratio should be adjusted accordingly.

  In this example, the loss ratios on the unearned premium should be increased by the ratio of expected losses under the new XOL treaty to the expected losses under the current XOL treaty.
- Premium Development—As noted earlier, unearned premiums used in EQUP calculations should be fully developed before being multiplied by the ultimate expected loss ratios. Examples of premium development are audit premiums, where the final premium is unknown until the expiration of the coverage. Premium development also may exist on reinsurance assumed business due to a time lag between the time the pri-

mary insurer records the premiums and the time the assuming party reports them. Swing-rated excess-of-loss treaties, which provide for a rate adjustment based on the loss experience, are another example.

- Other—There are other factors that could require adjustments to historical loss ratios. This paper has focused on the factors that actuaries are most likely to encounter. No list, however extensive, can be expected to cover all situations. Actuarial judgment and skills should be used to determine the required adjustment if it is felt the impact is material.

7.3 Internal Adjustment Expenses

Internal adjustment expenses (IAE) will be incurred on future claims. They need to be taken into account when calculating future losses and expenses arising from the unearned premiums.

Future losses should be increased by the ratio of IAE to losses. Ratios of IAE to losses are usually stable. As a result, the IAE loading used in connection with claim liability calculations is a good proxy for the IAE loading on the unearned premium. As can be seen from Exhibit 1, line 10, the selected IAE percentage loading applied to the expected losses yields IAE of $271,000.[14]

7.4 Maintenance Expenses

Maintenance expenses are necessary to maintain and service policies inforce. They must be estimated and accrued as part of the unearned premium. Servicing costs include expenses associated with endorsement, mid-term cancellations, and changes in reinsurance contracts.

These expenses should be expressed as a ratio of the premium, called the maintenance expense ratio (MER):

$$MER = \frac{\text{Maintenance Expenses on Inforce Policies}}{\text{Net Unearned Premiums}}.$$

This ratio is rarely used, given that an accurate estimate of maintenance expenses requires detailed expense studies that can be costly to produce. Instead, one can rely on the P&C-1 Expense Exhibit,[15] which is

[14] As will be seen later, the intercompany reinsurance agreement between DF&C and its parent KIC provides for IAE cession. The $271,000 IAE provision on Exhibit 1 includes $83,000 IAE assumed from KIC (based on the IAE ratio used by KIC's actuary).

[15] P&C-1, Page 80.20.

shown in Appendix G, and identify for each expense category (classification) the portion that belongs to policy maintenance. These expenses are divided by the earned premiums to obtain the maintenance expense ratio to be applied to the unearned premiums. As a result, the maintenance expense ratio shown above can be approximated by calculating for a given period:

$$MER \approx \frac{33\% \times \text{General Expenses}}{\text{Net Unearned Premiums}}.$$

This is based on the assumption that two-thirds of general expenses are front-end expenses and remaining expenses relate to maintenance and servicing policies. The considerations that should be taken into account when selecting this ratio include the insurer's distribution method (companies dealing with brokers may have fewer maintenance expenses than direct writers) and the degree of automation of the servicing insurer's operations.

The resulting maintenance provision is $286,000, which is equal to the selected maintenance expense ratio of 2.5 percent multiplied by the $11.45M net unearned premium provision (excludes FA unearned premiums).[16]

7.5 Contingent Commission

These commissions arise from agreements between insurers and their brokers or agents whereby the insurer may pay additional commissions based on the level and profitability of business produced. There are several kinds of contingent commission arrangements or contracts. In our example, the results are measured in terms of loss ratios and contracts are on a three-year rolling average basis.

Contingent commissions, available from the annual return,[17] are expressed as a percentage of premiums earned during the year. The resulting ratio is applied to unearned premiums. For DF&C, the 0.2 percent ratio yields a $14,000 provision.

7.6 Net Reinsurance Costs

Net reinsurance costs are costs associated with reinsurance such as commissions paid to reinsurance brokers. These costs are reduced by

[16]As mentioned before, the intercompany reinsurance agreement between DF&C and KIC provides for the cession of maintenance expenses.

[17]From page 80.10 row 83.

the reinsurance commissions received from reinsurers. Such costs can be negative (and thus increase EQUP) for those insurers receiving large reinsurance commissions from their reinsurers. A loading approach is used whereby net reinsurance costs incurred during the year are divided by premiums earned during the year. The resulting ratio is applied to the unearned premium reserve.

If the risk transfer is at the expected loss level, no additional expense is included in the reinsurance premium. Therefore, EQUP calculations do not show any reinsurance cost item. If not, there might be a provision for the premium adjustment as a result of the experience level.

Finally, costs associated with the purchase of excess-of-loss protection also should be included. In the DF&C example, the premium is equal to 1.25 percent of the subject written premiums. This translates into a $4,000 provision, which reduces EQUP.

7.7 Adjustment for Retro-Rated Policies

Retro-rated policies allow for premium adjustment based on actual loss experience. The difference between the ultimate premium and the paid premium at the valuation date will dictate the magnitude of the premium adjustment. DF&C does not have retro-rated policies.

8 Discounting

CIA recommends that the premium liabilities provision be established on a present value basis using expected payment patterns. *Recommendations for Property-Casualty Insurance Company Financial Reporting* provides guidance related to the selection of a discount rate and provisions for adverse deviations (PFAD). CIA recognizes, however, that its position is different from some regulators and that its recommendations do not apply in instances where the regulators preclude present value liabilities.[18]

As noted earlier, the statutory premium deficiency must be calculated using undiscounted claims and expenses. The approach shown here is consistent with CIA recommendations. Exhibit 3 shows the

[18]"Pending better definition by the profession of an appropriate provision for adverse deviations, regulation in some jurisdictions requires the liabilities in government financial statements to be the sum, rather than the present value, of those payments. Where there is such a requirement, the recommendation in this section to establish a present value provision does not apply to the valuation of liabilities in government financial statement and (...) it likewise does not apply to the valuation of liabilities in published financial statements." (Section 5.04 of the CIA's *Recommendations* ... .)

calculations required to obtain discount factors applicable to future expected claims and expenses for auto-third party liability (TPL). Appendix D includes calculations for each line of business.

First, an expected payment pattern is selected for each line of business. It is appropriate, and often practical, to select the payment pattern implied by the IBNR projections, as long as it reflects future claims payment.

If future settlements are expected to behave differently than historical paid claims development, the selected patterns should reflect future paid claims development. This could arise from a change in legislation that affects both claims already reported and future claims. This was the case with the implementation of Bill 59 (discussed later). Another good example is found in medical malpractice, where the time allowed for filing a lawsuit after the discovery of an injury is prescribed by the statute of limitations. Extending the statute over a longer period also points to different payout patterns than those used in IBNR projections as, under the revised statute, one would expect claims to be paid over a longer time period.

The payouts are discounted to reflect the time value of money. CIA, without specifically defining an appropriate discount rate, provides guidance in selecting an investment rate of return. Among other things, the selected rate of return should depend on the projected rate of return on the insurer's assets, market rates, the method of reporting investment return and valuing assets, the expected investment expenses, and the expected losses arising from asset default.[19] Based on these considerations, a discount rate of 7 percent for the first five years and 5 percent for future years was selected for DF&C.

When claim liabilities are discounted, the inherent uncertainty again increases. In addition to the risk of underestimating or overestimating the overall amount of the claim liabilities, there are the additional risks that the timing of the future payment of those liabilities or the expected return on investments will differ materially from the assumptions underlying the calculation. Actual claim and external adjustment expense payments could occur more or less rapidly than projected due to random variations and the timing of large claim payments. Also, the yield on assets supporting the liabilities may be affected by capital gains or losses or by significant changes in economic conditions.

CIA standards require that a provision for adverse deviations (PFAD) be included to account explicitly for the uncertainty in the three following variables:

[19]The *Recommendations for Property-Casualty Insurance Company Financial Reporting* provides an extensive list of considerations in Section 5.04.

Table 7
LOB Selected Margins

	Margins		
Line of Business	Claim Development	Reinsurance Recovery	Interest Rate
Auto-TPL	12.5%	5.0%	50 basis points
Auto-AB	10.0%	5.0%	50 basis points
Auto-PD	5.0%	5.0%	50 basis points
Personal property	5.0%	5.0%	50 basis points
General liability	12.5%	5.0%	50 basis points

- Claims development;
- Reinsurance recovery; and
- Interest rate.

Exhibit 3 illustrates how each PFAD is included in the calculation for auto-TPL. The claims development margin, judgmentally selected between 2.5 percent and 15 percent, increases the discounted loss ratio.[20] The reinsurance recovery margin, which varies between 0 percent and 15 percent, provides for the possibility that the insurer will not be able to recover reinsurance receivables. Hence, it is applied to the expected ceded claims (as a percentage of the net unearned premium), and the resulting margin is added to the discounted loss ratio (already loaded with the claims development). Finally, the interest rate margin (varying between 50 and 200 basis points) is treated as an additive factor that decreases the selected discount rate. Table 7 lists the selected margins by LOB.

The selected loss ratios are discounted to the average accident date (AAD) of the unearned premium by multiplying the discounted payment pattern [Column (7) in Exhibit 3] by the undiscounted loss ratios loaded for claims development and reinsurance recovery margins, as described above.

A further step is needed to discount the loss ratio from the average accident date to the evaluation date. The average accident date is four months after the evaluation date. These four months recognize the investment income generated on the unearned premium when the

[20]These selections are based on considerations mentioned in the CIA's *Memorandum on Provision for Adverse Deviations (P&C)* released January 1, 1994.

unearned premium is fully invested. Because part of the unearned premiums is held by brokers for up to 60 days after the policy inception, however, the investment income on premium receivables is credited to the brokers, not to the insurer. The larger the premium receivables as a proportion of the unearned reserve provision, the larger is the offset to the four month additional discount.

The methodology described in this section produces discounted loss ratios, which find their way back in Exhibit 1, where they are applied to the unearned premiums to yield discounted losses. For TPL, the selected undiscounted loss ratio of 72.5 percent, once discounted and loaded with PFAD, is 70.4 percent. As only 50 percent of the unearned premium is held by DF&C, an extra two months (instead of four) of investment income is credited to DF&C, resulting in a 69.6 percent discounted loss ratio. This loss ratio is used in Exhibit 1 to calculate the expected discounted losses arising from the unearned premium. As seen previously, regulators allow investment income in the EQUP calculation as long as the unearned premium reserve is sufficient to cover future undiscounted claims and expenses, i.e., that there is no premium deficiency.

Expenses are also discounted under similar circumstances. Maintenance expenses are incurred until the policy expires. Given that the average earning date of the unearned premium is May 1, 1999, the maintenance expenses provision is discounted four months.

Internal adjustment expenses are discounted using a factor equal to the ratio of the total discounted losses to the total undiscounted losses (excluding any pools such as the facility association where IAE is paid by the pool).

The discount factor applicable to the contingent commissions depends on the length of the period over which the underwriting results (which influence the commissions) are measured. DF&C's agreement with its broker provides for commissions to be determined on a three-year rolling average basis. The average accident date of that period is assumed to be the period's midpoint.[21] The discount rate, the interest rate margin, and the reinsurance recovery margin are the same as those used to discount losses. This is not true of the claims development margin, however. Although the contingent commissions ultimately depend on claims development, they are subject to less volatility than the un-

[21]This assumption does not differ significantly from the theoretically correct answer of 1.48 years

$$(1.065^{-1.48} = \frac{1.065^{-.5} + 1.065^{-1.5} + 1.065^{-2.5}}{3}.$$

derlying losses because the agreement provides for a minimum and a maximum commission. Hence, even though GL losses can be volatile, the impact of their variability on the contingent commissions' level is dampened by these limits. As a result, the claims development margin included in the contingent commissions discount factor is lower than those used in the claims discount. In the DF&C case, the claims development margin was judgmentally set at 5.0 percent, keeping in mind that the impact of the contingent commissions on the resulting EQUP is not significant.

The maximum allowable DPAE, after discounting and subject to the limitation of 30 percent of the total unearned premium, is calculated as the difference between the unearned premium reserve and the sum of the discounted losses and expenses.

9 Gross Calculations

The appointed actuary also must provide an opinion on the gross unearned premium provision, gross DPAE and deferred reinsurance commission, and the gross statutory premium deficiency. The same calculations described earlier must be performed on a gross basis.

The considerations and assumptions used to perform EQUP calculations on a gross basis are similar in most respects to those used for the net calculations described in the previous two sections. This section focuses on the differences and on the issues related to gross calculations.

9.1 Overall Calculations

Exhibit 4 illustrates the calculations needed to derive equity in the gross unearned premiums. It is similar in many respects to Exhibit 1, although there are a number of differences worth noting.

Additional Lines of Business: Insurance companies can act as fronting companies. (They write the business and cede it to the other party.) Companies with low acquisition expenses could follow that strategy when they expect the ceding commissions to outweigh the costs incurred to underwrite the business. Whatever the rationale, the fronting company, even though it has ceded the business to a third party, remains liable to the insureds should the third party go bankrupt or default on its obligations to indemnify

the cedant under the agreement. As such, the gross claims provision needs to account for this liability and, therefore, the calculations underlying the equity in the gross unearned premium should include the additional exposures.

An extra line of business appears on Exhibit 4 to account for the fact that DF&C acts as a fronting company for TupolevInsure (TvI). The undiscounted expected loss ratios should be derived in a manner consistent with the approach described above, using, if possible, the historical loss experience.

The rate used to discount aviation expected claims theoretically should be derived by considering the projected return on TvI's assets and other factors described earlier. This is rarely practical, however, and the returns generated on DF&C's assets are used instead. This is generally a reasonable proxy. The same can be said of the interest rate margin, which should be selected based on TvI's portfolio, but instead is chosen by considering DF&C's portfolio. The claims development margin should reflect the uncertainty of the LOB; the reinsurance recovery margin does not apply.

Maintenance Expenses: Even though the insurer cedes part or all of a policy, it is still responsible for servicing and maintaining the inforce policy. This also holds true for aviation policies underwritten through a fronting agreement. Hence, in order to yield the same expense provision, the maintenance expense ratio will be a lower proportion of the gross unearned premium than it is of the net unearned premium.

Internal Adjustment Expenses: Typically, internal adjustment expenses are not subject to reinsurance and cost the same to the insurer on both gross and net bases. The IAE loading will be a higher proportion of the net unearned premium than it is of the gross unearned premium in order to yield the same IAE provision.

For those less frequent treaties that allow insurers to cede part of their internal adjustment expenses, the IAE ratio will be lower than in the circumstances above and will depend on how many IAE are ceded. Both gross and net loadings could be equal in cases where these expenses are ceded on a quota-share basis.

Discounting: The selected paid loss development factors are not usually the same for gross and net bases. DF&C has a $250,000

excess-of-loss treaty protecting its GL exposures. The gross payment pattern could be longer than the net pattern due to the fact that DF&C stops paying claims once they exceed $250,000. Also, there is no need for the reinsurance recovery PFAD when discounting gross policy liabilities.

9.2 The Discounting Paradigm

The previous subsection highlights the major differences between gross and net calculations. This subsection will briefly discuss a conceptual problem that arises from discounting gross policy liabilities.

As seen before, the discount rate used on a net basis reflects the insurer's projected rate of return, its method of reporting investment return and valuing assets, etc. When selecting a discount rate for gross calculations, the actuary effectively selects a discount rate for the ceded business, which is added to the net business to produce gross figures. Hence, the actuary is implicitly required to make assumptions about the reinsurer's investment portfolio, returns and valuation methods. Although this is conceptually problematic, it often will be reasonable to use the same discount rate on both gross and net bases even though the actuary has little or no knowledge of the reinsurer's investment returns.

In a similar fashion, although the interest rate margin should be based on the reinsurer's portfolio, it often will be reasonable to assume the same margin as the one used for net calculations. On the other hand, the claims development margin could differ between net and gross bases. Under the $250,000 GL excess-of-loss treaty mentioned previously, ceded losses are expected to be more volatile than net losses. In this case, claims development margins used in discounting gross policy liabilities should be at least as high as those used to discount net policy liabilities. If reinsurance were proportional, the claims development margins would be equal under both gross and net bases.

GL exposures are protected under a $250,000 XOL treaty. The gross claims development margin has been set at 15.0 percent, which is higher than the 12.5 percent margin used on a net basis. On the other hand, the proportional treaty under which DF&C cedes 25 percent of its premium (for all LOB) does not warrant selecting different claims development margins for gross discounting calculations.

10 Assumed Business

This section will focus on issues and considerations that arise from situations where the insurer participates in pools and associations or assumes business from other companies. More specifically:

- Facility association and other residual markets; and
- Intercompany reinsurance arrangements.

Under each of these situations, the insurer assumes business from a third party. Although different in nature, a number of analogies can be established between considerations related to ceded business and those that the actuary needs to take into account when factoring in the impact of assumed business on EQUP calculations.

10.1 Facility Association and other Residual Markets

Premiums and claims written by FA and other residual market pools are shared among insurers, also based on each insurer's total market share. Administrative expenses are reimbursed to the carriers, subject to certain limits. Part of the claims expenses also can be refunded.[22]

These pools typically provide participating insurers with a report that indicates the unpaid claims provision and the unearned premium reserve. The selected loss ratio and the discount factor used by the pool's actuary, in connection with his or her year-end valuation of the pool's liabilities, to calculate EQUP are provided to participating insurers. In addition, the pool's actuary provides those insurers with his/her estimates of the pool's premium deficiency. In his/her policy liability report, the insurer's actuary should disclose that he/she has relied on assumptions made by the pool's actuary.

The 92.6 percent loss ratio shown in Exhibit 1 is already discounted and was provided by the pool's actuary. An actuary also could perform a separate calculation instead of using the figure provided by the pool.

[22]For example, the PRR states that "insurers are also entitled to a full reimbursement of outside settlement expenses they have paid on transferred risks, except those expenses relating to claim adjusters; Insurers are however entitled to the reimbursement of fees paid to claim adjusters retained to make the original appraisal of a claim involving bodily injury covered under an Automobile Third Party Liability policy, or to make a supplemental appraisal in exceptional circumstances where an inadmissible or fraudulent claim is suspected, or to uphold the original appraisal of the claim against a formal contestation." Under RSP the allowance is calculated on the basis of the insurer's last approved private passenger automobile rate filing, subject to a maximum.

10.2 Intercompany Reinsurance Arrangements

Intercompany reinsurance arrangements are similar to ceding reinsurance, but to an affiliate or a parent company. They can take many forms. Our example will focus on DF&C's arrangement, which is analogous to proportional reinsurance. Considerations raised by including these arrangements in EQUP calculations are best understood by examining the DF&C example.

Under the agreement, DF&C assumes 25 percent of KIC's exposures (net of any other reinsurance). This increases DF&C's gross unearned premium reserve by $4,250,000. The selected undiscounted loss ratio of 72.5 percent and the 0.931 discount are identical to those used by KIC's actuary in his/her own EQUP calculations. The KIC actuary may use (but he/she is not required to) the same assumptions as used in DF&C calculations when including the exposures KIC is assuming from DF&C. The agreement also will specify if other items such as IAE and maintenance expenses are subject to cession by the parties. Computations of these items should follow the same process.

11 Closing Comments

As our paper illustrates, estimating policy liabilities encompasses much more than calculating the adequacy of the pro-rata unearned premiums in relation to deferred policy acquisition expenses. It consists of examining all assets and liabilities related to an insurer's insurance and reinsurance contracts and ensuring that these assets and liabilities make proper provisions to cover the obligations other than claim liabilities on the contracts. Our approach attempts to address all relevant causes. There may be circumstances particular to some insurers that may necessitate variations in the approach.

We hope this paper has achieved one of our goals, which is to generate more interest in this topic so that eventually more work will be done in developing or refining actuarial approaches to evaluating premium liabilities.

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Exhibit 1
Dubois Fire & Casualty Insurance Company
Equity in Net Unearned Premium Reserve as of December 31, 1997 ($000s)

A. Claims and External Adjustment Expense Data

Line of Business	Net Unearned Premium (a)	Estimated Ultimate Loss Ratio (b) 1995	1996	1997	Selected Undiscounted Loss Ratio (b)	Discount Factor	Discounted Loss Ratio (c)
Auto - Third Party Liability	1,500	0.656	0.681	0.740	0.725	0.960	0.696
Auto - Accident Benefits	2,100	0.958	0.944	0.870	0.900	0.858	0.772
Auto - Physical Damage	2,700	0.620	0.636	0.650	0.650	1.039	0.676
Auto - Total	6,300	0.741	0.749	0.745	0.751	0.949	0.713
Personal Property	600	0.667	0.641	0.594	0.600	1.060	0.636
Liability	300	0.886	0.860	0.978	0.950	0.985	0.936
(1)Total - Voluntary Business	7,200	0.741	0.745	0.742	0.747	0.958	0.716
(1a)Facility	350				0.926	1.000	0.926
(1b)Assumed from KIC	4,250				0.725	0.931	0.675

B. Actual Data Other Than Claims

	1995	1996	1997	Selected
(2)Earned Premiums - Voluntary Business (a)	19,487	22,543	24,546	
(3)Maintenance Exp. [1/3 of Gen. Exp.] (a)	521	540	580	
(4)Maintenance Expense Ratio [(3) / (2)]	2.7%	2.4%	2.4%	2.5%
(5)Selected Internal Adjustment Expense Ratio (d)				3.5%
(6)Contingent Commission Ratio (e)				0.2%

Exhibit 1 (cont.)
Dubois Fire & Casualty Insurance Company
Equity in Net Unearned Premium Reserve as of December 31, 1997 ($000s)

C. Equity in Unearned Premium Reserve

	Undiscounted	Discounted
(7) Unearned Premiums – Voluntary Business [(1)]	7,200	7,200
(7a) Unearned Premiums - Facility Association [(1a)]	350	350
(7b) Unearned Premiums – Assumed from KIC [(1b)]	4,250	4,250
(8) Expected Claims & ALAE – Voluntary Business [(7) × (1) disc.]	5,378	5,152
(8a) Expected Claims & ALAE – Facility Association [(7a) × (1a)]	324	324
(8b) Expected Claims & ALAE – Assumed from KIC [(7b) × (1b)]	3,081	2,869
(9) Maintenance Expenses (f)	286	280
(10) Internal Adjustment Expenses [(5) × (8)] + [2.7% × (8b)] (g)	271	258
(11) Contingent Commissions [(6) × (7)]	14	14
(12) Cost of Excess-of-Loss (h)	1,291	1,537
(13) Equity in Unearned Premium Reserve (i)	4	4
(14) Actual Deferred Policy Acquisition Expenses (a)	2,441	2,900
(15) Statutory Premium Deficiency (j)	1,510	1,510

(a) From DF&C
(b) From Appendix A, Rows (16) and (17)
(c) From Appendix C, Row (17)
(d) From DF&C Policy Liabilities Report as of December 31, 1997
(e) From P&C-1, Page 80.10, Row 83
(f) (4) x [(7) + (7b)] × [Discounted: Appendix C, Row (16)]
(g) KIC's actuary uses a 2.7% IAE ratio
(h) Based on 1.25% of Subject Written Premiums
(i) [(7) + (7a) + (7b) - (8) - (8a) - (8b) - (9) - (10) - (11) - (12)]
(j) Max [(14) - (13) Undiscounted, 0]

Exhibit 2
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Auto – Third Party Liability ($000s)

	1995	1996	1997
(1) Earned Premiums (a)	3,413	3,823	4,013
(2) On-Level Factors (b)	1.321	1.342	1.078
(3) Drift Factors (c)	1.004	1.002	1.000
(4) Ultimate Premium [(1)×(2)×(3)]	4,529	5,140	4,328
(5) Incurred Losses (a)	2,482	3,300	2,454
(6) Incurred CAT Losses (a)	-	435	-
(7) Incurred Normal Losses [(5)-(6)]	2,482	2,865	2,454
(8) Loss Development Factor (d)	1.130	1.210	1.315
(9) Trend Factor (e)	1.068	1.017	1.000
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	2,994	3,524	3,227
(12) Projected Loss Ratio [(11)/(4)]	66.1%	68.6%	74.6%
(13) CAT Loading (g)	0.3%	0.3%	0.3%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	66.3%	68.8%	74.8%
(15) Seasonality Adjustment (h)	0.990	0.990	0.990
(16) Adjusted Loss Ratio [(14)×(15)]	65.6%	68.1%	74.0%
(17) Selected Loss Ratio (g)	72.5%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) From Table B1, row (7)

Exhibit 3
Dubois Fire & Casualty Insurance Company
Discounting of Loss Ratios on Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto – Third Party Liability						
12	2.275	4.349	22.99%	22.99%	0.983	22.61%
24	1.180	1.912	52.31%	29.32%	0.935	27.40%
36	1.035	1.620	61.72%	9.42%	0.873	8.22%
48	1.027	1.565	63.88%	2.16%	0.816	1.76%
60	1.035	1.524	65.61%	1.72%	0.763	1.32%
72	1.035	1.473	67.90%	2.30%	0.717	1.65%
84	1.045	1.423	70.28%	2.38%	0.683	1.62%
96	1.050	1.362	73.44%	3.16%	0.651	2.06%
108	1.050	1.297	77.12%	3.67%	0.620	2.28%
120	1.042	1.235	80.97%	3.86%	0.590	2.28%
132	---	1.000	100.00%	19.03%	0.562	10.70%
Total				100.00%		81.89%
(8) Selected Undiscounted Loss Ratio (c)						72.5%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						88.6%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						4.4%
(12) Selected Claim Development Margin Factor (e)						12.5%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						70.4%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						69.6%

Notes:
(a) Payment pattern from DF&C's paid triangles
(b) Yield rate from DF&C investment returns; three month payment lag in the first year
(c) From Exhibit I – Auto – Third Party Liability
(d) From Exhibits I and IV [(Gross UPR×Gross LR)-(Net UPR×Net LR)]/Net UPR
(e) Judgmentally selected based on CIA standards of practice on PFAD
(f) [Total for Column (7)]×[(8)×{1+(12)}+(11)]
(g) Assumptions: UPR is discounted four months, assuming 12 month policies
(h) From DF&C P&C-1: (Unearned Premium-Premium Receivables)/Unearned Premium

Exhibit 4
Dubois Fire & Casualty Insurance Company
Equity in Gross Unearned Premium Reserve as of December 31, 1997 ($000s)

A. Claims and External Adjustment Expense Data

Line of Business	Gross Unearned Premium (a)	Estimated Ultimate Loss Ratio (b) 1995	1996	1997	Selected Undiscounted Loss Ratio (b)	Discount Factor	Discounted Loss Ratio (c)
Auto - Third Party Liability	3,333	0.656	0.681	0.740	0.725	0.911	0.660
Auto - Accident Benefits	4,667	0.950	0.937	0.863	0.900	0.812	0.731
Auto - Physical Damage	6,000	0.620	0.636	0.650	0.650	0.982	0.638
Auto - Total	14,000	0.739	0.747	0.743	0.751	0.898	0.675
Personal Property	1,333	0.666	0.640	0.593	0.600	1.002	0.601
Liability	667	0.881	0.855	0.972	0.950	0.955	0.907
Aviation (g)	1,650	0.810	0.592	0.643	0.700	0.981	0.687
(1)Total - Voluntary Business	17,650	0.745	0.729	0.731	0.742	0.914	0.679
(1a)Facility	350				0.926	1.000	0.926
(1b)Assumed from KIC	4,250				0.725	0.931	0.675

Exhibit 4 (cont.)
Dubois Fire & Casualty Insurance Company
Equity in Gross Unearned Premium Reserve as of December 31, 1997 ($000s)

B. Equity in Unearned Premium Reserve

	Undiscounted	Discounted
(2) Unearned Premiums - Voluntary Business [(1)]	17,650	17,650
(2a) Unearned Premiums - Facility Association [(1a)]	350	350
(2b) Unearned Premiums - Assumed from KIC [(1b)]	4,250	4,250
(3) Expected Claims & ALAE - Voluntary Business [(7) × (1)]	13,105	11,984
(3a) Expected Claims & ALAE - Facility Association [(7a) × (1a)]	324	324
(3b) Expected Claims & ALAE - Assumed from KIC [(7b) × (1b)]	3,081	2,869
(4) Maintenance Expenses (f)	286	280
(5) Internal Adjustment Expenses [(5) × (8)] + [2.7% × (8b)] (g)	271	258
(6) Contingent Commissions [(6) × (7)]	14	14
(7) Equity in Unearned Premium Reserve (i)	5,168	6,522
(8) Actual Deferred Policy Acquisition Expenses (a)	3,267	3,267
(9) Statutory Premium Deficiency (j)		N/A

(a) From DF&C
(b) From Appendix A, Rows (16) and (17)
(c) From Appendix D, Row (14)
(d) From Exhibit I, Rows (9) through (11)
(e) [(2) + (2a) + (2b) - (3) - (3a) - (3b) - (4) - (5) - (6)]
(f) Max [(8) – (7), 0)
(g) Underwritten through DF&C's fronting agreement with TvI

Appendix A

Table A1
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Auto-Third Party Liability ($000s)

	1995	1996	1997
(1) Earned Premiums (a)	3,413	3,823	4,013
(2) On-Level Factors (b)	1.321	1.342	1.078
(3) Drift Factors (c)	1.004	1.002	1.000
(4) Ultimate Premium [(1)×(2)×(3)]	4,529	5,140	4,328
(5) Incurred Losses (a)	2,482	3,300	2,454
(6) Incurred CAT Losses (a)	-	435	-
(7) Incurred Normal Losses [(5)-(6)]	2,482	2,865	2,454
(8) Loss Development Factor (d)	1.130	1.210	1.315
(9) Trend Factor (e)	1.068	1.017	1.000
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	2,994	3,524	3,227
(12) Projected Loss Ratio [(11)/(4)]	66.1%	68.6%	74.6%
(13) CAT Loading (g)	0.3%	0.3%	0.3%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	66.3%	68.8%	74.8%
(15) Seasonality Adjustment (h)	0.990	0.990	0.990
(16) Adjusted Loss Ratio [(14)×(15)]	65.6%	68.1%	74.0%
(17) Selected Loss Ratio (g)	72.5%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) From Table B1, row (7)

Table A2
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Auto - Accident Benefits
($000's)

	1995	1996	1997
(1) Earned Premiums (a)	4,631	6,245	7,499
(2) On-Level Factors (b)	1.026	0.857	0.954
(3) Drift Factors (c)	1.000	1.000	1.000
(4) Ultimate Premium [(1)×(2)×(3)]	4,751	5,350	7,153
(5) Incurred Losses (a)	3,001	3,432	3,888
(6) Incurred CAT Losses (a)	-	-	-
(7) Incurred Normal Losses [(5)-(6)]	3,001	3,432	3,888
(8) Loss Development Factor (d)	1.128	1.237	1.494
(9) Trend Factor (e)	1.358	1.202	1.083
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	4,597	5,101	6,288
(12) Projected Loss Ratio [(11)/(4)]	96.8%	95.4%	87.9%
(13) CAT Loading (g)	0.0%	0.0%	0.0%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	96.8%	95.4%	87.9%
(15) Seasonality Adjustment (h)	0.990	0.990	0.990
(16) Adjusted Loss Ratio [(14)×(15)]	95.8%	94.4%	87.0%
(17) Selected Loss Ratio (g)	90.0%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) From Table B1, row (7)

Table A3
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Auto- Physical Damage ($000s)

	1995	1996	1997
(1) Earned Premiums (a)	7,501	8,211	8,464
(2) On-Level Factors (b)	0.950	0.951	0.986
(3) Drift Factors (c)	1.007	1.004	1.001
(4) Ultimate Premium [(1)×(2)×(3)]	7,172	7,835	8,347
(5) Incurred Losses (a)	4,411	5,226	5,914
(6) Incurred CAT Losses (a)	-	225	525
(7) Incurred Normal Losses [(5)-(6)]	4,411	5,001	5,389
(8) Loss Development Factor (d)	1.000	0.999	1.012
(9) Trend Factor (e)	1.013	1.003	1.000
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	4,470	5,013	5,454
(12) Projected Loss Ratio [(11)/(4)]	62.3%	64.0%	65.3%
(13) CAT Loading (g)	0.5%	0.5%	0.5%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	62.6%	64.3%	65.7%
(15) Seasonality Adjustment (h)	0.990	0.990	0.990
(16) Adjusted Loss Ratio [(14)×(15)]	62.0%	63.6%	65.0%
(17) Selected Loss Ratio (g)	65.0%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) From Table B1, row (7)

Table A4
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Personal Property ($000s)

	1995	1996	1997
(1) Earned Premiums (a)	3,007	3,251	3,578
(2) On-Level Factors (b)	1.000	1.000	1.000
(3) Drift Factors (c)	1.000	1.000	1.000
(4) Ultimate Premium [(1)×(2)×(3)]	3,007	3,251	3,578
(5) Incurred Losses (a)	2,144	1,986	2,351
(6) Incurred CAT Losses (a)	263	-	411
(7) Incurred Normal Losses [(5)-(6)]	1,881	1,986	1,940
(8) Loss Development Factor (d)	0.992	0.991	1.050
(9) Trend Factor (e)	1.043	1.028	1.012
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	1,946	2,023	2,062
(12) Projected Loss Ratio [(11)/(4)]	64.7%	62.2%	57.6%
(13) CAT Loading (g)	1.0%	1.0%	1.0%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	65.4%	62.8%	58.2%
(15) Seasonality Adjustment (h)	1.020	1.020	1.020
(16) Adjusted Loss Ratio [(14)×(15)]	66.7%	64.1%	59.4%
(17) Selected Loss Ratio (g)	60.0%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) From Table B1, row (7)

Table A5
Dubois Fire & Casualty Insurance Company
Selection of Net Loss Ratios
Liability ($000s)

	1995	1996	1997
(1) Earned Premiums (a)	935	1,013	992
(2) On-Level Factors (b)	1.000	1.000	1.000
(3) Drift Factors (c)	1.004	1.002	1.000
(4) Ultimate Premium [(1)×(2)×(3)]	939	1,015	992
(5) Incurred Losses (a)	642	652	592
(6) Incurred CAT Losses (a)	-	-	-
(7) Incurred Normal Losses [(5)-(6)]	642	652	592
(8) Loss Development Factor (d)	1.055	1.173	1.542
(9) Trend Factor (e)	1.227	1.142	1.062
(10) Other Adjustment Factors (f)	1.000	1.000	1.000
(11) Projected Ultimate Losses [(7)×(8)×(9)×(10)]	832	873	970
(12) Projected Loss Ratio [(11)/(4)]	88.6%	86.0%	97.8%
(13) CAT Loading (g)	0.0%	0.0%	0.0%
(14) Projected Smoothed Loss Ratio (12)×[1+(13)]	88.6%	86.0%	97.8%
(15) Seasonality Adjustment (h)	1.000	1.000	1.000
(16) Adjusted Loss Ratio [(14)×(15)]	88.6%	86.0%	97.8%
(17) Selected Loss Ratio (g)	95.0%		

Notes:
(a) From DF&C
(b) From DF&C's rate change history, using the parallelogram method
(c) Limit drift from Table E2, column (5)
(d) From DF&C's policy liabilities @12/31/97
(e) From Table E1, column (7)
(f) Estimated impact of Bill 59
(g) Judgmentally selected
(h) Judgmentally selected

Appendix B

Table B1
Dubois Fire & Casualty Insurance Company
Seasonality Adjustment Factor
Automobile - All Lines

Month (1)	Monthly Loss Ratios (a) (2)	Unearned Premium Weight (b) (3)	Earned Premium Weight (4)
January	88.0%	0.958	1.000
February	86.4%	0.875	1.000
March	81.5%	0.792	1.000
April	74.3%	0.708	1.000
May	68.1%	0.625	1.000
June	70.1%	0.542	1.000
July	76.7%	0.458	1.000
August	82.2%	0.375	1.000
September	77.4%	0.292	1.000
October	79.3%	0.208	1.000
November	88.8%	0.125	1.000
December	92.2%	0.042	1.000
(5) Average Loss Ratio on the Unearned Premium (c)			79.6%
(6) Average Loss Ratio on the Earned Premium (d)			80.4%
(7) Seasonality Adjustment [(5)/(6)]			0.990

Notes:
(a) From DF&C, based on latest three accident years experience
(b) Based on the 24th method
(c) Weighted average of columns (2) and (3)
(d) Weighted average of columns (2) and (4)

Table B2
Dubois Fire & Casualty Insurance Company
Seasonality Adjustment Factor
Property

Month (1)	Monthly Loss Ratios (a) (2)	Unearned Premium Weight (b) (3)	Earned Premium Weight (4)
January	69.1%	0.958	1.000
February	66.4%	0.875	1.000
March	62.9%	0.792	1.000
April	61.1%	0.708	1.000
May	59.4%	0.625	1.000
June	57.5%	0.542	1.000
July	54.3%	0.458	1.000
August	52.1%	0.375	1.000
September	55.9%	0.292	1.000
October	59.4%	0.208	1.000
November	60.6%	0.125	1.000
December	64.8%	0.042	1.000
(5) Average Loss Ratio on the Unearned Premium (c)			61.5%
(6) Average Loss Ratio on the Earned Premium (d)			60.3%
(7) Seasonality Adjustment [(5)/(6)]			1.020

Notes:
(a) From DF&C, based on latest three accident years experience
(b) Based on the 24th method
(c) Weighted average of columns (2) and (3)
(d) Weighted average of columns (2) and (4)

Appendix C

Notes for Appendix C:
(a) Payment pattern from DF&C's paid triangles
(b) Yield rate from DF&C investment returns; three month payment lag in the first year
(c) From Exhibit I
(d) From Exhibits I and IV [(Gross UPR×Gross LR)-(Net UPR×Net LR)]/Net UPR
(e) Judgmentally selected based on CIA standards of practice on PFAD
(f) [Total for Column (7)]×[(8)×{1+(12)}+(11)]
(g) Assumptions: UPR is discounted four months, assuming 12 month policies
(h) From DF&C P&C-1: (Unearned Premium-Premium Receivables)/Unearned Premium

Table C1
Dubois Fire & Casualty Insurance Company
Discounting of Net Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Third Party Liability						
12	2.275	4.349	22.99%	22.99%	0.983	22.61%
24	1.180	1.912	52.31%	29.32%	0.935	27.40%
36	1.035	1.620	61.72%	9.42%	0.873	8.22%
48	1.027	1.565	63.88%	2.16%	0.816	1.76%
60	1.035	1.524	65.61%	1.72%	0.763	1.32%
72	1.035	1.473	67.90%	2.30%	0.717	1.65%
84	1.045	1.423	70.28%	2.38%	0.683	1.62%
96	1.050	1.362	73.44%	3.16%	0.651	2.06%
108	1.050	1.297	77.12%	3.67%	0.620	2.28%
120	1.042	1.235	80.97%	3.86%	0.590	2.28%
132	---	1.000	100.00%	19.03%	0.562	10.70%
Total				100.00%		81.89%
(8) Selected Undiscounted Loss Ratio (c)						72.5%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						88.6%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						4.4%
(12) Selected Claim Development Margin Factor (e)						12.5%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						70.4%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						69.6%

Table C2
Dubois Fire & Casualty Insurance Company
Discounting of Net Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Accident Benefits						
12	4.000	21.863	4.57%	4.57%	0.983	4.50%
24	1.850	5.466	18.30%	13.72%	0.935	12.82%
36	1.300	2.954	33.85%	15.55%	0.873	13.58%
48	1.180	2.273	44.00%	10.15%	0.816	8.29%
60	1.130	1.926	51.92%	7.92%	0.763	6.04%
72	1.090	1.704	58.67%	6.75%	0.717	4.84%
84	1.070	1.564	63.95%	5.28%	0.683	3.61%
96	1.060	1.461	68.43%	4.48%	0.651	2.91%
108	1.050	1.379	72.53%	4.11%	0.620	2.54%
120	1.045	1.313	76.16%	3.63%	0.590	2.14%
132	---	1.000	100.00%	23.84%	0.562	13.40%
Total				100.00%		74.69%
(8) Selected Undiscounted Loss Ratio (c)						90.0%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						110.0%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						5.5%
(12) Selected Claim Development Margin Factor (e)						10.0%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						78.0%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						77.2%

Table C3
Dubois Fire & Casualty Insurance Company
Discounting of Net Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Physical Damage						
12	2.250	2.555	39.14%	39.14%	0.983	38.48%
24	1.130	1.136	88.05%	48.92%	0.935	45.72%
36	1.004	1.005	99.50%	11.45%	0.873	10.00%
48	1.001	1.001	99.90%	0.40%	0.816	0.32%
60	1.000	1.000	100.00%	0.10%	0.763	0.08%
72	1.000	1.000	100.00%	0.00%	0.717	0.00%
84	1.000	1.000	100.00%	0.00%	0.683	0.00%
96	1.000	1.000	100.00%	0.00%	0.651	0.00%
108	1.000	1.000	100.00%	0.00%	0.620	0.00%
120	1.000	1.000	100.00%	0.00%	0.590	0.00%
132	---	1.000	100.00%	0.00%	0.562	0.00%
Total				100.00%		94.60%
(8) Selected Undiscounted Loss Ratio (c)						65.0%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						79.4%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						4.0%
(12) Selected Claim Development Margin Factor (e)						5.0%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						68.3%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						67.6%

Table C4
Dubois Fire & Casualty Insurance Company
Discounting of Net Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Personal Property						
12	1.375	1.420	70.45%	70.45%	0.983	69.27%
24	1.014	1.032	96.86%	26.42%	0.935	24.69%
36	1.008	1.018	98.22%	1.36%	0.873	1.18%
48	1.005	1.010	99.01%	0.79%	0.816	0.64%
60	1.002	1.005	99.50%	0.50%	0.763	0.38%
72	1.001	1.003	99.70%	0.20%	0.717	0.14%
84	1.002	1.002	99.80%	0.10%	0.683	0.07%
96	1.000	1.000	100.00%	0.20%	0.651	0.13%
108	1.000	1.000	100.00%	0.00%	0.620	0.00%
120	1.000	1.000	100.00%	0.00%	0.590	0.00%
132	---	1.000	100.00%	0.00%	0.562	0.00%
Total				100.00%		96.50%
(8) Selected Undiscounted Loss Ratio (c)						60.0%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						73.3%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						3.7%
(12) Selected Claim Development Margin Factor (e)						5.0%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						64.3%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						63.6%

Table C5
Dubois Fire & Casualty Insurance Company
Discounting of Net Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Liability						
12	2.350	6.984	14.32%	14.32%	0.983	14.08%
24	1.500	2.972	33.65%	19.33%	0.935	18.07%
36	1.405	1.981	50.47%	16.82%	0.873	14.69%
48	1.150	1.410	70.91%	20.44%	0.816	16.69%
60	1.075	1.226	81.55%	10.64%	0.763	8.12%
72	1.050	1.141	87.67%	6.12%	0.717	4.39%
84	1.040	1.086	92.05%	4.38%	0.683	3.00%
96	1.025	1.045	95.73%	3.68%	0.651	2.40%
108	1.010	1.019	98.13%	2.39%	0.620	1.48%
120	1.009	1.009	99.11%	0.98%	0.590	0.58%
132	---	1.000	100.00%	0.89%	0.562	0.50%
Total				100.00%		83.98%
(8) Selected Undiscounted Loss Ratio (c)						95.0%
(9) Ratio of Expected Ceded Claims to Net UPR (d)						116.1%
(10) Reinsurance PFAD (e)						5.0%
(11) Reinsurance Recovery Margin [(9)×(10)]						5.8%
(12) Selected Claim Development Margin Factor (e)						12.5%
(13) Loss Ratio with Margin Discounted to Average Accident Date (f)						94.6%
(14) Average Earning Period for UPR (g)						4
(15) Percentage of Unearned Premium in Invested Assets (h)						50.0%
(16) Discount from Average Accident Date to Evaluation Date (g)						0.978
(17) Discounted Loss Ratio with Margins (13)×[1-(15)×{1-(16)}]						93.6%

Appendix D

Table D1
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Third Party Liability						
12	2.275	4.349	22.99%	22.99%	0.983	22.61%
24	1.180	1.912	52.31%	29.32%	0.935	27.40%
36	1.035	1.620	61.72%	9.42%	0.873	8.22%
48	1.027	1.565	63.88%	2.16%	0.816	1.76%
60	1.035	1.524	65.61%	1.72%	0.763	1.32%
72	1.035	1.473	67.90%	2.30%	0.717	1.65%
84	1.045	1.423	70.28%	2.38%	0.683	1.62%
96	1.050	1.362	73.44%	3.16%	0.651	2.06%
108	1.050	1.297	77.12%	3.67%	0.620	2.28%
120	1.042	1.235	80.97%	3.86%	0.590	2.28%
132	---	1.000	100.00%	19.03%	0.562	10.70%
Total				100.00%		81.89%
(8) Selected Undiscounted Loss Ratio (c)						72.5%
(9) Selected Claim Development Margin Factor (d)						12.5%
(10) Loss Ratio with Margin Discounted to Average Accident Date						66.8%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						66.0%

Notes:

(a) Payment pattern from paid triangles in appendices

(b) Yield rate from DF&C investment returns; three month payment lag in the first year

(c) From Exhibit IV

(d) Judgmentally selected based on CIA standards of practice on PFAD

(e) [Total for Column (7)]×[(8)×[1+(9)]

(f) Assumptions: UPR is discounted four months, assuming 12 month policies

(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Table D2
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Accident Benefits						
12	4.000	21.863	4.57%	4.57%	0.983	4.50%
24	1.850	5.466	18.30%	13.72%	0.935	12.82%
36	1.300	2.954	33.85%	15.55%	0.873	13.58%
48	1.180	2.273	44.00%	10.15%	0.816	8.29%
60	1.130	1.926	51.92%	7.92%	0.763	6.04%
72	1.090	1.704	58.67%	6.75%	0.717	4.84%
84	1.070	1.564	63.95%	5.28%	0.683	3.61%
96	1.060	1.461	68.43%	4.48%	0.651	2.91%
108	1.050	1.379	72.53%	4.11%	0.620	2.54%
120	1.045	1.313	76.16%	3.63%	0.590	2.14%
132	---	1.000	100.00%	23.84%	0.562	13.40%
Total				100.00%		74.69%
(8) Selected Undiscounted Loss Ratio (c)						90.0%
(9) Selected Claim Development Margin Factor (d)						10.0%
(10) Loss Ratio with Margin Discounted to Average Accident Date						73.9%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						73.1%

Notes:

(a) Payment pattern from paid triangles in appendices

(b) Yield rate from DF&C investment returns; three month payment lag in the first year

(c) From Exhibit IV

(d) Judgmentally selected based on CIA standards of practice on PFAD

(e) [Total for Column (7)]×[(8)×[1+(9)]

(f) Assumptions: UPR is discounted four months, assuming 12 month policies

(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Table D3
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Auto - Physical Damage						
12	2.250	2.555	39.14%	39.14%	0.983	38.48%
24	1.130	1.136	88.05%	48.92%	0.935	45.72%
36	1.004	1.005	99.50%	11.45%	0.873	10.00%
48	1.001	1.001	99.90%	0.40%	0.816	0.32%
60	1.000	1.000	100.00%	0.10%	0.763	0.08%
72	1.000	1.000	100.00%	0.00%	0.717	0.00%
84	1.000	1.000	100.00%	0.00%	0.683	0.00%
96	1.000	1.000	100.00%	0.00%	0.651	0.00%
108	1.000	1.000	100.00%	0.00%	0.620	0.00%
120	1.000	1.000	100.00%	0.00%	0.590	0.00%
132	---	1.000	100.00%	0.00%	0.562	0.00%
Total				100.00%		94.60%
(8) Selected Undiscounted Loss Ratio (c)						65.0%
(9) Selected Claim Development Margin Factor (d)						5.0%
(10) Loss Ratio with Margin Discounted to Average Accident Date						64.6%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						63.8%

Notes:

(a) Payment pattern from paid triangles in appendices

(b) Yield rate from DF&C investment returns; three month payment lag in the first year

(c) From Exhibit IV

(d) Judgmentally selected based on CIA standards of practice on PFAD

(e) [Total for Column (7)]×[(8)×[1+(9)]

(f) Assumptions: UPR is discounted four months, assuming 12 month policies

(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Table D4
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Personal Property						
12	1.375	1.420	70.45%	70.45%	0.983	69.27%
24	1.014	1.032	96.86%	26.42%	0.935	24.69%
36	1.008	1.018	98.22%	1.36%	0.873	1.18%
48	1.005	1.010	99.01%	0.79%	0.816	0.64%
60	1.002	1.005	99.50%	0.50%	0.763	0.38%
72	1.001	1.003	99.70%	0.20%	0.717	0.14%
84	1.002	1.002	99.80%	0.10%	0.683	0.07%
96	1.000	1.000	100.00%	0.20%	0.651	0.13%
108	1.000	1.000	100.00%	0.00%	0.620	0.00%
120	1.000	1.000	100.00%	0.00%	0.590	0.00%
132	---	1.000	100.00%	0.00%	0.562	0.00%
Total				100.00%		96.50%
(8) Selected Undiscounted Loss Ratio (c)						60.0%
(9) Selected Claim Development Margin Factor (d)						5.0%
(10) Loss Ratio with Margin Discounted to Average Accident Date						60.8%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						60.1%

Notes:

(a) Payment pattern from paid triangles in appendices

(b) Yield rate from DF&C investment returns; three month payment lag in the first year

(c) From Exhibit IV

(d) Judgmentally selected based on CIA standards of practice on PFAD

(e) [Total for Column (7)]×[(8)×[1+(9)]

(f) Assumptions: UPR is discounted four months, assuming 12 month policies

(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Table D5
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Liability						
12	2.350	6.984	14.32%	14.32%	0.983	14.08%
24	1.500	2.972	33.65%	19.33%	0.935	18.07%
36	1.405	1.981	50.47%	16.82%	0.873	14.69%
48	1.150	1.410	70.91%	20.44%	0.816	16.69%
60	1.075	1.226	81.55%	10.64%	0.763	8.12%
72	1.050	1.141	87.67%	6.12%	0.717	4.39%
84	1.040	1.086	92.05%	4.38%	0.683	3.00%
96	1.025	1.045	95.73%	3.68%	0.651	2.40%
108	1.010	1.019	98.13%	2.39%	0.620	1.48%
120	1.009	1.009	99.11%	0.98%	0.590	0.58%
132	---	1.000	100.00%	0.89%	0.562	0.50%
Total				100.00%		83.98%
(8) Selected Undiscounted Loss Ratio (c)						95.0%
(9) Selected Claim Development Margin Factor (d)						15.0%
(10) Loss Ratio with Margin Discounted to Average Accident Date						91.8%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						90.7%

Notes:

(a) Payment pattern from paid triangles in appendices

(b) Yield rate from DF&C investment returns; three month payment lag in the first year

(c) From Exhibit IV

(d) Judgmentally selected based on CIA standards of practice on PFAD

(e) [Total for Column (7)]×[(8)×[1+(9)]

(f) Assumptions: UPR is discounted four months, assuming 12 month policies

(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Table D6
Dubois Fire & Casualty Insurance Company
Discounting of Gross Premium Liabilities
Discounted Loss Ratios on the Unearned Premium
December 31, 1997

Evaluation Point in Months (1)	Selected Age to Age Factors (a) (2)	Age to Ultimate Factors (a) (3)	Estimated Percentage Paid [1/(3)] (4)	Incremental Percentage Paid (5)	Discount Factor to Average Accident Date (b) (6)	Discounted Percentage Paid (5)×(6) (7)
Aviation						
12	2.371	5.176	19.32%	19.32%	0.983	19.00%
24	1.450	2.183	45.81%	26.49%	0.935	24.76%
36	1.160	1.505	66.43%	20.62%	0.873	18.01%
48	1.097	1.297	77.09%	10.66%	0.816	8.70%
60	1.060	1.182	84.60%	7.51%	0.763	5.73%
72	1.031	1.115	89.68%	5.08%	0.717	3.64%
84	1.019	1.081	92.50%	2.82%	0.683	1.93%
96	1.023	1.061	94.24%	1.74%	0.651	1.13%
108	1.018	1.038	96.37%	2.13%	0.620	1.32%
120	1.019	1.019	98.10%	1.73%	0.590	1.02%
132	---	1.000	100.00%	1.90%	0.562	1.07%
Total				100.00%		86.31%
(8) Selected Undiscounted Loss Ratio (c)						70.0%
(9) Selected Claim Development Margin Factor (d)						15.0%
(10) Loss Ratio with Margin Discounted to Average Accident Date						69.5%
(11) Average Earning Period for UPR (f)						4
(12) Percentage of Unearned Premium in Invested Assets (g)						50.0%
(13) Discount from Average Accident Date to Evaluation Date (f)						0.978
(14) Discounted Loss Ratio with Margins (13)×[1- (15)×{1-(16)}]						68.7%

Notes:
(a) Payment pattern from paid triangles in appendices
(b) Yield rate from DF&C investment returns; three month payment lag in the first year
(c) From Exhibit IV
(d) Judgmentally selected based on CIA standards of practice on PFAD
(e) [Total for Column (7)]×[(8)×[1+(9)]
(f) Assumptions: UPR is discounted four months, assuming 12 month policies
(g) From DF&C P&C-1: (Unearned Premium - Premium Receivables)/Unearned Premium

Appendix E

Table E1
Dubois Fire & Casualty Insurance Company
Calculation of Loss Trend Factors
December 31, 1997

		Selected Annual Trend		Time Spent Under (b)		
Accident Year	Average Accident Date	Bill 164 (a)	Bill 59 (b)	Bill 164 1-Nov-96	Bill 59 1-May-98	Trend Factor (c)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Auto-Third Party Liability						
1995	1-Jul-95	5.0%	0.0%	1.339	1.495	1.068
1996	1-Jul-96	5.0%	0.0%	0.337	1.495	1.017
1997	1-Jul-97	5.0%	0.0%	0.000	0.832	1.000
Auto-Accident Benefits						
1995	1-Jul-95	13.0%	10.0%	1.339	1.495	1.358
1996	1-Jul-96	13.0%	10.0%	0.337	1.495	1.202
1997	1-Jul-97	13.0%	10.0%	0.000	0.832	1.083
Auto - Physical Damage						
1995	1-Jul-95	1.0%	0.0%	1.339	1.495	1.013
1996	1-Jul-96	1.0%	0.0%	0.337	1.495	1.003
1997	1-Jul-97	1.0%	0.0%	0.000	0.832	1.000
Personal Property						
1995	1-Jul-95	1.5%	1.5%	1.339	1.495	1.043
1996	1-Jul-96	1.5%	1.5%	0.337	1.495	1.028
1997	1-Jul-97	1.5%	1.5%	0.000	0.832	1.012
Liability						
1995	1-Jul-95	7.5%	7.5%	1.339	1.495	1.227
1996	1-Jul-96	7.5%	7.5%	0.337	1.495	1.142
1997	1-Jul-97	7.5%	7.5%	0.000	0.832	1.062

Notes:
(a) Bill 164 and Bill 59 impact only automobile coverages
(b) Time span starts at average accident date
(c) [1+(3)]^(5)×[1+(4)]^(6)

Table E2
Dubois Fire & Casualty Insurance Company
Calculation of Drift Factors
December 31, 1997

Accident Year (1)	Average Written Date (2)	Selected Drift Factor (3)	Time Span from Average Written Date to 1-Sep-96 (4)	Drift Factor (5)
Auto-Third Party Liability				
1995	1-Jul-95	0.2%	2.171	1.004
1996	1-Jul-96	0.2%	1.169	1.002
1997	1-Jul-97	0.2%	0.170	1.000
Auto-Accident Benefits				
1995	1-Jul-95	na		na
1996	1-Jul-96	na		na
1997	1-Jul-97	na		na
Auto - Physical Damage				
1995	1-Jul-95	0.3%	2.171	1.007
1996	1-Jul-96	0.3%	1.169	1.004
1997	1-Jul-97	0.3%	0.170	1.001
Personal Property				
1995	1-Jul-95	0.0%	2.171	1.000
1996	1-Jul-96	0.0%	1.169	1.000
1997	1-Jul-97	0.0%	0.170	1.000
Liability				
1995	1-Jul-95	0.2%	2.171	1.004
1996	1-Jul-96	0.2%	1.169	1.002
1997	1-Jul-97	0.2%	0.170	1.000

Notes:
(a) [1+(3)]^(4)

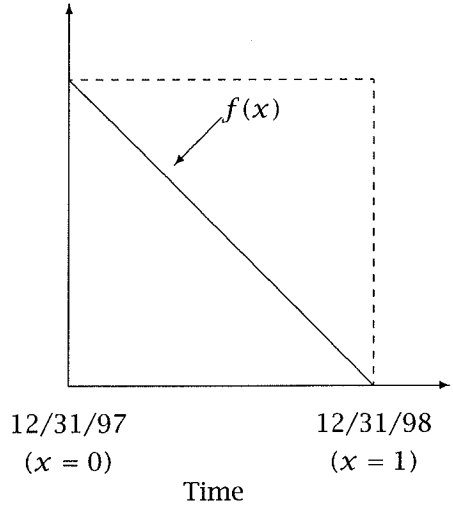
Appendix F

Average Accident Date (AAD) of the Unearned Premium

Figure F1 displays the earning pattern of the 12/31/97 unearned premium reserve through 1998 assuming that the unearned premium density function, $f(x)$, is given by

$$f(x) = \begin{cases} 1 - x & \text{if } 0 \le x < 1 \\ 0 & \text{if } x \ge 1. \end{cases}$$

Figure F1
Earnings Pattern for 1998



The average earning date of the unearned premium can be found by calculating the area of the lower triangle. The following integral calculates the lower triangle's average, which is equal to the average earning date of the 12/31/97 unearned premium reserve:

$$\int_0^1 x f(x) dx = \frac{1}{6}.$$

As this is the mean of the triangle whose area is equal to half a year, the average earning period for the unearned premium is

$$\frac{1}{6} \times 2 \times 12 \text{ months} = 4 \text{ months},$$

and the AAD is thus May 1, 1998. Generally it is assumed that the average accident date of losses is equal to the average earning date of the premium. We can conclude that the average accident date of losses that will arise from the unearned premium is May 1, 1998. The calculation is similar for a six-month policy. It easily can be shown that the resulting AAD is March 1, 1998. This calculation assumes that there is no unusual growth/decline in premium volume.

Average Writing Date (AWD) of the Unearned Premium

Figure F2
Written Premium Pattern for 1998

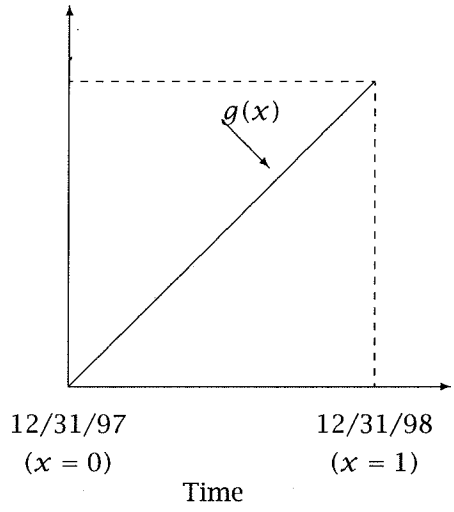


Figure F2 displays the writing pattern, $g(x)$, of the 12/31/97 unearned premium reserve through 1998, where

$$g(x) = \begin{cases} x & \text{if } 0 \le x < 1 \\ 0 & \text{if } x \ge 1. \end{cases}$$

The average writing date of the unearned premium can be found by calculating the area of the lower triangle. The lower triangle's average, which is equal to the average writing date of the 12/31/97 unearned premium reserve, is given by:

$$\int_0^1 xg(x)dx = \frac{1}{3}.$$

As this is the mean of the triangle whose area is one half of the year, the average earning period for the unearned premium is

$$\frac{1}{3} \times 2 \times 12 \text{ months} = 8 \text{ months},$$

and the AWD is thus September 1, 1997.

The calculation is similar for a six-month policy. It easily can be shown that the resulting AWD is November 1, 1998.

Appendix G

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Insurer Year

Expenses - Total

($000)

Expense Classification		Applicable to Insurance Operations				
		Acquisition Expenses				
		Deferred at End of Year (01)	Attributable to the Year* (02)	General Expenses (04)	Net Internal Adjustment Expenses (06)	Investment Expenses (08)
Salaries	02					
Employee benefits	04					
Employee acquisition	06					
Occupancy	08					
Advertising	10					
Agency (excl. commiss.)	12					
Auto & travel	14					
Allowance-doubtful accnts	16					
Bureaus & associations	18					
Directors remuneration	20					
Donations	22					
EDP & statistical	24					
Furniture & equipment	26					
Home office overhead	28					
Inspections, investigations	30					
Insurance	32					
Management fees	34					
Postage & courier	36					
Printing & stationery	38					
Professional fees	40					
Telephone, other comm.	42					
Miscellaneous	44					
	46					
Regulatory assessments	48					
Total	89					

*Total on line 89 to be reported on page 20.30. line 14

Appendix H—Sheet 1
Expression of Opinion

I have valued the policy liability of XYZ Insurance Company for its balance sheet at December 31, 19xx and their change in the statement of income for the year then ended in accordance with accepted actuarial practice, including selection of appropriate assumptions and methods. I am satisfied that the data utilized are reliable and sufficient for the valuation of these liabilities. I have verified the consistency of the valuation data with the company's financial records.

(Qualifications should be included here.)

The results of my valuation with items from the Annual Return are the following:

	Carried in Annual Return ($000)	Actuary's Estimate ($000)
Policy liabilities in connection with unpaid claims		
Direct unpaid claims and adjustment expenses	$	$
Direct unpaid claims and adjustment expenses	$	$
Assumed unpaid claims and adjustment expenses	$	$
Gross unpaid claims and adjustment expenses	$	$
Ceded unpaid claims and adjustment expenses	$	$
Net unpaid claims and adjustment expenses	$	$
Policy liabilities in connection with unearned premiums		
Gross policy liabilities in connection with unearned premiums		$
Net policy liabilities in connection with unearned premiums		$
Gross unearned premiums	$	
Net unearned premiums	$	
Deferred policy acquisition expenses	$	
Maximum policy acquisition expenses deferrable		$
Premium deficiency	$	$
Other policy liabilities – Net	$	$

In my opinion, the amount of policy liabilities makes appropriate provision for all policyholders' obligations and the annual return fairly presents the results of the valuation.

_____ _____

Signature of Actuary Date Opinion was Rendered

Fellow, Canadian Institute of Actuaries

_____

Printed name of Actuary

Appendix H—Sheet 2
Expression of Opinion

I have valued the policy liability of XYZ Insurance Company for its balance sheet at December 31, 19xx and their change in the statement of income for the year then ended in accordance with accepted actuarial practice, including selection of appropriate assumptions and methods. I am satisfied that the data utilized are reliable and sufficient for the valuation of these liabilities. I have verified the consistency of the valuation data with the company's financial records.

The results of my valuation with items from the Annual Return are the following:

	Carried in Annual Return ($000)	Actuary's Estimate ($000)
Policy liabilities in connection with unpaid claims		
Direct unpaid claims and adjustment expenses	$	$
Assumed unpaid claims and adjustment expenses	$	$
Gross unpaid claims and adjustment expenses	$	$
Unpaid claims recoverable from other insurers under the loss transfer provisions	$	$
Ceded unpaid claims and adjustment expenses	$	$
Net unpaid claims and adjustment expenses	$	$
Policy liabilities in connection with unearned premiums		
Gross policy liabilities in connection with unearned premiums		$
Net policy liabilities in connection with unearned premiums		$
Gross unearned premiums	$	
Net unearned premiums	$	
Deferred policy acquisition expenses	$	
Unearned commission	$	
Maximum policy acquisition expenses deferrable		$
Premium deficiency	$	$

In my opinion, the amount of policy liabilities makes appropriate provision for all policyholders' obligations and the annual return fairly presents the results of the valuation.

Joe Doe, Montreal, Quebec
Fellow, Canadian Institute of Actuaries