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**GAAP ACCOUNTING FOR REINSURANCE ACCEPTED**

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**ABSTRACT**

The paper describes an approach for determining reserves for reinsurance accepted for use in financial statements prepared according to generally accepted accounting principles. Separate formulas and procedures are described for use for risk premium reinsurance and for coinsurance. In each case the appropriate reserves for nonrefunding reinsurance are described. The adjustments then necessary to adjust for experience refunding reinsurance are presented.

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**INTRODUCTION**

**T**HIS paper describes the theory underlying the accounting procedures used by the Lincoln National Life Insurance Company for reinsurance accepted in general-purpose financial statements. In considering the appropriateness of these or similar procedures for another company, it is important to keep in mind that the volume of reinsurance in force with the Lincoln National is substantially greater than for most companies and that reinsurance constitutes a major line of business for the company. Companies with smaller amounts of reinsurance in force undoubtedly will find less complicated procedures appropriate.

It is hoped that this paper may provide a theoretical basis on which a company can evaluate the materiality of simplified procedures for accounting for reinsurance accepted. In addition, certain new theoretical concepts are presented, particularly with reference to accounting for experience refunds. Some actuaries also may be interested in the calendar-year approach to developing GAAP reserve factors.

This paper does not consider deferred tax accounting. Adjustments for deferred taxes are made in bulk for the company as a whole.

**RISK PREMIUM REINSURANCE**

About half the reinsurance in force is on the risk premium reinsurance (RPR) plan. Because the reinsured company purchases reinsurance for the difference between the face amount and the reserve under the policy, the reinsurer's death benefit usually decreases with duration. However, the reinsurance premium per unit of death benefit increases with both

attained age and duration. The net result is a premium which could increase or decrease from year to year but which usually increases.

The American Institute of Certified Public Accountants audit guide does not address itself specifically to reinsurance, and the principles discussed in the guide do not consider specifically the special characteristics of RPR. A basic decision was necessary as to whether premiums and benefits should be recognized in proportion to premium income, in proportion to the death benefit, or in proportion to the original face amount reinsured. It was felt that it would be possible to select any of these approaches and still produce results consistent with generally accepted accounting principles. Recognition of premiums in proportion to either premium income or the death benefit would result in recognition of profit in a manner substantially different from the pattern that would result if the reinsurance were accepted on a coinsurance or a modified coinsurance basis. Coinsurance, modified coinsurance, and RPR are considered variations of the same basic program and are priced to generate substantially the same level of profits. It seemed illogical for the accounting system to develop different profit patterns from variations of basically the same product. Accordingly, it was decided that, for RPR, premiums and benefits should be recognized in proportion to the renewing amounts of original face amount of insurance. This approach has the further advantage of being most consistent with the accounting method used for directly written insurance.

To follow the more traditional procedure of calculating terminal reserve factors and then mean reserve factors would be very complicated for experience refunding reinsurance, because the experience refunds are calculated and paid on a calendar-year basis. Instead, the reserve calculations were made on a calendar-year basis, thereby producing mean reserve factors directly.

The amount of acquisition expense which varies directly with new business is so small as to be almost negligible. Although some of the other issue and selling expense might logically be deferred, we chose not to do so. Even this expense, on a unit basis, is small in relation to expense levels for other lines of insurance. By not deferring any acquisition expense and by assuming that renewal expenses per unit of original face amount are level, it was possible to exclude entirely from the reserve calculation all expenses other than premium tax reimbursements.

The basic approach is to calculate the net cash flow for each calendar year net of benefits and tax reimbursements and without considering reserves. By dividing the present value at issue of this net cash flow over the life of the policy by the present value of a unit of mean insurance in

force per year, the average net cash flow per year per unit of mean insurance in force is determined. The GAAP reserve is then that reserve which produces this amount as profit per unit of mean in-force each year. This is equivalent to the net premium approach more normally used.

*Nonrefunding RPR*

The following formulas were used to calculate reserves for nonrefunding RPR:

- $n_x$  = Net amount at risk reinsured in policy year  $x$  per unit of face amount;
- $q_x$  = Mortality rate for policy year  $x$ ;
- $w_x$  = Termination rate excluding deaths for policy year  $x$ ;
- $i_y$  = Interest rate for calendar year  $y$ ;
- $s_y$  = Premium tax rate for calendar year  $y$ ;
- $pI$  = Reinsurance premium per thousand reinsured, excluding policy fee, for policy year  $x$ ;
- $f_x$  = Policy fee per policy for policy year  $x$ ;
- $a$  = Average face amount of policy in thousands;
- $F_x$  = Face amount in force at beginning of policy year  $x$ ;
- $M_y$  = Mean face amount in force in calendar year  $y$ ;
- $A_y$  = Discount factor for end of calendar year  $y$ ;
- $B_y$  = Net income after benefits and tax reimbursements for calendar year  $y$  but before reserve charges and other expenses, accumulated to the end of the year;
- $B$  = Present value of profits at issue (before expenses);
- $C_y$  = GAAP profit in calendar year  $y$  (before expenses);
- $D_y$  = GAAP reserve at end of calendar year  $y$ .

Terminations other than deaths are assumed to occur at the end of the policy year. Deaths for a policy year are assumed to occur half at the end of the first quarter-year and half at the end of the third quarter-year. Premium tax reimbursements are assumed to occur at the end of the calendar year.

$$\begin{aligned}
 F_0 &= 0, \quad F_1 = 1, \quad F_x = F_{x-1}(1 - q_{x-1} - w_{x-1}) \quad \text{for } x > 1; \\
 M_y &= 0.5[F_{y-1}(1 - 0.75q_{y-1}) + F_y(1 - 0.25q_y)]; \\
 A_1 &= (1 + i_1)^{-1/2}, \quad A_y = A_{y-1}/(1 + i_y) \quad \text{for } y > 1 \\
 B_y &= F_y(p_y n_y + f_y/a)[(1 + i_y)^{1/2} - s_y] \\
 &\quad - 0.125q_{y-1}p_{y-1}n_{y-1}F_{y-1}[(1 + i_y)^{3/4} - s_y] \\
 &\quad - 0.375q_y p_y n_y F_y [(1 + i_y)^{1/4} - s_y] - 0.5q_{y-1}n_{y-1}F_{y-1}(1 + i_y)^{3/4} \\
 &\quad - 0.5q_y n_y F_y (1 + i_y)^{1/4}
 \end{aligned}$$

$$B = \sum_{v=1}^w B_v A_v \quad (w \text{ is the calendar year in which age 99 is reached})$$

$$C_v = M_v(1 + i_v)^{1/2} B / \left( \sum_{t=1}^w M_t(1 + i_t)^{1/2} A_t \right);$$

$$D_v = (1 + i_v) D_{v-1} + B_v - C_v \quad (D_0 = 0).$$

#### *Experience Refunding RPR*

When the reinsurance is on an experience refunding basis, the above formulas must be modified to include the payment of the experience refund. For most RPR, experience refunds are computed according to the following formula:

$$\text{Refund} = 0.5(\text{Earned premium} + \text{production adjustment} \\ - \text{claims} - \text{expense charge}).$$

The earned premium is the mean of the premium paid in the current calendar year and that paid in the previous year, both premiums excluding policy fees. The production adjustment equals half the increase in premiums over the previous year, positive or negative. The expense charge is a constant percentage,  $e$ , of the earned premium.

If  $P$  is the current year's premium excluding policy fees,  $P_{-1}$  is the previous year's premium excluding policy fees, and  $C$  is the amount of claims, this formula is

$$\text{Refund} = (0.5 - 0.25e)P - 0.25eP_{-1} - 0.5C.$$

If the refund, so calculated, is negative, no refund is paid, and the deficit is carried forward without interest to the next calendar year. Any deficit not offset within a specific number of years—typically three or four—is written off.

Experience refunds are considered in the GAAP reserve calculation by including a charge against each year's net cash flow based on the above formula. If  $R_v$  is the refund charge for calendar year  $v$ , it is computed as follows, assuming payment at the end of the calendar year:

$$R_v = (0.5 - 0.25e)[P_v n_v F_v - 0.125q_{v-1}P_{v-1}n_{v-1}F_{v-1} \\ - 0.375q_v P_v n_v F_v] \\ - 0.25e[P_{v-1}n_{v-1}F_{v-1} - 0.125q_{v-2}P_{v-2}n_{v-2}F_{v-2} \\ - 0.375q_{v-1}P_{v-1}n_{v-1}F_{v-1}] \\ - 0.5[0.5q_{v-1}n_{v-1}F_{v-1} + 0.5q_v n_v F_v].$$

The formulas for the present value of net income and for the GAAP reserve are then modified to the following:

$$B = \sum_{y=1}^w (B_y - R_y) A_y, \quad D_y = (1 + i_y) D_{y-1} + B_y - R_y - C_y.$$

The procedures described above assume that, if experience follows the valuation assumptions, the aggregate amount of experience refunds paid can be determined by assuming that the refund for each individual account can be calculated under the assumption that valuation assumptions are realized and the results accumulated. In fact, even if aggregate experience follows valuation assumptions, some accounts will have more favorable experience and some less favorable. Those accounts with favorable experience will have increased refunds; those with less favorable experience, reduced refunds. If it could be assumed that overall average mortality implies that the increased refunds from accounts with favorable experience offset the reduced refunds from accounts with unfavorable experience, use of the average refund would be appropriate. However, for those accounts with unfavorable experience, the refund never can be less than zero. Instead, the negative refund is carried forward and used to offset the positive refunds, if any, of future years. Those future years' reductions in experience refunds attributable to losses carried forward from a given year more properly should be recognized in the year the losses occurred. Hence it is appropriate to reduce the reserves by the expected amount by which future years' experience refunds will be reduced because of existing loss carry-forwards. Those expected values are discounted for interest.

The percentage of a given year's loss of carry-forwards which are used to reduce the subsequent years' experience refunds was determined by a study of past experience and found to be a relatively stable quantity.

At the end of a given year, the present value of the amounts by which future refunds would be reduced because of losses generated in the given year will always be less than the understatement of the expected experience refunds introduced by assuming that all accounts experience average mortality. Part of the difference is attributable to the loss of interest because losses are not carried forward with interest and part to the fact that a certain portion of the loss carry-forwards will be written off, since sufficient profits are not generated before the expiration of the carry-forward time. The average value of this difference was determined, on the basis of past experience, as a percentage of the earned premium and was introduced into the reserve calculations by reducing

the expense charge a constant amount. The expense charge, therefore, was determined as the average expense charge for all RPR accounts less the average value of loss carry-forwards not offset against future experience and the value of the lost interest on the loss carry-forwards.

#### COINSURANCE AND MODIFIED COINSURANCE

Coinsurance and modified coinsurance are much more similar to directly written life insurance than is RPR. Accordingly, many procedures which are applicable to direct insurance are also applicable here. However, the treatment of dividends and the experience refunds are complicating factors.

For coinsurance and modified coinsurance, the reinsured company is reimbursed for its commissions and a portion of its other expenses, according to an agreed-on formula. For the purpose of determining GAAP reserves, these reimbursements are considered acquisition costs. As with RPR, it might also be appropriate to consider a part of the reinsurer's issue and selection costs as acquisition costs. This was not done. Accordingly, only those expenses which are reimbursed to the original company are deferred.

The reimbursed commissions and expense allowances are reserved for separately in order that this expense portion of the reserve may be presented on the asset side of the balance sheet.

#### *Nonrefunding Coinsurance*

Except for the following, the same notation is used as for RPR:

- $b_x$  = Death benefit per unit of face amount for policy year  $x$ ;
- $p_x$  = Gross premium per unit of face amount for policy year  $x$ ;
- $d_x$  = Dividend per unit of face amount for policy year  $x$ ;
- $H_x$  = Cash value per unit of face amount for policy year  $x$ ;
- $c_x$  = Commissions and expense allowances, as a percentage of premium, for policy year  $x$ ;
- $M_y$  = Premium earned in calendar year  $y$ ;
- $B_y$  = Net cash income for calendar year  $y$  after claims and other benefits but before reimbursement of commissions and other expenses and reserve charges, accumulated to the end of the year;
- $E_y$  = Commissions and other reimbursed expenses in calendar year  $y$ ;
- $D_y$  = GAAP benefit reserve at end of calendar year  $y$ ;
- $S_y$  = GAAP expense reserve at end of calendar year  $y$ ;
- $B$  = Present value at issue of profits before commissions and other expenses;

$E$  = Present value at issue of commissions and other reimbursed expenses.

Dividends are assumed paid at the end of the policy year.

$$F_0 = 0, \quad F_1 = 1, \quad F_x = F_{x-1}(1 - q_{x-1} - w_{x-1}) \quad \text{for } x > 1$$

$$M_y = 0.5p_{y-1}F_{y-1}(1 - 0.75q_{y-1}) + 0.5p_yF_y(1 - 0.25q_y);$$

$$A_1 = (1 + i_1)^{-1/2}, \quad A_y = A_{y-1}/(1 + i_y) \quad \text{for } y > 1;$$

$$\begin{aligned} B_y = & p_yF_y[(1 + i_y)^{1/2} - s_y] - 0.125q_{y-1}p_{y-1}F_{y-1}[(1 + i_y)^{3/4} - s_y] \\ & - 0.375q_y p_y F_y [(1 + i_y)^{1/4} - s_y] - 0.5q_{y-1}b_{y-1}F_{y-1}(1 + i_y)^{3/4} \\ & - 0.5q_y b_y F_y (1 + i_y)^{1/4} - w_{y-1}F_{y-1}H_{y-1}(1 + i_y)^{1/2} \\ & - d_{y-1}F_{y-1}(1 - q_{y-1})(1 + i_y)^{1/2}; \end{aligned}$$

$$\begin{aligned} E_y = & p_yF_yc_y[(1 + i_y)^{1/2} - 0.375q_y(1 + i_y)^{1/4}] \\ & - 0.125p_{y-1}c_{y-1}q_{y-1}F_{y-1}(1 + i_y)^{3/4}; \end{aligned}$$

$$B = \sum_{t=1}^w B_t A_t - H_w F_w A_w;$$

$$E = \sum_{t=1}^w E_t A_t;$$

$$D_y = (1 + i_y)D_{y-1} + B_y - M_y(1 + i_y)^{1/2}B / \left[ \sum_{t=1}^w M_t(1 + i_t)^{1/2}A_t \right]$$

( $D_0 = 0$ );

$$S_y = (1 + i_y)S_{y-1} - E_y + M_y(1 + i_y)^{1/2}E / \left[ \sum_{t=1}^w M_t(1 + i_t)^{1/2}A_t \right]$$

( $S_0 = 0$ ).

The treatment of dividends warrants special mention. These represent the reinsurer's share of the dividends paid by the original company to the policyholder, computed according to the original company's actual scale of dividends. Unlike dividends in the more usual sense, they do not represent distributions of surplus of the reinsurer but, rather, are a contractual benefit, not subject to the discretion of the reinsurer and not contingent on the experience of the insurance reinsured. There is a presumption that changes in the scale of dividends will reflect changes in overall insurance experience, so that excess earnings may be a source for paying these additional dividends. However, there is no assurance

that this would be the case. Neither is there any assurance that the reinsurer would participate in the favorable earnings which led to the dividend change.

For lack of a better alternative, the original company's dividend scale at the time the policies were issued was selected as the best assumption for the expected cost of dividends. Thus, differences between dividends actually paid and those assumed in the reserve calculation represent an additional source of profit or loss to the reinsurer. It was hoped that the profit or loss from this source would tend to be offset by profits and losses from other sources.

#### *Nonrefunding Modified Coinsurance*

Modified coinsurance was treated exactly the same as coinsurance, except that the interest rate assumed was chosen so as to be consistent with the interest rate used for the mean reserve adjustment. This introduced a minor theoretical error. The mean reserve adjustment interest rate applies only to the reserve which the reinsurer transfers back to the reinsured. This is the statutory reserve. Theoretically, there should be an adjustment based on the difference between the mean reserve adjustment rate and the Lincoln National's earned rate applied to the difference between the statutory reserve and the GAAP reserve. Because the amount of reinsurance for which the mean reserve adjustment rate differed substantially from the Lincoln National's net earned rate was very small, this adjustment was ignored.

#### *Experience Refunds*

A substantial part of the coinsurance and modified coinsurance is on an experience refunding basis. For a given account the experience refund formula is used to calculate the statutory profit for the year, recognizing all sources of profit and loss other than the reinsurer's administrative expenses. From this gross profit, a specified expense and contingency charge is made, leaving the net profit. Half this net profit is returned to the reinsured company, although the payment of part of this experience refund is deferred through holding it in a contingency reserve. That contingency reserve is accumulated with interest and may be used to offset any net losses in future years. Any net losses in excess of amounts which may be charged against the positive contingency reserves are accumulated through a negative contingency reserve, which in effect carries forward with interest those losses to be charged against future profits.

The nature of the experience refund introduces two new complications.



First, as with RPR, there is a need to identify that portion of existing loss carry-forwards which can be expected to be charged against future profits. As with RPR, this value should be deducted from the overall reserves. Second, because experience refunds are calculated and paid on a statutory basis, timing differences are introduced which must be recognized in the accounting system.

The timing differences are recognized through the developing of an additional reserve item, the "refund reserve." That reserve is determined in the following manner. Let  $W_y$  be the expected experience refund for calendar year  $y$ .

$$W_y = 0.5\{B_y - E_y - [r_y F_y(1 - \frac{1}{2}q_y) - (1 + i_y)r_{y-1}F_{y-1}(1 - \frac{1}{2}q_{y-1})] - g_y\},$$

where  $r_y$  is the statutory reserve per thousand in policy year  $y$  and  $g_y$  is the expense charge for calendar year  $y$ . The expense charge is generally a fixed amount per thousand of mean in-force, so that

$$g_y = 0.5K[F_{y-1}(1 - \frac{1}{2}q_{y-1}) + F_y(1 - \frac{1}{2}q_y)].$$

If  $W$  is the present value at issue of refunds,

$$W = \sum_{y=1}^{\infty} W_y A_y,$$

the refund reserve,  $T_y$ , is given by

$$T_y = (1 + i_y)T_{y-1} - W_y + M_y(1 + i_y)^{1/2}W / \left[ \sum_{t=1}^{\infty} M_t(1 + i_t)^{1/2}A_t \right] \quad (T_0 = 0).$$

This refund reserve has the effect of apportioning the expected cost of experience refunds uniformly over the policy's premium-paying period. Actual payment of experience refunds is on a statutory basis and, therefore, is deferred until acquisition costs are recovered. Therefore,  $T_y$  normally is positive. At least theoretically, it is possible that statutory refunds would be paid earlier than on a GAAP basis, in which case  $T_y$  would be negative. It still would be appropriate to carry this negative reserve if the negative contributions from a given policy are used to reduce the positive contributions of other policies.

Let  $T$  be the aggregate refund reserve for a given reinsurance account. This would be the appropriate total reserve to establish if experience refunds were paid exactly as earned on a statutory basis. As mentioned previously, part of the experience refunds are held in a contingency

reserve rather than paid immediately to the reinsured company. The amount of this contingency reserve is denoted by  $CR$ . Normally this contingency reserve would be an additional liability. If experience has been sufficiently unfavorable that losses have developed, those losses are carried forward with interest through use of a negative contingency reserve. If it is expected that the losses can be recovered out of future profits, it is appropriate to take credit for such recoveries through use of a negative reserve. In either case, it is appropriate to carry the positive or negative contingency reserve as a positive or negative liability in addition to the aggregate refund reserve. If, for a given account, the amount of negative contingency reserve is larger than can be expected to be recovered out of future profits, the amount of total negative refund reserve which can be used to offset other reserves must be limited.

The present value of future experience refunds for a given policy is given by the following formula:

$$V_v = \left[ \sum_{t=v+1}^w W_t A_t \right] / A_v .$$

Let  $V$  equal the aggregate amount of present value of future refunds for a given account.

If a deficit is being carried forward, that is, if the contingency reserve ( $CR$ ) is negative, and if the amount of that deficit is less than the present value of future refunds, it is appropriate to take full credit for the deficit on the premise that, if assumptions follow expected, that deficit would serve to reduce future refunds which would otherwise be payable. The total reserve for the particular account would thus be  $T + CR$  ( $CR$  being negative).

If the expected amount of future refunds is not adequate to offset past deficits, the credit taken should be limited to the expected value of future refunds, so that the total reserve would be  $T - V$ .

Algebraically,

$$\begin{aligned} \text{If } V \geq -CR \text{ and } CR \leq 0, \quad \text{reserve} &= T + CR ; \\ \text{If } V \leq -CR \text{ and } CR \leq 0, \quad \text{reserve} &= T - V . \end{aligned}$$

Special consideration must be given to the situation in which, for an entire account, no refunds would be generated if experience followed the actuarial assumptions. This does not mean necessarily that no experience refunds would be paid—experience more favorable than was assumed may make payment of experience refunds possible. A situation in which the valuation assumptions produce no expected refund can be identified by noting that these circumstances will result in release of a negative

experience refund by the GAAP reserving structure. Because, prospectively, the refund reserve equals the present value of future refunds paid less the future amounts released by the reserving structure, if those amounts are negative the present value of future refunds will be less than the refund reserve—that is,  $V < T$ .  $V$  could be negative, and it is even possible that both  $V$  and  $T$  could be negative.

Whenever  $V$  is less than  $T$ , it is appropriate to consider whether or not future refunds will be paid if experience follows valuation assumptions. If the test indicates that future refunds will be paid, it follows that those refunds must necessarily be attributable to past favorable experience. The amount of those future refunds should be established as a reserve in order that past experience is charged for the cost of those refunds. The amount of expected future refunds is equal to  $V + CR$ . If this sum is negative, no reserve should be established.

Finally, it should be noted that the formulas which apply when  $CR \leq 0$  also apply when  $CR > 0$ , as long as  $V \geq T$ .

The amounts of refund liabilities which are needed can therefore be summarized by looking at four situations:

	Total Reserve
A. $V \geq -CR, V \geq T$ .....	$CR + T$
B. $V \leq -CR, V \geq T$ .....	$T - V$
C. $V \geq -CR, V \leq T$ .....	$CR + V$
D. $V \leq -CR, V \leq T$ .....	0



## DISCUSSION OF PRECEDING PAPER

FRANK W. KLINZMAN:

Mr. Robertson has written a timely paper on the method of GAAP Accounting for reinsurance accepted. In the hope that further light might be shed upon this subject, I thought it might be appropriate to outline the basic approach to GAAP reinsurance accepted that we are using at General Reassurance.

### *YRT Reinsurance Accepted*

We developed special GAAP factors for a total GAAP reserve and a GAAP reserve for the benefit portion only. The difference between these two GAAP reserves determined the deferred expense asset. In determining these special GAAP factors, we assumed that the benefits and expenses ran for twenty years. After that time we assumed that there was no deferred expense asset and that the benefit GAAP reserve equaled the statutory reserve.

In calculating these GAAP factors, we assumed an amount-at-risk runoff which would be applicable to all our yearly renewable term (YRT) reinsurance accepted. This overall amount-at-risk runoff was based upon the results of samples taken from a typical block of this business.

A basic question we had to answer was what the pattern of revenue would be under our YRT assumed business. We thought possibly the total revenue would be level, since the premium increase by duration might be offset by the amount-at-risk runoff. If this were so, we thought we could assume a total GAAP valuation premium that would be level per \$1,000 of initial amount in force. However, studies showed that this would give what we felt were distorted GAAP earnings patterns. A model on this basis is shown as Exhibit I; although it is on a twenty-year term plan with no risk runoff, we still found the distortion, but to a lesser degree than when we did assume an amount-at-risk runoff. The twenty-year term plan is shown on a policy-year basis for simplicity.

We felt that the audit guide wanted a matching of expenses and revenues, including benefits as an expense in the broad sense of the term. We thought we should have a total GAAP premium for benefits and expenses that would be matched with revenue. This meant that we would determine our total GAAP premium to be a constant percentage of the gross premium. Also, the profit (if the actual experience followed that assumed) would emerge as a constant percentage of the gross premium,

EXHIBIT I

YRT REINSURANCE OF A \$25,000 20-YEAR TERM POLICY ISSUED TO A MALE AGED 42  
 REINSURANCE RATES ON GUARANTEED COST YRT BASIS—AGE NEAREST BIRTHDAY  
 GAAP VALUATION PREMIUM CALCULATED PER \$1,000 IN-FORCE\*

Policy Year	Premiums	Claims	Expenses	Increase in Statutory Reserves	Cash Beginning of Year	Cash End of Year Excluding Investment Income	Investment Income	Statutory Earnings	GAAP Adjustment	GAAP Earnings	GAAP Surplus End of Year
1.....	\$ 44.50	\$ 38.00	\$103.25	0	-\$ 58.75	-\$ 96.75	-\$ 2.64	-\$99.39	-\$ 23.12	-\$122.51	-\$122.51
2.....	58.97	43.25	17.18	0	- 57.60	- 100.85	- 2.59	- 4.05	- 83.00	- 87.05	- 209.56
3.....	72.80	48.00	15.60	0	- 46.24	- 94.24	- 2.08	7.12	- 70.66	- 63.54	- 273.10
4.....	81.37	52.50	14.39	0	- 29.34	- 81.84	- 1.32	13.16	- 60.76	- 47.60	- 320.70
5.....	92.30	55.00	13.40	0	- 4.26	- 59.26	- 0.19	23.71	- 53.00	- 29.29	- 349.99
6.....	98.85	60.50	12.55	0	26.85	- 33.65	1.21	27.01	- 44.17	- 17.16	- 367.15
7.....	101.89	63.75	11.82	0	57.63	- 6.12	2.59	28.91	- 37.52	- 8.61	- 375.76
8.....	104.85	67.25	11.20	0	90.12	22.87	4.06	30.46	- 31.36	- 0.90	- 376.66
9.....	107.68	71.00	10.66	0	123.95	52.95	5.58	31.60	- 24.93	6.67	- 369.99
10.....	111.53	76.50	10.17	0	159.89	83.39	7.20	32.06	- 16.98	15.08	- 354.91
11.....	115.07	83.00	9.73	0	195.93	112.93	8.82	31.16	- 8.14	23.02	- 331.89
12.....	119.33	88.75	9.31	0	231.77	143.02	10.43	31.70	0.47	32.17	- 299.72
13.....	124.20	96.25	8.92	0	268.73	172.48	12.09	31.12	10.77	41.89	- 257.83
14.....	128.52	103.00	8.55	0	304.54	201.54	13.70	30.67	20.71	51.38	- 206.45
15.....	133.33	107.75	8.19	0	340.38	232.63	15.32	32.71	28.98	61.69	- 144.76
16.....	137.62	128.75	7.86	0	377.71	248.96	17.00	18.01	53.68	71.69	- 73.07
17.....	141.87	135.50	7.52	0	400.31	264.81	18.01	16.86	65.42	82.28	9.21
18.....	145.31	142.50	7.19	0	420.94	278.44	18.94	14.56	77.70	92.26	101.47
19.....	147.92	149.75	6.85	0	438.45	288.70	19.73	11.05	90.89	101.94	203.41
20.....	150.54	157.50	6.53	0	452.44	294.94	20.36	6.87	105.17	112.04	315.45

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\* Assumptions: mortality, 100% 1955-60 Society of Actuaries table; lapses, 1½ Linton A; interest, 4½%; total GAAP valuation premium = \$6.4656 per \$1,000.

EXHIBIT II

YRT REINSURANCE OF A \$25,000 20-YEAR TERM POLICY ISSUED TO A MALE AGED 42  
 REINSURANCE RATES ON GUARANTEED COST YRT BASIS—AGE NEAREST BIRTHDAY  
 GAAP VALUATION PREMIUM CALCULATED AS PERCENTAGE OF GROSS PREMIUM\*

Policy Year	Premiums	Claims	Expenses	Increase in Statutory Reserves	Cash Beginning of Year	Cash End of Year Excluding Investment Income	Investment Income	Statutory Earnings	GAAP Adjustment	GAAP Earnings	GAAP Surplus End of Year
1.....	\$ 44.50	\$ 38.00	\$103.25	0	—\$ 58.75	—\$ 96.75	—\$ 2.64	—\$99.39	\$103.73	\$ 4.34	\$ 4.34
2.....	58.97	43.25	17.18	0	— 57.60	— 100.85	— 2.59	— 4.05	9.90	5.85	10.19
3.....	72.80	48.00	15.60	0	— 46.24	— 94.24	— 2.08	7.12	0.43	7.55	17.74
4.....	81.37	52.50	14.39	0	— 29.34	— 81.84	— 1.32	13.16	— 4.55	8.61	26.35
5.....	92.30	55.00	13.40	0	— 4.26	— 59.26	— 0.19	23.71	— 13.60	10.11	36.46
6.....	98.85	60.50	12.55	0	26.85	— 33.65	1.21	27.01	— 15.77	11.24	47.70
7.....	101.89	63.75	11.82	0	57.63	— 6.12	2.59	28.91	— 16.78	12.13	59.83
8.....	104.85	67.25	11.20	0	90.12	22.87	4.06	30.46	— 17.68	12.78	72.61
9.....	107.68	71.00	10.66	0	123.95	52.95	5.58	31.60	— 17.80	13.80	86.41
10.....	111.53	76.50	10.17	0	159.89	83.39	7.20	32.06	— 17.43	14.63	101.04
11.....	115.07	83.00	9.73	0	195.93	112.93	8.82	31.16	— 15.39	15.77	116.81
12.....	119.33	88.75	9.31	0	231.77	143.02	10.43	31.70	— 14.88	16.82	133.63
13.....	124.20	96.25	8.92	0	268.73	172.48	12.09	31.12	— 13.10	18.02	151.65
14.....	128.52	103.00	8.55	0	304.54	201.54	13.70	30.67	— 11.39	19.28	170.93
15.....	133.33	107.75	8.19	0	340.38	232.63	15.32	32.71	— 12.08	20.63	191.56
16.....	137.62	128.75	7.86	0	377.71	248.96	17.00	18.01	3.93	21.94	213.50
17.....	141.87	135.50	7.52	0	400.31	264.81	18.01	16.86	6.51	23.37	236.87
18.....	145.31	142.50	7.19	0	420.94	278.44	18.94	14.56	10.24	24.80	261.67
19.....	147.92	149.75	6.85	0	438.45	288.70	19.73	11.05	15.00	26.05	287.72
20.....	150.54	157.50	6.53	0	452.44	294.94	20.36	6.87	20.71	27.58	315.30

\* Assumptions: mortality, 100% 1955-60 Society of Actuaries table; lapses, 1½ Linton A; interest, 4½%; total GAAP valuation premium = 0.9072 × gross premium.

which would be the complement of the percentage determined for the total GAAP premium. Using this approach, we would get a pattern of GAAP earnings as shown in Exhibit II.

At this point it should be mentioned that the GAAP earnings shown in Exhibit II are not a constant percentage of the premium for that year only because these GAAP earnings include the investment income on prior years' accumulated GAAP earnings. If one were to exclude the interest on the current year's GAAP earnings and the interest on the accumulation of all prior years' GAAP earnings, then these GAAP earnings so adjusted would be a constant percentage of that particular year's premium. This was done, and Exhibit III shows the results after the exclusion of interest. The GAAP earnings shown in Exhibit I also reflect interest on the current year's and prior years' GAAP earnings. Exhibit IV shows the results of the Exhibit I GAAP earnings after the

## EXHIBIT III

TOTAL GAAP VALUATION PREMIUM MATCHED AGAINST TOTAL PREMIUM  
REVENUE \$25,000 20-YEAR TERM POLICY—AGE 42 NEAREST BIRTHDAY  
GAAP VALUATION PREMIUM CALCULATED AS PERCENTAGE OF  
GROSS PREMIUM

Year	GAAP Surplus Beginning of Year	Interest for Year	Adjusted Earnings	Adjusted Earnings Excluding Interest	Adjusted Earnings Excluding Interest as % of Premium
1.....	\$ 4.15	\$ 0.19	\$ 4.34	\$ 4.15	9.3%
2.....	9.75	0.44	5.85	5.41	9.2
3.....	16.98	0.76	7.55	6.79	9.3
4.....	25.22	1.13	8.61	7.48	9.2
5.....	34.89	1.57	10.11	8.54	9.3
6.....	45.65	2.05	11.24	9.19	9.3
7.....	57.25	2.58	12.13	9.55	9.4
8.....	69.48	3.13	12.78	9.65	9.2
9.....	82.69	3.72	13.80	10.08	9.4
10.....	96.69	4.35	14.63	10.28	9.2
11.....	111.78	5.03	15.77	10.74	9.3
12.....	127.88	5.75	16.82	11.07	9.3
13.....	145.12	6.53	18.02	11.49	9.3
14.....	163.57	7.36	19.28	11.92	9.3
15.....	183.31	8.25	20.63	12.38	9.3
16.....	204.31	9.19	21.94	12.75	9.3
17.....	226.67	10.20	23.37	13.17	9.3
18.....	250.40	11.27	24.80	13.53	9.3
19.....	275.33	12.39	26.05	13.66	9.2
20.....	301.72	13.58	27.58	14.00	9.3



EXHIBIT IV

TOTAL GAAP VALUATION PREMIUM MATCHED AGAINST IN-FORCE AT BEGINNING OF YEAR  
 \$25,000 20-YEAR TERM POLICY—AGE 42 NEAREST BIRTHDAY  
 GAAP VALUATION PREMIUM CALCULATED PER \$1,000 IN-FORCE

Year	GAAP Surplus Beginning of Year	Interest for Year	Adjusted Earnings	Adjusted Earnings Excluding Interest	Net Charge against Premiums for Claims and Expenses = Premiums - Adjusted Earnings (Excluding Interest)	GAAP Valuation Premium = Net Charge against Premiums for Claims and Expenses per \$1,000 In-Force
1.....	-\$117.23	-\$ 5.28	-\$122.51	-\$117.23	\$161.73	\$6.47
2.....	— 200.54	— 9.02	— 87.05	— 78.03	137.00	6.46
3.....	— 261.34	— 11.76	— 63.54	— 51.78	124.58	6.47
4.....	— 306.89	— 13.81	— 47.60	— 33.79	115.16	6.48
5.....	— 334.92	— 15.07	— 29.29	— 14.22	106.52	6.44
6.....	— 351.34	— 15.81	— 17.16	— 1.35	100.20	6.47
7.....	— 359.58	— 16.18	— 8.61	7.57	94.32	6.46
8.....	— 360.44	— 16.22	— 0.90	15.32	89.53	6.47
9.....	— 354.06	— 15.93	6.67	22.60	85.08	6.46
10.....	— 339.63	— 15.28	15.08	30.36	81.17	6.46
11.....	— 317.60	— 14.29	23.02	37.31	77.76	6.47
12.....	— 286.81	— 12.91	32.17	45.08	74.25	6.46
13.....	— 246.73	— 11.10	41.89	52.99	71.21	6.47
14.....	— 197.56	— 8.89	51.38	60.27	68.25	6.47
15.....	— 138.53	— 6.23	61.69	67.92	65.41	6.47
16.....	— 69.92	— 3.15	71.69	74.84	62.78	6.47
17.....	8.81	0.40	82.28	81.88	59.99	6.46
18.....	97.10	4.37	92.26	87.89	57.42	6.47
19.....	194.65	8.76	101.94	93.18	54.74	6.47
20.....	301.87	13.58	112.04	98.46	52.08	6.46

exclusion of interest. Exhibit IV also shows that the total GAAP premium being charged against premiums is a constant per \$1,000 in force and that this method produces GAAP losses at the early durations and GAAP profits at the later durations.

We felt that the Exhibit II type of earnings was more in keeping with the intent of the audit guide, and this was the approach we used. It should also be noted that, if the premiums and amount per unit of coverage were level, this approach would give the same result as determining a total GAAP premium that would be a constant per \$1,000 in force. To me it appears that what the audit guide seems to be saying is that, if one matches revenue and expenses (using "expenses" in the broad sense to also include benefits), one also has a matching with revenue of the profit that is built into the premium structure (assuming that actual experience follows assumed). It also seems to me that this is the end result that the audit guide is trying to achieve. Therefore, I raise the following question: Why shouldn't the audit guide state this as their goal or objective directly, rather than trying to achieve it indirectly by stating that there should be a matching of expenses with revenue?

The above reasoning would apply to direct business where the premiums vary, as in graded premium life policies. The volume of such business may not warrant special handling, but if all GAAP premiums were determined as a percentage of the corresponding gross premium, it would not make any difference.

The formulas used to calculate the GAAP valuation premiums and reserves are given below.

Let

$A_t$  = Amount at risk in  $t$ th year per \$1,000 initial amount reinsured;

$E_1$  = First-year administrative expense per \$1,000 initial amount reinsured;

$E_r$  = Renewal years' administrative expense per \$1,000 initial amount reinsured;

$P_{[x]+t}$  = YRT premium per \$1,000 reinsured for an individual attained age  $x + t$ , where policy was originally reinsured at age  $x$ ;

$F$  = Policy fee for reinsurance after conversion to an amount per \$1,000 of initial amount reinsured (policy fee divided by average initial amount reinsured);

${}_tV_{[x]}^{\text{TR}}$  =  $t$ th-year total GAAP terminal reserve per \$1,000 initial amount reinsured, where policy was originally reinsured at age  $x$ ;

${}_tMV_{[x]}^{\text{TR}}$  =  $t$ th-year total GAAP mean reserve per \$1,000 initial amount reinsured, where policy was originally reinsured at age  $x$ ;

${}_tV_{[x]}^{\text{BR}}$  =  $t$ th-year benefit portion of GAAP terminal reserve per \$1,000 initial amount reinsured, where policy was originally reinsured at age  $x$ ;

${}_tMV_{[x]}^{\text{BR}}$  =  $t$ th-year benefit portion of GAAP mean reserve per \$1,000 initial amount reinsured, where policy was originally reinsured at age  $x$ .

A. Total GAAP valuation premium per \$1,000 initial amount reinsured:

$A$  = Present value of benefits and expenses

$$= \sum_{t=0}^{19} A_{t+1} \left( \frac{i}{\delta} \right) C_{[x]+t} + E_1 D_{[x]} + E_r (N_{[x]+1} - N_{[x]+20});$$

$B$  = Present value of YRT premiums

$$= 0.001 \sum_{t=0}^{19} A_{t+1} P_{[x]+t} D_{[x]+t} + F (N_{[x]} - N_{[x]+20});$$

$$K^{\text{TR}} = A/B, \quad A \leq B$$

$$= 1, \quad A > B;$$

Total GAAP valuation premium per \$1,000 initial amount reinsured  
 $= K^{\text{TR}}(P_{[x]+t} + F)$ .

B. Total GAAP terminal reserve per \$1,000 initial amount reinsured:

$${}_tV_{[x]}^{\text{TR}} = \frac{1}{D_{[x]+t}} \left[ \sum_{s=t}^{19} A_{s+1} \left( \frac{i}{\delta} \right) C_{[x]+s} + E_r (N_{[x]+t} - N_{[x]+20}) \right. \\ \left. - K^{\text{TR}} \sum_{s=t}^{19} (0.001 A_{s+1} P_{[x]+s} + F) D_{[x]+s} \right]$$

for  $t = 1, 2, \dots, 19$ ;

$${}_{20}V_{[x]}^{\text{TR}} = 0.$$

C. Total GAAP mean reserve per \$1,000 initial amount reinsured:

$${}_tMV_{[x]}^{\text{TR}} = \frac{1}{2} \left[ \frac{{}_tV_{[x]}^{\text{TR}} (D_{[x]+t-1} + D_{[x]+t}) + A_t (i/\delta) C_{[x]+t-1}}{D_{[x]+t-1}} \right]$$

for  $t = 1, 2, \dots, 20$ .

D. Benefit portion of GAAP valuation premium per \$1,000 initial amount reinsured:

$A'$  = Present value of benefits

$$= \sum_{t=0}^{19} A_{t+1} \left( \frac{i}{\delta} \right) C_{[x]+t};$$

$B$  = Present value of YRT premiums

$$= 0.001 \sum_{t=0}^{19} A_{t+1} P_{[x]+t} D_{[x]+t} + F(N_{[x]} - N_{[x]+20});$$

$$K^{BR} = A'/B.$$

Benefit portion of GAAP valuation premium per \$1,000 initial amount reinsured

$$= K^{BR}(P_{[x]+t} + F).$$

E. Benefit portion of GAAP terminal reserve per \$1,000 initial amount reinsured:

$${}_tV_{[x]}^{BR} = \frac{1}{D_{[x]+t}} \left[ \sum_{s=t}^{19} A_{s+1} \left( \frac{i}{\delta} \right) C_{[x]+s} - K^{BR} \sum_{s=t}^{19} (0.001 A_{s+1} P_{[x]+s} + F) D_{[x]+s} \right] \quad \text{for } t = 1, 2, \dots, 19;$$

$${}_{20}V_{[x]}^{BR} = 0.$$

F. Benefit portion of GAAP mean reserve per \$1,000 initial amount reinsured:

$${}_tM V_{[x]}^{BR} = \frac{1}{2} \left[ \frac{{}_tV_{[x]}^{BR} (D_{[x]+t-1} + D_{[x]+t}) + A_t (i/\delta) C_{[x]+t-1}}{D_{[x]+t-1}} \right]$$

for  $t = 1, 2, \dots, 20.$

*Coinsurance and Modified Coinsurance Accepted*

As Mr. Robertson stated in his paper, coinsurance and modified coinsurance are similar to GAAP accounting for directly written business. Therefore, the usual formulas applicable to direct business would apply to reinsurance accepted on a coinsurance or modified coinsurance basis.

However, under modified coinsurance the reinsurer each year transfers the amount of the reserve increase to the ceding company, so that at the end of each year the ceding company will have assets equal to the statutory reserve. Likewise, if this reserve was decreasing, the ceding company would transfer each year to the reinsurer the amount of the decrease so that their assets held would still equal the statutory reserve at year end. Also, the ceding company gives the reinsurer each year an interest credit on these funds held for the statutory reserve.

The statutory earnings statement of the reinsurer would be the same as under a regular coinsurance arrangement, except that there would be a charge for the reserve transfer which would be exactly offset by a smaller

reserve increase, so that the statutory earnings would be the same under either coinsurance or modified coinsurance. This also assumes that the interest credit allowed on the reserves would be the same as that earned on investments by the reinsurer.

The statutory balance sheet of the reinsurer would be the same as under a regular coinsurance arrangement, except that cash or some other asset and the reserve liabilities would both be reduced by the amount of the reserves held by the ceding company.

Under GAAP accounting for modified coinsurance we have assumed the fund transferred to the ceding company to be an investment by the reinsurer with the ceding company which happens to be equal to the statutory reserve. On this basis the GAAP earnings statement of the reinsurer would be exactly equal to the GAAP earnings statement under a regular coinsurance arrangement. There would be no charge for the reserve transfer, and there would be the usual and normal charge for reserve increases.

The GAAP balance sheet of the reinsurer would be the same as under a regular coinsurance arrangement, except that cash or some other asset would be reduced by the amount of the reserves held by the ceding company, with a corresponding increase in another asset item for the same amount, which might be titled "statutory reserves held on deposit with ceding company."

This is the GAAP approach we are using for modified coinsurance accepted. As mentioned earlier, this is only a very rough or brief outline of the approach we are using to adjust for reinsurance accepted. Mr. Robertson is to be congratulated for writing this paper and opening up more discussion on this important subject.

(AUTHOR'S REVIEW OF DISCUSSION)

RICHARD S. ROBERTSON:

My paper was written with the objective of describing how one company—the Lincoln National—accounted for the life reinsurance which it accepted. Mr. Klinzman's discussion enhances the paper by describing how another company—General Reassurance Corporation—accounted for its reinsurance accepted.

There were two major differences in the approaches taken. First, the Lincoln ignored expenses for reasons of materiality. General Reassurance took expenses directly into account. The latter approach is clearly the theoretically correct approach. Because General Reassurance is relatively new in the business and the volume of new business is large in relation to

the volume of in-force insurance, the deferred expense item is certainly more likely to be a material item.

The second major difference is that the reserves were constructed to recognize profit in proportion to the premium received. At the Lincoln, reserves were constructed to recognize the profit in proportion to the face amount of reinsurance. Mr. Klinzman is of the belief that the audit guide calls for relating expenses and benefits directly to the revenue, and he correctly points out that this approach can be significantly different from the one that we have taken. I do not agree that this is necessarily the approach that must be taken, although I certainly would not argue that it was an improper approach.

Mr. Klinzman suggests that modified coinsurance can be treated in exactly the same way as coinsurance if the reserve adjustment is considered in the nature of a loan by the reinsurer to the reinsured. This impresses me as a good practical approach. However, it should be examined carefully under circumstances where the terms of the reinsurance result in a significantly different return on the reinsured reserve from that attainable elsewhere.

Two discussions of my other paper, "GAAP Accounting for Reinsurance Ceded" (one by Mr. Klinzman and one by Mr. Ernie Frankovich), emphasize the important point that the accounting for ceded and the accounting for accepted reinsurance are not the same and involve different considerations. Mr. Frankovich goes into considerable detail as to significant differences between the treatment of reinsurance accepted and reinsurance ceded.