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THE COST TO REINSURE INDIVIDUAL LIFE INSURANCE POLICIES

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THE rapid growth in the volume of new life insurance written annually and the appearance during the past few years of a large number of new life companies have stimulated in turn a greater interest in and a stronger need for reinsurance facilities. The desire on the part of many companies to enter the substandard field or to broaden their substandard programs has contributed notably to this trend.

The increase in life insurance sales during the past ten or fifteen years alone has led many of the larger companies to re-establish for their excess lines a reinsurance connection which they had previously enjoyed or to establish for the first time formal relations with a reinsurer. Since the end of World War II more than two hundred new life insurance companies have been formed. It is not necessary to elaborate here on the value to these new entrants of broad reinsurance services, including substandard as well as standard risks. The ease with which both new and well-established life companies have turned and are turning to reinsurers is sufficient evidence that life reinsurance is firmly entrenched in the life insurance business in both the United States and Canada and has won the confidence and respect of the overwhelming majority of direct-writing companies. A very high percentage of the more than six hundred life insurance companies in this country are currently availing themselves of reinsurance services for their excess lines. Incidentally, the United States reinsurers are also receiving business from Canadian companies and from companies in Mexico and other Latin-American countries.

One of the highly important questions confronting a company interested in inaugurating a reinsurance program is that of cost. It is this aspect of reinsurance which has very likely acted as a deterrent to a number of companies. Whatever these costs are, whether they are to be judged reasonable or otherwise is a matter to be resolved by each company on the basis of its own operating conditions and objectives. The only suggestion being made here is that the decision be based on a realistic appraisal of the significant cost components in relation to the value of the benefits received, both direct and collateral.

In view of the importance of the subject of reinsurance costs to the life insurance industry and in view of the lack, as far as the writer is aware, in our actuarial literature of more than passing reference to this aspect of reinsurance, it is the purpose of this paper to present (i) sample calculations which demonstrate one possible actuarial approach in making the required cost analysis and (ii) illustrative costs to reinsure life risks individually under present-day conditions.

The determination of the maximum amounts of insurance which a company can safely retain for its own account is a subject that is not within the province of this paper. It will be assumed in the discussion which follows that a schedule of maximum retention limits has been decided upon by the management and that any amounts issued in excess of such schedule are reinsured.

A. GENERAL CONSIDERATIONS

For reasons which need not be discussed here, the reinsurer must make provision for mortality in excess of that for direct agency business. It is obvious, then, that the ceding company must pay to the reinsurer an amount sufficient to provide for both the higher anticipated mortality on reinsured policies and the reinsurer's operating expenses. In addition, the ceding company incurs the expense of issuing and maintaining the reinsurance policies.

Suppose, for example, that a company were to reinsure on the same plan as the original policy, which plan may be taken as Ordinary Life. If a level annual premium were to be paid by the ceding company, such premium might be expressed as follows:

$$P_x^{\text{reins.}} = \pi_x' + \frac{(R_1+C_1)\,D_x' + (R_r+C_r)\,N_{x+1}'}{N_x'},$$

where π_x' = net level annual premium for reinsurance mortality, per \$1,000

R = reinsurer's expenses per \$1,000, first year and renewal being denoted by the subscripts 1 and r

C = ceding company's annual expenses per \$1,000 for reinsurance administration, first year and renewal being denoted by the subscripts 1 and r.

(Primed functions signify reinsurance mortality.)

The difference between π_x' and π_x, where π_x represents the net level annual premium for direct mortality, is the excess mortality cost of the reinsurance. Even if reinsurance and direct mortality were identical, a company, whether large or small, would still want to resort to reinsurance of risks over a certain size in order to avoid undue fluctuations in its own mortality experience from year to year.

The difference between the hypothetical reinsurance premium, illustrated above for one plan of reinsurance, (which premium includes not only the amount payable to the reinsurer but also the original company's own expense of handling the reinsurance cessions) and that portion of the premium received from the policyholder (on the reinsured part of the face amount) which is not allocated by the ceding company as a direct-writing expense, or which is not retained by the ceding company to pay any part of a policy benefit for which there is no reimbursement from the reinsurer on the amount ceded, will be referred to herein as the out-of-pocket cost of reinsurance to the ceding company.

The concept of out-of-pocket cost which has been adopted for this study may be clarified somewhat by stating that it is entirely independent of the profits or losses of the reinsurer resulting from an experienced reinsurance mortality different from that anticipated. According to the concept defined above, the ceding company's cost to reinsure is the same regardless of the actual mortality on the amounts it reinsures. It is the mortality anticipated by the reinsurer rather than the subsequent experienced mortality which is one of the determinants.

Furthermore, acceptance of this fundamental cost concept means that the profit margin in a company's gross premium is not a potential profit the company forgoes when it issues and reinsures amounts which are not eligible for its own retention. On the contrary, such potential profit is a part of the margin which is available to pay whatever price is agreed upon for the reinsurance services.

Among the multitude of variables which have a direct bearing on the out-of-pocket cost of reinsurance is the practice of the ceding company with respect to reinsuring 100% of a policy. It is not necessary to labor the point here that from the standpoint of costs alone fully reinsured policies should be relatively few in number and should constitute only a small proportion of the total cessions under ordinary circumstances. It is on a fully reinsured policy that the cost to reinsure reaches a maximum value per unit of coverage. Although the practice of reinsuring the full face amount of a policy should not, in general, be encouraged indiscriminately if costs are to be minimized, it is believed that the cost to reinsure under such conditions will be of interest as illustrative of a cost limit.

More representative costs can be derived from calculations based on reinsurance of a portion of a policy. As would be expected, this is the situation which most frequently prevails in the field of life reinsurance on an individual basis and thus is accorded the greatest weight in arriving at a single index of unit costs for all amounts to be reinsured by a particular company.

Regardless of what portion of a policy is reinsured, widely different points of view are admissible in assessing expenses for these cost calculations. It may be helpful in this connection to state here, even though it may seem perfectly obvious, that any amounts reinsured will be regarded as amounts that would not have been issued in the absence of reinsurance facilities. This manner of regarding the reinsurance cessions is particularly pertinent in deciding what expenses associated with the direct writing are to be borne by the amount reinsured. Differences among companies in the costs to reinsure will arise in part from honest differences of opinion with respect to the allocation of expenses. It will be noted herein that the function chosen (that is, whether number of policies, amount of insurance, or amount of premium) for a given expense will directly affect the out-of-pocket cost of reinsurance. Although, for gross premium loading purposes, the manner of expressing expenses may not be of great concern so long as the proper total premium charge is arrived at, the same cannot be applied to the corresponding calculations for deciding what it will cost to reinsure.

Reinsurance involving only part instead of all of a policy should mean less out-of-pocket cost to the ceding company because on the average the provision for expenses in the gross premium for the portion retained may be considered sufficient to pay all expenses associated with the direct writing which are a function of the number of policies. The expense loading (including provision for profit) in the gross premium for the reinsured portion is available to pay (*a*) the direct writing expenses which are a function of either the amount of the premium (such as commissions and taxes) or the amount of insurance, (*b*) the ceding company's expenses incurred in ceding reinsurance, (*c*) the difference between reinsurance and direct mortality, and (*d*) the reinsurer's operating expenses. The extent to which the margin in the portion reinsured falls short of the aggregate of the foregoing items is the out-of-pocket cost of reinsurance that we are seeking.

It should be emphasized here that a company which accepts the principle stated in the preceding paragraph, namely, that the "per policy" expenses are on the average paid for by the loading in the premium on the portion of the policy which is retained, must exclude the portions reinsured in determining its average size policy for gross premium and asset share calculations.

Even with respect to the reinsurance of 100% of a policy there are two noteworthy points of view to consider. One is that each and every expense associated with the direct writing, however expressed in arriving at expense rates, must be assigned to the reinsurance and be included in computing the cost to reinsure. A company which adopts this principle requires in effect that all policies, whether fully reinsured or not, shall bear their proportionate share of the total overhead expenses. The other view is that although there is no question regarding the assignment of "per policy" expenses, it seems proper not to charge to a policy which is 100% reinsured the bulk of the overhead expense items. Illustrative calculations will be furnished for both points of view on fully reinsured policies in order to define an area within which the cost may be considered to lie, the value selected within this area depending on the particular company's point of view as to the portion of overhead to be charged to the reinsured policy.

B. EXPENSE ASSUMPTIONS

The reinsurance costs of a particular company will depend not only upon the charges made by the reinsurer for such services but also upon its own gross premiums and the underlying expense rates. It is believed that sufficiently representative reinsurance costs can be derived by basing them on a current set of nonparticipating gross premiums (subdivision *b* of Table 5) in conjunction with the expense rates employed in their calculation. These expense rates may be listed in skeleton form under the following three broad classifications:

1. *Expenses Which Vary Directly with Amount of Insurance Issued*
   a) Commissions: Full-time agents' scale, which for the three representative plans chosen are:

Year:	1st	2d	3d	4th	After 4th
Ordinary Life..........	50	15	10	5	2
Life 20...............	$42\frac{1}{2}$	15	10	5	2
Endowment 20........	30	15	10	5	2

   b) Managerial Field Compensation: a percentage of first four commissions
   c) Field Benefits: a percentage of commissions, each year
   d) Premium Taxes: a percentage of premiums
2. *"Per Policy" Expenses*
   a) Field Collection and Home Office Handling: \$*a* per policy during the premium-paying period
   b) Issue: \$*b* per policy, first year
3. *Overhead Expenses*
   a) Agency Expenses (Home Office and Field): a percentage of first four commissions
   b) General Overhead: \$*c* per thousand of insurance during the premium-paying period

It is clear that we have selected for the analysis a company which operates on the branch office system and compensates its field managerial staff on the basis of a percentage of agents' commissions. A study of the figures underlying Item 3*a* discloses that the expenses included are field (clerical salaries, rent, etc.) and home office sales overhead which could just as well perhaps be expressed in terms of the number of policies or the amount of insurance.

In addition to the expenses already mentioned, the original company incurs the issue and maintenance expenses associated with the reinsurance policies. These additional expenses will vary from company to company and will depend on a variety of operating conditions. For example, a company which issues and reinsures both nonparticipating and participating policies will have higher reinsurance handling costs because of the requirement that separate records be maintained for each class of business. Although the cost to handle the reinsurance cessions is definitely an individual company matter, an analysis of such expenses indicates that for a company which has a well-defined program and a reasonable volume (say, not less than fifty cases a year) the handling costs should not exceed $20 per policy the first policy year, and $2 per policy for each year after the first, whether all or only part of the policy is reinsured. These reinsurance handling costs are considered liberal and are for the preparation of the reinsurance certificate, photostatic copies of the underwriting papers to be furnished the reinsurer, creation and maintenance of the necessary records on the amounts reinsured for valuation and accounting work, etc.

C. ILLUSTRATIVE REINSURANCE COSTS

Once a company has decided to reinsure amounts issued in excess of its own retention, it may do so on either one of two basic plans: (1) Coinsurance or (2) Yearly Renewable Term.

Coinsurance

Under this plan, the excess face amount is reinsured on the same plan as that of the original policy. The reinsurer receives the gross premium charged the policyholder on that part of the face amount which is reinsured, maintains the regular policy reserves, and returns a specified portion (usually varying with policy duration) of such premium to the ceding company, the amount depending on the anticipated reinsurance mortality and the expenses of the reinsurer. Where the original policy is participating, the annual dividend is also returned by the reinsurer. For any given policy year, then, the cost to reinsure on the Coinsurance plan consists of the expenses incurred by the original company on the amount ceded less the expense allowances granted by the reinsurer.

The Coinsurance expense allowances referred to in the preceding paragraph are customarily expressed as $x\%$ of first premiums and $y\%$ of renewals indefinitely over and above commissions (including overriding and collection fees) on the General Agents' scale. Although the average size of the amounts reinsured is one of the determining factors, the variation in these expense allowances among the ceding companies is to a great extent a direct reflection of the variation in their net costs. Where the ceding company's net costs are extremely low, it is probable that there would be little, if any, margin which would permit the reinsurer to grant an expense allowance other than commissions. On the other hand, substantial allowances in addition to commissions may be warranted by net costs considerably in excess of the average.

In conjunction with the particular nonparticipating gross premiums selected for the analysis herein, asset share calculations from the point of view of the reinsurer indicate that the Coinsurance expense allowances would likely be in the neighborhood of 20% of first premiums and 1% of renewals over and above commissions (including overriding and collection fees) on the General Agents' scale in subdivision *c* of Table 5. This pattern of 20% of first and 1% of renewals is used in the subsequent cost calculations for Coinsurance reinsurance. In addition, there is a direct reimbursement by the reinsurer to the ceding company for premium taxes, which are assumed to be 2% each year.

Illustrative calculations for determining the cost to reinsure on the Coinsurance plan are presented in Table 1. A summary of similar calculations for three representative plans and ages appears in Table 2.

In subdivision *a* of Table 2, it is supposed that only part of the original policy is coinsured and that the average amount so reinsured is $20,000. Since the amount reinsured represents insurance that would not have been issued in the absence of reinsurance facilities, it is assumed that no overhead expenses are to be assigned to the reinsurance, and that all "per policy" expenses associated with the direct writing are to be borne by the retained portion of the policy. In other words, of the expenses listed in Section B, it is assumed that Items 2 and 3 may be considered as not applying to the additional amount which is issued and reinsured.

Subdivisions *b* and *c* of Table 2 present in summary form the costs to fully reinsure where expenses are allocated to the reinsurance in accordance with two extreme points of view. The first (subdivision *b*) is that each and every expense incurred in the direct writing must be assigned to the reinsurance and be included along with the reinsurance handling expenses in computing the total out-of-pocket cost to reinsure. Hence, in subdivision *b* all expenses listed in Section B have been included as allocable to the amounts issued and reinsured.

The second view (subdivision *c*, Table 2) is based on the premise that although all "per policy" expenses must be assigned to the reinsurance along with the true percentage expenses, no part of the overhead charges need be borne by a fully reinsured policy, on the theory that it would not have been issued if reinsurance facilities had not been available. That is to say, of the expenses listed in Section B, those in Item 3 are not assessed against the reinsurance. It is perhaps appropriate to add in clarification of this view that amounts which qualify for retention by the original

TABLE 1

COST TO REINSURE PART OF A POLICY ON THE COINSURANCE PLAN
ORIGINAL POLICY: STANDARD O.L.—AMOUNT OF REINSURANCE: $1,000
ISSUE AGE: 25—GROSS PREMIUM: $15.79

Policy Year	(1) Comms. (Full-Time Agents' Scale)	(2) % Expenses Other Than Comms.	(3) "Per M" Expenses	(4) Comms. on G.A. Scale plus 20% 1st and 1% Renewal	(5) (1)+(2)+(3)−(4)	(6) (5)× Persistency	(7) (6) Accum. @ 3%
1	$7.90	$3.00	$1.00	$11.84	$ .06	$ .06	$ .06
2	2.37	.90	.10	2.13	1.24	1.15	1.25
3	1.58	.60	.10	1.34	.94	.82	2.13
4	.79	.30	.10	1.34	− .15	− .13	2.06
5	.32	.03	.10	1.34	− .89	− .71	1.39
6	.32	.03	.10	1.34	− .89	− .68	.73
7	.32	.03	.10	1.34	− .89	− .65	.08
8	.32	.03	.10	1.34	− .89	− .63	− .57
9	.32	.03	.10	1.34	− .89	− .60	−1.21
10	.32	.03	.10	1.34	− .89	− .58	−1.84
11	.32	.03	.10	.55	− .10	− .06	−1.96
12	.32	.03	.10	.55	− .10	− .06	−2.08
13	.32	.03	.10	.55	− .10	− .06	−2.20
14	.32	.03	.10	.55	− .10	− .06	−2.33
15	.32	.03	.10	.55	− .10	− .05	−2.45
16	.32	.03	.10	.55	− .10	− .05	−2.58
17	.32	.03	.10	.55	− .10	− .05	−2.71
18	.32	.03	.10	.55	− .10	− .05	−2.84
19	.32	.03	.10	.55	− .10	− .05	−2.98
20	.32	.03	.10	.55	− .10	− .04	−3.11
	Average annual cost per M in force, 1st 20 years						$− .16

Explanation of Columns

(1): See Section B for full-time agents' commission rates.
(3): $20 per policy, 1st year; $2 per policy, renewal. Assume that average amount reinsured is $20,000.
(4): See Table 5 for General Agents' Commission Scale.
(5): Shows annual cost on basis of 100% persistency.
(6): See Table 6 for persistency factors.

NOTE.—Since there is a direct reimbursement for premium taxes, they need not be included in the calculations.

company are not considered eligible for reinsurance. The two categories of amounts to be retained and amounts to be reinsured are treated as mutually exclusive.

On fully reinsured cases, the modern treaties for reinsurance on the Coinsurance plan sometimes commit the reinsurer to a special allowance,

TABLE 2

SUMMARY OF COST TO REINSURE ON THE COINSURANCE PLAN
STANDARD INSURANCE
AVERAGE AMOUNT OF REINSURANCE POLICY: $20,000

PLAN	AVERAGE ANNUAL COST PER $1,000 REINSURANCE IN FORCE			
	Issue Age			Weighted Age (20–65–15)
	25	40	55	
	a. Only Portion of Policy Reinsured			
O.L.	$− .16	$− .39	$− .86	$− .41
Life 20	− .50	− .75	−1.16	− .76
End. 20	−1.19	−1.25	−1.53	−1.28
Weighted Plan (65–25–10)	$− .35	$− .57	$−1.00	− .59
	b. 100% of Policy Reinsured (Overhead Assigned to Reinsurance)			
O.L.	$ 1.13	$ 1.36	$ 2.05	$ 1.42
Life 20	1.16	1.34	1.79	1.37
End. 20	.88	.93	1.11	.95
Weighted Plan (65–25–10)	$ 1.11	$ 1.31	$ 1.89	$ 1.36
	c. 100% of Policy Reinsured (No Overhead Assigned to Reinsurance)			
O.L.	$ .18	$− .04	$− .49	$− .06
Life 20	− .16	− .40	− .80	− .41
End. 20	− .84	− .90	−1.16	− .93
Weighted Plan (65–25–10)	$− .01	$− .22	$− .63	$− .24

NOTE.—The above average annual cost figures were obtained from 20-year accumulated costs by dividing by factors consisting of the accumulation of $1 each year with interest and persistency, based on subdivision *a* of Table 6. The conversion factors are: age 25: $19.03; age 40: $18.56; age 55: $16.88.

in addition to the 20% and 1% already quoted. This additional allowance, which is included in the calculations summarized in subdivisions *b* and *c* of Table 2 and which may be considered the reinsurer's share of the medical and inspection fees where the ceding company is not retaining any part of the current application, is taken here as $10 for each fully reinsured case. (All policies issued within a specified period, such as 90 days, and based on the same medical examination are designated one case in determining eligibility for this special allowance.)

Reference to Table 2 shows that:

1. Reinsuring a portion of a policy in the standard class under the conditions specified results in an estimated profit instead of an out-of-pocket cost to the original company. The average annual profit per thousand of reinsurance in force varies with age and plan, the weighted average being in the neighborhood of $.60 per thousand of face amount reinsured. This is not unreasonable in view of the profit margins in current gross premiums, which appear to be sufficient to yield a profit to both reinsured and reinsurer.
2. The financial results of reinsuring 100% of a standard policy can vary from an average annual cost to the original company of $1.36 per thousand to an average annual profit of $.24 per thousand, the value selected depending on the particular view adopted with respect to the extent that the fully reinsured policy is to participate in the overhead costs.

Before turning to the second basic plan of reinsurance, it should be mentioned that a number of companies reinsure on the so-called Modified Coinsurance plan, which is essentially a variation of the Coinsurance plan where the reserves for the original policies are maintained by the ceding company instead of the reinsurer. At the end of each calendar year, say, the reinsurer transfers to the reinsured the increase in reserves for the year less interest on the reserves as of the beginning of the year at a rate agreed upon in advance.

In arriving at the out-of-pocket costs to reinsure on a Modified Coinsurance plan, the analysis may be the same as that already presented for Coinsurance, any change in costs being simply a reflection of different interest earnings. For example, if the interest rate agreed upon for the year-end transfer of funds exceeds that which the reinsurer would assume for a straight Coinsurance arrangement, then the out-of-pocket costs would be reduced by any increase in expense allowances which the reinsurer would be willing to grant because of the more favorable interest rate. Recognition might also be given to any probable excess interest on the funds invested by the ceding company over the rate allowed the reinsurer.

Yearly Renewable Term

Under the second basic plan of reinsurance, the original company transfers to the reinsurer the liability for the net amount at risk (usually taken in any given year as the difference between the excess face amount and the terminal reserve thereon) and pays to the reinsurer for each such unit of net amount at risk a one-year term premium. On the portion reinsured the original company maintains the regular policy reserve. From the premium paid by the policyholder on the portion of the face amount which is reinsured, the original company has to set up the regular policy reserve, pay the direct-writing expenses assigned to the amount reinsured along with those for its own reinsurance administration, and also remit to the reinsurer each year the "pure risk" premium. The ceding company's liability with respect to the amount reinsured is the reserve in the event of death and the cash value in the event of withdrawal. Therefore, on the assumption that the accumulated cost as of any duration can be taken as the excess of the original policy's cash value over the accumulation of premiums less expenses and other payments, the accumulated cost at the end of any given policy year may be taken as the algebraic sum of:

(1) The asset share as of the end of the previous year with interest for one year.
(2) The excess of the premium over the expenses for the current year with interest for one year, where expenses include the risk premium payable to the reinsurer on the current net amount at risk.
(3) The policy's proportionate share of the reserves payable on death losses and of the cash values on withdrawals. (Half a year's interest was not added to the death losses to provide for immediate payment of claims.)
(4) The cash value on the portion of the policy persisting at the end of the year.

Tables 3 and 4, corresponding to Tables 1 and 2 for Coinsurance, present illustrative costs of reinsurance on the Yearly Renewable Term plan. The same assumptions with respect to expenses, policy sizes, etc., were employed, with the exception that no expense allowances are granted by the reinsurer on policies whether fully or partially reinsured on the Yearly Renewable Term plan. However, the reinsurer does return to the ceding company 2% of the Yearly Renewable Term premium as its share of the premium taxes on the amounts reinsured.

From an examination of Tables 3 and 4 we find that:

1. The financial results of reinsuring a portion of a standard policy on the Yearly Renewable Term plan depend to a great extent on both the age at issue and the plan of the original policy, ranging from a substantial average annual profit to the ceding company of around $3.00 per thousand of face amount reinsured to a cost of approximately $2.50 per thousand. The average annual cost per thousand of reinsurance in force, weighted for both issue

age and original plan as indicated, is only a few cents ($.10) per thousand. However, it is to be noted that the wide variations in the average 20-year costs with plan and issue age render the over-all weighted average for this plan of reinsurance particularly sensitive to the weights employed. A slight change in either the age or plan weightings could easily change the result to an average annual profit to the ceding company.

TABLE 3

COST TO REINSURE PART OF A POLICY ON THE YEARLY RENEWABLE TERM PLAN

ORIGINAL POLICY: STANDARD O.L.—AMOUNT OF REINSURANCE: $1,000
ISSUE AGE: 25—GROSS PREMIUM: $15.79

Policy Year	(1) G.P. Less Direct and Ceding Expenses and Comms.	(2) Y.R.T. Prem. on Net Risk Less 2% for Taxes	(3) Premium Retained (1)−(2)	(4) (3)$\times l_{x+t-1}$	(5) $d_{x+t-1}\times$ Reserve	(6) $w_{x+t-1}\times$ Cash Value	(7) Fund at End of Year	(8) [C.V. $-(7)/l_{x+t}$] $\times$Persistency
1....	$ 3.58	$1.68	$ 1.90	$1,900	$ 9	....	$ 1,948	$− 1.95
2....	12.11	3.32	8.79	8,124	25	....	10,349	−10.35
3....	13.20	3.29	9.91	8,691	44	$ 513	19,054	− 8.18
4....	14.28	3.27	11.01	9,209	71	978	28,062	− 7.33
5....	15.03	3.25	11.78	9,393	108	1,398	37,073	− 7.44
6....	15.03	3.24	11.79	8,958	183	1,407	45,822	− 7.08
7....	15.03	3.33	11.70	8,551	215	1,711	54,078	− 6.98
8....	15.03	3.44	11.59	8,147	250	1,989	61,853	− 7.10
9....	15.03	3.57	11.46	7,747	285	2,244	69,159	− 7.42
10....	15.03	3.70	11.33	7,363	320	2,474	76,024	− 7.92
11....	15.03	3.84	11.19	6,991	355	2,706	82,444	− 7.98
12....	15.03	3.98	11.05	6,636	389	2,916	88,447	− 8.23
13....	15.03	4.13	10.90	6,290	420	3,105	94,054	− 8.66
14....	15.03	4.27	10.76	5,967	452	3,274	99,296	− 9.25
15....	15.03	4.44	10.59	5,642	486	3,443	104,157	− 9.47
16....	15.03	4.61	10.42	5,333	526	3,574	108,675	−10.37
17....	15.03	4.82	10.21	5,019	573	3,707	112,825	−10.88
18....	15.03	5.03	10.00	4,720	623	3,823	116,625	−11.53
19....	15.03	5.26	9.77	4,426	678	3,921	120,084	−12.29
20....	15.03	5.51	9.52	4,138	741	4,017	123,191	−12.72
	Average annual cost per M in force, 1st 20 years							$− .67

Explanation of Columns

(1): Commissions: Full-time agents' scale, Section B.
Direct Expenses: Only those which vary with amount of insurance issued; 1*b*, *c*, *d* of Section B.
Ceding Expenses: $20 per policy 1st; $2 renewal.
Average amount reinsured: $20,000.
(2): See Table 6 for Y.R.T. rates. Net amounts at risk based on CSO 2½% N.L.P. reserves.
(4): See Table 6 for l_{x+t-1} values.
(5): See Table 6 for d_{x+t-1} values.
(6): See Table 6 for w_{x+t-1} values, Table 5 for cash values.
(7): $[(7)_{-1} + (4)] \times 1.03 - (5) - (6)$.
(8): See Table 6 for persistency.

2. Under the conditions assumed for reinsuring 100% of a policy, the weighted average annual cost is about $2.00 per thousand (subdivision *b* of Table 4) if all the direct-writing expenses are assigned to the reinsurance. On the other hand, this same cost is reduced to $.50 per thousand if no overhead expenses are borne by the reinsured policy. As noted above, the extreme variation with plan and issue age makes these single indexes of cost highly dependent on the weights used.

TABLE 4

SUMMARY OF COST TO REINSURE ON THE YEARLY RENEWABLE TERM PLAN
STANDARD INSURANCE

AVERAGE AMOUNT OF REINSURANCE POLICY: $20,000

PLAN	AVERAGE ANNUAL COST PER $1,000 REINSURANCE IN FORCE			
	Issue Age			Weighted Age (20–65–15)
	25	40	55	
	a) Only Portion of Policy Reinsured			
O.L.	$− .67	$ .29	$2.59	$ .44
Life 20	−1.08	− .53	2.86	− .13
End. 20	−3.19	−1.98	2.10	−1.61
Weighted Plan (65–25–10)	$−1.02	$− .14	$2.61	$ .10
	b) 100% of Policy Reinsured (Overhead Assigned to Reinsurance)			
O.L.	$ .68	$ 2.09	$5.55	$ 2.33
Life 20	.64	1.61	5.86	2.05
End. 20	−1.07	.25	4.80	.67
Weighted Plan (65–25–10)	$ .50	$ 1.79	$5.55	$ 2.10
	c) 100% of Policy Reinsured (No Overhead Assigned to Reinsurance)			
O.L.	$− .28	$ .69	$3.01	$ .84
Life 20	− .68	− .13	3.28	.27
End. 20	−2.80	−1.58	2.52	−1.21
Weighted Plan (65–25–10)	$− .63	$ .26	$3.03	$ .50

NOTE.—The above average annual cost figures were obtained from 20-year accumulated costs by dividing by factors consisting of the accumulation of $1 each year with interest and persistency, based on subdivision *a* of Table 6. The conversion factors are: age 25: $19.03; age 40: $18.56; age 55: $16.88.

The question naturally arises as to why the costs to reinsure on the two basic plans of reinsurance are not more nearly the same. It is obvious from the effect of issue age and plan on reinsurance costs that a change in the assumed distribution of business with respect to either of these two factors could appreciably alter the results. For example, at issue age 25 on all three plans selected for the original policy, the annual profit to the ceding company is considerably greater under Yearly Renewable Term than under Coinsurance. The Yearly Renewable Term costs may also be reduced significantly by excess interest earned by the ceding company on the portions of the original premium it retains and invests for reserve and cash value purposes. A straight Coinsurance arrangement has no such cost-reducing feature.

Another factor contributing to this cost differential is that Yearly Renewable Term rates charged by life reinsurers are set at a level so that they will be adequate not only for those clients who submit a regular share of their business but also for those companies which submit an occasional facultative or jumbo case. On the other hand, the expense allowance pattern used in the Coinsurance calculations would likely not be granted by a reinsurer to other than a regular client ceding a typical cross section of its excess lines with a sizable expected average amount per cession. Moreover, it is reasonable to expect that any substantial cost differential between the two basic plans of reinsurance would be nullified in part at least by participation refunds, which will be discussed in the next section.

D. FEATURES OFFSETTING OUT-OF-POCKET COSTS

A company considering the adoption of a reinsurance program or considering the expansion of a program in effect would hardly base its final decision on out-of-pocket costs alone, for there are other features of reinsurance which serve to reduce such costs appreciably. We are not directly concerned here with the fact that through reinsurance a company is able to avoid undue fluctuations in its surplus earnings that can be caused by large risks. However, a company that does recognize the necessity of resorting to reinsurance for a stabilization of its mortality experience, if it is to issue amounts over a certain size, is interested in appraising all the facts which have a bearing on the effective costs of such services. The out-of-pocket costs to reinsure which have already been discussed should be considered in conjunction with a number of other features which are of value to the ceding company, such as:

1. *Participation.*—The extremely low mortality over the past decade on life reinsurance has resulted not only in successive noteworthy reductions in

Yearly Renewable Term rates and in more liberal expense allowances for Coinsurance reinsurance but also in the adoption recently by many reinsurers of well-defined programs under which they now share with their clients on a contractual or noncontractual basis the earnings arising from favorable experience. Both plans of reinsurance are included in this profit sharing, and the savings to the ceding companies with profitable accounts have played a major role in reducing reinsurance costs over the past few years.

2. *Additional Agency Earnings.*—Through reinsurance the field force is given the opportunity to increase its volume of production, thereby making it possible to earn commissions on insurance that might otherwise be placed by competing agents. Although it is true that in some cases the coverage involved could be handled through brokerage operations, it is still desirable for the agent to be in a position to place the insurance through his own company in order that it may serve to increase his retirement fund, if such benefits are available to him, and be included in his production for club qualifications and other media of recognition. The additional agency earnings and allied credits tend also to lessen the problems confronting a company with respect to recruiting, agency turnover, and the tendency on the part of general agents, for example, to request greater expense allowances or related concessions. Another source of savings in this connection, applicable to reinsurance on the coinsurance plan, is the nonvested commissions on orphaned business, which savings arise from the fact that the reinsurer's commitment with respect to commissions and other allowances is usually not affected by termination on the part of the original writing agent.

3. *Growth.*—As a company increases in size, it has the problem of periodically reviewing its retention schedule with a view, ordinarily, toward an upward revision commensurate with its growth. If it has been reinsuring its excess lines, it is in a position to examine the amounts placed with the reinsurer to obtain information useful in estimating the probable effect of a given increase in retention limits on the amounts it will issue and retain under the new schedule. In other words, there is available, so to speak, a preview of what to expect if it decides to adopt a higher retention schedule. This preview, along with the experience on amounts reinsured, can serve as a valuable guide in adjusting underwriting practices to larger risks qualifying for retention.

4. *Recapture.*—It is customary now to include in the reinsurance agreement a clause permitting the ceding company, at its own option and with specified restrictions, to effect a retroactive increase in its retention limits on amounts reinsured whenever it increases its limits for new business. The usual requirement is that this clause will not be applicable to policies less than a minimum number of years in force (such as five years for Yearly Renewable Term and ten years for Coinsurance) or to policies on which the ceding company limited its retention to less than the published limit. The recapture privilege is valuable to the ceding company as a source of additional profits and as a means of broadening the base of its exposures in general or in a particular underwriting class.

TABLE 5

a. Cash Values per $1,000

Policy Year	Ordinary Life			Life 20			End 20		
	Age 25	Age 40	Age 55	Age 25	Age 40	Age 55	Age 25	Age 40	Age 55
1......	....	....	$ 4	....	$ 2	$ 9	$ 12	$ 12	$ 13
2......	....	$ 14	34	$ 19	33	47	53	53	54
3......	$ 13	34	64	43	64	85	94	94	95
4......	26	54	95	68	96	123	137	137	137
5......	39	75	125	93	128	161	181	180	180
6......	53	95	154	119	161	199	226	224	222
7......	67	116	184	146	195	238	272	270	266
8......	81	137	213	173	229	277	319	316	310
9......	95	158	242	200	264	317	368	364	355
10......	109	179	270	229	299	357	417	413	401
11......	124	200	298	258	335	398	469	463	449
12......	139	222	326	287	372	439	521	515	497
13......	154	243	353	318	410	482	575	568	548
14......	169	264	380	349	449	526	631	623	600
15......	185	285	406	381	489	571	688	680	656
16......	200	307	431	413	529	619	747	739	714
17......	216	328	456	447	571	669	807	800	777
18......	232	349	480	481	614	722	870	864	844
19......	248	370	504	516	659	779	934	931	918
20......	265	391	527	552	705	841	1,000	1,000	1,000

b. Gross Premiums (Nonparticipating)

Plan	Age 25	Age 40	Age 55
O.L.......	$15.79	$25.65	$47.01
Life 20....	27.13	37.09	53.16
End. 20...	46.12	48.08	56.42

c. General Agents' Scale

Plan	1st Year	2d Year	3d–10th Year	After 10 Years
O.L......	55	12½	7½	2½
Life 20...	47½	12½	7½	2½
End. 20..	35	12½	7½	2½

TABLE 6

a. REINSURANCE MORTALITY AND WITHDRAWALS

Year t	Issue Age 25 l_{x+t-1}	Issue Age 25 d_{x+t-1}	Issue Age 25 w_{x+t-1}	Issue Age 40 l_{x+t-1}	Issue Age 40 d_{x+t-1}	Issue Age 40 w_{x+t-1}	Issue Age 55 l_{x+t-1}	Issue Age 55 d_{x+t-1}	Issue Age 55 w_{x+t-1}
1	1000.00	.78	74.97	1000.00	1.82	74.93	1000.00	5.46	74.80
2	924.25	1.03	46.18	923.25	2.35	46.11	919.74	7.15	45.81
3	877.04	1.20	39.44	874.79	2.78	39.30	866.78	8.56	38.81
4	836.40	1.42	37.60	832.71	3.31	37.40	819.41	10.28	36.64
5	797.38	1.71	35.84	792.00	4.07	35.54	772.49	12.52	34.48
6	759.83	2.40	26.55	752.39	4.87	26.25	725.49	15.07	25.13
7	730.88	2.40	25.54	721.27	5.03	25.16	685.29	15.55	23.71
8	702.94	2.42	24.56	691.08	5.19	24.10	646.03	16.00	22.33
9	675.96	2.43	23.62	661.79	5.36	23.07	607.70	16.44	20.98
10	649.91	2.44	22.70	633.36	5.54	22.07	570.28	16.90	19.66
11	624.77	2.44	21.82	605.75	5.73	21.10	533.72	17.36	18.38
12	600.51	2.43	20.98	578.92	5.92	20.16	497.98	17.78	17.12
13	577.10	2.40	20.16	552.84	6.09	19.24	463.08	18.13	15.89
14	554.54	2.38	19.37	527.51	6.26	18.35	429.06	18.41	14.70
15	532.79	2.37	18.61	502.90	6.45	17.49	395.95	18.62	13.53
16	511.81	2.39	17.87	478.96	6.65	16.65	363.80	18.76	12.41
17	491.55	2.43	17.16	455.66	6.85	15.83	332.63	18.79	11.31
18	471.96	2.48	16.48	432.98	7.03	15.03	302.53	18.69	10.26
19	453.00	2.54	15.81	410.92	7.21	14.25	273.58	18.46	9.25
20	434.65	2.62	15.16	389.46	7.42	13.50	245.87	18.10	8.29
21	416.87	....	....	368.54	....	....	219.48	....	....

b. REINSURANCE YEARLY RENEWABLE TERM RATES PER $1,000

Issue Age	Year 1	2	3	4	5	6	7	8	9	10
25	$ 1.73	$ 3.47	$ 3.49	$ 3.51	$ 3.54	$ 3.58	$ 3.73	$ 3.92	$ 4.12	$ 4.35
40	3.02	6.43	6.86	7.33	7.84	8.40	9.00	9.67	10.38	11.17
55	8.77	18.96	20.49	22.16	23.97	25.94	28.08	30.42	32.94	35.69

Issue Age	Year 11	12	13	14	15	16	17	18	19	20
25	$ 4.59	$ 4.84	$ 5.10	$ 5.38	$ 5.69	$ 6.03	$ 6.43	$ 6.86	$ 7.33	$ 7.84
40	12.02	12.95	13.95	15.05	16.24	17.54	18.96	20.49	22.16	23.97
55	38.67	41.91	45.43	49.23	53.36	57.85	62.70	67.96	73.66	79.82

E. CONCLUDING REMARKS

It is realized that this paper has not covered the important areas of the reinsurance of substandard risks and participating insurance. The average financial results for participating insurance having comparable net costs should not be greatly different from the calculations presented for nonparticipating. However, the incidence of the cost to reinsure for a particular issue age and original plan will likely be different, the cost being less in the early years and more in the later years than under nonparticipating insurance. An analysis for the reinsurance of substandard risks would be essentially the same in principle as that for standard insurance.

In the last analysis, the effective cost to reinsure is an individual company matter depending as it does, in addition to the usual factors such as average size and the reinsurer's charges, on

1. The gross premiums charged the policyholder. Other things being equal, the higher the net costs of the ceding company the lower the costs to reinsure.
2. The extent to which the reinsurance is required to carry the overhead charges.
3. The percentage of policies fully reinsured.
4. The distribution with respect to age and original plan of the amounts reinsured. On either the Yearly Renewable Term or Coinsurance plan, the variation of average yearly reinsurance costs with issue age and plan is noteworthy.
5. The value placed by the ceding company on the numerous features which tend to offset the out-of-pocket cost to reinsure, such as: (i) annual participation in reinsurance earnings; (ii) the greater opportunity afforded agents (both soliciting and general) for increasing their commission earnings, with its salutary effect on recruiting efforts and agents' persistency; (iii) the assistance with respect to more rapid and more orderly growth; and (iv) the recapture privilege offered by the reinsurer.

Under present-day reinsurance treaties, there is a rather large area of issue ages and plans of original insurance where reinsurance yields a profit to both the reinsured and reinsurer. The participation programs adopted in recent years by reinsurers for both the Yearly Renewable Term and Coinsurance plans tend to broaden this area of profit to both parties.

Many companies throughout the United States and Canada have been reinsuring their excess lines for years. Surely they must have accumulated much worth-while information on what it costs to reinsure life risks on an individual basis. This paper will have better served its purpose if it is successful in soliciting the experience and thinking of others on this subject so that all interested can benefit.