SOME OBSERVATIONS ON ORDINARY DIVIDENDS

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IVIDEND apportionment may well be the actuary's most important job in a mutual company. In the short run, the scale applicable to current business will have a substantial effect on sales; in the long run, the ability of the company to carry out its dividend projections, barring obviously adverse conditions, will affect its reputation and prestige.

This paper was written at the suggestion of the Education and Examination Committee which expressed a need for review of recent developments in methods of dividend distribution. It may well be argued that there are no really new developments in the theory of distribution, but merely changes in practice represented by the introduction of various refinements in the dividend distribution process. These refinements have resulted from the increased financial importance of benefits once considered too minor to warrant establishment of separate dividend classes, and also, perhaps, from constant improvement of equipment, which has made such refinements economically feasible.

An attempt has been made throughout this paper to avoid repetition of the material so thoroughly covered by Mr. Maclean and Mr. Marshall in *Actuarial Studies, No. 6*, except in a few instances where it appeared to be warranted by a somewhat different approach and emphasis.

DETERMINATION OF DIVISIBLE SURPLUS

Over the long run the amount of surplus available for distribution as dividends will be determined only as the last step in the review of the financial operations of the company. First comes determination of the excess of assets over liabilities. The increase for the year is then allocated to additional reserves, contingency funds, and surplus required to assure the company's solvency and, finally, to divisible surplus. To view dividend distribution in its proper perspective some review of the entire financial statement is therefore required.

Annual Statement Accounting

By definition, surplus (including capital in stock companies) is the difference between the company's assets and its liabilities (other than capital stock). Financial custom and insurance department regulations deter-

mine to a degree the value of any single property holding (using property in its widest sense) and to a somewhat lesser degree the liability arising from contractual obligations. Nevertheless, despite these limitations, the values of assets and liabilities are themselves the result of a wide variety of management decisions which produce very different results in companies with similar asset holdings and similar policy obligations. Thus the surplus (including divisible surplus), far from being a simple mathematically determinable amount, may be described as the best approximation to the excess of the assets over the liabilities, both being determined in a manner which in the judgment of the management reflects a reasonable valuation of their worth.

In any individual company, however, the majority of these decisions are established by tradition (and in many cases by policy contract) and are, therefore, for practical purposes, irrevocable. Hence, the difference between assets and liabilities will be arrived at by routine accounting methods, with only small variations due to management decisions in the year of calculation.

Once the difference between assets and liabilities has been determined, the management is faced with a new set of decisions—allocation of the year's earnings (the increase—or decrease—during the year in the excess of assets over liabilities) between strengthening of reserves, contingency funds, free surplus and divisible surplus.

Reserve Strengthening

The first duty of prudent management in allocating surplus is to see that the surplus arrived at is, in fact, true surplus and does not result from undervaluing the company's liabilities. The very cornerstone of the reserve theory is that present reserves held, plus future income to be received from premiums and from interest on reserves and premiums, will be sufficient to meet future obligations as they arise.

The existing reserve fund on any block of business represents such a prospective approach at the time of issue. Where conditions have changed radically, a retesting is indicated. As a minimum, strengthening of reserves is indicated when a prospective gross premium valuation based on realistic future estimates of interest, mortality and expense indicates current reserves are inadequate.[1]

Failure to recognize and correct reserve deficiencies not only distorts the company's true current financial position but will, unless the deficiency in reserves is small in relation to the total reserve account, result

[1] See "Modern Applications of Gross Premium Valuation" by Bert A. Winter, *TASA* XLIX, 8.

in future, possibly increasing, drains on surplus as actual losses materialize. The strengthening of a deficient reserve, on the other hand, results in an orderly development of surplus once the strengthening has been accomplished.[2]

Contingency Reserves

A reserve fund is held against a specific hazard mathematically determinable (at least in theory) as to its probability of occurrence. Contingency funds in general are a part of surplus—in fact, they are frequently termed "earmarked" surplus—and, except where required by state regulation, the management has as free a hand in their management as in management of surplus. Being by their very nature not subject to mathematical laws of probability, contingency funds are normally built up as an arbitrary percentage of some known value—for example, of a certain premium account or of certain asset values.

The reasons for which contingency funds are set up are varied. The most common are:

1. To set aside funds against losses which will presumably occur but rarely, but which, if they do occur, will have a severe financial effect because of concentration of risk.[3]
2. Funds to offset capital losses, particularly losses on investments with more than the normal element of risk.
3. As a convenient fund to accumulate money intended for eventual use in reserve strengthening.
4. To absorb fluctuations in free surplus, thereby permitting a more orderly progression of future surplus growth.

Current practices of companies vary widely. Some hold what appear clearly to be contingency funds (*e.g.*, the group life contingency fund) as reserves. Others hold what appear to be reserves (*e.g.*, reserves for future losses under settlement options) as contingency funds. These variations in handling appear to be dictated less by any difference in concept of

[2] Because so many unfamiliar with accounting principles seem to consider reserve strengthening as a permanent loss of policyholders' funds, it may be pardonable to state the obvious here—*i.e.*, that any funds used for reserve strengthening must return to surplus over the lifetime of the strengthened block of business, either by reducing or eliminating a loss that would otherwise have developed, or as a profit if the strengthening proves more conservative than was required.

[3] The special group life contingency reserve of 2% of group life premiums up to 50% of gross premiums, required of companies doing business in New York State, is an example of this type of contingency fund.

reserves and contingency funds than by practical considerations, primarily the freedom of control desired by management.[4]

At least one company has no "free surplus" in its statement, but holds only contingency funds. This gives a practical demonstration of the thinness of the line between contingency funds, held against unpredictable contingencies of a specific kind, and surplus, held against unpredictable contingencies of all kinds.

Unassigned Surplus

The validity of the asset and liability valuation of an insurance company as an accurate statement of the company's financial position over any period of time rests on the assumption that security values will remain reasonably constant and that interest returns and mortality results will follow a reasonably predeterminable pattern. The free surplus exists as a cushion against the possibility of a sudden and violent change in this predetermined and presumptively normal pattern.

The primary function of surplus being as a protection against fluctuations in asset values and mortality, a general formula for required surplus might be expressed as $x\%$ of liabilities plus $y\%$ of the amount at risk. The values to be assigned x and y, as well as the total amount of surplus, will obviously be influenced by a number of considerations: the degree of conservatism and diversification in the investment policy; the degree of concentration of risk in any one area or location (a factor particularly important in the group field); the protection afforded by special contingency reserves; etc. Finally, there is the very practical consideration, frequently overriding all theoretical approaches, of the amount available for surplus after the company's general objectives have been attained.

In theory, it would appear that a company with well diversified investments and a conservative valuation of its assets, with full level premium reserves on all outstanding business at an interest rate well below current interest earnings and based on a mortality table reflecting mortality rates substantially above those that can be anticipated in the future, and with substantial margins in the gross premium for any reasonable future expenses, would require substantially less in the way of free surplus than a company which values its assets to the hilt, carries reserves on the minimum reserve basis permitted by law, at an interest rate near current in-

[4] The mandatory Security Valuation Reserve, held against future investment losses of which neither the date nor amount is ascertainable (in fact, investment losses of the future may be more than offset by future gains), is, under the criteria mentioned earlier, properly a contingency fund. It is required to be held as a reserve specifically to limit the management's freedom of control.

terest earnings, and with thin gross premium margins for expense. It would also seem reasonable to assume that a very large company doing a country-wide business with investments equally diversified would require less surplus (because less fluctuation need be anticipated) than a company doing a relatively local business with relatively localized investments. It must be admitted, however, that whatever the theory, there is no evidence that the amount of surplus is any smaller as a percentage of liabilities or amount at risk among large companies with very conservative valuations than it is among smaller companies with near-minimum valuation standards.

Perhaps the problem of the proper surplus position to maintain may best be summed up by Henry Jackson's paraphrase of the familiar nursery rhyme, "You nor I nor nobody knows how oats, peas, beans, and barley grows." His variation reads, "You nor I nor no one can know how big the surplus funds should grow."[5]

In practice, in most companies, the amount of unassigned surplus is, within narrow limits, a given percentage of the liabilities or assets of the company, and the management aims at preserving this ratio.

There is perhaps a certain amount of window dressing in the build-up of the surplus: that is, management feels that a surplus must show a reasonably orderly progression from year to year because the public, however unjustifiably, may feel that any adverse fluctuation in the surplus account is a sign of financial weakness. This fact may tend to freeze surplus, since once a policy of setting up, say, $x\%$ of assets as surplus has been established, it may be difficult to change at a later date to a lower figure, even though that may appear justified by the conditions then prevailing.

Divisible Surplus

Once the total increase in surplus has been determined, and once the portions to be allocated to free surplus, to contingency funds, and to reserve strengthening have been decided upon, divisible surplus is, in effect, the balancing item. It would be a mistake, however, to assume that divisible surplus is arrived at in any such precise order. Decisions as to reserve strengthening, contingency funds, free surplus, and divisible surplus are all interrelated, and any one may be the decisive factor in any one year. For example, a company which had a considerable surplus drain due to setting up level premium reserves on a large amount of new business written would not be likely to change its dividend scale merely to

[5] One addendum is in order: for a sizable domestic New York company, the surplus should not grow beyond 10% of its liabilities (Section 207).

avoid interruption of orderly progress in the accumulation of one of the other funds.

As a matter of fact, year-to-year fluctuations in surplus earnings for the year (using surplus in the broadest sense) are rarely reflected in the divisible surplus, both because very frequent changes in dividends seem undesirable for practical reasons of expense and, more important, because it is felt that frequent fluctuations in dividend payments will cause too much policyholder dissatisfaction whenever the adjustments are downward.

One cannot help being impressed, when going through all of the steps which must be taken to determine the divisible surplus, with how large a degree of management judgment must enter into the determination of the total amount available for dividends. No mathematical formula can possibly determine the precise point at which a company is conservative enough so as to guarantee its policyholders against any reasonable possibility of failure to carry out its obligations, and yet not so conservative as to withhold unduly from the present generations of policyholders for the benefit of the generations of the future.

INDIVIDUAL DIVIDENDS

The perfect dividend scale would appear to be one which returned to each policyholder class the precise difference between the premiums received from that class (plus interest earned on accumulations attributable to the class) and the cost of providing the insurance to that class (including exactly correct provision for future experience).

If that were true it would appear to follow that the greater the number of classes the greater the equity. If this number is increased indefinitely, however, the entire thesis breaks down. The ultimate in dividend scales would call for refunding to each policyholder the precise difference between premiums and cost of *his* insurance. Considering mortality alone, the sole purpose of purchasing pure life insurance is to avoid the catastrophic cost of death should it occur in the near future.

Next, considering investment, there is obviously an overwhelming advantage to the individual in having his small premium mingled with those of many others to avoid the violent and possibly disastrous fluctuations that could otherwise occur. Even were an individual to argue that his interests were best served by providing the true investment gain or loss to his account, the impossibility of such an accounting is evident.[6]

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[6] The following comment on this problem is particularly interesting: "My childhood imagination was pleasantly stirred when my father showed me a spot some ten miles from our Vermont home from which one drop of water would proceed rather directly

Finally, the most exacting policyholder would permit a fairly broad allocation of expense costs if only because he was unwilling to have the cost of his policy fluctuate wildly depending upon how high-priced a clerk was assigned to work on his policy.

For all these reasons the concept of the individual policy's dividend as representing the contributions of that policy to divisible surplus is patently unsound; the individual dividend exists only as a share of the operations of the entire company. In fact, even the concept of the entire dividend group for a given plan or age giving direct rise to a portion of the surplus to which the members of the group are therefore equitably entitled is correct only in the broadest sense within the framework of the entire company.[7] Rather the dividend represents an idealized pattern of the results which would obtain within the group if that group's experience were consistent with the experience of the company as a whole, taken over a reasonable period of time.

The Three-Factor Method

These cautions about the individual dividend seem particularly necessary because the mathematical formulas for the dividend calculations give the appearance that a dividend based on individual contributions to divisible surplus is produced. Of these formulas, the three-factor method is used by the great majority of mutual companies. The basic theory of the three-factor method is that ordinarily the divisible surplus arises from three sources—interest, mortality and expense margins—and that, therefore, a dividend formula designed to compute directly the policy's in-

to the Connecticut River and this to Long Island Sound, while a neighboring drop would be routed by way of the Winooski River, Lake Champlain, the Richelieu River and the mighty St. Lawrence system. I suppose no meteorologist, however learned, would undertake to predict on which side of the watershed each would fall. It might be even more difficult in dipping up a bucket of sea water somewhere off the coast of Maine to distinguish the constituent drops from the Connecticut and from the St. Lawrence.

"After a premium is once merged with the unsegregated funds of a life insurance company, it would seem to me equally presumptuous for an actuary to predict its course. Nor could he by dipping up random samples of the old stream of premiums venture a valid opinion as to their source or ultimate destination. . . ." Henry Jackson, *Fragments*, p. 209.

[7] William Marshall Bullitt gives a most interesting account of an actual case in which the New York Life was sued for an accounting of its dividend practices and in which he was able to establish that the age and plan group to which plaintiff belonged had actually received far more in death benefits than the value of all accumulated premiums from the group. See footnote, p. 26, Vol. 1, Sec. V, *Association of Life Insurance Counsel Proceedings*.

dividual share in these sources of surplus is the most equitable that can be devised.

The basic requirements for the three-factor method are (1) an idealized mortality table representative of current company experience as a whole and smoothed to eliminate fluctuations at individual ages; (2) an interest rate representative of that actually earned by the company as a whole and which can be maintained over a number of years; and (3) an expense rate (as a percentage of premiums and per $1,000 of insurance) representative of that actually anticipated within the next several years.

Normally, some margin will exist between the dividend and actual interest and mortality rates and, possibly, expense rates to allow for contribution to contingency funds and surplus.

Mathematics of the Dividend Formula

The surplus (assuming no gain or loss from surrender) for any plan and age-at-issue arising from the experience of the l''_{n-1} policyholders each holding one unit of insurance in the nth policy year may be written as:

$$S_n = l''_{n-1}(_{n-1}F + P''_n)(1 + i'') - d''_{n-1} - l''_n \cdot _nF , \qquad (1)$$

where

F = the fund held for each individual in the group,

P''_n = the portion of the gross premium left after payment of actual expenses in the nth policy year,

i'' = the interest rate earned during the year, and

d'' = the deaths incurred among the group.

This formula arises from general reasoning. The surplus (and as used here it may be positive or negative) arising from the nth year of operations must equal funds held for the group at the beginning of the year with interest earned thereon, plus income received from them with interest, less claims paid, and less funds held on their behalf at the end of the year.

The divisible surplus must differ from the actual surplus generated by the group in that year, the difference being due to the use of company-wide trends of interest, mortality and expense rather than the widely fluctuating actual results to be expected among small groups from year to year, and also to the contribution to general surplus and contingencies properly charged against the group.

If then we rewrite equation (1) to provide for the divisible surplus (DS_n) we will substitute assumed dividend rates of interest (i') and mor-

tality (q') for the corresponding rates in equation (1) and P' for P'' to allow for the expense rate assumed in the dividend formula, getting:

$$DS_n = l'_{n-1}(_{n-1}F + P'_n)(1 + i') - d'_{n-1} - l'_n \cdot {}_nF \tag{2}$$

or, substituting $l'_{n-1} - d'_{n-1}$ for l'_n,

$$DS_n = l'_{n-1}[(_{n-1}F + P'_n)(1 + i') - q'(1 - {}_nF) - {}_nF]. \tag{3}$$

It will be observed that the values of F must be predetermined quantities at the time of the calculation of the dividend scale, but that they may be any such quantities—i.e., F may be the reserve, the cash value, the asset share, or any of these plus such amount as it appears proper to retain to guarantee the financial solvency of the group. While such values of F must be calculated prospectively whenever a specific dividend scale is being developed, they may always be adjusted retrospectively according to actual experience at the time a new scale is introduced.

The theoretical individual contribution to divisible surplus (D_n) of each of the l'_{n-1} entrants in the year is then $DS_n \div l'_{n-1}$, or

$$D_n = (_{n-1}F + P'_n)(1 + i') - q'(1 - {}_nF) - {}_nF. \tag{4}$$

Equation (3) above expressed the divisible surplus arising during the nth policy year from a group of l'_{n-1} policyholders entering the year. If the requirement be imposed that F equal the reserve and the expense charges are such that this fund assumption is appropriate, equation (4) becomes the familiar three-factor dividend formula. Substituting in formula (4) $F = V$; $P'_n = \pi + L - e$ (i.e., the net premium plus loading minus the expense charge, in the notation of *Actuarial Studies, No. 6*):

$$D_n = (_{n-1}V + \pi + L - e)(1 + i') - q'(1 - {}_nV) - {}_nV$$

$$= (_{n-1}V + \pi)(1 + i') + (L - e)(1 + i') - q'(1 - {}_nV) - {}_nV.$$

Since

$${}_nV = (_{n-1}F + \pi)(1 + i) - q(1 - {}_nV),$$

$$D_n = (_{n-1}V + \pi)(i' - i) + (L - e)(1 + i') + (q - q')(1 - {}_nV),$$

the formula appearing on page 24 in *Actuarial Studies, No. 6*.

It is indeed debatable as to how much mathematical refinement is justifiable in calculation of a dividend scale when so much that is a matter of judgment and approximation is involved in the determination of every step of the dividend process. The adjustments which follow are, therefore, offered more for the sake of clarification than with any thought

that the refinements suggested need necessarily be introduced into the formula used.

Formula (2), $DS_n = l'_{n-1}(_{n-1}F + P'_n)(1 + i') - d'_{n-1} - l'_n \cdot {}_nF$, contains the implicit assumptions that all death claims occur at the end of the policy year and that a full year's premium is paid by all members contributing to the divisible surplus in the nth year. If then, formula (4) is used as the basis of calculation of the individual dividend, a further assumption in addition to those implicit in the derivation of formula (2) is introduced, namely, that a full dividend is payable to all who entered the policy year—those dying during (theoretically, at the end of) the year as well as those surviving to the end of the year.

If no dividends are payable on death, the distributable surplus is divided among survivors at the end of the year only and the theoretical formula becomes:

$$D_n = \frac{DS_n}{l'_n} = \frac{l'_{n-1}}{l'_n}\Big[\,(_{n-1}F + P'_n)\,(1 + i') - q'\,(1 - {}_nF) - {}_nF\,\Big]$$

$$= \frac{1}{p'_n}\Big[\,(_{n-1}F + P'_n)\,(1 + i') - q'\,(1 - {}_nF) - {}_nF\,\Big].$$

If a pro-rata dividend is payable at death, then

$$D_n = \frac{DS_n}{l'_n + \frac{1}{2}d'_{n-1}},$$

on the assumption that claims will occur on the average in the middle of the policy year—hence, that on the average a dividend of half the year-end dividend will be paid to all those dying in the year.

If the dividend formula is to allow for immediate payment of claims, then the group's distributable surplus (formula (2)) becomes:

$$DS_n = l'_{n-1}(_{n-1}F + P'_n)(1 + i') - d'_{n-1}(1 + i')^{1/2} - l'_n \cdot {}_nF,$$

or approximating $(1 + i')^{1/2}$ by $(1 + \frac{1}{2}i')$ and substituting $l'_{n-1} - d'_{n-1}$ for l'_n,

$$DS_n = l'_{n-1}\Big[\,(_{n-1}F + P'_n)\,(1 + i') - q'_{n-1}\Big(1 + \frac{i'}{2} - {}_nF\Big) - {}_nF\,\Big],$$

which may be divided by the theoretically appropriate factor indicated above to produce full dividend at death, a pro-rata dividend at death, or dividends payable only to survivors to the end of the policy year.

If payment of the dividend is to be made contingent upon payment of

the premium for the year following the date of declaration of the dividend, the formula becomes

$$\frac{DS_n}{l'_n + \frac{1}{2}d'_{n-1} - w_{n-1}},$$

where w'_{n-1} includes lapses due to failure to pay the premium due at the beginning of policy year $n + 1$. This formula is that appearing in *Actuarial Studies, No. 6* at page 138 after substituting for $l'_n + \frac{1}{2}d'_{n-1}$ its equivalent, in a single decrement table, $l'_{n-1} - \frac{1}{2}d'_{n-1}$.

Experience Premium Method

Under the Experience Premium method of dividend distribution, at the date of calculation of the dividend scale a second premium (EP′) is calculated using the dividend rate of mortality and expense and the valuation interest rate. The dividend payable (with the mortality and expense portions of the dividend arising from the precalculated value of $P - EP'$) becomes: $(P - EP')(1 + i') + (i' - i)(_{n-1}F + EP' - e)$. By definition the experience premium is precisely that amount in all policy years which, together with the fund to be held at the beginning of the year and interest earned at the valuation rate, will pay all expenses and claims and leave the fund assumed at the end of the policy year. Expressed mathematically, $EP' = v_nF - _{n-1}F + e + vq'(1 - _nF)$ for all values of n. Using this equation, the Experience Premium dividend above may be derived from equation (2) for the three-factor dividend, if e_n, the varying expense charge under the three-factor formula, is assumed to be equivalent to the level e of the Experience Premium formula.

Advantages and Disadvantages of Experience Premium Method

Under the three-factor dividend formula, if $_{n-1}F$ is correct, *i.e.*, if actual experience up to the beginning of the dividend year has followed that assumed, the dividend in the nth year can be corrected to reflect a changed experience, if necessary, by a change in the values of i', q', or P' only. That being true, it is obvious that any dividend calculated on the three-factor method will deviate from the dividend desired only because of the variation between actual and expected experience from the time of calculation *up to* the date of payment of the dividend.

On the other hand, since the Experience Premium method indirectly forecasts mortality and expense rates throughout the life of the policy, the dividends under this method are dependent on conditions to be anticipated *after* the date the dividend is to be paid. In valuation terminology, the Experience Premium dividend, except for interest, is a prospective calculation, the three-factor dividend a retrospective calculation.

As may be inferred from the description above of the method used in calculating Experience Premium dividends, they are relatively difficult to adjust for changing conditions, since dividends already paid may have included prospective gains from expenses and mortality on assumptions which experience has shown are no longer justified.

If $_nF'$ equals the nth year fund actually held in the nth year on account of the policy group rather than $_nF$, the amount assumed under the original calculation, then a new experience premium (say EP'_2) may be calculated such that on the changed assumptions the present value of future benefits less the present value of the adjusted experience premium at the revised rates of expense and mortality, and the valuation interest rate, will equal $_nF'$.

Although this will adjust for errors in the original dividend scale, the adjustment from its very nature is in all remaining dividends through the lifetime of the policy, hence is a slow way to correct past errors in the scale.

Despite its relative inflexibility, the Experience Premium dividend has advantages in several situations:

1. For a stock company issuing both participating and nonparticipating business the Experience Premium method provides a direct and obvious check on the balance between net costs of the participating and nonparticipating lines. The same advantage has been suggested for a mutual company with policies on two different bases (*e.g.*, American Experience and CSO mortality bases).[8]

2. When dividends would decrease with duration if the contribution method were used, a modified Experience Premium dividend is particularly useful.

   a) Although now primarily a matter of historical interest, many companies in the 1920's and early 1930's issued policies with interest calculated at rates which proved to be higher than those actually earned for many years. The contribution method therefore produced larger and larger deductions for interest from the dividend as the amount of the reserve increased. Particularly on higher premium forms where the mortality element in the premium became at the same time progressively less important, not only were dividends decreasing rapidly, but they actually became negative under the formula in later years. The use in such circumstances of an experience premium calculated at realistic rates of expense, mortality *and* interest would make possible a level (but lower) dividend scale which would avoid the eventual loss on such policies under the contribution method.

[8] *RAIA* XXXVI, 364–70.

b) Decreasing dividends normally arise on participating single premium immediate annuities if the contribution method is used.[9] Under this method the dividend, which arises largely from interest, will be greatest in the early years and can be expected to decrease every year unless gains from mortality show an offsetting increase. This means that large dividends will have been paid in the early years before the actual mortality experience of the group had emerged, and very small margins will be left to correct for errors in initial assumptions. An experience premium calculation including an expected interest assumption (thus providing a flat dividend) will retain some of the surplus margins accrued in the early years for distribution as the actual mortality experience develops.

3. Another use of the experience premium method arises whenever the calculation under the contribution method is unduly burdensome, considering the size of the dividend involved. Flat dividends, based on experience premiums, but using most probable interest rates[10] instead of the valuation rate, as well as most probable rates of mortality and expense, are normally provided in such cases. Almost all supplementary benefits may be handled in this way, *e.g.*, Accidental Death Benefits, Waiver and Income Disability, decreasing and level term riders, etc.[11]

Use of Asset Shares

Under the contribution or three-factor method the three elements contributing to surplus—loading, mortality and interest—are determined separately. If an ultimate table is used the difference between select and ultimate mortality is available to cover excess first year costs, but only by chance will the mortality margins so provided exactly equal or even closely approximate the actual excess first year costs. In fact, it is very likely that in the early years some part of the interest earnings and some portion of the mortality savings other than the difference between select and ultimate mortality will be required to cover expense.

Asset shares require the use of no assumptions not explicitly or implicitly required in the contribution method. They have the considerable advantage that they permit determination of the margins available for dividends as they actually develop, using expense, mortality and interest

[9] Although the majority of mutual companies issue only nonparticipating annuities, a few companies provide for participation.

[10] Interest is, of course, of negligible importance in a number of these benefits, particularly the reducing term benefits.

[11] Some companies which traditionally handled these as nonparticipating benefits have found it more practical to reduce future premiums for such supplemental benefits rather than provide additional dividend classes.

combined. Another advantage of asset shares lies in the direct inclusion of gain or loss on surrender, whereas the contribution method in its direct application takes no account of surrenders.

Certain practical and philosophic problems will be met in any asset share calculation. Although these same problems exist in the contribution method, they are not so directly evident.

Allocation of operating costs represents a difficult problem. No matter how much time is spent in cost studies, a considerable degree of judgment must go into allocation of costs between closely allied lines of business, between investment, insurance, and other functions, between first and renewal years, and, except for obvious items, in the assessment per policy, per thousand or as a percentage of premium. A substantial portion of general expense, such as executive salaries, is only remotely a function of number of policies, premium income or amount of insurance. Allocation of these expenses as a percentage of premium, a charge per thousand, a combination of the two, or on some other basis is entirely a matter of judgment and business philosophy. Finally, from their very nature, expense allocations must be made on the basis of the existing expense pattern within the company. Since fixed overhead expenses such as home office and agency rentals, etc., will only in the long run correspond to increases or decreases in number of policies, amount of premium income, or volume of insurance, existing expense patterns may not prove entirely reliable in the future, even without variations in costs brought about by inflation or deflation or changes in procedures or equipment.

Besides the practical problems an important philosophic problem exists —the determination of the amount, timing and method of charges for contributions to contingency funds and general surplus. How much should each policy contribute to general surplus? How should these charges for surplus be apportioned between the investment and insurance elements of the policy? At what policy duration should the surplus objective be attained?

Obviously the amount and incidence of the charges are determined by the company policy as to the amount of unassigned surplus to be held. Theoretically the method of allocation between investment and insurance elements should be a function of the purposes for which surplus is held, that portion of surplus held against asset fluctuations being charged against the investment element and that portion held for mortality fluctuations against the insurance element. Practical limitations imposed by an existing dividend scale or competitive considerations may, however, dictate allocations other than purely theoretical.

Theoretically, asset shares could themselves be used directly to develop

the dividend scale, with dividends being merely the difference between the asset share and the cash value after allowance for contribution to contingency and general surplus funds. The description of the process in the dividend vote would, however, be cumbersome. In any case some smoothing of the crude results would be necessary, since the direct asset share would show discontinuities due, for example, to changes by duration in the level of renewal commissions which, if directly reflected in the dividend scale, would presumably be puzzling to the policyholder. Furthermore, without adjustment the asset shares are likely to develop no dividends in early years, at least on policies for small amounts, whereas payment of such early dividends may appear desirable as a means of encouraging persistency.

In practice, asset shares are generally used either to check on the adequacy of a contemplated scale developed using the contribution method, or to provide points on the curve of a dividend scale, with a three-factor dividend formula being developed to fit the curve. This may be clarified by expression in mathematical terms. The asset share at the end of the nth policy year may be expressed, for an annual premium policy, as

$$F_n - l'_{n-1}(F_{n-1} + P'_n)(1 + i') - d'_{n-1}\left(1 + \frac{i'}{2}\right) - w'_{n-1}CV_n - l'_n D_n,$$

where F represents the asset share, CV_n the nth year cash value per unit of insurance, all primed symbols indicate the use of assumed most probable values on a select basis, and the other terms have been previously defined.

When using asset shares to test a proposed dividend scale, various criteria that the proposed scale must meet at specific durations will be set at, for example, 5 year intervals. As an illustration, one such requirement might be that the asset share at the end of the 10th year will be (on the assumption used) equal to the 10th year cash value plus, for contingencies, 2% of the cash value and \$2 per \$1,000 at risk, i.e., $F_{10} = CV_{10}(1.02) + .002(1 - F_{10})$. It will be noted that on any one set of assumptions all values in the equation for asset shares are fixed except the D_n generated by the proposed scale. The total effect of all dividends on F_n is

$$\sum_1^n l'_t(1 + i')^{n-t} D_t.$$

Therefore, having once generated F_{10}, for example, under a proposed dividend scale, the effect on F_{10} of any adjustments to the scale to make

it conform to the conditions imposed can be determined by examining only the change in the value of

$$\sum_{1}^{10} l'_t (1 + i')^{10-t} D_t.$$

Terminal Dividends

Terminal dividends have grown tremendously in importance in the insurance field. Prior to the mid-forties only one company doing business in New York paid terminal dividends. In the next ten years, 13 additional companies adopted terminal dividends, so that by 1955 companies with 75% of the assets of all New York writing companies were paying or proposed to pay such dividends.

The theoretical argument in favor of terminal dividends is formidable:

a) Contingency and surplus funds are needed to guard against fluctuations so long as the policy remains in force. When the policy terminates, should not the share of surplus allocable to the individual policy be released? The terminal dividend is the only practical means for doing so.

b) Under certain conditions the use of terminal dividends permits more equitable treatment than is possible through annual distribution. For example, when reserves have been strengthened by funds contributed by the group to which the policy belongs, a terminal dividend permits return to the policyholder of the increase in reserve due to the strengthening which is no longer required when he terminates.

c) A terminal dividend payable only to those policyholders taking cash settlements may preserve equity between terminating policyholders when dividends have been withheld in anticipation of settlement option losses (but see comments on New York Regulation, following).

d) Terminal dividends may provide a means of reducing loss on early withdrawal, at the same time encouraging persistency at early durations.

The opponents of terminal dividends argue as follows:

a) Surplus is particularly difficult to allocate to its source since it arises from many varied sources such as capital gains, a fact which makes equitable distribution on termination extremely difficult if not impossible.

b) In any event the company should be in no worse position after surrender than before, and a substantial investment of surplus will be required to replace the departing policyholder.

c) There is no evidence that policyholders of a company paying terminal dividends will in fact receive any more in dividends or any lower net cost than policyholders in a company with regular dividends only. As evidence of this there is no indication that the surplus held by terminal dividend paying companies is any smaller than that held by companies not paying such dividends.

d) In any event surplus apart from that refunded through terminal dividends must be built up. As Mr. Arlinghaus states,[12] "Some part, at least, of the contributions to the contingency reserve must be considered as a sort of risk premium, which cannot be returned simply because up to the date of termination of a particular policy no loss of the kind contemplated to be covered by the contingency fund has occurred."

e) Finally, terminal dividends give an unfair and in some cases illusory advantage in net cost comparisons.

The laws of New York specifically permit the payment of terminal dividends and permit special dividends (Sec. 216) ". . . with the approval of the Superintendent . . . in an amount deemed by him not inequitable in proportion to the annual dividends paid in preceding years on such policies or contracts." Furthermore, the Standard Valuation Law adopted with variations in almost all states appears to contemplate the possibility that the insurance commissioner may require a system of terminal dividends for companies permitted to use a valuation interest rate lower by more than $\frac{1}{2}\%$ than the interest rate used in the calculation of nonforfeiture values.

As a result of a sharp controversy within the industry over terminal dividends the New York Insurance Department investigated the entire subject and, after a series of hearings, promulgated the following criteria (letter from New York Insurance Department dated July 11, 1958) to which terminal dividends paid by New York licensed companies must adhere:

1. A company which hereafter proposes to pay terminal dividends shall demonstrate (a) that such dividends are equitably apportioned by reason of the actual experience for the given class of policyholders and particular plans and policy durations involved, over and above the apportionment for regular annual dividends; (b) that such dividends bear a reasonable relationship to the surplus accumulated by the class of policyholders; (c) that as to such dividends the company's practices shall be consistent in classifying policies by plans of insurance, years of issue, reserve bases, etc.; and (d) that such dividends are "not inequitable in proportion," *i.e.*, not dis-

[12] *RAIA* XXXI, 158.

proportionate to the annual dividends paid in preceding years for a given class of policyholders.

2. A company shall justify the interval after which terminal dividends are to commence.

3. If a company proposes to pay terminal dividends, it shall do so for all terminations by death, maturity, and surrender, including settlement options. Suitable provision should be made in the cases of reduced paid-up insurance and extended term insurance.

4. Departmental approval for terminal dividends shall be obtained annually by domestic life insurance companies.

Pursuant to the authority conferred by subsection 5, of Section 42 of the New York Insurance Law, it is hereby declared that foreign life insurance companies licensed to do business in this State, shall substantially comply with rules 1 to 3, inclusive, set forth in the paragraph next preceding, in the payment of terminal dividends to policyholders in this State, and it shall be a condition precedent to the issuance of renewal licenses to each such insurer and branch that it file certified copies of resolutions with the Superintendent of Insurance, as adopted by its board of directors or other governing body relating to the payment of terminal dividends commencing with the year 1959.

The requirement that policyholders electing settlement options receive the same terminal dividends as those electing cash seems unfortunate, since the result is that the cost of such options must be charged against the entire group insured, eliminating the equally equitable alternative of charging settlement option losses against those electing and benefiting thereby.[13]

Mathematical Formula for Terminal Dividends

Formula (3) gives the annual amount of divisible surplus arising from a group of policyholders as:

$$DS_n = l'_{n-1}[(_{n-1}F + P')(1 + i) - q'(1 - {}_nF) - {}_nF] \,.$$

If terminal dividends are to be paid they will, from general reasoning, be equivalent to ${}_nF - CV_n - K$, where K will be a quantity designed to cover termination costs, losses under settlement options, and any charge deemed necessary for antiselection on termination.

At the time of calculation of the dividend scale, the values of ${}_nF$ will be predetermined amounts to be built up gradually to cover such hazards as management feels necessary over and above the regular reserve, *e.g.*,

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[13] Section 216 of the New York Insurance Law, governing dividends, may, however, be interpreted as requiring this result, at least of domestic companies. It can be argued that the section contemplates distribution only of profits already earned, with no allowance for potential future loss.

additional contingency funds, funds for potential settlement losses, etc. In the early years, it is evident that such funds will rarely exceed the cash value, so that no terminal dividend will result.

The value of F may be changed at any time to reflect the fund developed from actual experience and either future theoretical values of $_nF$ adjusted accordingly or future dividends adjusted to bring back the fund over a period of years to the amount originally determined.

The formula above does not contemplate payment of the terminal dividend at death since in the expression $q'(1 - {_nF})$ provision is made only for a mortality charge for protection equal to the face less the fund. If the terminal dividend is to be payable on death $q'(1 - CV_n)$ should be substituted for $q'(1 - {_nF})$.

It is self-evident that annual dividends and terminal dividends are completely interdependent. Since the only source of funds held is income received from policyholders, and interest thereon, in excess of claims and expenses paid, the larger the value assigned to $_nF$ the smaller will be the annual dividend, and vice versa.

One large company has developed a highly integrated theory of dividend payments. Amounts withheld for payment of terminal dividends are viewed as being held primarily for the purpose of adjusting inequities between policyholder groups and absorbing moderate fluctuations in mortality, and only as a last resort as a catastrophic reserve. It is the function of general surplus to absorb catastrophic mortality fluctuations and capital gains and losses. A specific charge for surplus against the dividend formula in the form of a small percentage of interest and mortality is made. This charge is viewed as in the nature of a nonreturnable risk premium to cover abnormal financial losses or epidemics which occur only at long intervals, and which cannot, and properly should not, be charged solely against the body of policyholders existing at the time of the catastrophe.

Adjustment for Losses under Settlement Options

Almost all policies written prior to the early 1940's carry settlement options which, under reasonably current annuity assumptions, will cost substantially more than the settlement value. Unless it is felt that the losses to be incurred can be charged to the surplus contributed in the past by the group, some adjustment of the dividend formula is required. The material below, based on the method suggested by Walter Klem,[14] provides a method of calculating the net level deduction from dividends to adjust for such future losses. It would, of course, be possible to make nonlevel one-year term charges for such losses against dividends. However, such an

[14] *TSA* II, 77.

approach might produce an unwieldy dividend formula as well as a reducing dividend, since the deduction, representing a combination of the probability of death and withdrawal with the probability of selection, will normally be an increasing one.

Mathematical Formulas

Let $S_y a'_y = $ the amount of money required to provide settlement option income (S_y) under current annuity mortality assumptions at the beneficiary's age y.[15]

Then, $S_y a'_y - 1,000 = $ the additional insurance required at the beneficiary's age y to make up for the deficiency in settlement option rates, and

$$\frac{\sum_{t=0}^{n-1} C_{x+t} (S_{y+t} a'_{y+t} - 1,000)}{N_x - N_{x+n}}$$

is the net level premium (or net level deduction from dividends) to provide such benefits to all beneficiaries, x being the attained age of the insured at the date of introduction of the settlement option factor, and n the remaining premium payment period.

An additional term $D_{x+n}(S_{x+n}a'_{x+n} - 1,000)$ is introduced in the numerator if an endowment insurance is involved, assuming that at maturity the option will be exercised by the insured.

If the above formula were used, an additional benefit at death of $(S_{y+t}a'_{y+t} - 1,000)$ would properly be payable on all settlements not involving the option causing the loss.[16]

If the entire group is to be charged through dividend deductions for settlement losses anticipated, without refund to those not selecting the option, the above formula would be multiplied by $p^{(s)}$, the probability of selecting the option. This probability would be determined by actual company historical experience (modified for any apparent trend) as to the percentage selecting the option. Although this probability might in fact vary by the age of the beneficiary, it is unlikely that sufficient data to establish such a pattern would be available, so that practically a single value of $p_y^{(s)}$ for all ages would be used. With the introduction of this fac-

[15] As used in these formulas a'_y is a generalized expression for the value of any annuity whether or not it contains an annuity certain portion.

[16] Note, however, that this approach is apparently forbidden for companies doing business in New York (Letter of July 11, 1958 from the New York Superintendent of Insurance, Subject: Life Insurance—Terminal Dividends).

tor the formula for the dividend deduction from an endowment insurance would be:

$$\frac{1}{N_x - N_{x+n}} \Big[p_y^{(s)} \sum_{t=0}^{n-1} C_{x+t} \, (S_{y+t} a'_{y+t} - 1{,}000)$$

$$+ p_{x+n}^{(s)} D_{x+n} \, (S_{x+n} a'_{x+n} - 1{,}000) \Big].$$

Normally, there will be a number of different settlement options causing monetary losses of different amounts and with differing possibilities of selection. If $p_y^{(sr)}$ is the probability of selecting the rth settlement option and $S_{y+t}^r a_{y+t}'^r$ equals the value of the rth option under current assumptions, the deduction becomes:

$$\frac{1}{N_x - N_{x+n}} \Big[\sum_r p_y^{(sr)} \sum_{t=0}^{n-1} C_{x+t} \, (S_{y+t}^r a_{y+t}'^r - 1{,}000)$$

$$+ p_{x+n}^{(sr)} D_{x+n} \, (S_{x+n}^r a_{x+n}'^r - 1{,}000) \Big].$$

If surrenders are to be taken into account the formula will give the correct result only if the accumulated reserve for the additional insurance provides exactly the required amount to cover the loss occasioned by the application of the option to the surrender value by the insured—and only by chance would that be the case. Strict accuracy would, therefore, dictate use of a double decrement table including withdrawals and introduction of yet another set of probabilities representing the frequency of selection by the insured on cash values.

Considering the number of complications and assumptions which must be made—probabilities of selection of the various options, the relative ages of beneficiary and insured, etc.—practical considerations may dictate the use of an approximate value of $S_y^r a_y^r - 1{,}000$ which represents the average value of the additional insurance over a period of years when the option is most likely to be selected. Determination of the current dividend deduction is then a relatively simple matter.

Practical Considerations

The preceding paragraphs give a theoretical approach to the dividend calculation process. In practice a number of scales will normally be developed before arriving at one which meets all the necessary criteria for a practical and satisfactory scale. The criteria are:

1. The total of the individual dividends must be equal to the total amount determined in advance as available.

Based on data which may be a by-product of the valuation system used

or of the actual dividend scale in effect or the result of a special study, the amount payable in the existing dividend schedule for each of the elements in the dividend formula—mortality (in broad age groups), interest, and loading—will normally be available, as well as a distribution (by valuation interest rate) of business by plan, age, mortality table, etc. Since the amount payable under the existing scale must be known, it is possible to estimate the effect of possible changes in any one of these factors.

Although preliminary investigation will have produced the theoretical mortality, interest and expense bases desired, their direct use in the formula will seldom produce the amount of divisible surplus available without a good deal of trial-and-error modification.

2. The dividend scale must be as satisfactory as possible to existing policyholders.

After a preliminary set of acceptable dividends which meet the first criterion are found, they must be examined in relation to the present scale. Whenever there has been a change in emphasis in the dividend structure (e.g., a decrease in the expense refund at the same time as an increase in interest allowed), the dividends resulting from the new formula must be checked against those actually paid under the existing formula. Policyholder satisfaction is, after all, the primary aim of all dividend schedules and on the whole this is best attained by the most equitable distribution possible. However, the existing schedule has conditioned policyholders to a relatively narrow range of dividends, probably increasing slightly from year to year. A serious reduction in dividends due solely to a more equitable assessment of expenses, for example, might well result in lapse of existing business and prolonged and expensive correspondence in the attempt to justify the change. As a practical matter such a change in emphasis must normally be carried out over a number of adjustments in the dividend scale.

3. The net cost position of the company under the tentative scale must be checked against that of its chief competitors. Substantial departures from the net cost patterns of companies in similar financial position may result in dissatisfaction among the agency forces and a flow of business to those policies particularly favored in competition by the proposed scale. Since (unless the reasons for the differences can be satisfactorily explained) weight must be given to the opinion of his colleagues in other companies, the actuary must be very confident that the advantages of the proposed scale outweigh the possible disadvantages before dismissing competitive considerations.

4. There are limitations on the reliability of available data for use as a

basis for allocating costs, mortality and income by group. For example, the small company can produce reliable mortality data only in the broadest possible groupings. It must, therefore, rely on the mortality statistics of the industry, modifying them to its own situation. Even the largest company, however, may find it impossible (even if it is desirable) to get reliable and usable statistics on all possible refinements of mortality classes, including age, underwriting class (standard, substandard and preferred risk), sex, race, occupation, family history, type and size of policy, habits, social, economic and family status, as well as the almost infinite possible variations by habitat, including area, urban versus rural, etc.

5. The administrative cost of operation of the proposed scale must be considered. Obviously the pursuit of greater theoretical equity can be justified only when the results are significant enough to warrant the expense involved. Even with the largest computers the number of dividend classes which can be economically handled is limited by the capacity of the machine to store the necessary instructions. Also the expense involved in a change in scale is substantial enough to militate against frequent insignificant changes in the dividend scale.

6. The dividend scale adopted must represent the trend of the company's experience over a period of years, not merely the results of a single dividend year. As Mr. Winter said,[17] "It is apparent that temporary waves of high lapse rates, bursts of agency expansion activity, sharp fluctuations in security values, epidemics and wars can and do have capriciously and widely different effects on policy groups that differ as to time of issue but are quite similar as to premium rates, cash surrender values and other policy provisions. Erratic variations in the net cost of such similar policies are clearly inappropriate." All these fluctuations, except where considerations of company solvency are involved, should have little, if any, impact on the dividend scale unless it is felt that they represent a basic change in the trend of company operations.

7. Simplicity is an important, though not overriding, objective of any dividend scale. Ordinarily a simple scale will be easier to change to meet varying conditions and it will almost certainly be easier to explain to the curious policyholder who wishes to know just how his dividend was arrived at. Refinements introduced to attain more equitable distribution may, however, run directly counter to this objective.

[17] *TASA* XLIX, 13.

LEGAL CONSIDERATIONS

Statutory Provisions

By far the most comprehensive and at the same time influential state law governing dividend distribution is that of New York (Section 216).

For Ordinary policies of domestic insurers it requires annual distribution of surplus;[18] permits special and terminal dividends only with the approval of the Superintendent; requires specific dividend options—cash and reduce premiums on term and annuity plans and, in addition to these two options, paid-up additions and accumulations at interest on ordinary plans; provides for which option is to be used if no election is made by the insured; prohibits a first year dividend unless "earned" by the policy; prohibits issuance by mutual companies of any nonparticipating policies, although it specifically excludes extended term and pure endowment taken as a nonforfeiture benefit, annuities while income is payable, paid-up additions, and reinsurance, from the participation requirement;[19] and prohibits issuance by any stock companies of participating policies except with operating limitations designed to protect the participating policyholders. (By specific provision, however, payment of excess interest on settlement options does not make a nonparticipating policy participating).

Certain of these provisions are specifically made applicable to policies issued in New York by out-of-state companies. These include the requirement of annual participation, the limitation on stock companies writing participating policies, and the requirement that all policies issued by a mutual company, with the exceptions noted above, be participating. Moreover, Section 42 of the New York Law requires, of out-of-state companies, substantial compliance with any portion of the Law applicable to domestic companies, wherever deemed by the Superintendent of Insurance "reasonably necessary to protect the interests of the people of

[18] According to Section 216, on December 31 the surplus ". . . earned . . . during said year . . ." must be ascertained. This peculiarly restrictive phrase has the (presumably unintended) effect of implying that the dividend is earned as of December 31—hence that payment of premiums to the anniversary is not a necessary condition for receipt of the full dividend declared. To avoid this unfortunate result the dividend vote has been altered by New York domiciled companies to provide that the divisible surplus consists of funds already earned and those expected to be earned prior to the policy anniversaries in the coming year.

[19] New York's prohibition against the issuance of nonparticipating policies by mutual companies has in at least one instance been interpreted by the Insurance Department to include a prohibition against nonparticipating riders attached to a participating contract. However, the dividend vote can presumably be worded so as not to allocate surplus to such a rider.

this state." This section has been invoked with increasing frequency in recent years to give general effect to New York departmental rulings.

In addition to the statutory provisions, the New York Superintendent has ruled that an increase in dividend scale may not be announced more than two months before it becomes effective if any first year dividend is payable, and that any reduction in scale must be announced as soon as determined.[20]

No other state has nearly as comprehensive a set of laws regarding dividends as New York. In fact, twelve states have no specific legislation on the subject, except for a provision in some of these against discrimination, relying on the general powers of the Superintendent of Insurance to safeguard the policyholders' interests.

Of those states with legislation concerning dividend distribution, the most common requirement is that of annual distribution, although in many states no distribution is required before the end of the third policy year and in others none before the fifth. Massachusetts interprets their statute as requiring that at least one nonforfeiture option be participating, with the result that, on term policies where it is normally the only nonforfeiture option, extended term insurance —specifically excluded from the participation requirement in a number of states—must be participating in Massachusetts. A number of states besides New York provide specific protection of the mutual policyholder in a stock company. Finally, four other states (Illinois, Maryland, Massachusetts and Missouri) require the four dividend options under the same circumstances as New York.[21]

Court Decisions

A large body of cases throughout the years has arisen from attempts to force larger dividend payments or to require distribution to a departing policyholder of his "share" of the surplus. Substantial surpluses held by

[20] Letters to all authorized Life Insurance Companies, "Re: Advance Announcement of Dividends to Policyholders" dated January 10, 1930, April 8, 1931, and February 21, 1933. (Query: Does the letter of April 8, 1931 requiring immediate announcement of reductions apply only to the year 1932?)

[21] If the policyholder can get his dividends in cash, what further protection does he need? The requirement that three other dividend options be handled creates unnecessary and substantial expense. Furthermore, how is equity among policyholders furthered by a statutory guarantee that a policyholder who has not elected paid-up additions at issue may at any time elect to purchase standard insurance at net rates with future dividends, particularly when the obvious time for the choice is when he finds he is no longer insurable?

the major companies have throughout the years been a target for policy-holders' suits.[22]

Cases involving dividend apportionment have been concerned with four main questions:

1. *The relationship of the mutual company to its policyholder.* Is that relationship that of debtor and creditor or trustee and *cestui que trust?* The importance of the distinction lies in the fact that the rights of the policyholder are much more detailed, including specifically the right to an accounting, if a trust relationship exists than if the relationship is that of debtor and creditor. The precise relationship is still not settled in many jurisdictions. Vance states that the relationship is that of conditional debtor and creditor, though he also cites cases giving the opposite view;[23] Bullitt suggests that the tendency has been to find that the mutual policyholder has a right to an accounting.[24]

2. *The degree of discretion which the directors may exercise in the determination of the amount of surplus to be distributed.* The following quotation from the Brown case[25] is still good law in most, if not all, jurisdictions: ". . . how much of the surplus shall be distributed to the policyholder and how much shall be held for the security of the defendant and its members is to be decided by the officers and management of the defendant in the exercise of their discretion to distribute, having in mind the present and future business, and in the absence of any allegations of wrong doing or mistake by them, their determination must be treated as proper and their apportionment of the surplus is to be regarded prima-facie as equitable."

3. *The right of the company through its board of directors to determine the various classes for purposes of dividend distribution.* This question arose

[22] For example, see *Lubin* v. *Equitable* (61 NE 2d 753) in which the court said, "We are constrained to believe that the nineteen suits involved herein were instituted solely for what possible nuisance value they might prove to have."

[23] *Vance on Insurance,* Third Edition, by B. M. Anderson, p. 121.

[24] "Notwithstanding the decisions in the Uhlman, Greef, and Brown cases, that the relationship between the policyholder and the mutual life insurance company is that of creditor and debtor, that no trust relation exists, and consequently that a bill for an accounting will not lie, there is a line of late cases where (either under special statute or by a different conception of a company's relation to the policyholder) it has been held that the policyholder (whether of an annual or of a deferred dividend policy) may maintain an action for (or equivalent to) a general accounting of the company's methods, funds, surplus, and principles of dividend distribution." ("The Relation of the Individual Policyholder to the Resources of a Mutual Life Insurance Company," *Association of Life Insurance Counsel Proceedings,* Volume 1, Section V.

[25] *Equitable Life Ins. Co.* v. *Brown,* 213 US 25.

repeatedly in the 1930's when, because of disability losses, many companies reduced dividends on policies with disability income benefits. In these cases, the courts uniformly held that the disability clause was an integral part of the policy and upheld the right of the companies to treat such policies as a separate class for dividend purposes.[26]

4. *The jurisdiction in which suits involving dividend allocation may be brought.* The leading cases, *Ellis* v. *Mutual Life Insurance Company of New York*, 187 So. Rep. 434 and *Pratt* v. *Mutual Life Insurance Company* (Kansas Sup. Ct. 1944), 145 P 2d 113, hold that dividend allocation is a matter concerning the internal affairs of the company and that, therefore, the court of the state in which the insurer is domiciled has jurisdiction in litigation involving dividends.

CURRENT DEVELOPMENTS AFFECTING DIVIDEND CALCULATIONS

Many of the changes discussed below have been accomplished by some companies through an adjustment in premium charges rather than through changes in dividend practices. A refinement in premium charge rather than a dividend adjustment may be dictated by any number of considerations, including sales appeal and reluctance to complicate further an already complicated dividend structure. Premium adjustments for special benefits have, however, the inherent disadvantage that they must be based on assumptions made before the policy is issued and cannot be varied as actual experience develops. For that reason many of the refinements now handled through premium adjustments may also call for dividend adjustments at some time in the future, if the experience developed varies substantially from that expected at the time the premiums were calculated.

Variation by Size of Policy

It has been a practice for years in many companies to make adjustments in the dividend formula to reflect the average amount by plan and age.

In recent years the increase in business costs together with drastic reductions in mortality have focused attention on the portion of the policyholder's dollar going into expense. One aspect of that expense is the relatively high basic per-policy cost which does not vary with the size of the policy. Many companies, especially those with low average amounts, began to issue policies with large minimum amounts at reduced rates because in such policies a smaller charge per $1,000 was required to cover these per-policy costs.

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[26] The leading cases are *Rhine* v. *New York Life*, 273 NY 1, 6 NE 2d 74 (1936) and *Rubin* v. *Metropolitan Life Ins. Co.*, 728 NY 625, 16 NE 2d 293.

This developed into a practice among many companies of charging either a policy fee, grading premiums on all plans by size, or grading dividends by size. Because premium grading has more sales appeal, and dividend adjustments are complicated, the former has proved more popular. Those companies using premium grading by size may, however, wish to introduce dividend amount credits on existing business. Furthermore, since the validity of permanent premium grading by size rests on a static per-policy renewal expense it may well be that, either through reductions in per-policy costs brought about through more efficient use of electronic equipment, or through increases in those costs due to inflation, companies now offering premiums varying by size may also eventually introduce dividends varying by size.

The first step in the calculation of dividends varying by size is obviously an asset share study designed to separate the first year and renewal costs that vary only by the number of policies, e.g., most issue costs (except underwriting), valuation, collection and some change costs, etc., from those varying by amount or those which are properly charged as a percentage of premium. At best a considerable degree of judgment must be involved. The first year per-policy cost will normally be many times the renewal cost, and this excess first year cost may be either (a) absorbed by the nonforfeiture charge, or (b) spread with benefit of lapse, interest and mortality over a number of years. Some combination of the two will normally be found necessary. The most direct use of the result is to strip out the per-policy expenses from the loading portion of the basic dividend formula and make a flat per-policy charge against the dividend, the dividend becoming x per \$1,000 minus K, where K is the per-policy charge. This is also, probably, the simplest way to fit an amount variation into an existing pattern of dividend payment. The disadvantages of this approach are (a) it may appear to exact a penalty and (b) for small policies the result may be the complete elimination of dividends for many years.

The alternative, which has proved more popular, is to give specific additional dividend credits per \$1,000 in various amount bands (the per-policy costs must obviously be contained in the basic dividend formula). This method is believed to have wider popular appeal, but has two disadvantages: (a) for very large policies an additional dividend credit of say \$2.00 per \$1,000 may be more than seems justified; (b) the administrative handling of such a scale may prove considerably more burdensome than the flat fee basis.

Variation by Sex

Lower mortality among females has been recognized for years in annuity and settlement option rates. However, until recently no advantage in

life premium rates has been offered female risks because the average amount on female lives was so much lower than that on male lives and it was felt that administrative costs more than offset the mortality advantage. With the introduction of high minimum amount policies followed by grading by size, the reason for ignoring the mortality difference vanished. (However, it may be that, particularly in the small amount bands, the average amount within the band will be enough lower on female lives than on male lives to warrant ignoring the mortality differential.) The first method used to recognize the better mortality among females was to give a straight age setback as in annuities, with standard premiums, dividends and cash values at the set back age, a practice which a few states felt violated their nonforfeiture law. (A number of states have recently enacted legislation to permit such an age setback of three years.) Other companies now give special premiums or dividends, with standard nonforfeiture benefits. Since no intercompany statistics have been kept for female mortality until recently, either the company's own experience or some adjustment of an experience giving mortality by sex (for example, the U.S. Life Tables) may be used as the basis for differentiation of premiums or dividends by sex. All available information would indicate that the very practical approach of using a straight age setback is a very approximate one and that the correct age setback is much greater at the young than at very advanced ages.

High Early Cash Value Policies

In the last several years policy forms, usually on the ordinary life basis, with high cash values in the early years have become popular.[27] The policies were designed to meet the requirements of split dollar plans, the tax advantages of which were specifically blessed by ruling of the Treasury Department, but the majority of sales were made to individuals attracted by the apparent tax advantages arising from the deductibility of loan interest from gross income. To reduce losses on surrender and attract a class of policyholders who have traditionally shown good persistency, such policies have normally been offered with substantial minimum amounts.

Possible effects on the dividend scale include both direct charges for the additional benefits paid as cash values and a hedge against loss due to a lapse rate higher than anticipated.

Assuming that premium rates, a dividend scale and a scale of cash values exist which are considered satisfactory if no gain or loss on surrender is anticipated, the appropriate charge would consist of the present

[27] The New York Department has moved to ban "discriminatory" high cash value policies, *i.e.*, policies with surrender values substantially greater than those of similar policies written in the same company (Regulation 39 dated July 31, 1959).

value of the additional cash value payable on assumed rates of lapse, interest, mortality and direct additional expense, divided by an annuity (on a survival table including lapse as a decrement) for the period over which the charge is to be made.

In addition, since it is possible that the existence of the higher cash values (or more specifically, of loans induced by the high cash values) will produce a higher than normal lapse rate, it may appear desirable to withhold some of the early dividends, either to cover adverse experience or for payment in later years if lapse experience proves favorable. The net result would, of course, be a steeper scale than the hypothetical scale for a policy with no gain or loss anticipated on surrender.

Obviously one alternative to the charge against dividends is a direct charge included in the premium and this approach has been used by a number of companies. Also, as an alternative to the steeper dividend scale, a number of companies writing these policies have adopted a very much flatter commission scale as a hedge against adverse lapse experience.

Quite apart from special high early cash value policies designed to meet a specific market, there has been no tendency to decrease cash values on regular business despite the rising business costs of recent years—in fact, the tendency appears to be quite the opposite, whether because of changes in the philosophy of charging costs of procuring business or because of competitive considerations. The potential offset to the natural tendency of rising costs to reduce surrender values which lies in increased average size has been largely eliminated by the introduction of grading by size. It would appear, then, that a substantial volume of policies are now issued or will be issued with surrender values in excess of asset shares. Since it is self-evident that, in a mutual company, wherever cash values exceed asset shares, that excess must be paid for by the policyholders, it would seem preferable, when that situation exists, to make a direct charge to all policyholders from the start either through higher premiums or through lower dividends, rather than face an eventual charge only to persisting policyholders through a reduction in later dividends. Obviously such charges will be automatically included wherever dividends are directly or indirectly governed by asset share calculations.

One Year Term Option

In connection with the high early cash value policies mentioned in the previous paragraphs, a new dividend option, colloquially called the fifth dividend option, sprang up, with dividends being used to purchase an amount of insurance equal to the cash value.[28] The use of dividends to

[28] The future of this option on policies written in New York is extremely cloudy at the time this is written. The recently promulgated Regulation 39 requires, on the

purchase term insurance is nothing new, but in the past it has failed to achieve any general popularity probably because of the rapid decline in insurance purchased with advancing age which results if the entire dividend is used to purchase the insurance. Under the fifth dividend option the balance of the dividend after purchasing modest amounts of insurance in the early durations is (at least theoretically) accumulated to provide a fund from which the future larger costs can be drawn. Adverse selection is eliminated by permitting the option at issue or after examination, generally only on standard risks, and providing that if the dividend in any year is not used to purchase the prescribed insurance the option will terminate.

The fifth dividend option was designed, at least initially, to "insure the loan," that is, to provide enough additional insurance so that the original face amount would be received by the beneficiary even though the policy was fully loaned. It is also argued that this option provides a hedge against inflation, though, for it to be at all satisfactory for such a use, the rate of inflation would have to be approximately equivalent to the ratio of the increase in cash values to the face of the policy (and in later years when the accumulations have been exhausted, there is a rapid decrease in the amount of insurance purchased).

The normal charges for the one year term option have been based on a current mortality table (usually X_{18}) with some margins. The usual practice has been to determine the rate at which the purchase is to be made through the dividend vote, with a maximum rate, usually the net CSO rate, stated in the rider. The justification advanced for the use of such a relatively low rate is that normal production costs need not be charged against such insurance and no good purpose would be served (and a considerable expense generated) by charging a higher rate with a dividend at the end of the year on the amount of insurance purchased, since the company is sufficiently protected against future adverse experience by its ability to increase the rate (up to the guaranteed maximum) on future purchases.

For the policyholder the primary advantage of the fifth dividend option lies in the substantial additional insurance available at very low rates; for the company, its current sales appeal makes it attractive. For the policyholder it has two disadvantages: first, the amount of insurance payable on death is never fixed, but may be substantially affected by

grounds of discrimination, that the option be made available "on all policies" and that the charge for the insurance "be consistent with the company's other term insurance rates." Undoubtedly some clarification of these terms will be forthcoming.

changes in the amount of dividends paid or the level of mortality used; second, coverage decreases rapidly when all accumulated dividends have been used and only the current dividend is available for purchase of insurance, despite the fact that the present dividend scales of many companies will, on an ordinary life basis, carry full insurance for a great many years at most issue ages.

From the company's viewpoint the fifth dividend option introduces the costs of administering yet another dividend option. Particularly on small policies where amounts of insurance equivalent to the cash value are extremely small, these costs may appear prohibitive.

Guaranteed Issue

A development of recent years in the individual Pension Trust field has been to offer, subject to specific amount limits, issue to all participants without individual underwriting, although the case as a whole is underwritten to avoid selection. To offset the higher mortality costs which must be anticipated on such business, the writing companies have generally introduced a combination of lower commissions and lower dividends than those payable on comparable policies offered with individual selection. The basis for dividend mortality has frequently been group clerical experience. However, since the intercompany group clerical experience is generally based on cases with many more lives than the average pension trust case (as a result of the upper limit on size of pension trust cases imposed by the competition of group and self-administered plans) it must be doubted that the latter will show as good mortality in view of the greater effect of antiselection on the small case. Furthermore, the tendency under guaranteed issue has been to follow group limits down to 10 lives and there is some evidence that "baby group" business is showing a mortality well above that of the standard group experience.

Conversion Options

For pension trust business many companies in recent years have developed a policy or policies providing an option to purchase additional single premium annuity income at rates guaranteed at date of issue of the policy. Typical of these is a policy in all other respects identical with an ordinary life policy but with insurance terminating at retirement age of 65 or 70 and with a provision that for a fixed single premium additional income may be purchased at retirement. Normally the optional additional income is that amount necessary, together with the optional income available for settlement of the cash value, to provide at retirement $10 monthly income for life, with a period certain, for each $1,000 of life in-

surance. Normally the charge for the option is the policy option rate plus a small loading to provide for expected premium taxes and, perhaps, for some change in annuity values.

The only difference between such a policy and a standard life policy which may be surrendered at the same time is that the special pension trust policy contains an option to purchase additional income at a future date at approximately current annuity rates. Obviously the option is entirely one-sided since not only is there no compulsion on the part of the policyholder to exercise the option, but if annuity costs should drop the policyholder would be completely free to purchase the income elsewhere.

Some of the risk of future increases in the value of the annuity option can be offset by changes in the dividend scale. Nevertheless, it would appear that standard dividends of companies writing such policies might properly be altered (*a*) to retain margins from early dividends, which in later years, as the situation becomes clearer, can either be paid out in increased dividends or be used to offset increases in the value of annuity benefits (obviously a steeper scale than that under the comparable standard life contract would result); or (*b*) to make a specific charge for the option benefit. Since, in normal business usage, options to purchase at a specified price are given only for a consideration which must be paid whether or not the option is exercised, it would appear equally logical that a specific charge for the option should be contained in the premium or dividends of these policies. Unfortunately, it is very difficult, practically, to develop an appropriate charge.

Theoretically it might be based on the difference between the excess of the value of the annuity option under very unfavorable conditions over the guaranteed rate, after allowing for anticipated recovery under such conditions from dividend reductions; the result being then multiplied by the probability of occurrence of such adverse conditions. It is obvious, however, that the multiplicity of assumptions involved makes any result suspect, and this difficulty in finding an appropriate charge has led many companies to make no charge at all for the option except when exercised.

DISCUSSION OF PRECEDING PAPER

ARTHUR C. CRAGOE:

Mr. Jackson is to be congratulated on his scholarly review of dividend theory. I am sure students and others will appreciate this summary of recent developments in dividend distribution.

I should like to add a few comments on the problem of changing the mortality element in dividend scales computed by the Experience Premium method. As Mr. Jackson pointed out, the Experience Premium method levels out the mortality return and when experience factors need to be changed a theoretical problem occurs, since if experience premiums are recalculated as of original age the new mortality is thereby assumed to have been in effect since original age. If attained age premiums are calculated, the problem is to decide how much reserve is in hand—experience premium reserve on old basis, net level valuation reserve, etc. Also, if the attained age method is followed, one could argue for a separate scale for each year of issue, since original ages in each year of issue would reach different attained ages in the year of change to a new scale. It might be suggested that a year of issue somewhere near the middle of the span over which a series of policies was offered could be chosen and the entire series could use the new premiums calculated with the attained ages for that year of issue. It is possible that this might be satisfactory, but where a series of policies has been issued over a long period, say from 1907 to 1935, it may be questioned whether this method is sufficiently refined. Finally, if any of the recalculation methods is employed we have the practical problem of possible "breaks" in the present scale, due to a large change in the experience premium, with its resulting explanation to policyholders.

An alternative method that has a high degree of theoretical merit would be to add a three-factor type extra mortality return to the normal experience premium dividend. If q_x' represents the former company experience table and q_x'' represents the new company experience table, this method would add $(q_{x+t-1}' - q_{x+t-1}'') \times$ (amount at risk) to the present tth year experience premium dividend for age at issue x. This has the effect of paying out mortality improvements more or less as they occur at the attained ages where there is improvement without recomputing experience premiums. The mortality return in future years is thus considered in two parts: the normal level mortality return which can equitably continue the dividend return to the policyholder over the life of his policy on the basis on which he started, $i.e.$, the original company experi-

ence table, plus a mortality return that will be paid out as earned result-
ing from the difference between the old and new company experience
tables. This extra mortality return will fluctuate somewhat and will
probably decrease in the later durations of a policy where the amount at
risk decreases rapidly. This is the usual problem with a three-factor type
mortality return, but it should not be serious in this instance since the
extra mortality return will probably be small and the increase in the
interest return element each year should more than offset these fluctua-
tions.

In the same spirit in which Mr. Jackson's comments on the refinements
justifiable in determining a dividend scale were made, I should like to
add one further point on the Experience Premium method. If we make
the same implicit assumptions concerning death claims and annual pre-
miums as are made under Formula (2) we could justify multiplying the
factor $(P - EP')$ by $(1 + i')$ since premiums are paid at the beginning
of the year but dividends at the end of the year.*

BERT A. WINTER:

Mr. Jackson has rendered the profession a real service in describing
in such a lucid and well-organized fashion the practical changes required
by the experience of the last two decades in the application of the funda-
mental principles of surplus distribution so ably set forth in the 1930's
by Mr. Maclean, Mr. Marshall and his own distinguished father.

With the needs of the Society's students primarily in mind, Mr. Jack-
son has quite properly streamlined his approach to the fundamental for-
mula appearing on page 24 of *Actuarial Studies No. 6*, reserving for later
discussion comment on adjustments to meet detailed problems. A natural
result is that nowhere in his paper does there appear a "generalized"
contribution formula, with explicit parameters provided to deal with the
detailed problems. This discussion is devoted to setting down in one
place such a "generalized" formula, if only to show what flexible tools
have been developed to give effect to the universally used contribution
method—recognizing, by one mathematical means or another, the princi-
pal contributions a dividend class has made to aggregate divisible surplus.

Let us start with a level benefit life or endowment policy, which has
attained a policy duration which is "ultimate" in two respects:

It has accumulated a fund position $(1 + \lambda^4)V + K^4$ which can appro-
priately be maintained (in relation to the changing value of V) for the
remaining durations that any such policies remain in force, and

* [This modification was incorporated in the formula in the paper before publica-
tion.—EDITOR.]

First and renewal commissions and acquisition expenses have been paid, the remaining expenses e comprising administrative expenses, service commissions and premium taxes.

Let us designate by $1 + \lambda^T V_n + K^T + D_n$ the cost to the company of a death claim, assuming that any termination dividend payable at death can be described by $\lambda^T V_n$ plus a portion of K^T, the remainder of K^T comprising:

Any allowance in the dividend formula for immediate payment of claims, or for functional expense of claim settlement, and

Any excess of the average present value of optional settlements (considering rates of election) over the one-sum settlement value.

D_n is included on the assumption that the annual dividend otherwise due at the end of the policy year is paid at death; $\frac{1}{2} D_n$ would be used if such a dividend is paid on a pro-rata basis, and zero if no mortuary dividends are paid.

If P is the gross premium, we then have:

$$[(1 + \lambda^A) V_{n-1} + K^A + P - e](1 + i') = q'_{n-1}[1 + \lambda^T V_n + K^T + D_n]$$

$$+ p'_{n-1}[(1 + \lambda^A) V_n + K^A + D_n]$$

$$D_n = [(1 + \lambda^A) V_{n-1} + P - e](1 + i') - q'_{n-1}[1 + K^T - K^A]$$

$$+ i'K^A - [(1 + \lambda^A) p'_{n-1} + \lambda^T q'_{n-1}] V_n .$$

Since

$$p_{n-1}V_n = (V_{n-1} + \pi)(1 + i) - q_{n-1} ,$$

$$D_n = F_y (V_{n-1} + \pi) + G_y + [P - e - \pi (1 + \lambda^A)](1 + i') , \tag{1}$$

where $y = x + n - 1$, the attained age at the beginning of the year, and

$$F_y = \frac{1}{v p_y}\{ (1 + \lambda^A)[(i' - i) v p_y - (q_y - q'_y)] - \lambda^T q'_y\}$$

$$G_y = \left(\frac{q_y - q'_y}{p_y}\right) + (K^A - K^T) q'_y + \frac{q_y}{p_y}(\lambda^A p'_y + \lambda^T q'_y) + i'K^A .$$

It will be noted that F_y and G_y depend only on the attained age y (*not* on issue age, duration or plan) and on the category of issue years (*i.e.*, rate basis) for which given values of λ^A, K^A, λ^T, K^T and given bases of i and q are appropriate.

It will be found that the increase by attained age of $(q_y - q'_y)/p_y$ is important to the slope of dividends by duration. For this reason, it is

convenient to take q from the same mortality table for as many categories as possible. In this connection, a review of the derivation of the formula will show that nowhere is it assumed that V is the actual policy reserve —it is merely assumed that accumulated funds are accurately described by $(1 + \lambda^A)V + K^A$. It will usually be found possible, by using the actual reserve interest rate i and judiciously choosing λ^A and K^A, to base q, π and V on 1958 CSO, for example, not only for policies issued on that basis but also for policies issued on 1941 CSO and AM[5]. At the advanced durations and high attained ages that have now been reached by policies originally issued on the American Experience basis in many companies, this device will even work for such policies.

The last term in formula (1) depends only on issue age and plan (within category), but, as stated, applies only at "ultimate" durations. Designating this term as $L_{20}^{x,P}$ for plans with at least a 20-year premium period, the formula at earlier durations may take the form (assuming the first dividend is payable at the end of the first policy year):

$$D_{x+n}^{P} = F_{x+n-1}(_{n-1}V_x^P + \pi_x^P) + G_{x+n-1} + L_n^{x,P},$$

where

$$L_n^{x,P} = \frac{10-n}{9} \cdot L_1^{x,P} + \frac{n-1}{9} \cdot L_{10}^{x,P} \qquad 1 \le n \le 10$$

$$= \frac{20-n}{10} \cdot L_{10}^{x,P} + \frac{n-10}{10} \cdot L_{20}^{x,P} \qquad 10 \le n \le 20$$

and $L_1^{x,P}$ and $L_{10}^{x,P}$ are derived from asset share calculations, as outlined by Mr. Marshall in *Actuarial Studies No. 6*.

HARLOW B. STALEY:

This paper on dividends should give the uninitiated a better view as to what companies really do in preparing dividend scales.

Too Much Equity?

There is one argument the author makes which I shall attempt to refute because I have so often heard it applied to rate and dividends by both life and casualty people who, I feel, should know better.

The argument is nearly always applied as a reason for not recognizing as a separate class of policyholders a group whose anticipated losses or expenses are higher than normal. In this paper it is expressed in these words:

"The ultimate in dividend scales would call for refunding to each policyholder the precise difference between premiums and cost of insurance —*his* insurance. Considering mortality alone, the sole purpose of pur-

chasing pure life insurance is to avoid the catastrophic cost of death, should it occur in the near future."

The trouble with this argument is that it is too good. It can be applied to argue against all deviations in dividends and rates—and has been! The people who use it most effectively, however, like Mr. Jackson, imply —or state explicitly as he has—that "it would appear to follow that the greater the number of classes, the greater the equity. If this number is increased indefinitely, however, the entire thesis breaks down."

The argument in this form leaves us very much up in the air, for we are left with no standard by which to judge when sufficient equity has been reached and when we are over the precipice of defeating the insurance principle.

I should like to suggest that we find ourselves in this fix because the real limitation has nothing to do with the number of classes, but upon their type, particularly as regards the time the distinction is made.

As regards premiums, any distinction in possible loss made at the time of issue of a contract would seem to be justified without defeating the insurance principle even if, as it sometimes does, it puts the policyholder in a class by himself. With dividends I would apply the yardstick that chance fluctuation should not be recognized, but that any element existing in the original risk and recognized for premium classification purposes may properly be recognized in the dividend scale. To emphasize the distinction I am trying to make, I should like to repeat that there is no theoretical limit on the *number* of such classifications.

The principle of not recognizing the differences resulting from chance fluctuations would take care of the author's three examples of too much equity concerning mortality, interest and expense.

I should like to discuss one other limitation on equity which should be recognized because it is frequently used in support of the above argument that too much equity defeats the principle of insurance. It is obviously not sound to recognize differences which are so small that the cost of making the distinction would be greater than the dollars which could be returned to the more favored class. This serves to provide a practical limit on the number of classes recognized, but the limitation has no connection with a supposed threat to the insurance principle.

Adjusting Experience Premiums

The author makes the point that the use of a new experience premium, making use of the retrospective fund built up, is a slow way to correct past errors in a dividend scale. I should like to draw the analogy of a pilot blown somewhat off course. There would appear to me to be no need for

the pilot to quickly return to his original course—unless he has been blown over forbidden territory. Rather, he will set a new course to his original destination. This is what a new experience premium does—the forbidden territory being a fund lower than nonforfeiture values.

Select Mortality

The author has quite correctly pointed out that if an ultimate mortality table is used, there will be wide variances between select mortality savings and excess first year costs. This leads me to ask why, with the electronic equipment most of us use to calculate dividends, we do not introduce select mortality into our formulas and make properly designed deductions for excess first year costs. The approximation to 1946–49 select mortality which we use in our own three-factor formula is shown below:

$$q_{[x]+n-1} = (1 - k_n x) \, q_{x+n-1}$$

$$k_n = .50\left(1 - \frac{\log n}{\log 16}\right) \div (48 - n), \qquad n = 1, 2, \ldots, 16.$$

Expense Allocation

There is an approach to the problem of unallocable expenses—those not directly related to policies, premium income, or amount of insurance —which I should like to see explored. To draw my comparison, I have to speak of the gross nonparticipating premiums of stock companies, but the problems are similar to the dividend problems in participating insurance in many ways.

Such an insurance company could well classify all such difficult-to-relate expenses as corporate overhead and not assign them to classes of policies at all. Then a "gross profit" (or profit not deducting corporate overhead) would be earned on each class of policies. The price for each class should be set at the level at which that class would produce the maximum dollar contribution in gross profit to cover corporate overhead and profit. This optimum price level would be somewhere between the point at which the unit gross profit is zero and the point at which sales would be zero. Such pricing would produce the maximum gross profit and therefore the maximum net profit.

Competition will now force the companies to make their corporate overhead allocation in a manner that will make their net costs in line with those for nonparticipating insurance. Of course, company philosophy also enters the picture because even the companies operated for the benefit of stockholders do not necessarily set rates to maximize profits. The approach described here would be difficult to apply directly by an insur-

ance company, but it might provide us with insight into our objective in allocating these expenses.

Conclusion

Having expressed the thoughts raised by isolated portions of this paper, I should like to add before closing that I believe this to be one of the best and most useful discussions of ordinary dividends I have seen. We should welcome it when someone pauses to re-examine some of our basic actuarial concepts.

<div align="center">CHARLES F. B. RICHARDSON</div>

Mr. Jackson is to be congratulated on this excellent paper which should be a most helpful addition to the literature for students and practicing actuaries alike.

My comments will be largely confined to the area of expense allocation. Mr. Jackson makes only a brief reference to this under the three-factor method, with a longer discussion in connection with the use of asset shares. As he says, no matter how much time is spent on cost studies, the allocation of costs involves a considerable degree of judgment. The methods of allocation used and the ways in which the resulting expenses are assessed have a very considerable effect on the dividend scale.

In my own thinking, the dividend scale is determined by the relation between the asset share or fund and the cash value and the incidence of the desired contributions to surplus, the actual dividend formula (especially the expense factors) being in the nature of an interpolation device. In this approach, the expense assumptions used in the fund or asset-share calculations become very important.

A general agency company operating on the more common types of expense allowance formulas actually incurs substantially higher renewal and lower first year expenses than a branch office company. Furthermore, since the renewal expenses in the agencies are generally paid for in the form of a percentage of premium, a much smaller proportion of the total field expenses depend upon number of policies than in the case of a branch office company. In this connection the discussions of D. J. Lyons and D. Gilbert (*TSA* VIII, 427–431) are very much in point. If these differences were reflected directly in dividend formulas we should probably see rather large differences in the dividend pattern as between branch office and general agency companies. The fact that such differences do not appear in practice indicates one area where "judgment" comes into play.

The assessment of the expenses involved in marketing the product is one of the areas where the greatest differences of opinion occur. This

covers the expenses of the home office agency department, compensation of managers or general agents and other supervisory personnel, the expenses of operating the agencies and the cost of financing new agents.

At the one extreme, one might assess all or most of the expenses of the home office agency department as a percentage of first year commissions, since they are concerned primarily with sales. At the other extreme, one could argue that the company cannot continue to flourish without new business and therefore these expenses should be charged to the business as a whole, e.g., as a percentage of total premiums, as $x per thousand in force, or as a percentage of total commissions. Some compromise between these extremes will probably be adopted in practice.

Managers, and other field supervisory salaries are another troublesome item. One might split these between first year and renewal in the ratio of first year to total agents' commissions, since this personnel supervises the agency force. Another possibility would be to split managers' salaries between first year and renewal in accordance with the compensation formula, but this generally includes base salary and other items which do not lend themselves to this treatment and arbitrary methods are required. Having made the split between first year and renewal, we must then decide what factors to employ in charging the unit costs. It seems logical to charge the first year portion as a percentage of first year commissions since this conveniently grades the charges by plan and age. The renewal portion could be charged as a percentage of premiums or of renewal commissions, per M of business in force or per policy in force.

The cost of operating the agencies in a branch office company can be analyzed to arrive at a proper split between first year and renewal. Most but not all of these expenses vary by number of policies and here again armchair methods are needed to determine the unit costs for use in asset shares.

Financing new agents today involves very substantial costs, and there will undoubtedly be wide differences of opinion as to how these should be charged. From one point of view, we might charge as a current operating cost the excess of the subsidy over normal commissions for a number of new agents sufficient, under a table such as the McConney-Guest Table, to maintain the existing force at its current size. If the company is recruiting at a higher rate, the balance of the subsidy might be regarded as a capital cost. The portion regarded as current operating cost may be charged to the entire business, e.g., as a percentage of total premiums, on the theory that the policyholders as a whole should bear the expense of maintaining the sales organization.

If the company enters upon a substantial agency expansion program, the expenses in excess of current operating costs in established agencies might seriously distort the dividend scale. Therefore, it can be argued that the subsidy involved in opening new agencies may be regarded as a capital cost and should not be included in the asset share expense rates. This can be a very important item since it generally takes 6 or 7 years to get a new agency's operating costs down to the level of an established agency, and each such new agency requires a very large investment. This is a type of situation in which the use of a capital account for the investment involved may be justified, the excess expenses being charged against current surplus earnings.

Reinsurance is an item which requires special treatment. In my own company we compute unit expense rates net of reinsurance. It follows that reinsurance expense allowances and dividends received from the reinsurer on this business must be credited to insurance expenses and we attempt to allocate these credits on a functional basis before arriving at our unit costs for each function.

Any expense item charged on a per policy basis will affect the dividends in different ways depending on the pattern of average policy assumed. At the one extreme, a single average size might be used for all plans and ages. At the other extreme, the actual average size for each plan, graded by age, might be used. This undoubtedly would result in noncompetitive dividends at the younger ages on many plans. In practice, some compromise between these extremes is likely to be adopted to avoid substantial departures from the net cost pattern in the industry, to which Mr. Jackson refers.

The subject of cost allocation in dividend distribution is a very large and difficult one and could easily form the subject of a separate paper. I have merely given illustrations of a few areas where a wide range of possibilities appear to exist.

The calculation of the interest rate to be used for the life insurance fund is an item that can become quite involved. One way of doing this is to divide the ordinary lines of business into three groups: (a) those not receiving dividends or excess interest; (b) those receiving excess interest; (c) those receiving dividends. Group (a) consists of such items as nonparticipating annuities or supplementary contracts, staff pension plans and funds earmarked for future reserve strengthening; on these items only interest required to maintain reserves is credited. Group (b), consisting of such items as supplementary contracts and dividend deposits, is credited with required and excess interest. The balance of the interest in-

come is then credited to the ordinary business receiving dividends, thus increasing the available interest earnings as compared with using the earned interest rate on the total funds without adjustment.

<center>RALPH E. EDWARDS:</center>

This is a most excellent paper in its own right, but it is particularly valuable for filling in what has been missing from *Actuarial Studies No. 6*. We are indebted to Mr. Jackson for such fine work on behalf of our students.

In the discussion of the use of asset shares there is one place where the student may be puzzled. It is in the statement that "theoretically, asset shares could themselves be used directly to develop the dividend scale, with dividends being merely the difference between the asset share and the cash value after allowance for contributions to contingency and general surplus funds."

The student may feel that the policy reserve should be used rather than the cash value. Instead, it is one of the functions of general surplus funds to provide for any excess of the reserve over the cash value.

This point leads me to note that the author seems to treat contributions to contingency funds and surplus as a one-way street, with no return of such contributions to the policyholder. Under this system it would appear that each generation of policyholders leaves behind a certain amount of the surplus, furnishing a safety margin for future generations. However, I believe this theory is not universally accepted.

It would seem generally more satisfactory under the theory of mutuality to have the contingency funds and surplus belong to the group represented by the asset shares. To accomplish this we require two sets of asset shares, one with, and the other without, contributions to and returns from contingency funds and surplus. By the time the last policy terminates the two asset shares should become equal. In order to achieve this equality it will obviously be necessary to have dividends reflect surplus drains or accretions. We thus have the picture of a group of policies "borrowing" surplus at issue, then repaying the amount borrowed, then contributing surplus funds (some of which are temporarily "borrowed" by newer issues), and finally withdrawing its contributions plus any surplus gains or minus any surplus losses.

<center>ALLEN L. MAYERSON:</center>

Mr. Jackson's excellent paper fills an important gap in actuarial literature. The distribution of surplus is one of the actuary's most important

jobs and, until now, it has received far too little attention. I am very grateful to Mr. Jackson for reawakening our interest in this subject.

I believe there is still considerable room for thought and discussion on the question of what constitutes an equitable dividend scale. Some companies go to very great lengths to ascertain the sources of their earnings and to allocate divisible surplus in proportion to earnings; others do not. Some companies make comprehensive asset share studies to determine equity between plans and ages, while others use a standard table and a simple formula.

There is a question about the extent to which dividends are a competitive matter, and the extent to which the actuary has a moral obligation to his company's policyholders to determine the company's actual experience and use it in distributing dividends. What does he do if the company's actual mortality rates produce dividends which are not competitive at certain plans and ages? What does equity require relative to old versus new policies?

Other questions frequently arise when a dividend scale has not been changed for quite a while. If the actuary discovers that one or more elements of the dividend scale are out of line with actual experience, to what extent is it his obligation to attempt to redress the past? Some companies have, in such a situation, made elaborate fund studies, to attempt to allocate the company's surplus among existing policyholders, and have then determined a dividend scale whose point of departure was the accumulated funds. Other companies have been unable or unwilling to make such studies and have simply changed an out-of-date dividend scale to reflect an equitable allocation of future earnings, without reference to inequities that might have occurred in the past.

There are many such questions, both philosophical and practical, that deserve some reflection. Perhaps Mr. Jackson's paper will help to stimulate some new thoughts about these matters.

JOSEPH B. MACLEAN:

As one of the authors of *Actuarial Study No. 6,* I have naturally read Mr. Jackson's paper with more than usual interest. That Study was published in May 1937—more than twenty-two years ago. It is rather surprising, I think, that the Council of the Society has, evidently, not felt the need for a new edition. It may be true, in a limited sense, that, as Mr. Jackson says, there have been no new developments in the *theory* of surplus distribution. However, as the paper abundantly shows, many important practical developments have taken place since 1937, even in

the limited field of ordinary insurance, and these have created many new problems in regard to the practical methods of surplus distribution. I agree with Mr. Jackson's suggestion that surplus distribution may well be the actuary's most important job. If so, an up-to-date text book on the subject for our students would appear to be desirable. If the Council should take that view it is clear that they have not far to seek for a suitable author.

Since I have been "out of the line-up" for so many years and since I imagine this paper will evoke a full discussion by others better qualified and in closer contact with current problems, I shall restrict myself to a very few comments on the first section of the paper which deals with the surplus itself.

Mr. Jackson calls attention to the lack of uniformity in the companies' annual statements as to what is identified as "surplus" and what is not. In this respect, uniformity is, I think, very desirable. Lack of it can lead to serious misunderstandings and, as I know, on occasion to embarrassment. For example, in the law suit relating to the final accounting of the old Missouri State Life (in which I had some part) a very eminent actuary who was one of our "star" witnesses testified that a Group Mass Hazard reserve *is* a reserve, *i.e.*, a liability, and not surplus. Unfortunately, in the annual statement of his own company, this "reserve" was classified as a surplus item, a fact which was pointed out by our opponents and which took considerable explaining.

It seems to me that the proper criterion of what is surplus is simply whether the funds in question would, in fact, be available in case of need for any and all purposes. Any so-called contingency fund which is established voluntarily by the company would, by this criterion, be a part of the surplus whether it is earmarked or not. In my opinion, any such earmarking of surplus has no significance and cannot change what is really surplus into a liability.

In the case of the Mandatory Security Reserve, we have the strange situation where what is clearly a contingency fund, although of specified amount, *must* be earmarked and is then treated as a liability although it is not, in fact, a liability but surplus since, if the need arose, it could and would be used for other purposes. As Mr. Jackson points out, the chief function of the "free" surplus is to provide for capital losses and catastrophic mortality experience. Why, then, should any portion of this surplus be earmarked and regarded as a special contingency fund for either of these purposes?

As to "contingency reserves" for optional settlement guarantees in old policies, the situation seems to be even more clear. If the company admits

that such guarantees constitute a liability which is not provided for in the policy reserves, it is its duty, of course, immediately to establish additional policy reserves. There can be no justification for delaying this step and thus continuing to overstate surplus. The mere establishment of a contingency reserve would indicate that the company does not actually admit the existence of the additional liability.

I hope it may not be inappropriate for me to say in conclusion that I was pleased to see the author's several references to the *dicta* and writings of his father. Those of us who knew Henry Jackson well will never forget him. It is pleasant to think that the name of Jackson is likely to continue to be an honored one in the Society for at least another generation.

<div align="center">(AUTHOR'S REVIEW OF DISCUSSION)</div>

<div align="center">ROBERT T. JACKSON:</div>

Mr. Cragoe offers some practical suggestions for changing experience premium dividend scales because of changes in the mortality level. Mr. Staley suggests that no such direct revision may be required and uses the simile of an airplane blown off course which need merely alter its course toward its destination rather than return to its original course. Mr. Staley doubtless expects to use a termination dividend. Otherwise his method would appear to provide less equitable results than Mr. Cragoe's for all who terminate by death or withdrawal within a few years after the change in scale.

Mr. Winter provides a generalized dividend formula which, though formidable at first glance, can, as he shows, be reduced to a form such that large portions of the calculation are in a function solely of attained age. He also indicates a method whereby asset shares can be used directly to provide interpolated dividends in the earlier policy years.

Mr. Staley takes issue with the statement in the paper to the effect that the insuring principle is violated if too many separate groups are introduced into the dividend process, since he feels this is the argument generally used as an excuse for ignoring refinements which can produce greater equity. My motive was to attack the notion of the dividend as representing the individual contribution to surplus, a concept which the mathematical formulas used to calculate dividends may easily foster. In fact, the surplus does not arise from decisions made either by or on behalf of the individual policyholder but rather from decisions by the Board of Directors in which the welfare of the entire policyholder body must be the overriding consideration. Surplus is, then, the result of the operation of the corporate body of policyholders as a whole and not the sum of in-

dividual contributions. In dividend allocation we attempt, to the degree possible, to return it to the various subgroups of policyholders in proportion to what their contribution to surplus can be considered as being, on the assumption that the total surplus represents the sum of the surpluses which would have been generated if each policyholder group represented a separate company.

Even within the framework of this assumption which is generally recognized as producing the greatest degree of equity possible, it must be recognized that men of the most judicial temperaments may still disagree on the sources from which the surplus theoretically came and that there may be honest differences of opinion as to the classifications producing the greatest degree of equity.

Mr. Staley suggests that expenses which cannot directly be allocated might be allocated in such a manner as would, in a stock company, maximize profit. This is a most ingenious idea and provides a theoretical base for the role of "competitive considerations" in the dividend and rate-making process.

Mr. Richardson offers a few comments on expense allocation on which he is an acknowledged expert. In my company we view the manager's salary as primarily a first year expense, since not only is our compensation formula based primarily on first year results but also the great majority of his time is properly spent in the production of new business.

Mr. Richardson also suggests that a number of interest rate calculations may be involved in asset share calculations to be used as a basis for dividend allocation. The three different rates which he suggests will doubtless be proliferated as a result of our new tax law.

Mr. Edwards suggests that the surplus produced by each generation of policyholders should have been returned to that generation by the time the last policy of the group terminates. This appears the most equitable approach and is certainly the only approach which could be followed by a company winding up its business. On the other hand because of the possibility of catastrophic losses (which may skip entire policyholder generations) I wonder whether, under such a policy strictly carried out, sufficient surplus would exist to cover the catastrophic loss. I am therefore inclined personally toward Mr. Arlinghaus' view quoted in the paper, "Some part, at least, of the contributions to the contingency reserve must be considered as a sort of risk premium, which cannot be returned simply because up to the date of termination of a particular policy no loss of the kind contemplated to be covered by the contingency fund has occurred."

Mr. Mayerson asks a number of questions as to what constitutes an equitable dividend scale. Every conscientious actuary must fret occasion-

ally under the restraints placed on his ideas of proper dividend distribution—the demands of time which will, except in the most amply staffed office, leave unpursued pertinent investigations which could help in refining the formula, the demand that the scale be popular with existing policyholders with the result that substantial rearrangements of existing dividend patterns may prove unwise, and the demand that the scale be competitive.

Although he did not provide a published discussion Mr. James C. Hickman has sent me criticisms of the paper which appear worthy of inclusion in the discussion. He suggests that the amount of the contingency funds is not entirely a matter of judgment but that powerful statistical and actuarial techniques are available for determining a satisfactory level. Certainly this is true in the small company, although in the very large company reserves for asset fluctuations which must be largely determined empirically may loom so large as to overshadow funds held for other contingencies.

He also suggests producing a dividend scale by direct use of a grid of asset shares with interpolation for individual dividends—a method also suggested in Mr. Winter's formula.

Finally, it was with great pleasure that I learned that Mr. Maclean, the author of the classic text on dividend distribution, had found time to discuss these remarks on current trends in ordinary dividend distribution. He suggests a complete revision of *Actuarial Studies No. 6;* whether or not that is necessary, it appears to me that more current information on group dividends, or retentions, than any now available, is very much needed by the student.