

UPDATING EXISTING LIFE INSURANCE POLICIES

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ABSTRACT

In these times of rapidly changing and uncertain economic conditions, companies are seeking ways to keep their existing policyholders' policies, coverage, and cost up to date. The dividend mechanism in mutual companies has, in most instances, been doing an excellent job of this. However, today's economy is creating problems that cannot be resolved completely by means of dividends. Updating the underlying reserve assumptions of existing business to reflect those of current new business represents one approach to this problem.

This paper describes the technique used by Northwestern Mutual to increase the reserve interest rate of previously issued business to the level being used for new business as permitted by current law. As a result of this change, the company can provide increased insurance benefits to policyholders, save federal income taxes, and use those savings to benefit policyholders.

After a discussion of the tax impact of the reserve increase, several alternative actuarial techniques are examined and critiqued. Numerical illustrations are provided. A potential "best blend" technique is discussed in more detail. Finally, a number of practical actuarial and administrative considerations regarding the implementation of the change are discussed.

I. INTRODUCTION

TODAY, policies with a 4 percent reserve assumption can be issued in all states. Such policies can provide more benefits per premium dollar than those with lower assumed interest rates. They also can provide better value, because they are more tax-effective. Soon it may become possible to use a $4\frac{1}{2}$ percent assumption in all states. In selecting an interest rate (or rates), each company has to resolve for itself the basic conflict between (1) long-term solvency and the self-sufficiency required for each block of participating business, which imply low interest rates, and (2) tax efficiency and the resulting improved cost to the policyowner, which imply high interest rates. Solvency is of first importance, but the

dividing line for the interest rates is not clear, and other margins (mortality or loading) may be available.

If a mutual life insurance company decides that a higher reserve interest rate assumption, say 4 percent, is appropriate for new business and that all dividends should reflect the improved tax performance, does it have any obligation to pass these improvements on to existing policyowners? Some companies will decide that it does not; others will decide that it does. This paper explores this question briefly, suggests various ways of making these improvements available to existing policyowners, examines the basic changes involved, and describes the technique that Northwestern Mutual is using to update its permanent policies to the reserve/pricing basis of its current issues.

II. WHY UPDATE?

Until inflationary pressures pushed interest rates and federal income taxes to record heights, there was little if any reason to consider an "update" program. The dividend mechanism was working well, enabling companies to provide participating insurance "at cost" as the policyowners expected. As investment earnings increased, the dividends were increased. In the first half of the 1970s, most companies also raised their reserve interest rates from the 2-2½ percent level of the 1950s to 3 percent. Federal taxes on this business were lower for a phase 1 company, but the difference was small, so to the best of our knowledge, many companies continued to assess these taxes uniformly to all policies.

As the economy continued to heat up, investment yields increased, and by mid-1978 all states had responded by moving to a 4 percent reserve rate maximum. Higher yields benefited policyowners, since they permitted increased dividends. On the other hand, the underlying inflation made it increasingly difficult for policyowners to maintain adequate coverage. Consumers sought better value and lower premiums. Companies' investments kept pace, but unfortunately taxes increased at a faster pace, and as a result it became increasingly difficult to maintain the real economic value of existing coverage.

Companies responded to this rapidly increasing tax burden by establishing reserve interest rates for new policies at the maximum level permitted by law. This solution may be of limited use, however, since companies also must be concerned about the long-term self-sufficiency of these new blocks of business. To provide long-term solutions, we must seek some other relief from, or adjustments to, the Life Insurance Company Income Tax Act of 1959. This act was developed in an era of 3 percent interest rates, and was designed to raise a desired level of

revenue. Subsequent bursts of inflation have, however, made the tax formula increasingly inappropriate for phase 1 taxpayers. The artificial limitation on dividends makes it very difficult or impossible for these companies to pay out the higher yield as dividends. An update program provides the policyowners greater benefits from the higher investment yields.

A 4 percent reserve rate means lower taxes. If these lower taxes are allocated to the 4 percent block of business, and higher taxes are allocated to business with lower assumed reserve rates, the tax differential between the blocks of business having the highest and lowest reserve rates now will be significant. The magnitude of these differences is illustrated below, assuming a simplified company that writes no tax-qualified business, has no tax-exempt income or no policy loans, has a current earnings rate equal to its average earnings rate of i^{BT} , and has assets equal to 110 percent of its reserves. The after-tax rate, i^{AT} , for this phase 1 company is given by

$$i^{AT} = i^{BT} - 0.46[i^{BT} - i^{BT}(1 + 10r - 10i^{BT})/1.1]$$

$$= 0.54i^{BT} + 0.41818i^{BT}(1 + 10r - 10i^{BT}),$$

where r is the reserve interest rate.

Assuming that the before-tax rate, i^{BT} , is 7 percent, we obtain the following results for various values of r (rounded to the nearer 0.05 percent).

Reserve Interest Rate (r)	After-Tax Interest Rate (i^{AT})	Difference
2%.....	5.25%	0.30%
3.....	5.55	0.30
4.....	5.85	

The difference in after-tax yield rate between business written with a 2 percent reserve rate and business written with a 4 percent reserve rate is 0.60 percent.

Differentials for other interest rates may be obtained by interpolation. Differences for companies using dual interest rates may depend on individual company philosophy. It seems to us that it would be preferable for companies using such rates to treat each rate as applicable for its period and calculate differentials accordingly, rather than use an equivalent

effective rate. We will leave the phase 2 development to someone in that tax situation, who, we hope, will share it with us in the form of a discussion of this paper.

We believe that these tax differentials have become large enough that equity suggests—even demands—that they be recognized. Recognizing them is consistent with standard dividend practice. When changes in experience factors emerge that are large enough to recognize, equity requires action, for, if the new factors are not recognized, policyowners no longer will receive coverage “at cost.” Practical pressures also will come into play. Failure to reflect these emerging changes may lead consumers to purchase from companies that do reflect them and to replace existing policies.

Some phase 1 companies have recognized the impact of taxes by reserve block for many years. Others have begun to reflect taxes only recently, with the introduction of their new 4 percent-based policies. Each company must decide, on the basis of its own range of reserve rates, when the differential is of sufficient magnitude to require recognition. This recognition, however, creates a unique problem for existing business, since its costs will reflect the higher taxes associated with its lower reserve interest rates.

It would be fair to do nothing for existing policyowners; the dividend mechanism is working well, and each is receiving his coverage at cost. Yet the company established the reserve rate (the policyowner had no choice), and inflation changed the tax impact (the companies could not have anticipated that). Under these circumstances, does the company have any obligation to its policyowners? Many would say no. Some policyowners could resolve the problem by dropping their existing coverage and buying new coverage. Select mortality and tax savings may offset the initial acquisition costs, especially for higher attained ages, say over age 45. Such action would add to the problem, however, since only the healthy lives could do this.

In deciding what, if anything, the company should do for existing policyowners, there are other considerations, such as the company's past practices when improvements were introduced and the practical effect of introducing lower gross premiums. Finally, there is the question of trusteeship—the commitment to provide the best coverage to the policyowners at the lowest cost.

We concluded that something should be done, and sought to find a practical way to provide our existing policyowners with the same benefits as those available on new issues, just as we had done in the past with many other improvements or refinements. We view this action as a logical extension of the mutuality concept—to provide improved value to our

policyowners whenever possible. Mutual companies are owned by their policyowners and should do all they can to lower policyowner costs.

Finally, we believe that update may be appropriate for nonparticipating insurance also, although primarily for reasons different from those suggested for participating business. These reasons are tied to the need to minimize replacements (including replacement by the company's own new policies). Improving existing benefit structures to current levels may encourage persistency, and that, coupled with any tax savings, may improve the profitability of existing blocks of business. We welcome and encourage discussions of the nonparticipating considerations.

III. UPDATE METHODS

In this section we will explore briefly the major methods that may be used to implement an update project. There are many possible combinations of these methods that could be used to meet a company's objectives.

Any potential update method will affect at least one of the following variables: face amount, gross premium, net premium, premium-paying or endowment period, cash value, and, for participating business, dividends. In fact, usually all of these are affected. The change in each of these variables is controlled within limits by the choice of update method. To clarify these interrelationships, we will investigate the effects of each major method on a hypothetical policy defined as follows:

SAMPLE POLICY

Plan: Ordinary life

Issue age: 25

Issue year: 1960

Gross premium: \$19.37 per \$1,000

Original reserve basis: 1941 CSO, 2½ percent, continuous functions

Net level fully continuous annual premium [$\bar{P}(\bar{A}_x)$]: \$15.07804 per \$1,000

Net level discounted continuous annual premium [$\bar{P}(\bar{A}_x)\bar{a}_{\overline{1}|}$]: \$14.89 per \$1,000

Cash values: Equal to net level premium reserves (twentieth-year cash value, \$288.48)

In all the examples that follow, the policy will be updated on the twentieth policy anniversary. A comparison of emerging cash value and dividend patterns will be shown for one year, five years, ten years, and twenty years after update. Each dividend illustration is based on \$1,000 of pre-update coverage. The dividend factors assumed are the following:

Dividend scale mortality assumption: 1965-70 Male Ultimate Basic Table

Dividend scale interest assumption: 2½ percent basis, $i' = 0.06$; 4 percent basis, $i' = 0.065$

Dividend scale expense assumption: $(0.08)(\text{gross}) + \$1.15$

The dividends and cash values on the original policy for policy years 21, 25, 30, and 40 may be derived as follows:

Policy year 21 (cash value = \$304.80):

Mortality gain (\$1,000 - \$304.80)(0.00861 - 0.00362).....	\$ 3.469
Interest gain (0.060 - 0.025)(\$288.48 + \$14.89).....	10.618
Expense gain (\$4.48 - \$2.699)(1.06).....	1.888
Dividend.....	\$15.98

Policy year 25 (cash value = \$371.10):

Mortality gain (\$1,000 - \$371.10)(0.01145 - 0.00551).....	\$ 3.736
Interest gain (0.060 - 0.025)(\$354.40 + \$14.89).....	12.925
Expense gain (\$4.48 - \$2.699)(1.06).....	1.888
Dividend.....	\$18.55

Policy year 30 (cash value = \$455.11):

Mortality gain (\$1,000 - \$455.11)(0.01665 - 0.00905).....	\$ 4.141
Interest gain (0.060 - 0.025)(\$438.29 + \$14.89).....	15.861
Expense gain (\$4.48 - \$2.699)(1.06).....	1.888
Dividend.....	\$21.89

Policy year 40 (cash value = \$618.47):

Mortality gain (\$1,000 - \$618.47)(0.03658 - 0.02381).....	\$ 4.872
Interest gain (0.060 - 0.025)(\$602.82 + \$14.89).....	21.620
Expense gain (\$4.48 - \$2.699)(1.06).....	1.888
Dividend.....	\$28.38

Use of this example throughout the paper will enable the reader to have a better understanding of the interrelationships involved in the various update methods.

It is necessary to note one other factor before looking at the methods. The first decision we made was that the original mortality basis not be changed. Simplicity was a major consideration. Our rates and values computer systems associate mortality tables with policy series, and this decision allowed us to maintain this relationship whether or not the policy was updated. Some inconsistencies were avoided, too. A change to the 1958 CSO Table for all business would, in effect, have increased the premium-paying period for ordinary life policies issued on the American Experience Table by changing the limiting age from 96 to 100. Leaving the mortality basis unchanged had a positive influence on dividends also. A change to a more modern mortality table would have reduced greatly the gain from mortality, and we felt, and some research showed, that our policyholders were less likely to accept an amendment if it substantially lowered the dividend pattern that they had come to expect. Finally,

leaving the mortality basis unchanged serves to limit the potential anti-selection costs by generally holding down the initial increase in coverage.

Let us now consider the potential update methods. The basic prospective reserve equation establishes the relationship among the variables. For duration t —the duration at which the policy is updated—this equation is

$${}_tV_x = FA_{x+t} - Pa_{x+t:\overline{n-t}|},$$

or

$$\begin{aligned} \text{Current reserve} = & \text{Face amount} \times \text{Present value of future benefits of 1} \\ & - (\text{Net premium} \times \text{Present value of 1 per year} \\ & \quad \text{for the premium-paying period}). \end{aligned}$$

Each method shown is defined by a change in one primary factor. Each of the other factors is held constant unless the requirement of actuarial equivalence at the time of update dictates a change. Comparing the results of each method to those of the original policy will establish the range of numerical values for each of the variables. The method chosen should maximize the company's objectives within these constraints.

A. Method 1: Increase the Face Amount (Alternative 1)

Keeping the plan, net premium, gross premium, and current reserve constant, solve the basic prospective reserve equation for the new face amount. The current reserve and the net premium are known, and the two present-value factors are calculated on the updated basis. For this example, the calculations are based on the 1941 CSO Table, 4 percent interest, and continuous functions.

$$\begin{aligned} \$288.48 &= (\text{Face amount})(0.41120) - (\$15.07804)(15.01236); \\ \text{Face amount} &= \$1,253. \end{aligned}$$

For our sample policy, the increase in face amount is \$253 per thousand of original coverage. How does this affect future dividends and cash values?

The results for selected years are shown below. While the fully continuous premium remains the same, the discounted continuous premium (used in the interest gain calculation) changes to \$14.79 with the change to a 4 percent interest rate.

Policy year 21 (cash value = \$307.39):		
Mortality gain (\$1,253 - \$307.39)(0.00861 - 0.00362)		\$ 4.719
Interest gain (0.065 - 0.04)(\$288.88 + \$14.79)		7.592
Expense gain (\$4.58 - \$2.699)(1.065)		2.003
		\$14.31
Dividend		\$14.31

Policy year 25 (cash value = \$384.36):

Mortality gain (\$1,253 - \$384.36)(0.01145 - 0.00551)	\$ 5.160
Interest gain (0.065 - 0.04)(\$364.72 + \$14.79)	9.488
Expense gain (\$4.58 - \$2.699)(1.065)	2.003
Dividend	<u>\$16.65</u>

Policy year 30 (cash value = \$485.89):

Mortality gain (\$1,253 - \$485.89)(0.01665 - 0.00905)	\$ 5.830
Interest gain (0.065 - 0.04)(\$465.21 + \$14.79)	12.000
Expense gain (\$4.58 - \$2.699)(1.065)	2.003
Dividend	<u>\$19.83</u>

Policy year 40 (cash value = \$695.67):

Mortality gain (\$1,253 - \$695.67)(0.03658 - 0.02381)	\$ 7.117
Interest gain (0.065 - 0.04)(\$674.87 + \$14.79)	17.242
Expense gain (\$4.58 - \$2.699)(1.065)	2.003
Dividend	<u>\$26.36</u>

Note that the guaranteed cash values are higher, and the dividends are lower, than those of the original policy.

B. Method 2: Increase the Face Amount (Alternative II)

Assume that the policy was issued originally on the new reserve basis, and determine a new face amount such that the old reserve is equal to the new reserve. Essentially the new face amount is determined as the ratio of the old-basis reserve per thousand to the new-basis reserve per thousand. This method leaves the plan, the gross premium, and the current reserve unchanged and allows the net premium to vary. If the policy had been on a 4 percent basis from issue, its twentieth-year cash value would be \$235.07 and the net level discounted premium would be \$11.51. Thus, for our example, the new face amount would be

$$\$1,000(\$288.48/\$235.07) = \$1,228 .$$

Dividends and cash values would be as follows:

Policy year 21 (cash value = \$306.71):

Mortality gain (\$1,228 - \$306.71)(0.00861 - 0.00362)	\$ 4.597
Interest gain (0.065 - 0.04)(\$288.67 + \$14.13)	7.570
Expense gain (\$5.24 - \$2.699)(1.065)	2.706
Dividend	<u>\$14.87</u>

Policy year 25 (cash value = \$381.69):

Mortality gain (\$1,228 - \$381.69)(0.01145 - 0.00551)	\$ 5.027
Interest gain (0.065 - 0.04)(\$362.54 + \$14.13)	9.417
Expense gain (\$5.24 - \$2.699)(1.065)	2.706
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Dividend	\$17.15

Policy year 30 (cash value = \$480.60):

Mortality gain (\$1,228 - \$480.60)(0.01665 - 0.00905)	\$ 5.680
Interest gain (0.065 - 0.04)(\$460.46 + \$14.13)	11.865
Expense gain (\$5.24 - \$2.699)(1.065)	2.706
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Dividend	\$20.25

Policy year 40 (cash value = \$684.99):

Mortality gain (\$1,228 - \$684.99)(0.03658 - 0.02381)	\$ 6.934
Interest gain (0.065 - 0.04)(\$664.73 + \$14.13)	16.972
Expense gain (\$5.24 - \$2.699)(1.065)	2.706
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Dividend	\$26.61

Because of the smaller increase in face amount, the dividends are slightly larger, and the cash value increases slightly smaller, than for method 1.

C. Method 3: Cash Release

As in method 2, assume that the policy was issued originally on the 4 percent reserve basis, but keep the face amount at \$1,000, determine the reserve necessary, and return the excess to the policyowner. For our example, the 4 percent reserve is \$235.07, the net level discounted premium is \$11.51, and the excess reserve is \$53.41, which would be returned to the policyowner.

If the gross premium were not changed, the loading gain would offset a large portion of the excess interest lost.

Dividends and cash values for this example are as follows:

Policy year 21 (cash value = \$249.76):

Mortality gain (\$1,000 - \$249.76)(0.00861 - 0.00362)	\$ 3.744
Interest gain (0.065 - 0.04)(\$235.07 + \$11.51)	6.165
Expense gain (\$7.86 - \$2.699)(1.065)	5.496
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Dividend	\$15.41

Policy year 25 (cash value = \$310.82):

Mortality gain (\$1,000 - \$310.82)(0.01145 - 0.00551)	\$ 4.094
Interest gain (0.065 - 0.04)(\$295.23 + \$11.51)	7.669
Expense gain (\$7.86 - \$2.699)(1.065)	5.496
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Dividend	\$17.26

Policy year 30 (cash value = \$391.37):

Mortality gain (\$1,000 - \$391.37)(0.01665 - 0.00905).....	\$ 4.626
Interest gain (0.065 - 0.04)(\$374.97 + \$11.51).....	9.662
Expense gain (\$7.86 - \$2.699)(1.065).....	5.496
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Dividend.....	\$19.78

Policy year 40 (cash value = \$557.81):

Mortality gain (\$1,000 - \$557.81)(0.03658 - 0.02381).....	\$ 5.647
Interest gain (0.065 - 0.04)(\$541.31 + \$11.51).....	13.821
Expense gain (\$7.86 - \$2.699)(1.065).....	5.496
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Dividend.....	\$24.96

In this case, future dividends and cash values are both lower than on the original policy.

D. Method 4: Create New Paid-up Additions

Method 4 is simply a variation of method 3 with the excess reserve used to provide full-paid insurance on a net basis. In our example, the \$53.41 is used to purchase \$130 of paid-up additions on the 1941 CSO 4 percent basis. Hence, the total coverage is increased from \$1,000 to \$1,130 under this method.

Total dividends and cash values are made up of two parts—premium-paying and full-paid. Dividends and cash values on the premium-paying part have already been calculated under method 3. The full-paid dividends are illustrated below on a per \$1,000 basis; these must be adjusted to reflect the actual paid-up addition balance of \$130.

Policy year 21 (cash value = \$249.76 + \$54.93 = \$304.69):

Mortality gain (\$1,000 - \$422.51)(0.00861 - 0.00362).....	\$ 2.882
Interest gain (0.065 - 0.04)(\$411.20).....	10.280
Expense gain (-0.00175)(\$411.20).....	-0.720
	<hr/>
Full-paid dividend.....	\$12.44

The dividend on the \$130 of full-paid addition is 0.130 times \$12.44, or \$1.62. The total policy dividend is the premium-paying dividend of \$15.41 plus the additions dividend of \$1.62, or \$17.03.

Policy year 25 (cash value = \$310.82 + \$61.04 = \$371.86):

Mortality gain (\$1,000 - \$469.51)(0.01145 - 0.00551).....	\$ 3.151
Interest gain (0.065 - 0.04)(\$457.52).....	11.438
Expense gain (-0.00175)(\$457.52).....	-0.801
	<hr/>
Full-paid dividend.....	\$13.79

The total policy dividend is \$17.26 + \$1.79, or \$19.05.

Policy year 30 (cash value = \$391.37 + \$69.10 = \$460.47):

Mortality gain (\$1,000 - \$531.52)(0.01665 - 0.00905)	\$ 3.560
Interest gain (0.065 - 0.04)(\$518.89)	12.972
Expense gain (-0.00175)(\$518.89)	-0.908
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Full-paid dividend	\$15.62

Total policy dividend is \$19.78 + \$2.03, or \$21.81.

Policy year 40 (cash value = \$557.81 + \$85.75 = \$643.56):

Mortality gain (\$1,000 - \$659.63)(0.03658 - 0.02381)	\$ 4.347
Interest gain (0.065 - 0.04)(\$646.93)	16.173
Expense gain (-0.00175)(\$646.93)	-1.132
	<hr/>
Full-paid dividend	\$19.39

Total policy dividend is \$24.96 + \$2.52, or \$27.48.

Initially the total dividend is larger than, and the total cash values about the same as, those of the original policy. Dividends eventually become lower, and total cash values higher, than those of the original.

E. Method 5: Change the Premium-paying Period

Keep the same face amount, current reserve, and gross premium and, as nearly as possible, the same net premium. Determine a new premium-paying period. In our example,

Current reserve = Present value of future benefits

$$- (\$15.07804)(\text{Present value of 1 per year}) ,$$

or

$$\$288.48 = \$411.20 - \$15.07804Z ;$$

$$Z = 8.13899 .$$

This is the present value, at 4 percent interest, of a temporary life annuity for the new remaining premium-paying period.

Using commutation functions, it may be determined that the plan is being changed to life paid up at age 56. Eleven more premiums must be paid, with a new fully continuous net premium of \$14.51497. Dividends and cash values are as follows:

Policy year 21 (cash value = \$308.64):

Mortality gain (\$1,000 - \$308.64)(0.00861 - 0.00362)	\$ 3.450
Interest gain (0.065 - 0.04)(\$288.48 + \$14.23)	7.568
Expense gain (\$5.14 - \$2.699)(1.065)	2.600
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Dividend	\$13.62

Policy year 25 (cash value = \$394.94):

Mortality gain (\$1,000 - \$394.94)(0.01145 - 0.00551)	\$ 3.594
Interest gain (0.065 - 0.04)(\$372.49 + \$14.23)	9.668
Expense gain (\$5.14 - \$2.699)(1.065)	<u>2.600</u>
Dividend	\$15.86

Policy year 30 (cash value = \$517.41):

Mortality gain (\$1,000 - \$517.41)(0.01665 - 0.00905)	\$ 3.668
Interest gain (0.065 - 0.04)(\$491.44 + \$14.23)	12.642
Expense gain (\$5.14 - \$2.699)(1.065)	<u>2.600</u>
Dividend	\$18.91

Policy year 40 (cash value = \$659.63):

Mortality gain (\$1,000 - \$659.63)(0.03658 - 0.02381)	\$ 4.347
Interest gain (0.065 - 0.04)(\$646.93)	16.173
Expense gain (-0.00175)(\$646.93)	<u>-1.132</u>
Dividend	\$19.39

Under this method, dividends are lower and cash values are higher than those of the original policy, since they are increasing with the higher guaranteed rate. Building this rate into the guaranteed values produces lower dividends because the same interest cannot be paid in both places.

F. Method 6: Increase Dividends

Keep the same plan, face amount, gross premium, and current reserve, and solve the equation of value for the future net premium. In our example,

$$\begin{aligned} \$288.48 &= \$411.20 - (P)(15.01236) ; \\ P &= \$8.17460 . \end{aligned}$$

The new net level discounted premium is \$8.02, and the new loading is \$11.35. The increased loading will produce a larger expense gain. The impact of this method on the dividends and cash values is as follows:

Policy year 21 (cash value = \$302.15):

Mortality gain (\$1,000 - \$302.15)(0.00861 - 0.00362)	\$ 3.482
Interest gain (0.065 - 0.04)(\$288.48 + \$8.02)	7.413
Expense gain (\$11.35 - \$2.699)(1.065)	<u>9.213</u>
Dividend	\$20.11

Policy year 25 (cash value = \$358.94):

Mortality gain (\$1,000 - \$358.94)(0.01145 - 0.00551)	\$ 3.808
Interest gain (0.065 - 0.04)(\$344.45 + \$8.02)	8.812
Expense gain (\$11.35 - \$2.699)(1.065)	<u>9.213</u>
Dividend	\$21.83

Policy year 30 (cash value = \$433.88):

Mortality gain (\$1,000 - \$433.88)(0.01665 - 0.00905)	\$ 4.303
Interest gain (0.065 - 0.04)(\$418.61 + \$8.02)	10.666
Expense gain (\$11.35 - \$2.699)(1.065)	9.213
Dividend	\$24.18

Policy year 40 (cash value = \$588.69):

Mortality gain (\$1,000 - \$588.69)(0.03658 - 0.02381)	\$ 5.252
Interest gain (0.065 - 0.04)(\$573.34 + \$8.02)	14.534
Expense gain (\$11.35 - \$2.699)(1.065)	9.213
Dividend	\$29.00

Dividends are substantially increased under this method because the net premium is reduced while the gross premium is maintained. Future cash values are lower, also because of the reduced net premium.

G. Method 7: Reduce the Gross Premium

This method is similar to method 6, except that the gross premium is reduced to reflect the lower net premium directly. Using the same loading formula, we derive a new gross premium of \$11.47 per thousand. Of course, cash values are the same as in method 6, and only the loading portion of the dividend is changed.

Policy year 21 (cash value = \$302.15):

Mortality gain (\$1,000 - \$302.15)(0.00861 - 0.00362)	\$ 3.482
Interest gain (0.065 - 0.04)(\$288.48 + \$8.02)	7.413
Expense gain (\$3.45 - \$2.699)(1.065)	0.800
Dividend	\$11.70

Policy year 25 (cash value = \$358.94):

Mortality gain (\$1,000 - \$358.94)(0.01145 - 0.00551)	\$ 3.808
Interest gain (0.065 - 0.04)(\$344.45 + \$8.02)	8.812
Expense gain (\$3.45 - \$2.699)(1.065)	0.800
Dividend	\$13.42

Policy year 30 (cash value = \$433.88):

Mortality gain (\$1,000 - \$433.88)(0.01665 - 0.00905)	\$ 4.303
Interest gain (0.065 - 0.04)(\$418.61 + \$8.02)	10.666
Expense gain (\$3.45 - \$2.699)(1.065)	0.800
Dividend	\$15.77

Policy year 40 (cash value = \$588.69):

Mortality gain (\$1,000 - \$588.69)(0.03658 - 0.02381)	\$ 5.252
Interest gain (0.065 - 0.04)(\$573.34 + \$8.02)	14.534
Expense gain (\$3.45 - \$2.699)(1.065)	0.800
Dividend	\$20.59

The primary attraction of this method is the lower gross premium. Future cash values are identical with those of method 6. Table 1 summarizes the future values for these seven methods.

H. Key Considerations in Selecting an Update Method

As we studied various update techniques and noted their characteristics, we tried to analyze how each possible method would affect the policyowner/insured, the agent, and the home office. Some of the methods have little or no effect on any of these parties, but each method deserves consideration on its own merits. The pluses and minuses of each of these methods are examined below.

Method 1 provides the largest face-amount increase possible given that the net premium does not increase. Its major selling points to policyholders are the increased face amount and the increased guaranteed cash values. On the other hand, dividends are reduced rather substantially, and, as a result, some policyholders would not accept the offer. From the company standpoint, there is the maximum potential for mortality antiselection. Also, this attained-age method is complicated from a systems viewpoint, since each issue-age/duration cell has a different face amount. Finally, the original net premium must be known in order to determine future reserves and cash values.

Method 2 also provides for an increase in face amount, but it is done on an original-age basis. Almost all of the comments that apply to method 1 apply here. However, because the net premium is reduced, dividends are not so dramatically affected. Also, future cash values and reserves are more easily calculated, since they are derived from per thousand factors of the traditional form. Once the increase in face amount is determined, all future values can be determined directly and all the values are at 4 percent—there is no need to have the prior net premium available.

The primary attraction of method 3 for the policyowner is the return of cash value. This could trigger a tax for some policyowners because the returned cash might produce a gain. Also, this method could lead to lapses if a policy loan balance were in excess of the new policy cash value. From the company's standpoint, there is a substantial drain on cash flow and a decline in assets. The method does leave dividends relatively unchanged.

Method 4 attempts to retain the money within the company by creating additional paid-up insurance. The policyowner gets more coverage, and dividends are maintained at very close to their original pattern. The relatively lower increase in coverage minimizes antiselection. However, it is quite possible that a significant portion of the additional paid-up

TABLE 1

FUTURE CASH VALUES AND DIVIDENDS FOR SAMPLE POLICY UNDER SEVEN ALTERNATIVE UPDATE METHODS
 (Updates a 2½ Percent Ordinary Life Policy Issued at Age 25 to a 4 Percent Reserve Basis at Duration 20)

	Present Basis	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6	Method 7
Description of method.....		Increased face amount; attained-age basis	Increased face amount; original-age basis	Cash release	Create additional paid-up	Shorten premium-paying period	Increase dividends	Reduce gross premiums
Coverage amount.....	\$1,000	\$1,253	\$1,228	\$1,000	\$1,130	\$1,000	\$1,000	\$1,000
Cash values:								
21st.....	304.80	307.39	306.71	249.76	304.69	308.64	302.15	302.15
25th.....	371.10	384.36	381.69	310.82	371.86	394.94	358.94	358.94
30th.....	455.11	485.89	480.60	391.37	460.47	517.41	433.88	433.88
40th.....	618.47	695.67	684.99	557.81	643.56	659.63	588.69	588.69
Dividends:								
21st.....	15.98	14.31	14.87	15.41	17.03	13.62	20.11	11.70
25th.....	18.55	16.65	17.15	17.26	19.05	15.86	21.83	13.42
30th.....	21.89	19.83	20.25	19.78	21.81	18.91	24.18	15.77
40th.....	28.38	26.36	26.61	24.96	27.48	19.39	29.00	20.59

insurance would be surrendered and the problems of method 3 would be realized.

The main advantage of method 5 is the shortened premium payment period, which probably would be received favorably by some policyowners. However, this method creates an extremely complicated systems problem for the company. New plans would be created, such as, in our example, life paid up at age 56. In addition, it is possible that some life plans already would be paid up and would have to be changed to endowment plans, with possible adverse tax consequences for the policyholder.

The main selling point of method 6 is the dramatic increase in dividends. The policyowner receives no extra coverage, but he can easily perceive the improved value that this change affords him, even though he is trading guarantees for the uncertainty of higher future dividends. From the company's standpoint there is a possibility of somewhat reduced cash flow. This method has many of the systems problems of methods 1 and 5, since the future net premium depends on the policy duration at which the update occurs.

Method 7 is a spin-off of method 6, but because it reduces the gross premium, it could have a significant impact on the company's cash-flow position. The policyowner, however, probably can perceive immediately the better value of the updated policy because of the lower gross premium and lower future net payments. Agents' commissions are affected. Substandard policyowners may prefer to continue to pay full premiums to maximize their dividend additions.

Table 2 identifies the key considerations and our analysis of the seven methods with respect to these considerations.

IV. OUR UPDATE METHOD AND REASONS FOR ITS SELECTION

The previous section describes many ways of changing a policy to reflect an increase in the reserve interest rate and presents many considerations involved in selecting a method from among these choices. These considerations must be weighed according to the unique characteristics of the company and its policyowners to determine a method that best fits the particular priorities. As an example of this process, let us consider what our primary objectives were as we selected the method for Northwestern Mutual's Project Update.

As a mutual company we believe that the primary objective of such a change should be to provide an improved benefit for the policyowners. An obvious choice is increased life insurance coverage. However, this is not the only major objective—there are others of almost equal importance. Unless the policyowner is able to perceive the value of the increased benefits and analyze the impact of the change on his policy, he

TABLE 2
ANALYSIS OF ALTERNATIVE UPDATE METHODS

Method	Description	Major Impact on Policyholder	Negative Cash-Flow Impact	Mortality Antiselection	Adverse Tax Impact on Policyowner	Understandable
1.....	Increase face amount; attained-age basis	More coverage	No	Yes	No	Yes
2.....	Increase face amount; original-age basis	More coverage	No	Yes	No	Yes
3.....	Cash release	Cash	Yes	Maybe	Maybe	Yes
4.....	Create additional paid-up	More coverage	Maybe	Maybe	No	Maybe
5.....	Shorten premium-paying period	Fewer premiums	Yes	No	No	Yes
6.....	Increase dividends	Lower payments	Yes	No	No	Yes
7.....	Reduce gross premium	Lower payments	Yes	No	No	Yes

may reject it simply because he cannot understand it. A valuable benefit is not useful to the policyowner (or the company) if he does not perceive it as useful. Policyowner understanding can be achieved most readily if the relative changes in basic policy elements and values are consistent and, to the maximum extent possible, provide only pluses for the policyowner—such as having the guaranteed cash values always be higher after the change than they would have been if no change were made. Finally, increased coverage creates the potential for antiselection. This must be minimized if possible, since the cost of the increased benefit could become prohibitive for the company, that is, for the policyowner group.

As we considered the results of each method, we developed the concept of a “best-blend” method that would improve most subsequent policy values. The death benefit would increase, reflecting our primary objective, and cash values generally would be higher. Since an increased reserve interest rate tends to reduce the interest element of dividends, we sought a way to offset this reduction in order to minimize the resulting likely decrease in future dividends.

For overall simplicity and policyowner understanding, it was decided that the best-blend method should retain as many basic features of the original policy as possible, including the gross premium, the plan, and the premium-paying period. Furthermore, the increases in face amount logically should reflect the relative change in the reserve interest rate. These increases should be limited to reduce potential antiselection. Finally, all changes should be kept as simple as possible.

With this best-blend concept in mind, we constructed our update method. We believe the result meets the objectives that are most important for our policyowners and the company as a whole. Our method is based on an original-age policy change. The change affects only key reserve and nonforfeiture value provisions. All other policy benefits and provisions remain unaffected. Calculation of the new values is based on equating the policy’s original and new cash values on the policy anniversary following the change. The gross premium, plan, and premium-paying period are the same as for the original policy.

We chose to limit the increase in the face amount of premium-paying policies to accomplish several objectives:

1. The limit would help reduce the impact of antiselection.
2. A limit on the increase in face amount generally reduces the net valuation premium below that of the original policy. This increases the loading element of the dividend and, along with the pass-through of the tax savings, offsets some or all of the reduced excess interest element.

3. On the other hand, the net premium should be large enough that future guaranteed cash values generally will be higher at all durations, not just at maturity.
4. Since a variety of reserve interest rates was involved, the limit on the increase in coverage should reflect the relative change in reserve interest rate.
5. Any limit should accomplish all these objectives by means of a single formula.

The limit we chose is based on a simple linear formula: the face amount of a premium-paying policy is increased in accordance with our required equation of cash values, but not more than 10 percent for each 1 percent change in reserve interest rate. Table 3 specifies these limits for various original reserve interest rates.

For some premium-paying policies, the requirement of equal cash values produces an increase in face amount that is less than the limit, particularly at the higher attained ages. For others, the cash value for the increased face amount on the new basis is less than the original policy cash value at time of change, because of the limit. In the latter situation, the excess cash value is applied to provide paid-up additions. These paid-up additions are added to the existing paid-up additions account, if any, or a new paid-up additions account is created.

For full-paid policies and existing paid-up additions, the method simply provides the full-face-amount increase generated by equating the original cash value to a new 4 percent cash value. There is no limit on the increase for full-paid policies or paid-up additions. In fact, if we were to apply the limit formula and purchase an extra paid-up amount with any excess cash value, we would get the same result.

Although for premium-paying policies, the increase in face amount is limited, the overall percentage increase in coverage is greater than this limit in many cases. The limit serves only to vary the nature of the

TABLE 3
 MAXIMUM INCREASE IN
 FACE AMOUNT
 (New Reserve Interest Rate
 Assumed at 4 Percent)

Original Reserve Interest Rate	Maximum Increase in Premium-paying Face Amount
2%	20%
2½	15
3	10
3½	5

increase in coverage. Up to the limit, the increase is in premium-paying face amount, while any remaining excess cash value provides an additional increase in the form of paid-up insurance. The result is a smaller increase in the amount at risk exposed to antiselection.

Perhaps an example will clarify a number of points. Suppose that a \$10,000 ordinary life policy issued in 1960 to a 25-year-old is updated in 1980. The twentieth-year guaranteed cash value for this policy is \$2,884.80, reflecting a 2½ percent reserve interest rate assumption. It is therefore eligible for an increase in face amount up to a maximum of 15 percent. If this policy had been issued on a 4 percent basis in 1960 for \$11,500 (a 15 percent increase), its twentieth-year guaranteed cash value would be \$2,703.31. To maintain the equality of cash values, the excess cash value of \$181.49 provides \$442 of paid-up additional insurance on a 4 percent basis. Thus, the coverage has been increased from \$10,000 to \$11,942, for a total increase of a little over 19 percent.

Future cash values and dividends are affected by our update process. In general, dividends after update will be slightly lower than they would have been, because more of the company's earnings will be used to provide benefits and to build up guaranteed cash values, which generally are higher after update. Table 4 illustrates the changes in future cash values and dividends for our example. If, in the example, the policy had an additions balance of \$2,830 with a cash value of \$1,579.82 at attained age 45, this additions balance would be updated to \$3,842 with the same cash value. This is a 35 percent increase.

Thus, in this case the total coverage—increased face amount (\$11,500), extra paid-up insurance (\$442), and increased dividend additions

TABLE 4
COVERAGE AMOUNTS, GUARANTEED CASH VALUES, AND DIVIDENDS
FOR ORIGINAL POLICY AND UPDATED POLICY
(Updates a 2½ Percent Ordinary Life Policy Issued at Age 25
to a 4 Percent Basis at Duration 20)

ATTAINED AGE	YEARS AFTER UPDATE	POLICY YEAR	COVERAGE AMOUNT		GUARANTEED CASH VALUES		DIVIDENDS	
			Original	Updated	Original	Updated	Original	Updated
46.....	1	21	\$10,000	\$11,942	\$3,048	\$3,058	\$159	\$156
50.....	5	25	10,000	11,942	3,711	3,781	185	177
55.....	10	30	10,000	11,942	4,551	4,735	218	207
65.....	20	40	10,000	11,942	6,184	6,706	283	268

(\$3,842)—is increased from \$12,830 to \$15,784. This is a 23 percent increase. Note that any additional paid-up insurance will be combined with the increased dividend additions to create a single new paid-up additions balance—in this case \$4,284.

V. IMPLEMENTATION OF UPDATE

The remainder of the paper examines key theoretical and practical considerations in the implementation of an update program.

A. *Contractual Considerations*

1. UNILATERAL OR BILATERAL APPROACH?

A major question requiring much deliberation was whether or not this project could be done on a unilateral basis, without policyowner consent. A unilateral update would have several advantages: (1) it would maximize the tax savings, (2) it would eliminate any mortality antiselection, and (3) it would reduce home office administrative cost substantially, since policyowner consent would not be needed.

Technically, since the life insurance contract is a bilateral agreement it cannot be amended unilaterally. From a practical point of view, however, unilateral changes are possible. If the changes do not affect the policyowner adversely, then they can be made on a unilateral basis. Under these conditions, the changes presumably would be acceptable, since there would be no reason for a policyowner to contest them.

It would seem that any change that would qualify for a unilateral approach must meet certain criteria. First, it must not reduce any current or future guaranteed benefits of the policy. Second, it must not impair any of the policyowner's current contractual rights. Finally, it is desirable, if not required, that future dividends be not lower than they would have been if the change had not been made. In other words, the policyowner must be, in all possible future respects, no worse off than he would have been if the change had not taken place. In fact, in order to be justified, the change should improve some benefit(s).

We studied several methods, based primarily on some modifications of those described earlier, in an attempt to find one that would satisfy these unilateral criteria. Some of the methods were quite technical in nature. For example, we considered "guaranteeing" a portion of the dividend. In essence, this method would involve a series of guaranteed future "annuity" payments. The amount of these payments would be such that, when valued along with the other policy benefits on the increased reserve interest rate basis, the total policy reserves would equal the

original policy reserves. These payments would be applied under the policy's dividend options in the same way as dividends.

Another technical method involved defining a series of future additional death benefit amounts that generally decreased with duration. These benefits also would be determined in such a way that, when they were valued together with the basic policy benefit on the higher reserve interest rate basis, the total reserve each year would equal the original policy reserve.

As we studied these and other methods, we ran into several different obstacles. In some cases there was a question whether we might be "guaranteeing" a portion of distributable surplus and thereby denying the policyowner the required optional applications of these funds. In other cases, there was some question as to the substantive nature of the change for purposes of obtaining the desired tax savings. For the guaranteed "annuity" and some other methods, there was concern that the change might represent a taxable event for the policyowner, thus increasing his personal taxes. And, of course, there was serious concern about the potentially complex systems requirements. Another complicating factor for us was the vast amount of split-dollar business with dual policyowners having varying relative shares in policy rights and values.

In reviewing all this research, we found that there was a common "fatal flaw," which applied to virtually every method we studied. We interpreted the standard valuation and nonforfeiture laws to require that the interest rate for reserves not be higher than that for cash values. This requirement appeared to block the unilateral methods we studied because the reserve rate could not be changed unilaterally under any of our methods without changing the cash values, and the cash values could not be changed unilaterally. In any event, this flaw seemed to require policyowner consent, a "meeting of the minds," before we could make a change in reserve interest rate.

Let us consider in a little more depth one aspect of the fatal flaw referred to above. Can the interest rate for nonforfeiture values (or reserves) be raised to 4 percent for all blocks of existing business? The standard nonforfeiture law provides for certain maximum interest rate assumptions based on a policy's year of issue. For many years of issue this maximum is below 4 percent.

Under the bilateral approach, the company and the policyowner strike a new deal with regard to the future nonforfeiture values (and reserves). Thus, for a bilateral change it seems obvious that the current nonforfeiture interest rate assumptions should apply, and a 4 percent rate

clearly is permitted. Under a unilateral approach, the limits may not be as clear. Some would assert that, if the change were made today, the current tests should apply. Others might view unilateral changes as limited to those permitted under the rules at the time of original issue. Since there is no such doubt with the bilateral approach, it is clearly preferable.

2. NONFORFEITURE VALUES AND VALUATION STANDARDS

If the interest rate is the only change, extensive testing is required to ensure that the future nonforfeiture values of the updated policies will meet or exceed the current minimum statutory requirements, since the slopes of the original and current nonforfeiture mortality tables will differ. Special consideration may be required for extended term or paid-up values as well as for limited payment plans. Obviously, the values per *policy* also will exceed the minimum established at issue, since the higher assumed interest rate means higher guaranteed values. Similar considerations apply to meeting minimum valuation standards.

3. DIVIDENDS

The dividend mechanism works well both for those who accept the offer and for those who do not. The three-factor contribution method is easy to adjust for updated policies, since (1) the tax expense factor is reduced to reflect the lower taxes assessed to the 4 percent reserves and (2) the mortality factor is adjusted to reflect assumed antiselection, with possible variation by sex and premium class. If the dividend scale interest rates currently recognize the impact of taxes, no additional factors are required—the 4 percent reserve rate is used and all the tax savings are allocated to updated policies, as required by contribution theory.

Any existing expense charges assessed per thousand must be adjusted to the new face amount, or the total amount recovered will be excessive. Since our system carries both the new and the old face amounts, this was not difficult.

We assessed the administrative expenses of the program to surplus. Alternatively, these expenses could be amortized over the future lifetime of the updated policies. This amortization charge would be quite small, especially on a per thousand basis.

For other dividend methods, such as fund accounting and experience premium, the adjustments may be more difficult. The tax savings and assumed mortality experience should be reflected in actual and illustrated dividends for updated policies.

No changes in dividend factors are required for those who do not accept the offer. The update program does not affect these dividends.

4. CONTRACTUAL APPROACHES FOR BILATERAL CHANGES
IN RESERVE INTEREST RATE

Once we convinced ourselves that the bilateral approach was the best, if not the only, way to amend successfully in all states, we gave serious consideration to various contractual approaches. We identified three basic alternatives:

1. Replacement of the old policy with a new policy. Under this alternative the old policy would be lapsed to a special higher reserve interest rate paid-up basis, and a new higher reserve rate policy would be purchased with the original premium.
2. Adjustable policy with a lump-sum feature. While similar in concept to the replacement idea, this would make use of a single new contract.
3. Amendment of the existing policy.

Both the first and second alternatives raised several legal questions, including application of replacement regulations and incontestability and suicide clauses. They would have an impact on many policy benefits and provisions such as settlement option rates—not only on those related to the change in reserve interest rate and coverage. They raised the potential of a taxable event for the policyowner because of the dramatic contractual change. Commissions also would become a factor. Finally, neither of these approaches seemed consistent with the update method that we had chosen.

Another key difference between the first two alternatives and the last relates to the policy loan interest rate provision. The first two alternatives undoubtedly would include a change to the 8 percent loan rate, since it is part of the new policy. (Perhaps this would not be required, but management might at least prefer to include the change.) This would also be consistent with other new issues. The third alternative certainly does not require a change in the loan rate to bring about the change in the reserve interest rate. We decided that it was best not to change both, since the offer would be more attractive if the 8 percent loan rate were not required. These are really independent issues, which we felt the policyowner should decide separately. Besides, we already had initiated a program giving our policyowners an opportunity to change their policy loan interest rates. A company that has not done so might find this change an attractive opportunity for raising policy loan interest rates in existing policies. We believe, however, that that could have a dramatic impact on overall policyowner acceptance of the update change.

The third approach, amendment of the existing policy, is simple and straightforward. It is definitely consistent with our original-age-change

approach. It is also easiest to describe to the policyowner, since he need be concerned only with the specific changes that would increase the valuation interest rate and the benefits. He retains without change all his other existing benefits and provisions. This focuses his attention on the key aspects of the change and makes a decision much easier.

5. STATE APPROVALS

We believe that state approval of the amendment provisions is required. Even on a unilateral basis, the form to be given to the policyowner identifying the unilateral changes and guaranteeing the new benefits must be approved. The state also will want to see demonstrations that the updated policies meet the nonforfeiture and valuation laws. While the policyowner communication materials generally do not require approval, many states will want to see them as well.

B. *Mortality Considerations*

1. ANTISELECTION AND UNDERWRITING

The potential for mortality antiselection exists any time increased coverage is offered to existing policyowners on an optional basis. The potential antiselection resulting from the update offer could be eliminated or minimized by asking for medical or nonmedical evidence of insurability and underwriting the risk. However, the cost and administrative burden of underwriting the entire in-force would be prohibitive, particularly for the vast majority of policies where the amounts of additional coverage offered are quite small. Other factors may be employed to reduce this risk, such as limiting the additional coverage offered (previously discussed), limiting the acceptance period, and doing everything possible to obtain a high acceptance level of the offer.

Having concluded that underwriting every case was not feasible, we decided to estimate the potential antiselection associated with various acceptance levels of the offer and, if it were significant and at an acceptable (modest) level, to assess this cost to all updated policies. No additional mortality charge would be assessed to those who did not amend, since there would be no antiselection in this class.

Estimating this potential cost is a classic actuarial problem, with few practical historical guidelines to assess likely results. Conventional wisdom suggests that if everyone elects the coverage there is no antiselection. If not all elect, the potential cost is not proportional to the number that elect, since it is assumed that those in poorest health are most likely to elect. This is particularly true because the cost of the additional coverage is largely deferred.

The traditional method of estimating the impact of this antiselection is to define three or four levels of mortality to represent the continuum of mortality characteristics of a group of insured lives not recently underwritten. These represent the range from those insureds experiencing better than select mortality to those with terminal illness. Various election assumptions within these mortality levels are possible; the most conservative is that those with the highest mortality always will elect.

The most critical factor in applying this method is choosing the size and mortality level of each group. Ideally, the mortality level also should vary by issue age and duration, and possibly other factors such as sex, policy origin (original issue or term conversion), original underwriting basis (medical or nonmedical), and so forth. It is questionable whether one ought to pursue much refinement, however, when the mortality level structure itself is not very well defined. We developed our factors on the basis of actuarial judgment and sample underwriting data at selected issue ages for males medically underwritten, as this is the basis for our dividend mortality rates.

Average mortality levels for updated policies, including substandard business, for various acceptance rates were projected in an initial simplified model (see accompanying table). These are not percentages of

Acceptance Rate	Projected Mortality Level
10%	201%
25	156
50	124
75	108

standard mortality. They relate to the total company aggregate mortality, including substandard and uninsurable lives, that would be experienced without update. Lower levels of antiselection are expected for higher levels of acceptance, and this is substantiated by the table.

These results suggest that an election (or acceptance) rate of 50 percent or more is highly desirable. Lower antiselection mortality charges mean a more attractive offer, and, presumably, the more attractive the offer, the greater the acceptance rate. Obviously the converse is also true, hence the 50 percent minimum target. Reinsurance of this risk, if available, would ensure attractive offers and continued competitive position.

The mortality antiselection of course applies only to the additional coverage provided. The antiselection cost could vary by plan, issue age, duration, amount of increase, and so on. We found that the variation by age in the unit costs was substantial. For example, the cost at age 55 was

ten times that at age 35 for any acceptance level. The antiselection cost is very sensitive to changes in the mortality stratification assumptions, particularly at the higher attained ages. It may be current and temporary or it may be deferred and long term. The mortality characteristics of those accepting are critical. Therefore, we decided to build it into the dividends as a mortality surcharge. Practical considerations dictated a simple recognition of this factor. In our initial illustration given to the policyowners with the offer, we used a constant percentage of the dividend mortality rate that graded off over a period of years. We intend to conduct follow-up studies of the mortality experience for this block of business. (We may report on our results in a future paper.) Any changes in the mortality experience of this block will be reflected in future dividends as the actual experience emerges, just as is done for any other factor. Thus the update block will be self-supporting.

The estimate of antiselection described above is based on many assumptions with substantial risk of error. We thought it prudent to buy reinsurance to cover any potential antiselection above that anticipated, since the actual distribution of those electing may exhibit poorer mortality experience than that expected. Such reinsurance may be particularly desirable for cost-competitive companies that wish to protect their positions in the industry.

2. FEMALE RISKS

Females may require special treatment, depending on the company practice. If an age setback is used, quite likely no further adjustment or refinement is required. The dividends automatically will apply to the increased coverage. If female mortality differentials are reflected in reduced premiums or a female credit, as in our company, additional adjustments may be required. After some study, it was decided to reflect the lower female mortality on the additional coverage by increasing the dividend by a female credit equal to a percentage of the gross premium female credit for the particular plan and series times the additional coverage. The percentage used is less than 100 percent because there is no savings of per-premium expenses. There are many factors to consider that may vary from company to company. Again, an overriding practical constraint is that any adjustment must be relatively simple and fair, since the entire in-force may be involved.

3. LARGE RISKS

What about those few lives with significantly large amounts of insurance in force? Is there not a greater concern about their relative impact on the antiselection costs? The large number of lives involved provides

no protection. In fact, one life could have a dramatic impact on the mortality cost of the update. Should a simple inquiry be made as to current health, to avoid the deathbed cases?

Should the increase in coverage offered be limited to a maximum amount? Should there be a maximum that could be exceeded if minimal underwriting evidence were provided? What about reinsurance—are the extra risks automatically covered? Should the reinsurance limits be increased? What about discrimination?—can a limit be imposed? What about the adverse publicity that may result if one large claim is paid? Are there other practical considerations?

Our initial reaction was to make a “conditional” offer to those policy-owners qualifying for very large increases in coverage. The underwriting would be on a pass/fail basis designed to eliminate only those whose health had deteriorated very seriously. However, after further study and recognition of several difficult practical problems, we decided that since this group of lives had exhibited better than average mortality, acceptance of these risks without special treatment, although undesirable, was less burdensome than any practical alternative.

4. CLASSIFIED OR SUBSTANDARD ISSUES

The update method we chose, and the fact that our substandard extra premiums are nonparticipating, made the handling of substandard policies especially challenging. Before considering alternatives, we faced the more basic question: should these policies be included in the program? We concluded that they should be, if a practical way could be found to do so, since these policyowners are entitled to benefit from the increased coverage and greater tax efficiencies along with holders of standard policies.

Many alternatives are available. We used three criteria to judge them: (1) the method must be as equitable as is practical, (2) the method must be administratively simple, and (3) the business must be self-supporting. A separate charge to cover the marginal substandard costs of the additional coverage is required, since the dividend charges cover only standard mortality. A quick review of the range of the extra premiums for the span of classes and issue ages likely will eliminate any thoughts of a simple average constant percentage adjustment as being appropriate. The following alternatives for assessing this charge will provide some idea of the range of ideas we considered. This is not meant to be an exhaustive list.

a) Charge an Attained-Age Extra Premium for Additional Coverage

This alternative appears to be very fair, since it assesses the same cost as for a new purchase. Some might suggest that the premium should be reduced

to reflect the fact that only the mortality costs should be assessed, not the loading for expenses and so forth. Others might question the appropriateness of assuming the same premium class as originally issued. One must also consider changes in experience since underwriting, whether the premium structure should be the original or the current one, and the administrative and systems problems created by adding an attained-age premium.

This alternative reminds the insured that he is classified, which may lead to many requests for reconsideration—an additional cost. It also may aggravate the old-time policyowner who has not died and “knew” he never should have been classified in the first place.

An extra premium would be in contradiction to our offer form, which states: “for no increase in gross premium. . . .” This creates additional work and may lead to errors. It also raises the question of agent compensation on the premium. Should it be paid? To whom? At what rate?

b) Increase Dividend Mortality Rate by the Mortality Multiple of the Class Extra

This approach seems most attractive at first blush. It is easy, involves no increase in premium and thereby avoids all the related issues this creates, eliminates questions about agent compensation, and so on. However, it is very difficult to determine the percentage. Is it one rate, or many rates varying by policy series, attained age, or other factors? Should it be based on current experience, or on the original assumptions?

The biggest stumbling block, however, is that the charge may exceed the dividend for the higher classifications. Determining the period for the extra charge would be a problem. If the class extra premium period is less than the basic policy premium period, the charge during the former period should be increased to cover the cost during the latter period. This charge should vary by duration at time of update—a complicating factor that cannot easily be overlooked. If the class extra premium period has expired, it may be very difficult to assess a charge for the coverage. The treatment of flat extras is another consideration. In any case, there are a number of practical constraints to consider.

c) Reduce Additional Coverage Offered, to Reflect the Substandard Extra Charge

This alternative may be particularly attractive to a company that varies the benefits on the basic policy for substandard insureds. It issues the (reduced) amount of coverage that the standard premium will buy on the appropriate substandard basis. Some companies also offer paid-up additions on a substandard basis.

Either the face amount of the policy or the extra paid-up additions, if any, may be reduced. The major difficulty with this alternative is that in some cases the new coverage may be less than the original face amount. It is also quite complex and challenging from an administrative viewpoint unless the system is already in place.

d) Increase Dividend Mortality Charge by an Attained-Age Class Extra Premium Based on Original Class and Pricing Basis

This alternative has all the advantages of alternative *a*, in that it is fair and reasonable, while it minimizes the disadvantages associated with assessing an extra premium. For many companies it probably is easier to add another dividend expense charge than add to an attained-age premium. The dividend explanation in the offer form should be expanded to disclose the fact that the extra cost is reflected in the dividend.

Practical considerations include determining the maximum charge, the number of classes to recognize, and the "premium-paying" period for the extra mortality charge; handling flat and class extra premiums; and minimizing administrative problems.

For us this alternative was the most effective in meeting the basic criteria. We fitted a formula to the major plans and decennial issue ages for each policy series.

Combinations of the above alternatives are also possible, such as a single-premium charge to cover the current reserve required on an original-age basis and subsequent annual charges (either extra premium or increased dividend expense charges) equal to original-age class extra premium, and many more.

5. OTHER MORTALITY FACTORS

Preferred risk, nonsmoker, and other risk structures also require special handling. Since we believe that considerations and alternatives similar to those already discussed for substandard insurance apply to these categories, they are not repeated here.

C. Administrative and Systems Considerations

In planning our update project, we soon realized that it would be impossible to mail offers, process acceptances, and provide adequate service for the 1½ million eligible policyowners without spreading the project over a one-year period of time. Therefore, we needed to find a fair and nondiscriminatory selection basis for distributing the mailings to policyowners over a full year. We considered alphabetical selection, policy anniversary selection, birth date selection, and other bases. Since we wanted to mail all policies insuring a given individual at the same time, we felt that a selection related to the insured would provide the best basis and also be fair to all. We chose a basis related to the insured's birth date.

In reaching this decision, we realized that some eligible policyowners would die before receiving an update offer. Accordingly, we considered the possibility of providing the higher death benefit for those who would

die after we had initiated the program but before receiving the offer. Specifically, we examined the possibility of providing all eligible policyowners with increased coverage beginning on the date of the program's initiation and ending on the deadline of their individual offers. Of course, if they accepted the offer, the coverage would continue thereafter, since we already had concluded that we must make the additional coverage effective as soon as the policyowner accepted the offer.

Upon further examination of this "immediate coverage" proposal, however, we identified some legal concerns connected with it. In order to provide the increased coverage for all persons who would die before having the opportunity to accept our offer, we would have to use a substantial amount of surplus (we estimated several million dollars) to pay the increased mortality cost. There would be no offsetting tax savings or reserve adjustments. Although management certainly has substantial discretion in the distribution of surplus, legal concerns were raised as to the company's authority to use large amounts of surplus in this manner.

In the sections below, we briefly examine other administrative and systems aspects of the development of an update program.

1. DATA PROCESSING SYSTEMS

The following systems are involved in the update program:

Policy record: Whatever method, system, or approach the company uses to record basic policy data must be revised to accommodate and reflect the changed reserve interest rate and other policy benefit changes.

Operating systems: The company's basic systems for billing, claims, valuation, and other functions must be modified to recognize the changed policy record.

Values system: Our company handles basic policy values such as cash values, reserves, and dividends by means of a special "rates routine." This system had to be modified in order to calculate cash values and dividends for updated policies.

Selection and offer system: A special subsystem is needed to select policies and prepare individual letters and offers for each policyowner. This system will calculate current and future values with and without the change to illustrate the impact of the change for the policyowner.

Acceptance system: A subsystem is needed to process policyowner acceptance forms, so that policy records can be updated to reflect the change, and so that amendment forms can be sent out to the policyowner.

2. ADMINISTRATIVE SUPPORT

Communicating the update offer to a large number of policyowners will lead to many policyowner questions, not only on this offer but also on other aspects of their policies. We therefore decided that a toll-free

number should be made available to policyowners who receive the offer. This also requires a sizable staff of correspondents. In addition, people are needed to check and input the acceptance forms and to handle any special requests and problems that develop throughout the year. We set up a special division in our policyowner services department to handle all these functions.

The various decisions on administrative and computer systems were influenced favorably by the key objective of simplicity. The very nature of our approach, both actuarially and contractually, contributed substantially to a relatively straightforward systems and administrative design. Of course, a particular company's own systems approach will depend upon its update methods and its existing data processing systems.

D. Policyowner Communications

The success of a bilateral amendment program such as our Project Update depends substantially on the nature of the communication to policyowners. In designing our communications, we had to balance two somewhat divergent objectives or viewpoints. On the one hand, the legal view was that we should write a virtual "prospectus" detailing the nature of the amendment offer. At the other extreme, the public relations view was to emphasize simplicity to the point of saying, "Dear Policyowner—Do this; it is very advantageous for you."

We feel that the communication to the policyowner involves essentially two key elements. First, there is an explanatory cover letter to the policyowner. This must be short, simple, and direct. It must tell what is being offered to the policyowner and generally must explain why. This letter must be designed to encourage policyowner readership and give credibility to the offer.

The second key element is the individual policy illustration. This must present sufficient comparisons of basic policy values to allow the policyowner to make a decision. More complete data should be available on request. It also would be valuable if the proposal included a cost measurement device that would define clearly the value of the update for each specific situation. Unfortunately, we were unable to develop one. There may not be any. There are measures which, with suitable explanation in a one-on-one situation, would be helpful, but they are too complicated for general use and unaided understanding. Consequently, we concluded that the best approach was a simple ledger format comparing a limited number of amended and unamended policy values at selected future durations.

E. Agent Involvement and Compensation

The first and natural reaction of the agent to an update project is negative. He sees service. He sees a loss of future sales due to increased coverage. He sees time taken away from prospecting for new sales. He sees his insurance company writing business directly. He concludes that if the company is going to do this, it had better pay him something for it.

The compensation issue clearly is a critical one. The final result will depend to a great extent on the nature of the company and its field force, the nature of its policyowners, and the approach used to reflect the change in reserve interest rate. Reflecting our mutual company approach to minimizing policyowner costs, we felt that there was no basis for compensation. In particular, there was no increase in premium to fund compensation, and the tax savings were being allocated directly to policyowner values through dividends.

We saw another critical issue with respect to compensation. Paying agents for their activities with respect to this amendment offer would encourage undue involvement with update changes for their policyowners. This would take them away from their prime activity of developing new clients and making sales to both new and old clients, with a dramatic and long-term impact on the company as a whole as well as on the agent.

We decided that the best approach was to minimize the agent's involvement in every way possible. This included, for example, the direct-mail approach for making the offer to the policyowner, and the toll-free telephone number.

We found that, upon reflection, most agents completely reversed their initial position. They began to see a substantial opportunity for indirect compensation through this program. There is an opportunity for them to see their clients with "good news." Policyowners might actually be coming to the agent asking him to help them with a review of their entire insurance program as an aid to making a decision about the offer.

We realized that the update provided the company with a tremendous marketing and advertising opportunity, and we built an entire advertising program around it. We also provided "compensation" for our agency force by developing marketing support materials. These materials informed the agents about offer data and indicated when the offers would be received by their policyowners. We described how to answer expected questions and how to provide the reassurance that most policyowners wanted. We also helped them to be prepared to make sales where the need for new coverage was obvious. As a result, our field force strongly

supports the company's decision to make this Project Update offer to its policyowners.

F. Other Considerations

Many other items must be considered before a company embarks on a project to increase reserve interest rates for in-force policies. We have identified three such considerations below; there are no doubt many others.

1. SPECIAL PLANS

How does the method of reflecting the change in reserve interest rate apply, for example, to economic or retirement income plans, or to plans with graded premiums or death benefits? These plans might present unique actuarial and contractual questions.

2. OTHER CONTRACTUAL BENEFITS AND RIDERS

What impact, if any, should the policy change have on term insurance riders (or family income riders), accidental death benefit riders (double indemnity or triple indemnity), additional purchase benefit (guaranteed insurability), and similar features? Depending upon the design and definition of these benefits, a change in the basic benefits of the policy could create some real problems. In general, we felt it best not to change these benefits. Original amounts and provisions remain unaffected. In making these decisions, each company will, of course, have to review its specific benefits and riders in light of its approach.

3. TERMINATION DIVIDENDS

While we currently do not pay termination dividends on our policies, we suspect that a change in reserve basis, face amount, and cash value could have an impact on a company's termination dividend practices. This should be given careful consideration.

G. Market Testing

We cannot overstate the importance of market testing with a project as large in concept as a policy update. This testing can provide answers to several questions.

1. Is it possible to communicate the concept of the reserve basis change and the associated changes in policy benefits and values?
2. How can that communication be done most effectively?
3. How frequently will questions from policyowners be received in the home office and in the field?
4. What specific questions will be raised by policyowners, and how can the frequency and variety of these questions be minimized by the original communications?
5. What are the home office staff requirements to support the program?

6. Will acceptance be sufficient to justify the monumental effort involved and to keep antiselection costs down?
7. What will be the impact on policyowner attitudes about the offer, the company, and the agent?
8. Can agent involvement be minimized and/or properly channeled to maximize the positive impact on "normal" sales activity?

We utilized three different types of testing during development of our program.

1. *"Focus groups."*—These are small groups of six to ten policyowners gathered together in a discussion setting. Concepts and details are explained to them and their impressions recorded on videotape. The results are valuable in estimating policyowner understanding and company credibility. However, these results are only impressionistic in nature and cannot be projected in any statistical way. They are very valuable for initially drafting communications and illustrations to policyowners.

2. *Questionnaires.*—We developed individual policy materials based on our earlier focus group testing and sent these to a sample of policyowners along with a questionnaire and cover letter. Essentially, the approach was, "What would you do if you were to receive an offer like this in the mail?" Specific questions can be asked in the questionnaire, and the results can be projected to estimate total company figures.

3. *Actual market tests.*—This testing takes place at an advanced stage of development when the company is virtually committed to going ahead with the project. On the basis of the results of earlier testing, virtually final forms of communications are developed and selected policyowners are sent actual offers to amend. The purpose of the market test is to complete projections of staff needs and overall acceptance rates, as well as to determine the degree of agent involvement. After the offer period, follow-up telephone surveys of the sample policyowners can be conducted to get specific reactions from them and find out why they decided to accept or reject the offer. Offer materials may be modified accordingly. Specific types of policyowner questions can be anticipated and answers prepared as a result of this testing. We also found that the results of a follow-up telephone survey, which was conducted by an outside consultant, were valuable in demonstrating to state insurance departments policyowner understanding of and reaction to the program. Of course, actual market tests must be conducted in states where the program already has received approval.

As noted above, the focus-group and questionnaire testing was extremely valuable in developing our final communication and illustration package for policyowners, and in designing our home office support system. The most interesting results came from our actual market test. Some are listed below:

1. We found that approximately 92 percent of the policyowners in our sample recalled receiving our offer. Of these, about 87 percent (or 80 percent of the

- total sample) actually read the material. This was a very good result considering the general inclination to discard anything but essential mail in this age of direct-mail advertising.
2. We found that about 84 percent of those who read the offer believed the information presented to be clear and understandable—another very positive result.
 3. We found that about 22 percent of the sample sought additional information from their agents, 4 percent from their local agencies, and 6 percent from our toll-free number. (Our agents were happy to find out from this survey that most of those who called them would be policyowners with whom they were familiar or with whom they would like to become acquainted.)
 4. We found the majority of contacts beyond the original mailing to be policyowners looking for reassurance that the change was indeed in their best interests.
 5. We found that about 70 percent of those who read our offer material accepted it. In terms of the total sample, the overall acceptance rate was about 57 percent. The acceptance rate was substantially higher among those people who took the time to seek additional information from one of the three sources listed in item 3 above.
 6. Reasons for rejecting the offer included, primarily, a feeling that the individual had no need for increased coverage, or just procrastination so that no action was taken within the deadline period we had set.
 7. Finally, we found the overall effect of the update offer on the general attitudes and long-term intentions of policyowners with respect to our company to be highly positive.

VI. SUMMARY

Inflationary pressures have created many problems and opportunities for the life insurance industry. In this paper, one specific problem is discussed—what should be done for existing policyowners after the introduction of new issues with improved value. Although the paper is limited to an action a mutual company might take, the basic concepts presented may apply to a stock company as well.

With the increasing pace of change, there may be a continuing need to find a way—beyond dividends—to keep existing policyowner values up to date. The concepts developed in this paper may need to be applied repeatedly in the future to preserve the value of existing coverage.

We welcome discussions from all points of view. We would recommend your careful consideration of an update-like program in light of your company's in-force business. Update may not be appropriate for every company, but each should consider the concept and make a conscious decision about it.

DISCUSSION OF PRECEDING PAPER

SIDNEY A. LE BLANC:

I congratulate Messrs. Dyer, Murphy, and Reiskytl on their fine paper and their program to update existing policies. This is the type of achievement we expect from a quality company like Northwestern.

Pan-American Life instituted an "update" program somewhat similar to method 4 of this paper on June 30, 1980, and I feel that our experience may be a useful addition to this literature.

The paper describes the major impact on the phase 1 tax base. If this endorsement is considered a reissue and there is no ten-year spread of the reserve change, the phase 1 tax savings accrue in the year of the change. If it is not a reissue and therefore is considered a reserve weakening, there is a ten-year spread of the reserve change and the phase 1 effect begins in the subsequent year.

Although we are phase 1 taxpayers, I would like to comment on the effects on taxable gain. One effect is the ten-year spread of reserve weakening, if this is the tax answer obtained. If the block of business being updated is large enough, a shift in phase normally would result, with additional tax savings in the year of the update for phase 1 companies.

Other effects on taxable gain include the additional payments for death benefits and cash values and the increases in reserves in anticipation of these increased benefits. Any dividend change would affect companies taxed on phase 2 positive. It is rather difficult to generalize the year-by-year effect of all these items on any given company.

Since the tax savings are an important consideration in this project, I should comment on the future of these savings. I expect there will be changes in the 1959 tax act in the near future. The IRS likely will attack modified coinsurance through legislation. The ACLI has obtained a somewhat fragile alliance among the various segments of the industry in order to obtain a compromise proposal and likely will propose corresponding changes to the tax law during 1981. It is unclear what the outcome will be. These changes may make update programs less desirable as compared with other alternatives.

Pan-American's endorsement was similar to method 4 in that the cash value released as a result of the increased interest rate was used to purchase additional insurance at no increase in premium. The specific formula for the increase in amount of insurance, which we defined as K ,

was the cash value for the policy at $2\frac{1}{2}$ percent minus the cash value for the policy at $3\frac{1}{2}$ percent, divided by the $3\frac{1}{2}$ percent full-paid cash value.

The major difference between our program and Northwestern Mutual's was that ours was on an implied-consent basis. No additional paperwork was required on the part of the insured. He received the benefit automatically and did not have to take positive action to accept the change as in Northwestern Mutual's case. This procedure was followed because our endorsement did not affect the policyowner adversely in any area. The paper suggests that reducing cash values by increasing the interest rate would not be possible without the insured's approval. However, since the effect of our change was that the new cash value was always at least equal to the old, the insured never was affected adversely and his approval was unnecessary. We made certain that the cash values always would be the same or greater by calculating K for every future duration and giving the insured the largest K generated. Since our block of policyowners excluded recent issues, this additional step had little effect. We also have continued the same dividend scale. Although there was some discussion with a couple of states about this point, no state ultimately required that we receive a positive approval from the insureds. However, if any policyholder rejected the endorsement, we honored that request.

The paper points out some of the advantages of a unilateral approach. These advantages are achieved by our approach as well. In addition, I would include (1) insuring virtually 100 percent approval, (2) avoiding the necessity of extensive market testing, and (3) avoiding the problems described in the paper's section on nonforfeiture values and valuation standards, since our endorsement was a policy change rather than a reissue.

Since our change was not considered a reissue, there are some possible adverse effects involving restrictions of options. For instance, the valuation and nonforfeiture laws seem to allow a company, without reissue, (1) to go to 4 percent interest; (2) to use premium-paying as well as paid-up reserves, as Northwestern Mutual did; and possibly (3) to use different net premiums, as indicated in alternatives 1, 6, and 7. However, the valuation and nonforfeiture laws are not clear on these matters, and in a filing in fifty states it is likely that some states would raise these issues. A more conservative approach without the insured's approval is to use $3\frac{1}{2}$ percent interest, paid-up reserves on the increase, and $3\frac{1}{2}$ percent net premiums.

We hope this move will mitigate the severe lapse and replacement problem that the industry faces. We expect this motivation to lead other companies to similar programs.

WILLIAM L. ROACH:

Many of the reasons for updating existing life insurance policies involve considerations of equity between new and existing policyholders. I am inherently suspicious of arguments based on equity, which is, at best, a very nebulous concept. All kinds of abuses of the insurance mechanism have been justified in the name of equity. I am more confident of the authors' arguments based on market incentives:

1. "Practical pressures [for acknowledging tax differentials] also may come into play. Failure to reflect these emerging changes will lead consumers to replace existing policies and purchase from companies that do reflect them."
2. "Some policyowners could resolve the problem by dropping their existing coverage and buying new coverage. Select mortality and tax savings may offset the initial acquisition costs, especially for higher attained ages, say over age 45. Such action would add to the problem, however, since only the healthy lives could do this."
3. "Finally, we believe that update may be appropriate for nonparticipating insurance also. . . . These reasons are tied to the need to minimize replacements (including replacement by the company's own new policies). Improving existing benefit structures to current levels may encourage persistency, and that, coupled with the tax savings, may improve the profitability of existing blocks of business."
4. "The update provided the company with a tremendous marketing and advertising opportunity, and we built an entire advertising campaign around it."

Self-interest also played an important role in the selection of the method used to update the existing life insurance contracts and the program for implementation of that method.

The agent involvement in the update program was based, in part, on the following considerations:

1. "They [the agents] began to see a substantial opportunity for indirect compensation through this program. There is an opportunity for them to see their clients with 'good news.' Policyowners might actually be coming to the agent asking him to help them with a review of their entire insurance program as an aid to making a decision about the offer."
2. "We also provided 'compensation' for our agency force by developing marketing support materials."
3. "We also helped them [the agents] to be prepared to make sales where the need for new coverage was obvious."

The selfish motives for an update program seem extremely compelling. The authors' equity arguments only distract from these more relevant insights: "Every individual endeavors to employ his capital so that its

produce may be of greatest value. He generally neither intends to promote the public interest nor knows how much he is promoting it. He intends only his own security and his own gain. And he is led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it."¹ The free-market incentives for updating existing life insurance policies and the presence of the "invisible hand" are the best arguments that equity is being promoted.

MILTON L. BROWN:

This paper is a welcome addition to actuarial literature. The mathematical formula presented in Section II is essentially that presented by August C. Chow in *The Actuary* of March, 1976. In his discussion, Chow refers to the article by John C. Fraser in *The Actuary* of November, 1972. Certain of Chow's and Fraser's relationships can be developed mathematically as applicable to the present paper.

The after-tax interest rate does have a maximum, which occurs when the before-tax interest rate is around 13 percent, a relevant figure given today's high interest rates. The authors' equation relating the before-tax interest rate i^{BT} and the after-tax interest rate i^{AT} is

$$i^{AT} = i^{BT} - 0.46[i^{BT} - i^{BT}(1 + 10r - 10i^{BT})/1.1],$$

which becomes

$$i^{AT} = \frac{4.6}{1.1} i^{BT} \left[\frac{1.054}{4.6} + r - i^{BT} \right]. \quad (1)$$

The partial derivatives with respect to i^{BT} are as follows:

$$\frac{\partial i^{AT}}{\partial i^{BT}} = \frac{4.6}{1.1} \left[\frac{1.054}{4.6} + r - 2i^{BT} \right] \quad (2)$$

and

$$\frac{\partial^2 i^{AT}}{\partial (i^{BT})^2} = \frac{-9.2}{1.1} < 0. \quad (3)$$

Equation (3) shows that expression (1) has a maximum value, which is attained when $\partial i^{AT}/\partial i^{BT} = 0$, so that

$$\begin{aligned} i_*^{BT} &= \frac{r}{2} + \frac{1.054}{9.2} \\ &\approx \frac{r}{2} + 0.11457. \end{aligned}$$

¹ Adam Smith, *The Wealth of Nations* (1776).

This value of i_{*}^{BT} produces the maximum value for i^{AT} , which is given by the following equations on substituting in equation (1):

$$\begin{aligned} i_{\max}^{AT} &= \frac{4.6}{1.1} \left(r + \frac{1.054}{9.2} \right) \left(\frac{1.054}{4.6} + r - \frac{r}{2} - \frac{1.054}{9.2} \right) \\ &= \frac{4.6}{4.4} \left(r + \frac{1.054}{4.6} \right)^2. \end{aligned} \quad (4)$$

Table 1 shows values of i_{\max}^{AT} and i_{*}^{BT} corresponding to various values of r . If the reserve interest rate is 4 percent, then a before-tax interest rate larger than 13.46 percent actually will produce less after-tax interest income. For example, if r is 4 percent and i^{BT} is 15 percent, then i^{AT} is 7.47 percent, as opposed to a maximum of 7.57 percent.

It is also true that increases in the before-tax interest rate have a diminishing impact on the after-tax rate, as is shown in Table 2. Increasing the before-tax interest rate from 7 percent to 8 percent adds 0.50 percent to the after-tax interest rate, but increasing the before-tax interest rate from 10 percent to 11 percent adds only 0.25 percent to the after-tax interest rate, when the reserve interest rate is 4 percent.

Expression (4) above, relating the maximum after-tax interest rate to the reserve interest rate, is an increasing function of r . As such, it shows that the higher reserve interest rates produce higher maximum

TABLE 1

Reserve Interest Rate r	Maximum After-Tax Rate i_{\max}^{AT}	Corresponding Before-Tax Rate i_{*}^{BT}
2%.....	6.49%	12.46%
3.....	7.02	12.96
4.....	7.57	13.46
5.....	8.15	13.96

TABLE 2

Reserve Interest Rate r	Before-Tax Rate i^{BT}	After-Tax Rate i^{AT}
4%.....	7%	5.83%
4.....	8	6.33
4.....	10	7.07
4.....	11	7.32

TABLE 3

Reserve Interest Rate r	Before-Tax Rate i^{BT}	After-Tax Rate i^{AT}
6%.....	7%	6.41%
6.....	8	7.00
6.....	10	7.91
6.....	11	8.24

possible after-tax yields. If r is $4\frac{1}{2}$ percent, the maximum i^{AT} is 7.86 percent (with $i_*^{BT} = 13.71$ percent), and if r is $5\frac{1}{2}$ percent, then the maximum i^{AT} is 8.44 percent (with $i_*^{BT} = 14.21$ percent). These are the theoretical maximums under the 1976 NAIC amendments to the standard valuation law for the "simplified company" described in the paper.

It is good to use the highest possible reserve interest rate, since this will provide larger marginal increases in the after-tax interest rate as the before-tax interest rates become progressively higher, as in the current economy. This may be seen by comparing Table 3 with Table 2. When the reserve interest rate is 6 percent, increasing the before-tax interest rate from 7 percent to 8 percent adds 0.59 percent to the after-tax interest rate, but increasing the before-tax interest rate from 10 percent to 11 percent adds only 0.33 percent to the after-tax interest rate. This increase of 0.33 compared with the increase of 0.25 obtained from Table 2 shows that the marginal increase is significantly greater for the higher before-tax interest rates when a higher reserve interest rate is used. This is another answer to the question "Why update?" and another reason for the authors' method of basing the update amount on the interest rate in the reserves.

DINKAR D. KOPPIKAR:

The authors will be interested to know that this discussant made exactly the same kind of proposal in 1973, while working for a similar mutual insurance company. However, the proposal met with a chilly response, and, while its merits were recognized, objections to its immediate consideration were raised on so-called practical grounds such as possible problems with the IRS and state insurance departments, possible policyholder misunderstanding (skepticism about getting something for nothing), coolness of the agency force toward the concept, and the expense of carrying out the program. When I approached several other companies, the response was similar.

I am glad that Northwestern Mutual was able to find satisfactory

answers to several of these questions, but I would like to point out that the efficacy of this and similar programs could be maximized by using the measures suggested below.

1. *Premium Reduction*

As long as the current earnings rate as defined in the federal income tax law is above, but near, the 5 percent level, the "project update" type of approach alone is valuable because of the nature of the Menge formula. However, as the interest rate approaches the double-digit level, the tax savings generated by updating reach a plateau because of the nature of the Menge formula, and because of the limitation on the valuation interest rate (which can be increased, but only with a considerable time lag).

One way to solve this problem would be to reroute higher interest earnings by charging a lower gross premium (or by increasing insurance benefits at the beginning of the policy year), while reserving the right to charge the actual gross premium specified in the policy—instead of paying dividends at the end of the policy year. This is the approach taken recently by many nonparticipating companies in their flexible premium policies, for which the actual premium charged is lower than the premium specified in the policy and is dependent mainly on investment earnings experience.

In fact, there is no reason why life insurance surplus distribution should not be channeled mainly through premium reductions (or increased permanent or term insurance), determined at the beginning of each year. While in theory the mutual company surplus is determined at the end of each year and distributed on policy anniversaries in the following year, in practice the surplus can be projected at the beginning of each year with a high degree of predictability.

This approach would have several advantages. For example, while there is a limitation on the amount of tax-deductible dividends, there is no limit on the amount of reduction in premiums. A second advantage is that the Menge formula creates an artificial incentive to keep the current earnings rate down, whereas, if a company has sizable tax-qualified reserves, maximizing the current earnings rate is advantageous.

2. *Policy Loans*

A permanent solution is needed for the problems posed by policy loans. If a policyholder pays 5, 6, or even 8 percent interest, he has no incentive under current conditions to repay the loan. In these circumstances his net insurance benefit is the face amount less the amount of the policy loan; his net annual payment is the premium plus interest on the loan;

and his net surrender benefit is the cash value minus the loan. He could be offered a new policy based on a new premium equal to the old premium plus interest on the policy loan, and an initial reserve equal to the existing reserve minus the policy loan. In most cases the new face amount would wipe out the policy loan.

This approach has several advantages. If a company has a large proportion of assets in the form of policy loans, both assets and liabilities will reduce by the amount of policy loans plus the interest due and unpaid on policy loans. Investment income will be reduced by interest on policy loans, and premium income will be increased by a like amount. But the reduction in investment income will be proportionately less than the reduction in book assets. As a result, the current earnings rate will increase. If a company has large tax-qualified reserves, the increase in the proportion of nontaxable policyholder's share of investment income would be quite startling.

If the approach to the distribution of surplus suggested under "Premium Reduction" above were taken, the nonpension policyholders—particularly nonborrowers—also would receive a higher amount of surplus. Borrowers' gross payments would not increase, but their net payments would decrease, assuming the existing dividend structure charges them an equitable share of expenses.

After policy loans have been eliminated in this manner, a cash withdrawal option with a facility to repay could be offered in lieu of policy loans. This would benefit borrowers, nonborrowers, and pension policyholders alike. It would discourage systematic borrowing, but not occasional borrowing, and would encourage repayment.

3. *Policy Anniversary*

The current earnings rate also could be maximized by shifting the policy anniversary to the earliest premium due date in a calendar year. The policy anniversary would be the premium due date in January for all monthly premium policies, the premium due date in January through March for all quarterly premium policies, and the premium due date in January through June for all semiannual premium policies. The policy anniversary date for annual premium policies would not change. No change in the premium-paying habits of policyholders would be required.

This change, combined with the approach advocated under "Premium Reduction," would offer several advantages. First, all deferred premiums would be eliminated from the annual statement and the current earnings rate would be increased, since the IRS requires inclusion of deferred premiums in the asset base.

Second, if surplus distribution is effected mainly through reductions

in premiums, such reductions can be applied to premiums billed in the latter part of the year. This would minimize due and unpaid premiums.

Although dividends are payable throughout the calendar year at the end of each respective policy year (and thus are earned throughout the calendar year), normal company practice is to reserve for the full year's dividends at the beginning of each calendar year. These substantial reserves do not help to maximize the nontaxable investment income deduction. If surplus distribution is achieved through premium reduction and if the policy anniversary is shifted to the first premium due date in the calendar year, there is no need for such reserve, and it can be shifted to policy reserves, producing a nontaxable investment income deduction and increasing the benefits of the update program.

A third advantage of this approach is that it would be possible to offer the benefits of update to all eligible policyholders simultaneously, at the beginning of the calendar year, in the form of increased insurance benefits. The impact on the insuring public could be maximized by a publicity campaign launched at the same time. Letters could be mailed so as to reach policyholders on or before January 1. The policyholders could be given another option (discussed below) to exercise if they did not want increased insurance benefits.

I was surprised at the statement that an insurance company had no authority to use even a small part of its surplus to provide additional death benefits to those who died after the program was initiated but before they received the offer. In the approach suggested here, all policyholders would have the offer in their hands more or less simultaneously. A legal question could arise only for those who died before they might have rejected the offer or for those who died before they received the offer. The letter might stipulate that the increased insurance benefits would be paid to those who died before the deadline stipulated for acceptance or rejection of the offer. In any case, such persons would be a microscopic minority.

A fourth advantage of this approach is that the tax savings would be realized for the calendar year in which the benefits become effective, whereas if the benefits were effective on the respective policy anniversary dates, the tax savings would be postponed for one year.

4. *Communication*

Policyholder understanding could be enhanced by a letter somewhat along the following lines:

When you purchased this policy, the interest rates were low and nobody (including us) thought that they would reach such high levels. Accordingly, we

guaranteed a low interest rate in your policy, which we use to build up your cash values.

Today, your dividends reflect part of the difference between these high interest rates and our low guaranteed rates, but an increasing portion of this difference goes to pay federal income taxes. Strangely, the lower our guarantee to you, the higher the federal income tax. If we increase our guaranteed rate, the federal income tax will be lower and we can use these savings to increase your benefits.

Here is our dilemma. We cannot guarantee the higher rate unless you agree to it. If you agree, your benefits will increase. If you do not agree or neglect to return your signed consent to the proposed amendment, you are indicating your willingness to pay higher income taxes on the earnings of your policy.

If you sign proposed amendment A, you will receive higher insurance benefits, higher cash values, and slightly decreased dividends (because we deduct the higher guaranteed rate from the interest earnings on your policy). We strongly urge you to accept this amendment.

If you sign proposed amendment B, your insurance benefit will remain unchanged, your cash values will increase slightly, and you will receive higher dividends. If you are convinced that you have all the insurance that you need, you should accept this amendment.

But remember, if you accept neither, you are agreeing to pay higher taxes.

Amendment A would offer increased insurance benefits, while amendment B would offer higher dividends with reduced net premium.

5. Changing to a Single Mortality Table

I do not share Northwestern Mutual's concerns about the possible antiselection implications of offering increased insurance benefits en masse. A mutual insurance company is in the business of offering insurance protection to the public, and I believe that such concerns are rather excessive. Moreover, the policyholders could have been shown that the proposed increase in insurance benefits was small in comparison with the increase in the cost of living since they purchased their policies.

Such a line of reasoning would have made it possible to shift all policies issued on older mortality bases to 1958 CSO. This would have provided larger increases in benefits to older policies, which would have seemed more logical to the insuring public.

6. Interest Rate

The benefits could have been maximized by assuming a 4.5 percent valuation interest rate (the maximum permitted by law) and a uniform net premium not much less than the difference between the actual gross premium and the expense charge assumed in the dividend formula.

Since the interest rates earned by Northwestern Mutual were well above 7 percent, there was ample margin for dividends. Interest rates do not yet show signs of declining. Even if it were assumed that the long-term rates might decline by duration, the average unexpired insurance term is shorter for existing policies than for new policies, so it would be more logical to make a conservative interest assumption for new policies than for existing policies. Moreover, conservatism in computing reserves could be assured by a graded interest assumption, such as 4.5 percent for the first twenty years and a lower rate thereafter.

7. Future Updates

With interest rates still rising and mortality rates still declining, future updates might be unavoidable. The approach discussed under "Premium Reduction," which might be called continuous updating, is a possible method.

8. Nonparticipating Companies

Since at least part of the increase in benefits could be financed by savings in taxes, all life insurance companies should update existing business. Moreover, this would be in the interest not only of policyholders but also of stockholders.

In determining the premium for life insurance, the actuary for a nonparticipating company makes minimum and maximum assumptions for each element (mortality, interest, lapses, and so on) and takes a stand somewhere in the middle. Even if these minimum and maximum assumptions are not conveyed to the policyholder, they form an ethical basis of contract between the insurer and the insured. If the elements move within this contemplated minimum and maximum range, the insurer makes a profit or loss. Since the insured has no hand in formulating these assumptions, it is reasonable to assume that they are sufficiently conservative to assure a reasonable profit to the insurer.

However, when the experience with respect to one or more elements moves beyond the range of the original assumptions, the insurer experiences a windfall profit (unless it is eliminated by the movement of other elements in the opposite direction). There is no reason why an insurer should not share it with the insured.

Moreover, by not increasing the benefits of existing policyholders, the insurer encourages replacement activity, which is detrimental to both the insurer and the insured. In other words, the insured loses whether he maintains his original policy or replaces it. This can only tarnish the image of the life insurance industry.

Finally, periodic updating by all companies would not only enhance price competition but also emphasize the importance of regular servicing of existing policyholders, minimize wasteful expenditure in acquiring new business, adjust the life insurance policy to ever increasing inflation, increase the attractiveness of life insurance as a savings medium, and reduce the incentive for deceitful practices in selling insurance.

9. *Agency Relationships*

I was pleased to note that the Northwestern Mutual was able to transform the attitude of its agency force from cool hostility to enthusiastic support. But the description of this process prompts the following question. Who are the real owners of a mutual insurance company? If any action benefits the policyholders—supposedly the owners—should not the attitude of the employees and agents be of secondary importance? Second, is it not a fact that life insurance salesmen represent themselves as insurance advisers, much in the line of physicians, accountants, and lawyers? If so, should they not enthusiastically support an idea that provides an opportunity to bring good news to their policyholders? Is there something missing in the education of salesmen or in the public representation of their function?

10. *Expenses*

An update program should give a company the opportunity to take a fresh look at the way policies are serviced and to identify the wasteful elements. For example, the present practice of receiving premiums and paying dividends is wasteful because it unnecessarily increases the number of transactions. Future evolution should be in the direction of one transaction only (premium payment), the amount of the premium or the amount of the coverage being adjusted as appropriate.

Companies might also consider offering policyholders the option of consolidating several policies into a single contract.

11. *Regulatory Requirements*

Unnecessary regulatory impediments should be eliminated. I suggest that the current valuation interest rate limitation be replaced with a graded limitation under which the valuation (and nonforfeiture) interest rate is left to the discretion of the actuary, who should be required to show that it is consistent with the new-money rate for up to five years from the date of valuation, consistent with the portfolio rate for the next fifteen years, and not greater than some noninflationary rate such as 3 percent thereafter. This could be applied to all existing policies as of

the year-end. For nonforfeiture purposes, the insurer may specify a set of surrender charges decreasing by duration, which could be deducted from emerging reserves on the current valuation basis to determine cash surrender values.

Another reform would be to replace the policy loan provision with a cash withdrawal provision. This would make it unnecessary to revise the policy loan interest ceiling from time to time.

Many of these features are being introduced by a number of life insurance companies, particularly in adjustable life policies. But the need to conform to the regulatory requirements makes these policies unnecessarily complicated.

12. *Inflation-Era Policy*

Several insurers are experimenting with a new form of policy that features interest, risk-charge, and surrender-charge guarantees. The insurer undertakes to adjust premiums and/or insurance coverage and/or cash-value buildup on the basis of its actual experience. I believe that this should be the standard policy for the future. It may offer an option to the policyholder to increase the insurance benefit from time to time consistent with increases in the Consumer Price Index.

(AUTHORS' REVIEW OF DISCUSSION)

THOMAS E. DYER, JAMES J. MURPHY, AND JAMES F. REISKYTL:

We would like to thank Messrs. LeBlanc, Roach, Brown, and Koppikar for their comments and contributions.

Mr. LeBlanc's discussion of Pan-American's update method and some of its advantages is a welcome addition to our paper, since, to our knowledge, his is the only other company that has already implemented an update program. We had hoped to receive some comments from others who are considering such a program.

We would have liked to use a unilateral approach but could not always put the policyholder in a better position with respect to coverage, cash values, *and* dividends. Most companies could provide higher cash values and increased death benefits, but few could also continue the same dividends. The Pan-American approach is unique and will benefit their policyholders.

We would like to reemphasize one of the fundamental differences between Pan-American's unilateral method and our bilateral method. Since Northwestern Mutual's agreement with its policyowners is new and independent, we believe that it is appropriate to view the amendment as a "reissuance" for determining applicable reserve and nonforfeiture

minimums but that the update amendment should not be so viewed for all other purposes. For instance, since our offer is not unilateral, reserves are not being "destrengthened" in the sense contemplated by state laws.

Mr. Roach seems to have equated our objective of providing better value to our existing policyowners with that of equity. That was not our intent. We believe that it would be fair to do nothing for existing policyowners and, to us, equity is "being fair." Presumably, equitable treatment would also lead to better value for everyone, and thus it is also fair to do something. Hence the possible confusion. The practical and market incentives he cites were very important considerations for implementing our update program. Whether they or a sense of trusteeship should be the primary (or only) motivators may not really matter. In either case, the policyowners win!

If taxes were the only consideration, and if they were to continue to be assessed as defined in our paper, it would be desirable for companies to use the highest permissible reserve interest rate, as Mr. Brown has shown. His illustrative examples support our studies and clarify the relationships.

The concept of a maximum after-tax interest rate, discussed by both Mr. Brown and Mr. Koppikar, has been around for some time. We accepted this concept without question until a few years ago. It now appears that the analysis and conclusion are incorrect. Consider the following interpretation.

Under section 802(b) of the Code, "life insurance company taxable income" is the sum of (i) taxable investment income, or if smaller, gain from operations; (ii) 50 percent of any excess of the gain from operations over taxable investment income; and (iii) the amount subtracted from the policyholders surplus account.

Taxable investment income is defined in section 804 to be net capital gains plus the company's share of investment yield, with certain modifications. The company's share of investment yield is obtained by excluding the policyholder's share, which, in turn, is determined by dividing policy and other contract liability requirements by investment yield.

In our example, "policy and other contract liability requirements" is the product of the "adjusted life insurance reserves, multiplied by the adjusted reserves rate" under section 805(a). If the adjusted life insurance reserves are \$0 (because mean reserves are multiplied by 0 percent), the policy and contract liability requirements will be \$0. As a consequence, the policyholder's share of investment yield will be 0 percent and the company's share will be 100 percent.

Once the adjusted reserves are reduced to zero, no further reductions

make any sense. The purpose of the two shares is to divide the investment yield into two parts—a relatively simple concept. Thus it is reasonable to conclude that the policyholder's share cannot be less than 0 percent or the company's share greater than 100 percent. If one wants to contend otherwise, then the development of the full tax base, not just taxable investment income, should be investigated in depth. We think that in the extreme the answer is the same—an earnings rate equal to 10 percent plus the average reserve rate produces the maximum marginal tax rate. This interpretation suggests that the company's marginal tax rate increases to 100 percent as the earnings rate increases, and then drops to the corporate tax rate (currently 46 percent for large taxpayers). Thus, there is no maximum after-tax rate.

While it is helpful to examine the effect of the Menge formula on increasing earnings rates to understand the operation of the 1959 act on a segment of life company income, the knowledge thus gained cannot be automatically translated into company tax rates. These latter rates will depend on a variety of factors.

Taxable investment income affects the deductions permitted for dividends to policyowners for certain nonparticipating contracts and for certain accident and health and group insurance. Careful analysis requires further review of these economic and noneconomic deductions.

Mr. Koppikar obviously has given quite a bit of thought to update-type proposals. We are tempted to comment on each of his suggestions, since we considered most of them previously and are pleased to see that we were not alone in our thinking. However, since that would be almost equivalent to writing another paper, we will limit our comments to two of his twelve suggestions.

Anyone who suggests that he has a permanent solution to the policy loan problem, as Mr. Koppikar does in his second point, has our full attention. Unfortunately, we do not think this suggestion is workable. Most states will not permit the insurer or the policyowner to replace the policy loan provision with a cash withdrawal option even if both parties agree to do so. Even if this hurdle were removed, what incentive would be offered to the borrower to induce him to give up a favorable loan rate and the right to borrow? The nonborrower subsidy of the borrower's dividend (or coverage) would be reduced if the loans were repaid. However, we hold out little hope for the successful implementation of Mr. Koppikar's suggestion, although it eventually may lead to a solution.

As to our "considerable" reservations about possible mortality anti-selection, we took little comfort in the ability of either a formula or inflation to protect the policyowner group, since the offer was on an

optional basis. Perhaps we did not stress this concern enough. If the offer had been on a group or unilateral basis, these factors would have been effective, but they are of limited use in a bilateral situation.

To expand a bit, we believe that the potential cost of mortality anti-selection resulting from an update program offered on an optional basis must be carefully assessed, since this cost will reduce, and could possibly exceed, the tax savings generated. Results will depend on two things. The first is the proportion of acceptances by issue age, policy duration, policy size, and so on, by insureds who are in poorer than average health. This group covers a broad range, from those whose health is slightly worse than average to those who are terminally ill. The second, of course, is the proportion of declinations by those in better than average health.

If the cost of antiselection were significant, dividends would have to be reduced and this would adversely affect the company's competitive position. Competitors surely would enjoy pointing this out to both new prospects for insurance and current policyowners. Field morale would be depressed, since agents not only would have to defend or explain the results but also would have to cope with the "free" coverage (no commissions) provided.

Because of these concerns, we decided to eliminate most of these risks by reinsuring this block of business.

Finally, we are even more convinced now than earlier that external environmental changes will lead to periodic updating by many companies—either through programs such as ours or through replacement with new issues.