

RECORD OF SOCIETY OF ACTUARIES 1980 VOL. 6 NO. 1

PRICING TECHNOLOGIES FOR THE 1980's

*Moderator: ROBERT D. SHAPIRO. Panelists: CLAYTON A. CARDINAL,
PETER F. CHAPMAN, JOSEPH M. FITZGERALD*

1. Are currently used approaches to pricing appropriate for the environment of the 1980's?
 - a. Asset share techniques
 - b. Accepted profit standards (return on investment, discounted future profits, breakeven durations, etc.)
2. Do any alternative pricing methodologies seem to be emerging to a level of practicality and appropriateness?
 - a. Are any of the applications of risk theory gaining in popularity or usage?
 - b. Have any mathematical models emerged as alternatives to the life table model?
 - c. Is pricing on a rate book and/or a policy generation basis gaining in popularity?
 - c. Should overhead be included directly in profit studies?
3. What pricing assumptions beyond interest, mortality, and expenses should be taken into account? How should these basic assumptions be developed and used?
 - a. Are current Society of Actuaries statistics adequate?
 - b. Is future persistency experience predictable?
 - c. What methods seem appropriate for the determination of interest rate assumptions?
 - d. Is there any way to appropriately determine and apply inflation assumptions?
 - e. Will it be common practice to utilize experience trend patterns?
4. What environmental aspects of the 1980's will affect the pricing cycle?
5. What is the anticipated effect of mandatory net cost comparison and disclosure? Will the life insurance consumer pay increasing attention to relative net costs?
6. What will be the actuary's primary pricing problems in an increasingly competitive environment?
 - a. How will single premium and flexible premium annuities be priced in the 1980's?
 - b. Will term insurance be continually rate sensitive?

MR. ROBERT D. SHAPIRO: This unique meeting of the Society of Actuaries has as two of its goals (1) to identify the general direction of our individual life and annuity businesses and (2) to paint a picture of what these businesses will look like in 1990. The three scenarios set forth in the program booklet provide a perspective for our discussion.

Our panel will explore changes in our pricing approaches that are occurring today. We will examine how our methods, assumptions, and standards are likely to change during the decade of the 1980's.

As a simple backdrop for our discussion, consider the following "picture" of the industry as it exists for one illustrative company on April 14, 1980:

1. The individual life line product mix is rapidly shifting to lower premium coverages.
2. The annuity line is growing rapidly, with persistent pressure to provide higher current excess interest credits.
3. There is an emerging cash flow problem as policy loans and replacements of existing business are on the increase.
4. A new portfolio was introduced on January 1, 1980 ... it included, among other features, fewer products, a term/annuity package, nonsmokers' discounts, higher policy fees and minimum size requirements, and increased nonmedical limits.

Our illustrative company would not be unusual if it had a planning subteam dealing with product development and pricing strategies for the 1980's. This subteam could be expected to include marketing, actuarial, and economic expertise. In addition, there may well be other task forces examining:

1. Tax planning
2. Conservation of existing business
3. Competition (industry and other)
4. Government and consumer activities
5. And so on...

Although this illustrative company is the reflection of one actuary's imagination, each of us can surely relate closely to many of the issues inherent in the created image. Ultimately, the strategies adopted to deal with such issues will affect our pricing functions ... and this panel will focus on how today's problems and opportunities will be reflected in tomorrow's products and prices.

As an oversimplified example of how to initially define and attack the uncertainties that we face today, consider the "Pricing Uncertainty Analysis" set forth on the previous page. First, each of the major perceived pricing issues is listed. Then, the impact of each issue on the major pricing factors is evaluated and appropriate pricing methodology and assumptions evolved.

MR. JOSEPH M. FITZGERALD: My part of this afternoon's session will deal with new trends in pricing methodologies. This is an area in which I have a particular interest, having been involved in pricing methodology reviews in both reinsurance and individual insurance operations at Connecticut General. I will deal primarily with stock company methodologies although many of the techniques mentioned could, with appropriate modification, be applied as well to mutual companies. The specific topics I will cover are applications of risk theory alternatives to the life table model, rate book pricing, and treatment of overhead expenses.

In tying this presentation in with our general theme on futurism, I have focused on the high inflation scenario as opposed to the incentive and investment and social democracy alternatives that have also been suggested. The high inflation scenario is my personal guess as to what the business environment of the 1980's will resemble. More importantly, it poses the greatest challenge for the pricing actuary and is, therefore, worthy of our closer examination.

APPLICATIONS OF RISK THEORY

There are two areas of application which seem to be growing in popularity.

The first involves the use of required surplus (or committed capital) in profit studies. In general terms, required surplus is the amount of surplus needed to keep a company statutorily solvent in the event of deteriorating experience. With the exception of the federal income tax calculation, required surplus is treated the same as statutory reserves in Anderson-type profit formulas.

In setting required surplus levels for pricing, the actuary is implicitly making a determination, however subjective, about the risks inherent in the product. This determination can take many forms. At the simplest level, the actuary can develop a formula that reproduces either the current or a target surplus level for in force business. The same formula could be used to determine the required surplus component in the book profit formula used in pricing new business.

A more analytical approach to setting required surplus levels is to determine the surplus required to withstand catastrophic losses of a pre-established magnitude such as the mortality levels experienced in the 1918 influenza epidemic. I am aware of at least one company that has used an approach similar to this.

An approach we adopted several years ago at Connecticut General involves determining statistically, through simulation studies, the amount of surplus needed to provide for adverse claim and investment experience for each of our major lines of business. These targets were then translated into formulas that could be applied at the individual pricing cell level (that is, plan, age and sex). For example, our individual life required surplus formulas are expressed as a percentage of liabilities (investment risk) and a flat dollar amount per \$1,000 net amount at risk (claim risk). We have also used the same formulas to allocate actual surplus on a pro rata basis for the in force block of business to develop return on equity results by line.

We will see increased attention to required surplus requirements if, as it seems inevitable, economic conditions continue to worsen in the early 1980's. Credit losses, decreased investment income because of policy loans, and increased lapses will all serve to strain surplus positions. At the same time, a listless economy will make it harder for insurance companies to raise capital through standard debt or equity offerings. In an environment of scarce capital resources, surplus needs for risk management will compete with new business demands, prompting more research on the part of the actuarial community into optimal required surplus levels.

A second application of risk theory that seems to be gaining in popularity is the use of a variety of experience scenarios to test the potential range

of profits. For example, the actuary will do profit tests on a most likely scenario as well as several optimistic and pessimistic scenarios using variations in interest rates, mortality, expenses, lapse, and federal income tax phases to name just a few variables that could be considered. Undoubtedly, some of the sensitivity analysis we are seeing today is due to the actuary's growing concern about his ability to predict the future through a single point best estimate assumption. But there is also a growing trend to go one step further and use the variation in expected profits under alternative scenarios as an indicator of product risk. That is, the greater the range of expected profits, the greater the risk and, therefore, the greater the reward required by stockholders for underwriting the product.

To give you an example of how this technique might be used, let me briefly describe an approach we just recently adopted at Connecticut General. The profit standards we use for pricing individual insurance products contain an explicit risk charge. Standards are stated in terms of the internal rate of return profit measure and are developed as the sum of two components -- a risk charge and a "risk free" profit return common to all products. The risk charge is developed for broad plan types based on relative risk as measured by the standard deviation of profits using as sample points alternative experience scenarios. For testing purposes, we considered variations in interest, lapse, mortality, and federal income tax phases. The risk charge component of our profit standard is associated with the risk of short term experience fluctuations. As I mentioned earlier, we also established a required surplus target for each of our products. This is intended to cover the risk of long term experience deterioration. Consequently, our pricing methodology makes provision for both short and long term risk.

My sense is that most stock companies today attempt, in one way or another, to reflect risk in setting profit standards. Methods vary widely from the judgmental to more elaborate, statistically based applications. Work in this area is relatively new and undoubtedly there will be further refinement in methodologies in the coming decade.

LIFE TABLE MODEL ALTERNATIVES

Basically, no mathematical models have emerged as alternatives to the life table model. It remains the primary tool for individual product pricing today, and I expect it will continue to be used extensively in the future. There are some new variations to the standard one life or one plan model that are worth noting however. Actuaries today frequently model the aggregate rate book (that is, all plans combined) in addition to individual cell testing. Aggregate rate book models can be used to determine the initial surplus strain, to estimate future surplus contributions, and to calculate profit measures (e.g., internal rate of return) that may not be obtainable at the individual cell level. Also growing in popularity are models which combine in force and new business issues. These models can be used to estimate GAAP and statutory earnings, return on equity, and surplus growth. Aggregate studies are usually completed as part of the introduction of a new portfolio or edition as well as on an annual basis, normally in conjunction with the setting of plans for the next year. We will see more of these aggregate type studies in the future as top management continues to demand a closer tracking of new product pricing to the impact on reported financial results.

In saying that the life table model or its variations remain the primary pricing tools in the industry does not mean that other alternatives have not been suggested. I would refer you to a recent article by Professor William Scheel in the Journal of Risk and Insurance describing an alternative to the life table model. Professor James Hickman, in an article published in ARCH (Actuarial Research Clearing House), has also suggested some interesting alternatives. While these and other models have been put forth, there seems to be no strong movement within the actuarial community to adopt these new approaches. This is due to the general de-emphasis of theoretical research activities in recent years within the life insurance industry because of increasing operational demands. The early 1980's will bring more of the same. Frequent rate book updates to maintain a competitive position and the development of more sophisticated new products (such as Adjustable Life and Retired Lives Reserves to name a few) will continue to push theoretical research projects further down our priority lists.

RATE BOOK PRICING

There seems to be some movement to rate book pricing among stock insurance companies today. Before going into the pro's and con's of this approach, let me first explain the concept. Rate book pricing involves setting individual plan premiums using, as the primary profit criteria, attainment of rate book level goals (e.g., an internal rate of return for the rate book of 15%). Individual cell profit estimates take a secondary position if done at all. Moreover, the measures used at the individual cell level may be different than those used to set the primary profit goals at the rate book level.

Rate book pricing seems to have evolved in response to a growing trend to price to premium targets imposed by the marketplace. With this pricing strategy, rate book pricing is more efficient than individual cell pricing. (Why should the actuary price each product to an individual cell standard when he will revise the premiums to meet competitive needs anyway?) A second and more technical advantage of rate book pricing is the ability to set profit goals at the rate book level using measures that may not be available at the individual cell level. For example, individual cell internal rate of return estimates are often misleading either because of lack of sizable surplus strain in the initial policy year or because of arbitrary allocations of overhead expense and surplus between cells. The obvious drawback to rate book pricing is loss of unit profit integrity at the individual cell level. This in turn creates the potential for adverse shifts in distribution to more thinly priced products, resulting in lower than expected rate book yields.

If the insurance industry becomes more price sensitive in the 1980's, more stock companies will adopt the rate book pricing approach. At the same time, companies using this approach will provide for certain product-level limits or safeguards, for example, establishing a minimum profit return that no plan should fall below no matter what the marketplace price is. To stay on top of distribution shifts, I also expect companies will complete portfolio profitability reviews more frequently (annually or semi-annually) to insure that any internal product shifts have not resulted in overall profit deterioration.

A related issue I would like to address is the concept of supporting current business from the earnings of older blocks. This alternative becomes

particularly attractive when, on the one hand, the actuary is reporting higher than expected profits on inforce business due to excess interest earnings and favorable mortality and, on the other hand, he is falling short of his desired competitive objectives if he maintains his normal pricing standards. As tempting as this trade off may seem, the actuary should realize that he is mortgaging his company's future for today's short term gain. Why? The primary source of capital to support new business within a stock company is retained earnings, that is, earnings after provision for dividends to stockholders. The rate of return on currently written business is, therefore, a natural limit to the future rate of new business growth and dividend payout the company will be able to support without additional capital from outside sources. A 10% yield on current business by definition cannot support a continuing 10% growth rate and a 5% dividend yield on book surplus to stockholders. It is also axiomatic that reduced profits on currently written business cannot be recovered by providing for higher margins on future issues. Marketplace and even more importantly, distribution system elasticity will simply not allow it. Consequently profits, once lost, are lost forever.

There are few, if any, companies knowingly using older business earnings to support marginal pricing on new issues. However, there are some companies unwittingly adopting this practice in trying to keep up with today's competitive market. Without going into detail on how this may occur, I refer you to an excellent article on the subject by Mr. David Carpenter in a recent edition of Best's Life Review.

TREATMENT OF OVERHEAD EXPENSES

The first area I will cover is what I term marginal expense pricing. By this I mean developing rates for one or a series of products or individual policies using direct costs only on the theory that sales of this product or products are truly incremental and that overhead costs have already been accounted for in the pricing of the remaining portfolio. Marginal expense pricing is a more accepted practice today than it was in the past, although most companies restrict its use to very selective situations. A typical example would be a single quote on a large group of individually underwritten, high amount policies for the top executives of a sponsoring corporation. In trying to develop a competitive quote the actuary may be forced to use marginal cost factors on the premise that if he does not he will not be competitive, the case will be lost, and overhead costs will be spread over the remaining portfolio anyway. The logic of this argument breaks down, of course, as exceptions become the rule leading to major blocks of business being priced on a marginal expense basis.

Another trend that seems to be becoming more prevalent is a dynamic approach to setting fixed (overhead) unit cost factors. This involves projecting new sales and expenses for a new plan, series of plans, or an entire rate book and using the projections in setting unit cost factors for use in pricing studies. While this is not classical marginal pricing per se, it can represent a liberalization of unit costs if (as usually seems the case) sales projections are optimistic and expenses are understated. I have even heard of some companies using factors as high as 50% for estimated increases in sales over current levels. If industry sales are only growing at 10% a year, we all cannot be using 50% sales growth projections for developing unit cost factors.

Finally, I would like to describe an innovative approach some companies have experimented with in dealing with overhead expenses. At the individual cell level, profit studies are done on a before overhead basis. Individual cell results are then aggregated to the rate book level. At this point, overhead expenses are deducted and rate book level profit measures are calculated on an after overhead basis. You will note this approach is similar to rate book pricing, although it may differ in terms of emphasis placed on rate book level vs. individual cell level profit objectives compared to the typical rate book pricing approach discussed earlier.

There are several advantages to adopting this approach. One is that the actuary can better analyze profitability by product type on a true "cost of goods" basis by eliminating the artificial allocation of overhead to individual products. Another is that new products or special quotes can be priced without developing special marginal cost factors. The disadvantages of this approach are more of a practical than a theoretical nature. One obvious disadvantage is the inability to relate product level profitability to bottom line rate book profitability. Another is the problem of seemingly excessive profits on individual products -- how can the actuary argue against a meager 5% premium decrease on a product with an internal rate of return of over 20% even if the 20% is before overhead?

It is my understanding that the few companies that have experimented with this new approach are moving back to more traditional after overhead profit studies. If past experience is any indicator of the future, we will see at least one swing in the pendulum between traditional and innovative unit cost methodologies in the 1980's, along with comparable swings in the length of hemlines, the price of gold, and the number of actuarial exams to obtain fellowship.

MR. CLAYTON A. CARDINAL: The life insurance market in the first quarter of this century was dominated by the mutual companies. Mutual companies also dominated the second quarter, but to a lesser extent. Stock companies, as a viable force in the marketplace, came of age in the third quarter.

As one would expect, in the first two quarters of this century actuarial literature on pricing techniques was heavily influenced by the mutual company perspective. Since the often stated primary objective (which is distinct from pricing objectives of adequacy, equity, and so forth) of a mutual company is providing to a reasonably homogenous class of risks insurance protection at the lowest cost possible in that company (through the use of dividends), while accumulating adequate surplus -- a secondary corporate objective -- to insure that the company will remain solvent to fulfill its promises, the early papers on pricing techniques stressed methodologies wherein a fund, such as "asset share," would be accumulated to meet the surplus objective of a company at the end of a specified period. Premiums were to be determined by the use of conservative assumptions, with the difference between the assumptions and the actual experience to be returned as dividends to the policyholders.

An early stock company modification of the mutual company methodology called for using more realistic assumptions. With this modification profit margin specifications took various forms, none of which represented a meaningful improvement over the mutual company's form of surplus target objective.

The first attempt, which received serious attention, to evolve a pricing technique exclusively from a stock company perspective (that is, providing a necessary and meaningful service, insurance protection, at a reasonable and acceptable cost while at the same time meeting the demands of capital) was not advanced until 1959 when Anderson presented his paper (TSA, Vol. XI, p. 357). Whereas the mutual company technique was inappropriate for a stock company because it evolved from a perspective inappropriate to the stock company, Anderson's technique failed, not so much because of its mathematical perspective (that is, defining a "rate of return," which was advanced as a measure of a return on invested capital), but because (i) the application of the methodology based the return on statutory surplus drain, not on equity capital, and (ii) the rate of return itself was void of capital market considerations. The Anderson rate of return was used to discount the statutory book profit stream to equal in value the amount of statutory surplus drain.

In the late 1960's, Mr. Thomas P. Bowles, Jr. (TSA, Vol. XXI, p. 9) suggested that statutory capital and surplus should form the basis for premium pricing. Mr. Bowles' central idea was correct, but like Mr. Anderson, he incorrectly looked to statutory values.

With the development of the application of GAAP to stock life insurance companies in the late 1960's and early 1970's, actuaries began focusing their attention on acquisition expenses. Soon thereafter, Mr. Richard W. Ziock (The Journal of Risk and Insurance, Vol. XL, p. 357) suggested using the acquisition expense, and a rate of return related to it, as a basis for determining premiums. At about the same time, some stock companies began determining their premiums with an explicit provision for the profit margin specified as a percentage of GAAP premiums. It is interesting to note that the essence of the formula for the GAAP pricing technique (Ernst & Ernst GAAP, p. 211) is virtually identical to the Ziock formula, except Mr. Ziock made a provision for the federal income tax expense.

Shortly after Mr. Ziock presented his paper, Mr. Cardinal (Proceedings, 1974-1975 Conference of Actuaries in Public Practice, p. 243) suggested using equity capital, and an aggregate rate of return related to it, as a basis for determining premiums. Equity capital was viewed as being comprised of two elements -- "invested" or "loaned" equity which was to be recovered from the future cash flow of the insurance operation, and "free" equity, that is the difference between the equity capital and "loaned" equity. It was recognized that shareholder equity as measured by GAAP was an inappropriate measure of equity capital. The equity capital approach called for an explicit profit margin expressed as a percentage of premiums which was additionally required, when integrated with a "nominal" rate of return (comparable in value to the return rate on an "asset" type investment or a debt instrument) on equity capital, to give an aggregate rate of return which would satisfy the demands of capital. Although that approach to determining stock insurance company premiums represented an improvement over other approaches, it was still defective. We will now further develop the conceptual basis of that approach for determining stock insurance company premiums.¹

The financial objectives for a stock company at a minimum in most situations should equal at least the average performance for its industry. In theory, financial objectives less than the average for all industries would lead to capital flight, something which should be avoided. For the life

insurance industry, average performance indices indicate that earnings should increase on an aftertax GAAP basis by at least 13% per year. Furthermore, the return on shareholder equity, also on an aftertax GAAP basis should be at least 13%. What does this mean for the average company?

For illustration, assume that equity capital and GAAP shareholder equity are identical. Also assume that a company's shareholder equity is \$100,000,000. Assume an average pretax rate of return on shareholder equity of 18% which results in \$18,000,000 of pretax earnings for the company. If \$8,500,000 of the \$18,000,000 of pretax earnings results from an "asset" type investment return on equity, then the balance, that is \$9,500,000, would have to come explicitly from the insurance operation. The pretax "asset" type investment return of \$8,500,000 has been arrived at by applying a return rate of eight and one half percent to an assumed "loaned" equity of \$60,000,000 and the same rate of eight and one half percent to the balance of the assumed shareholder equity, that is to the "free" equity of \$40,000,000.² The assumed relationship between "loaned" equity and "free" equity is arbitrary, and the significance of the two elements of equity, and the rates of return thereon, will become clearer as the profit model is explained.

The "asset" type investment return on equity capital (in the illustration, on shareholder equity) results from the following consideration. As noted previously, let us view equity capital as comprised of "free" equity and "loaned" equity. "Loaned" equity represents the moneys necessary to acquire insurance business, the amounts borrowed by insurance management, the amounts which are presumably recovered from the future cash flow of the insurance operation, and, in the parlance of the accountant, the amounts equal to the sum of deferrable and non-deferrable acquisition expenses. Therefore, "loaned" equity is not unlike moneys invested in quality corporate bonds. An investment in corporate bonds is an investment in the future cash flow of a corporation which needs to borrow money generally in order to acquire business. Accordingly, the investment return on the "loaned" equity should be comparable to the return on corporate bonds of similar investment quality. Furthermore, distinction can be made between the return rates on equity loaned to acquire the various types of insurances, because of the different cash flow characteristics of the various types of insurances, just as the rates of return on bonds vary by bond maturity periods and call features. The sum of the returns of "loaned" equity and "free" equity constitutes the "asset" type of investment return on equity capital.

"Free" equity is equity which is required to support the insurance operation. This support serves several functions, including functioning as a buffer for absorbing fluctuations in the insurance operation and the financial consequences of management error and malfeasance. The need to absorb fluctuations in the insurance operation results in assigning different amounts of "free" equity in support of the different types of insurances, depending on their variabilities. In a different sense, "free" equity is held captive by the insurance operation, and the demands of each type of insurance will vary according to its variability. A rate of return appropriate for "free" equity is considered later.

For some companies the proportion of "free" equity to equity capital may be such that the additionally explicit amount must be assessed the insurance operation in order to realize a satisfactory aggregate return on equity

capital is unrealistically large, overly burdensome to the insurance operation, and likely to frustrate the realization of corporate financial objectives. The resolution of this problem, which is a problem of perspective, is to view "free" equity as comprised of two elements -- a "support" element and an "excess" element. Only the "support" element should be considered in quantifying the additionally explicit amount to be assessed the insurance operation. The "excess" element should be applied to capital investment opportunities or otherwise returned to the owners.³

An imbalance between "free" equity and "loaned" equity can result from a number of causes, other than the non-application of equity capital, ranging from a company not having sufficient equity capital in the first place to destruction of either "free" or "loaned" equity. In any situation where a company's "free" equity would be inadequate to the support function, it would not be improper to inflate "free" equity to an amount appropriate for the support function and to establish an offsetting, but negative, "excess" amount. Such an accounting adjustment would keep in perspective the balance between "support" equity and "loaned" equity when over-viewing a company's financial profile and would be required in establishing the additionally explicit amount.

What is the return rate appropriate for the "support" element of "free" equity? Obviously, the higher the return rate on the "support" element of "free" equity, the lower need be the additionally explicit amount to be assessed the insurance operation. In practice, the assets appropriate for investment of policyholder funds would be identified. Remaining assets would be ascribed to shareholder funds. The return rates on those shareholder assets only then would need to be inventoried. In theory, an examination of the functions to be served by the "support" element of "free" equity would result in identification of investment requirements adequately defined to permit quantification of an appropriate return rate to be expected. Important requirements among those functions would be liquidity and security, and those requirements suggest that in today's political environment an expected return rate appropriate for "support" equity might be higher than that rate appropriate for "loaned" equity. Such requirements would also suggest the classes of investments appropriate for the "support" element.

In what form should the additionally explicit amount be expressed in product pricing? The basic problem in recognizing the additionally explicit amount is one of apportioning to or assessing the various classes of risks that which is already determined. Were a company to sell a single product to highly homogenous risks, the problem would not exist since any form of explicit profit margin specification would result in the same assessment, that is, all forms of explicit profit margin specifications would be equivalent in effect in satisfying capital demands. It is precisely because insurance risks are heterogenous that the various forms of explicit profit margin specifications result in different assessments. If a single parameter were to be specified, it must meaningfully result in apportionment of a positive assessment consistently applied to the various buyers of insurance. Whatever the form of the specification, it should be consistent with the functions of equity capital. We conclude our remarks on this topic by illustrating a simplified form of the profit model which uses a single parameter which is workable for a number of limited situations.

The profit model has been developed from the financial perspective which describes profit measurement as a rate of return (r_c) on equity capital (E). Equity capital is comprised of two parts, operationally invested or "loaned" equity (E_1) and equity (E_s) held in "support" of operations. To both parts of equity capital, rates of return (r_1 to E_1 and r_s to E_s) are ascribed which are similar in level and quality to those appropriate for "asset" type investments. Because the sum of the application of r_1 to E_1 and r_s to E_s is inadequate to satisfy the demands of capital as measured by the product of r_c and E, it is necessary to introduce another element of return in order to properly establish an equation of equilibrium. Representing this additional element by the function $f(E_1, E_s)$, then the equation of equilibrium is

$$r_c \times E = r_1 \times E_1 + r_s \times E_s + f(E_1, E_s).$$

Although the additional element of return $f(E_1, E_s)$ is a function of both "loaned" equity (E_1) and "support" equity (E_s), it must be derived from operations. Furthermore, the equation of equilibrium is time dependent, not independent of time as illustrated in the given form.

For the illustration, no consideration is given to extraordinary return on equity capital which would result from monopoly, extraordinarily "high" productivity, or extraordinary "high" risk. Also, only that situation is illustrated wherein the relationship between "loaned" equity and "support" equity is constant, or can be treated as so. With those qualifications, the additional element $f(E_1, E_s)$ can be equated to the product term $r_b \times E_1$ where r_b is a rate of return which balances the equation of equilibrium, and E_1 is, of course, the "loaned" equity. When the product term $r_b \times E_1$ is substituted in the equation of equilibrium and E_1 is factored, the equation of equilibrium becomes

$$r_c \times E = r_s \times E_s + (r_1 + r_b)E_1.$$

If we let $r_e = r_1 + r_b$, which we call the equilibrium rate of return, the equation of equilibrium reduces to

$$r_c \times E = r_s \times E_s + r_e \times E_1.$$

This equation can be integrated and programmed into any premium pricing formula.

The "loaned" equity (E_1) is set equal to acquisition expenses. The rate of return (r_s) on "support" equity (E_s) in more normal economic-political times would be set equal to slightly less than the company's assumed investment return rate, although as previously noted for these unstable times, it could be set equal to, or greater than, the investment return rate. For the illustration, a rate equal to .085 is used. The "support" equity (E_s) is not explicitly qualified, but is expressed instead as a proportion of the "loaned" equity (E_1). For the illustration, one unit of E_s is assigned in support of three units of E_1 , that is $E_s = E_1/3$.

Likewise, equity capital (E) is not explicitly quantified, but simply expressed as the sum of the elements E_s and E_1 . For the illustration, the capital return rate (r_c) is set equal to .18 which would approximate an average pre-tax rate of return on shareholder equity found in the capital market for insurance companies.

Substituting the foregoing values and relationships in the equation of equilibrium, and solving for the equilibrium rate of return (r_e), we get a value of .212 for the equilibrium rate of return.

Once the equilibrium rate of return has been determined, as in the illustration, the acquisition expenses -- that is, the "loaned" equity (E_1) -- are accumulated at that rate and amortized over the profit study period. The premium calculated to satisfy this condition is the premium which results in the satisfaction of the capital demands. From a GAAP perspective, if the proportion of GAAP premium required to amortize acquisition expenses is added to the excess of (i) the gross premium over (ii) the total GAAP premium, the resulting sum is just adequate to amortize the acquisition expenses over the profit study period at an accumulation rate equal to the equilibrium rate of return.

Footnotes

¹A number of technicalities are not considered in the essay. The first technicality is that the model is developed in terms of pretax return rates, when, in the reality of the corporate board room, aftertax return rates are of concern. Pricing on an aftertax basis on a unit age cell basis is not an easy matter. The second technicality is that the return rates on shareholders equity as measured under GAAP will only equal true capital return rates in a limited number of circumstances, mostly of the steady state variety. Therefore, were a company to work with GAAP values, the perceived relationship between "free" equity and "loaned" equity usually would require adjustment. However, because an adjustment would be required, the model is more easily applied to the pricing of new business than to in force business. The third technicality is that marketing considerations might suggest that the explicit profit margins for some products should be lower than for others, although in aggregate they would have to satisfy capital demands.

²In setting forth a pretax return rate of eight and one half percent for each of the two elements of equity capital, we have only intended to set forth a quantification for illustration. Since the return on "loaned" equity is likened to the return on a quality corporate bond, in today's market an eight and one half percent rate, after investment expenses, might seem low. However, whatever return rate would be used, it would have to be consistent with longer term expectations. Also, since the return on "loaned" equity is "fully" taxable, a rate appropriate for a fully taxable instrument has been selected rather than a rate for a "fully" or a "partially" tax-exempt instrument. Likewise, if a company's tax situation would dictate investments of funds in "fully" taxables, eight and one half percent might also seem low as a return rate on "free" equity. Where a company's tax situation calls for investments in "fully" or "partially" tax-exempts, a rate of return on "support" equity lower than eight and one half percent might be appropriate. However, to ensure the avoidance of anomalous results, such a company should properly provide for the impact of federal income taxes in the profit model or, as an expediency, use a fully taxable, pretax

equivalent return rate. In the final analysis, for both "support" and "loaned" equity, a company's management would use those rates which would be consistent with its understanding of its responsibilities and of the marketplace.

³In the 1960's, the Insurance Department of New York held a public hearing on limiting the amount of statutory surplus which could be passed up as a dividend to a holding company. At that hearing the concept of surplus (that is "support" equity) and surplus-surplus (that is "excess" equity) was advanced.

MR. CARDINAL: Whatever will prove to be the environmental aspects of the 1980's which will affect the pricing cycle will emanate from human actions. In short, man's behavior begets man's environment. A common characteristic of most futuristic dissertations, which I am familiar with, is that they ignore the three dimensional aspects of man -- body, mind and spirit. Alternative future scenarios concentrate on the material and mental aspects of man, ignoring the spirituality of man, or even worse, treating that spirituality as a social phenomenon -- or as some commentators assert, as a social disease. It would be easy to dismiss such scenarios, including the three scenarios discussed this morning, if the geosphere were not heading toward chaos. It is easy to say, and we could develop good argument, that this age of narcissism, this age of armament, this age of despotism, this age of faithlessness will affect the environmental aspects of the 1980's in the following ways:

- (1) Government will increase in size, influence and centralization, thereby further limiting our freedom to choose, controlling our lives through increasing fiat derived from the humanistic, secular religion of the state, and further destroying our human and spiritual dignity.
- (2) Such government dominance will lead to increasing debasement of money, thereby further discouraging capital formation and labor productivity, increasing de facto or de jure "socialization" of industries and services, and increasing regulations and inflation which will result in the further destruction of capital, an inflationary depression, and the debasement of man.
- (3) Tariffs and similar impositions will increase, thereby supporting the inefficient at great cost to the American public.
- (4) Such tariffs will in turn invite retaliatory tariffs from the other industrialized nations of the free world, thereby leading to nationalism, making a mockery of the so-called concept of interdependence, further alienating our allies, and because of the our increasing moral, one might say spiritual weakness, inviting further imperialism and aggression from our godless enemies, maybe even an all-out war.

In the April 7, 1980 Wall Street Journal, Mr. Edmund Fuller reviewed Professor Robert Nisbet's book, History of the Idea of Progress. The following quotations are insightful:

"No single idea has been more important than, perhaps as important as, the idea of progress in Western civilization for nearly 3,000 years ... Its flaws and corruptions understood, the idea of progress has been overwhelmingly a noble idea in Western history, noble for what it has celebrated in countless philosophical, religious, scientific and historical works and, most of all, for what it has meant to the motivations and aspirations of those who have made up the human substance of Western civilization."

The idea of progress now is challenged as never before. "Disbelief, doubt, disillusionment and despair have taken over -- or so it would seem from our literature, art, philosophy, theology, even our scholarship and science ... What is in all ways most devastating, however, is the single decline in America and Europe themselves of faith in the value and promise of Western civilization. What has succeeded faith is, on the vivid and continually enlarging record, guilt, alienation and indifference..." In the face of this, Professor Nisbet asserts: "If the idea of progress does die in the West, so will a great deal else that we have long cherished in this civilization."

He traces the idea of progress from the ancient world. There were intimations of it in Greek and Roman times, but its great impetus arose from the Judeo-Christian "conception of history as sacred" as divinely guided and therefore necessary."

Five major premises always have been associated with the idea of progress: "belief in the value of the past; conviction of the nobility, even superiority, of Western civilization; acceptance of the worth of economic and technological growth; faith in reason and in the kind of scientific and scholarly knowledge that can come from reason alone; and, finally, belief in the intrinsic importance, the inefaceable worth of life on this earth."

"If there is one generalization that can be made confidently about the history of the idea of progress, it is that throughout its history the idea has been closely linked with, has depended upon, religion or upon intellectual constructs derived from religion." But, as our century "especially in its second half is almost barren of faith in progress, so is almost barren of widespread and life-permeating religious faith..."

Many of the factors contributing to our decline are examined. One is the waning of respect for men of knowledge and for knowledge itself, "the fast spreading preoccupation with the religiously bizarre and exotic; with the occult..." He points to the loss of interest in history, to "our far-flung and relentless jettisoning of the past. The past, let us remember, is sacred ground for any

genuine, creative and free civilization." There is a "disenchantment with or more ominously an outright hostility toward economic growth ... rising fear that we and our planet are doomed unless we bring this growth to a halt..." In a rebuttal of this, he quotes a question by Mr. Norman Macrae of The Economist: "... will America continue to believe in economic growth? Half the world will remain hungry if it does not, and that half of the world will blow us up." Professor Nisbet speaks convincingly too, in attributing some of our worst social evils to the malign and spreading "pall of boredom."

Himself a social scientist, he has hard words about that field: "... the contributions of the social sciences have been minimal when not actually counterproductive ... in so many of the projects of social reconstruction designed by social scientists for government execution more harm than good has been the result -- as in benignly intended but disastrous 'wars' against poverty, ethnic discrimination, poor housing, slums, and crime."

He discerns, as a source of hope, "the faint, possibly illusory, signs of the beginning of a religious renewal in Western civilization, notably in America." The signs include "what has to be regarded as a true efflorescence of formal theology ... manifested in books and articles of an intellectual quality not seen in such sudden abundance for many decades in the West." All our prospects, including the political, economic and scientific, in Professor Nisbet's view lie in our recovery of "a true culture in which the core is a deep and wide sense of the sacred." That is the means by which we may be able to "regain the vital conditions of progress itself and of faith in progress -- past, present and future."

I am reminded of Mr. John Bragg's presidential address to this Society in 1976. After building a basically doomsday scenario based on his readings of a number of historians, he concluded his remarks by stating that in spite of his pessimism, man would ultimately triumph. However, he offered no argument to support his belief other than the "illusory" hope which Professor Nisbet offers. It is worth noting, however, that the United States in its history has experienced four major, national spiritual awakenings.¹

- (1) All four awakenings were accompanied or preceded by financial panic: (1) the first awakening, from 1725 to 1776, saw the South Seas Bubble crisis, (2) the second awakening, from 1787 to 1805, was preceded by currency failure and depression, (3) the third awakening, from 1857 to 1865, began at virtually the same time as the financial panic of 1857, and (4) the fourth awakening, 1900 to 1910, was preceded by the major panic of 1893 and accompanied by the panic of 1901, the down-turns of 1903, 1905 and 1906 and the full scale panic of 1907.

- (2) All four awakenings were followed by war: (1) the first awakening was followed by the Revolutionary War, (2) the second awakening by the War of 1812, (3) the third awakening by the Civil War, and (4) the fourth awakening by World War I.

By the end of the 1980's, will we be experiencing a positive utopia as indicated in Psalms 33:12, where we read "Blessed is the nation whose God is the Lord, and the people He has chosen for His own inheritance," or a negative utopia as Mr. George Orwell set out in his book, 1984?

* * * * *

MR. PETER F. CHAPMAN: Are current Society of Actuaries statistics adequate? Not entirely.

What the Society does, it does well. Its mortality studies of standard life insurance risks and of annuitants under a variety of guarantees and refund provisions have provided us with the necessary historical base for anticipating future mortality. This is important because, of the four major product pricing determinants, mortality is the one most likely to behave in the future in an historically recognizable pattern.

The question as asked, however, still cannot be answered affirmatively. The Society has told us nothing about the post-issue experience of rated policies. What percentage remain in force? What happens to the extra mortality as the policies age? What percentage of ratings are removed or liberalized?

The Society has not compiled any mortality data on insurance issued on any underwriting basis besides regular medical, nonmedical, or paramedical. Guaranteed issue, simplified issue, mass marketing, and automatic issue to existing insureds have not been studied in sufficient depth.

I am aware of the difficulties of compiling useful data on substandard risks and on non-traditional underwriting. I am also aware that many of the present gaps may be filled in the foreseeable future. Nevertheless, the answer to the question as it is asked, is negative.

Why do I cavil? Because this panel is future oriented. I cannot see very much in the projected scenarios that will materially disturb the mortality trend of regularly underwritten business. But I do see increasing percentages of new business being written with less and less traditional underwriting. The future outlook of physician's fees that will continue to outpace the accepted inflation indices, declining persistency which reduces the value of an increasingly costly investment in lower deferred mortality, increased legislative and regulatory interference in the underwriting process, and the need to improve the productivity of the individual agent, will all combine to stimulate more and more ingenious devices for issuing insurance with less and less individual underwriting. Product pricing in this environment will be one of the leading actuarial challenges in the 1980's.

Is future persistency experience predictable? Probably not.

¹ John R. Price, America at the Crossroads, Christian House Publishing Company.

Industry data over the last two decades indicate a general trend toward higher aggregate voluntary termination rates. There are many possible explanations for this trend. A higher proportion of term insurance, which by its nature is more lapse prone than permanent insurance, coupled with decreasing term rates which make it financially more advantageous to lapse and start over again than to renew. Increased rates of growth of new sales which tend to spawn managerial attitudes which, consciously or unconsciously, attach a lower priority to conservation and, at the same time, result in a higher proportion of the total in force being in the lapse prone early policy years. Higher agent attrition, greater stripping of policy values through increased indebtedness, ERISA induced terminations of marginal pension plans; I am sure that everyone present in this room can name at least one major contributory factor that I have omitted.

All, or almost all, of these problems will continue into the 1980's. Why then, do I suspect a higher probability of the type of discontinuity that will prevent an actuary from extrapolating the historic trend into the next decade? For one reason and one reason only.

No one has any idea of the economic behavior to be expected from the insurance buying public when high rates of inflation are almost universally expected to continue without significant abatement. The psychological effects of such an environment may be more important than the financial impact. Among the arguments for discontinuity are:

1. Attenuation of the incentive to save leads to a variety of responses from stripping of loan values for what is, in effect, monetary arbitrage, to shifting into lower premium forms. Such a shift has already taken place in participating whole life insurance where the lowest premium rate per \$1,000 has become the primary marketplace consideration, displacing the notion that higher premiums and reserves per \$1,000 lower costs in the long run by generating more distributable excess interest earnings. Spending a debased dollar today to get two even more debased dollars in the distant future is not a popular notion when inflationary expectations are high.
2. Term insurance, with its inherent volatility, will become even more ascendant as insurable interests are driven up by inflation while real purchasing power, the ability to pay premiums, declines.
3. The high interest single premium life insurance policy is bound to become a major replacement vehicle in the 1980's, rolling over large amounts of unborrowed cash values which are locked in at pre-inflationary valuation interest rates. Non-participating policies will be especially vulnerable. Inflation spawned flexible premium deferred annuities with reserves in foreign currencies, short term paper, precious metals, Renaissance art, or other exotica will, in combination with ruinously priced term insurance, make inroads into older, traditionally persistent, permanent policies.
4. More and more business will become orphaned, with predictable effects on persistency, as agent recruitment and

retention becomes financially more perilous. The cost of financing the agent through his novitiate is driven up by the same inflation that makes it more difficult to validate the allowances.

5. Nobody is really sure what effect an economic scenario of declining investment, declining productivity, higher taxes on illusory book profits, lower real earnings, and overregulation will have on employment and on the willingness of employers to sustain fringe benefit life insurance programs. It is not likely, however, that the effect on persistency will be salutary.

What methods seem appropriate for the determination of interest rate assumptions? According to your aesthetic predilections, you can (a) slaughter a chicken and count its entrails; (b) throw darts at a wall board of random numbers; (c) play Monte Carlo games with license plates (please don't ask me how to handle vanity plates); (d) none of the above.

I am, of course, stating in a very broad way, my own assumptions of discontinuity with pre-1980 experience. If we could confidently extrapolate the past into the future, we would all assume an annual inflation rate, add a premium of 1% to 3%, call the sum our new money rate and develop new portfolio aggregate rates by combining these new money rates with projections of operational cash flows, investment rollovers, policy loans, and marginal federal income tax rates.

There are a number of persuasive reasons for suspecting that investment experience in the 1980's will be unlike that of any preceding decade.

1. We have no idea how capital markets will behave in the type of static, no growth economy contemplated in Scenario #1 (the most likely of the three in my opinion). How will demand for long term debt instruments hold up? Having indexed income taxes and, as a result, forfeited its only hope of ever balancing the budget, will the federal government have any company at the loan window? Will the Federal Reserve Board be more concerned with money supply or with the interest rates?
2. Will life insurance companies continue to be able to invest primarily long term? This, of course, depends on cash flows continuing to be securely positive. But will they? With a combination of increased policy loan demand, worsening persistency, pension fund disintermediation, more term and semi-term products, and higher operating expenses, will the industry be able to continue its present liquidity ratios? Or will future interest rates be more subject to the vagaries of short term interest rate fluctuations than they are now?
3. In the general economic listlessness associated with all but the optimistic "investment and incentive" scenario, how many corporate debtors will go belly up? How will the resulting capital losses, the difference between book and market values, be digested by the asset shares or an equivalent profits indicator? What about the loss of interest?

4. If interest rates are figured net of federal income tax, what allowances should be made for alternative investment strategies that will attempt to respond to a Phase I company's attempt to hold the marginal tax rate below 100%, a level that will almost certainly be reached or approached by every Phase I company during the 1980's? For that matter, will the present tax laws, now limping and creaking into their 22nd year, still be around in substantially unaltered form by 1990? Or, if they are, how many of the coinsurance devices recently developed to cope with its more pernicious aspects will continue to live and breathe for the entire decade?

Is there any way to appropriately determine and apply inflation assumptions? I like chicken entrails; they go back three millennia-- they have stood the test of time.

I have already discussed the effect of inflation on mortality, persistency, agency manpower, product mix, and interest rates. Its effect on administrative expenses is less clear. Salaries, fringe benefits, rent, and energy related costs will almost inevitably increase at the inflationary rate, at the very least. This, however, does not necessarily translate into a comparable increase in per policy unit costs. Not all operations are personnel intensive. In many areas, the marginal cost of increasing productivity may be lower than the general rate of inflation, by whatever aggregates of goods and services this rate is measured.

Will it be common practice to utilize experience trend patterns? I don't know. I have enough trouble trying to predict what I am going to do, let alone try to forecast actuarial trends.

If, however, my reactions are reasonably typical, I suspect that actuaries will do what they have always done and extrapolate the past into the future, with allowances for environmental changes. This process is familiar and comfortable, like a security blanket. And, like a security blanket, there is nothing wrong with it as long as it does not shut out reality. In this process, continuity would be treated as one scenario with an assigned probability of occurrence. I would recommend, however, as part of the process, scenarios involving discontinuity, along several of the lines that I have suggested. The actuary's task will be the difficult one of attempting to distinguish the most probable scenario, or combination of scenarios.

What is the anticipated effect of mandatory net cost comparison and disclosure? Will the life insurance consumer pay increasing attention to relative net costs?

My particular duties at Mutual Benefit bring me reasonably close to the marketing scene. I have watched the concept of time value of money gain slow acceptance among agents. At first, most agents did not want any information but traditional cost displays. When it became apparent that interest adjustment was not going to go away, but would, on the contrary, become an integral part of statutory disclosure, there was unenthusiastic acceptance of a fait accompli, much like the loser in a bastardy suit embracing the offspring.

Lately, however, I have noticed the beginning of active interest in the positive aspects of net cost disclosure as a way to pinpoint the competitive posture of a specific product. Perhaps innate conservatism has finally been overcome; perhaps there is now recognition of the importance of the time value of money in an era of double digit inflation; perhaps both.

I understand that the question was asked about the insuring public. I have answered in terms of the agent because public recognition will necessarily lag behind agent understanding since, for all but the most militant consumerist or the insurance technician, the agent is the link of understanding between the home office and the general public. The public's awareness of any concept will follow the agent's understanding and will be proportionate to the value he attaches to it. Mandatory net cost comparison and disclosure will be a contributory part of the competitive environment that exists today and will exist to an even greater extent in the 1980's.

The second part of the question is not so easily answered. The evidence to date suggests that the premium per \$1,000 will be a more important factor in the purchase decision than net cost. For evidence, look at what is happening to the rates of the general agency career shop mutual life insurance companies. As a general rule, higher premiums and their consequent higher reserves and higher cash values will have a better net surrender cost index as a result of its product design. The higher the assets per \$1,000, the better the opportunity for increased dividends from excess interest earnings, which, with the higher cash values, tends generally to produce more favorable surrender cost indices than a low premium, low value policy. And yet, the marketplace gives every appearance of preferring the latter.

This trend is far likelier than not to continue because of the need for higher coverages with less disposable income. It will almost certainly be accelerated if the proposed adjustable valuation interest rates become part of the statutes. The combination of income tax savings (10-for-1-rule) and amelioration of deficiency reserve requirements will almost certainly accelerate the competition for lower and lower rates.

MR. WILFRED A. KRAEGEL: I would like to ask the panelists if you could say anything about the possibilities of using dynamic factors in the pricing formulas. That is, instead of having fixed assumptions about interest rates, expenses, and mortality, have you or do you know of others who have given thought to using assumptions which change over the future to reflect actual situations?

MR. FITZGERALD: Your question is an interesting one. In fact, in putting together my remarks on risk applications, at one point I considered a section on avoiding risk through product design which could be thought of as an indirect application. You may have heard of some of the new stock company product introductions, the generic term for which is non-guaranteed non-participating products. They provide that premiums will be changed over time as projections of future interest, mortality, or expense experience are revised. One of the motivations behind that type of product is a growing awareness within the stock companies that 1) you cannot predict the future, especially long term mortality and interest trends (certainly the last couple of months of money market experience have proven that) and 2) while there is actuarial value in long term guarantees, the buying public does not fully perceive that value at least in the current environment. I think that there has been some movement in this direction, and I

expect we will see more of this product form in the future if the high inflation scenario is realized in the 1980's as many of us expect it will.

MR. CHAPMAN: I would also expect that for participating products issued by mutual companies, the current activities of the dividend committee will probably require us to look into the dividend scales to see if they are supportable under some of the worst scenario assumptions. We have taken a look at what could happen to interest rates and expenses in the future. With the high degree of discontinuity, it is very difficult to know exactly how much value to give to dynamic assumptions because the further you extend dynamic assumptions, the shakier they become.

MR. SHAPIRO: In some ways, the non-guaranteed whole life product is permitting some companies to make assumptions that they felt uncomfortable making in the past. Yes, we have seen some companies projecting improving mortality and projecting a fairly high interest rate. It is pretty common to see companies with decreasing persistency trends finding all kinds of ways to say they are going to do a better job of hiring agents in the future and retaining agents so that persistency will hence go back to where it was.

MR. JESSE M. SCHWARTZ: Question 6 says, what will be the actuary's pricing problem in the increasing competitive environment? How will single premium and flexible premium annuities be priced in the 1980's? It seems to me that from the competitive viewpoint, the single premium and flexible premium annuities are trying to commission down where it is more likely to be a 2% or a 5% level commission rather than a high front end loaded commission. How do you expect to maintain equity from those policyholders who purchased a 10% first year commission, a higher level load and those who do not replace vs. those that do?

MR. CHAPMAN: That is a good question, Mr. Schwartz. I wish I knew a good answer. In the same category, take an older, better established policy, like a 1941 CSO block policy for which you can maintain equity by adjusting the dividend scale to reflect actual experience. You are, nevertheless, defenseless against somebody who comes along with a single premium life policy and suggests using the cash values to buy a single premium life policy, with a 5½% single premium reserve and 1958 CSO reserves. I do not think there is a single policy around today for which you couldn't rationalize a replacement by pointing to something that is current, that would really be perceived as being to the insured's advantage. I do not think there is anything surprising about that since the older policies were designed in a comparatively stable cost environment. Today we are in an inflationary environment. There is a very serious equity problem. The only thing that can be done is to adjust the dividends and the current interest rates; there is not any way of altering the fact that it was sold at a 10% commission and not at a 2% commission. It is not a satisfactory answer, but I do not think there is a satisfactory answer.