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INDIVIDUAL INSURANCE PRICING THEORY

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JOHN K. ROBERTS, CLAUDE THAU

MR. JOHN E. TILLER: The first speaker will be John Roberts, Senior Vice President for Corporate Services for Pan-American Life. John will discuss the first topic on our program which is defined as:

1. The pricing process - the recursive cycle.
 - a. Definition of goals and marketing plan.
 - b. Establishment of actuarial assumptions.
 - c. Determination of prices.
 - d. Management of results.

His company has done some fairly unique work in this area and John's input and examples of his company's endeavors will be most interesting to all of us.

MR. JOHN K. ROBERTS: The basic theme I want to cover this afternoon is to suggest a way out of the confrontations with your agency area on product pricing. To me the possible way around this dilemma is to make the product pricing process an integral part of the company's planning and management process. In this environment operating goals and pricing assumptions should be coordinated and consistent. This produces a result that as management strives to achieve its operating goals it is also able to recognize more clearly how its actions support the company's price structure. In its ultimate form several steps in the company's pricing process can and should be the same as in its corporate planning and management process. A major prerequisite is viewing the pricing process as a management function and not primarily as an actuarial function.

I generally feel somewhat uncomfortable when discussion concepts because it is very easy to give our words that relate to a concept, but indeed it is much more difficult to put that concept into action and, if all of this is so simple, it would seem to me that many more companies would be doing it. The dilemma as I see it, can be that the actuary generally has major influence over the company's pricing process, but at best is only one of a number of participants in the company's planning activity; if the actuary isn't also the primary architect of the company's planning process it would appear to me he is going to have to be particularly perceptive in seeing ways in which he can convince his company colleagues to integrate more the pricing process into the company's management process.

At this point I could attempt to give you a rather detailed description of how Pan-American has attempted to resolve this dilemma and how our pricing process has evolved in recent years. In some respects this would portray that for us at least, pricing activities have triggered company planning activities and vice versa. But it would also strongly suggest there is a best way to approach product pricing. While I do believe an organization's pricing will be more effective if it is linked to the company's overall management activity, there can be a variety of possible opportunities to tie these

activities more closely together. Not surprisingly, what is immediately feasible for your own company is going to depend upon how you manage your company and those topics and projects which are the highest priority to your management.

It might be useful for our discussion to give one example of a pricing project that triggered changes in our management process and, then vice versa, an example of how the results of a company planning project have been integrated into our pricing process. In 1972, Pan-American embarked on a project to develop a new U.S. ratebook which for us was to become our initial effort of relating pricing assumptions to operating goals and to involve a broad range of company management in the process of doing so. This project revolved around a rather simple principle that for a company to have competitive prices, it must have competitive performance. Initially our project team worked together to identify our competition and then based on data available within our own organization, we assembled information to demonstrate how well our company's performance compared to our competitors in such vital areas as expenses, persistency, investment yield, sales growth and so forth. I can still recall vividly the impact on our Senior Management Committee when in August of 1972, we summarized not only our company's current competitive position price-wise, but also our competitive position performance-wise. Suddenly Senior Management was involved and interested in product pricing. It was rewarding to see the dynamics at work when pricing becomes a company wide management concern and not merely an actuarial--agency confrontation and negotiation. Further, broad management involvement during the price setting process automatically sets the stage for the last phase defined in our program, that is to operate and manage results consistent with pricing decisions. If operating managers recognize both that their performance impacts directly on pricing and how their current performance compares to competition, a company has already created the momentum to implement a rather simple and relevant system to monitor and compare results with objectives.

Well, that I have just described is an example of how a pricing project itself can be a catalyst to establishing operating goals and then a launching pad for a follow-up monitoring system.

A purer approach would be to define a business plan or a marketing plan as the first phase or prerequisite for the subsequent phases of the pricing process. This is exactly the order of events that is described in our program and the Society Study Notes on this topic. That may be fine for those companies who already have a structured approach to corporate planning, but we would probably all agree that it is folly to assume that an actuary, faced with the responsibility of developing a ratebook for probably an anxious field force, is going to suggest to the President that the first step is to stop and develop a corporate or marketing plan. However, most companies have undertaken one or more significant projects that required important decisions concerning company marketing direction or philosophy. I found that often these projects have a strong planning flavor although they were probably initiated to react to some specific operating need. It is likely that the results of such a project can be helpful in defining the management goals and operating parameters that should guide the participants in a pricing project. I would like to illustrate with one company planning effort at the Pan-American.

In 1976, we organized a small corporate planning project team of senior officers. The purpose was to better identify desired future directions of the company and we labeled this effort Future Outlook. Each profit center in our company prepared a report which, in essence, was an analysis of its current situation and looked ahead in terms of its opportunities, strengths, weaknesses and vulnerabilities. It was not a highly structured effort, but it did result in tangible priorities and action. Relevant to the individual insurance pricing process we found that this project identified more clearly than ever before where participating insurance prices fit into the overall philosophy of a mutual life insurance company.

Typical questions considered were:

1. What is the purpose of a mutual life insurance company?
2. What is the purpose of non-par lines of business, such as group insurance?
3. What is the purpose of surplus and what are the priorities for the utilization of company surplus?

We discovered that answering these questions has direct impact on our participating insurance pricing process. For example, when company management establishes and believes that the competitiveness of its participating insurance prices and dividends is of the highest priority after company survival is protected, then company management really has no alternative but to become intimately involved in the pricing process, and in doing so moves it away from being predominantly the mysterious, and sometimes the suspicious, domain of the actuary.

In closing, our program outline implies that the pricing process should first be the definition of goals and marketing plan, then the establishment of actuarial assumptions, the determination of prices and finally the management of results.

I have not dwelled much on the second and third steps--that is the establishment of actuarial assumptions and the determination of prices and yet that was where in my early actuarial days I put my entire effort on a pricing project. Rather I have emphasized primarily the first phase, that is the definition of goals and marketing plan and have suggested that if this step is accomplished, the stage is automatically set for the last phase--the management of results consistent with objectives. In doing this I was really trying to communicate two beliefs: (1) that the company's product pricing process should be an integral part of a company's management planning process and (2) that while concepts are easier to articulate than to implement, the actuary--usually an important and influential member of management--can within the framework of his organization be alert to opportunities to move the pricing process increasingly into the mainstream of the company's management planning activity.

MR. CLAUDE THAU: John, I agree that making pricing more of a management, as opposed to strictly an actuarial, function is desirable. But what happens if management decides that you are going to have a goal of 25% growth each year in your new business and you think it is unrealistic. If you are starting to price a ratebook for which the mid-point will be, say, three years in the future, do you spread your overhead over a much larger or broader base because

of these sales projection? Maybe the answer differs for a par-line as opposed to a non-par line.

MR. ROBERTS: What I am hearing as the question, Claude, relates to management becoming more involved in setting your pricing assumptions as what if, in your view as an actuary, the assumptions they suggest are more optimistic or more liberal than your own view of the future. I see that as a real danger; that as management becomes more involved maybe more of the traditional authority of the actuary is then taken over by company management. In our own experience, however, the result is positive and I see it in this way: If company management recognizes that the pricing assumptions they are suggesting are going to become performance standards for them and the operating management is going to be accountable for the results, operating management will be more prudent and more realistic in their assumptions to the future. Indeed that is the type of dialogue that I see take place. My own relationship with our agency director today is a very much one of team work, of trying to identify better what our current performance is, what the performance of our competitors is and what kinds of strategies or actions we can undertake to keep our performance competitive and support competitive prices. He is not about to accept, in the pricing structure, an objective that he cannot support; he might look to somebody else in their area to be more liberal, but not certainly in how own.

MR. THAU: My topic is Profit Objectives. As John indicated, we work for Occidental Life of California, which is a wholly-owned subsidiary of Transamerica Corporation. Naturally, it is hard to manage such a diverse company. Corporate Management must select certain measuring sticks to evaluate the management of each subsidiary. Transamerica has chosen to express its primary corporate goal in terms of GAAP Return-On-Equity (ROE).

Equity = Paid-In Capital + Retained Earnings

$$\text{GAAP ROE} = \frac{\text{GAAP Earnings}}{\frac{1}{2}(\text{GAAP Equity}_{12/31/x-1} + \text{GAAP Equity}_{12/31/x})}$$

Equity is essentially equal to the sum of paid-in capital and retained earnings. GAAP Return-On-Equity is calculated by dividing GAAP Earnings by mean GAAP Equity, on a calendar year basis.

There are several advantages for Transamerica in using GAAP ROE as a profit measure.

1. It is easily determined periodically for each Transamerica entity.
2. It relates earnings to a measure of investment.
3. It measures all operations of a company; for example, blocks of business from different issue years.
4. It is popular with stock analysts and hence affects the price of a company's stock.
5. It avoids the large statutory strain related to insurance sales.

Generally speaking, GAAP ROE can be translated into sustainable growth. Assuming that the corporate debt/equity ratio and return on capital can be held constant, the following relationship holds. Sustainable growth is the product of GAAP ROE and the complement of the payout rate.

$$\text{Sustainable Growth} = \text{GAAP ROE} \times \left(1 - \frac{\text{Shareholder Dividends}}{\text{GAAP Earnings}}\right)$$

Occidental has been trying to tie its pricing more directly to after-tax corporate goals. Being a large company, Occidental could afford the luxury of assigning an actuary full-time to the project of developing a pricing philosophy and related tools.

Although my project is not yet complete, I will share some of my conclusions with you. In terms of analysis of profitability, there are many levels of criteria, the ultimate level being the profitability to the shareholder of Transamerica Corporation.

<u>Levels of Criteria</u>	
Shareholder of Transamerica	Line (Ordinary Line)
Corporate (TA)	Ratebook
Company (Occidental)	Pricing Cell

My efforts have concentrated on the Ordinary Life Line. Early in the project, I concluded that the line could be viewed as an accumulation of ratebooks, so the ratebook level has been studied heavily.

An acceptable profit measure had to meet certain standards:

1. As mentioned earlier, it should be able to tie in to corporate objectives.
2. Secondly, it should be theoretically justifiable. The ultimate level, as I have mentioned, is the shareholder. If we do not enrich the shareholder, we have not accomplished our economic purpose. Moreover any criterion should be somehow related to risk. I will get back to this shortly.
3. Thirdly, there are many practical characteristics which must be satisfied. If we establish criteria which lead to uncompetitive rates, we will go out of business. Although that might be a proper decision from the shareholders' viewpoint, it should not be arrived at blindly. The profit measure should be easily understood, explained and anticipated. It should be adaptable to unusual pricing situations and able to be determined quickly and cheaply. A slight modification to our assumptions should not cause significant changes in our rate structure.

Before continuing, I would like to make a few further comments about risk. Risk can be defined as the possibility of deviation from expected results. Too often, actuaries consider the level of expected payments to be a measure of risk. For example, risk is sometimes treated as proportionate to premium. The fallacy in this approach is brought to light by the following example. Which is more risky to issue to an 85 year old man--a 20 year certain annuity or a life annuity? Although the certain annuity would involve a higher level of expected payments, I maintain that it has a definite payment period whereas the actual payments under the life annuity might greatly exceed the actuarial expectation.

As we began to seek a ratebook level criterion, GAAP ROE soon began to be exposed as a weak criterion for this level. Here are some comments on the above:

1. It is difficult to project long-run GAAP ROE, partly because short-range GAAP earnings are significantly dependent upon long-range statutory profits and GAAP equity depends upon the pay-out rate.

2. Although ROE purports to relate earnings to investment, the earnings are not recognized in proportion to outstanding investment and the change in GAAP equity itself is not equivalent to actual investment in an insurance sale.
3. GAAP ROE cannot really be calculated over several years for a separate block of business. By defining equity as cumulative retained earnings, recognizing investment of surplus, we have been able to sum profits and equity over all durations to arrive at a GAAP ROE profit measure, but it has little value.
4. As GAAP ROE goals are related to periodic annual statement results covering all operations, the implicit assumption seems to be that the return on the current ratebook must make up for any unsatisfactory profit level on in force business. Although the profitability of in force business can be an influencing factor; each ratebook is a separate investment and should be priced to produce optimal results. The insurance industry is elastic. We can't raise our rates to make up for the past. The public is becoming increasingly sophisticated. Government intercedes where consumers are viewed as incapable of accomplishing elasticity. The distribution system is definitely elastic. Current management can suffer from a poor GAAP ROE because of the decisions of prior management and current management may be able to do very little about it. For example, if our ordinary life sales grow at 15% per year rather than 10% per year the impact on GAAP ROE in the 3rd year is only .1%
5. Another disadvantage of GAAP earnings is that they cannot be put to use. We cannot pay them out to shareholders, nor can we use them to finance new business. Thus the tie between GAAP ROE and sustained growth does not hold up.
6. Faster growth can cause temporarily lower GAAP ROE. For example, a young company experiencing rapid growth may need large transfusions of statutory surplus. Such surplus becomes GAAP equity. So the new business can cause equity to balloon while the existence of non-deferred first year expenses can keep it from making more than minimal contribution to current GAAP earnings.
7. Finally, inflation is not always reflected in GAAP ROE. Of course, the replacement cost question is raging in accounting circles now. For insurance companies, the question is more significantly related to recognizing (in GAAP earnings today) profit which will flow in only far into the future, in possibly much cheaper dollars.

Because of these weaknesses of GAAP ROE, we came up with the following ratebook level profit measure and criteria.

Recommended Profit Measure for a Ratebook:

Internal Rate of Return

Shareholder Dividends

Statutory Earnings - Δ Deficiency V - Δ "Surplus"

Evaluated in "Real" Terms (Constant Purchasing Power)

After-Overhead (Not Necessarily All First Year)

Weighted Across Several Scenarios

Recognition of 10% Rule by Tracking Par Account

and Projecting Dividends

More Realistic Equations

Criteria:

Expected IRR Appropriate Considering the Potential
Range and Minimum Values
Satisfactory Pattern of Shareholder Dividends
Satisfactory Pattern of GAAP Earnings
Competitive Premiums

Here are some comments on the above:

1. For the ratebook in question, we separate its experience or anticipated experience to determine its internal rate of return. By the internal rate of return (also known as IRR or ROI), I mean that interest rate which discounts the cash flows--both negative flows representing investments and positive flows representing earnings--to zero.
2. In order to keep the shareholders' interests at heart, we discount the flows to or from the shareholder; that is "shareholder dividends". Statutory earnings provide a basis for our dividend to shareholders. However, not all statutory earnings are paid out in dividends. Some is held as surplus or invested as deficiency reserves. To calculate a proper IRR we must recognize when dividends will be paid, so the holding of surplus funds is significant. Surplus must also be recognized in order to match annual statement figures. It is particularly relevant that surplus itself generally yields a very low return.

Therefore we have developed a method of allocating surplus to our various blocks of business. The method is not particularly sophisticated and I won't go into it here. The important point is that we do allocate surplus, rather than how we allocate it. So we determine a ratebook's profitability based upon Statutory earnings reduced by the increase in invested surplus.

3. To put a proper perspective on cash flows which occur at widely disparate times, we convert each cash flow into "real" dollars; that is, dollars of constant purchasing power, before we calculate our internal rate of return.
4. The ratebook is evaluated on an after-overhead basis. However, current overhead need not be allocated 100% to the current ratebook. Even if we were to discontinue writing new business, a substantial amount of overhead would continue. We have not yet determined how we wish to allocate overhead between normal new business, new business resulting from options exercised from in force business, mass marketing or other special business and in force business.
5. To reflect the risk that actual results differ from expected results, we project the results for the ratebook under a variety of scenarios--a most likely scenario and also several optimistic or pessimistic scenarios. We must expect to realize an IRR that is appropriate considering both the range of potential results and the worst result contemplated. In our various scenarios, we vary new money rates, mortality, expenses and lapses, of course, but we also vary such items as option election rates, roll-over rates, policy loan utilization and tax situation such as whether or not deficiency reserves will earn reserve interest credit and also the level of premium tax.

6. Our profit measure recognizes our charter 10% limitation on par earnings. More about this later.
7. We also use more realistic equations. Although our new formulas are not as flexible as Peyton Huffman's proposed method, we do recognize cash flow accurately. This improved recognition of incidence is particularly true of modal premiums and their related expenses and of the profits from option elections. Each year, we track the remaining original issues and also conversions or other option elections exercised in earlier years.

Cash flow into and out of investments, including roll-over and policy loan utilization is carefully considered and numerous other improvements have been made relative to our previous tools. However, we are still using a policy year approach.

In addition to a satisfactory IRR, the ratebook must produce adequate cash flow for the shareholders and adequate GAAP earnings. In conjunction with in force business and other lines, the pattern of shareholder dividends and GAAP earnings must be satisfactory. Finally, of course, we must not forget that premiums must be realistic also and that corporate management does expect a healthy GAAP ROE.

Our efforts-to-date indicate that this method produces realistic and meaningful results for a ratebook. However, pricing an individual cell--that is a specific plan, for a specific size band, benefit period, age, sex, etc.--is another matter entirely:

1. Meaningful IRR results occur only when there are distinctly positive and negative flows--typically first year investment followed by renewal earnings. However we do not always find a notable strain in the first policy year.
2. Most of our strain is comprised of overhead and surplus allocation. Such allocations must be done in an arbitrary manner between in force business and new business, but the allocation between cells is even more arbitrary and yet more significant.
3. Scenarios are expensive to run at the cell level. Furthermore, it is impossible to concoct equally extreme scenarios for each cell. The worst scenario for a particular plan may vary by age.
4. A widespread change that reduces strain (such as an increase in the valuation interest rate) can cause profit measures to jump at the cell level if the increase in idle surplus is not reflected.
5. Lastly it is pretty hard to tell the field to go out and sell as much strain as possible.

For these reasons, although we are comfortable with our ratebook results, we may have to fall back upon another profit measure to use in cell-by-cell pricing.

To recap, we need different profit measures for various purposes. Transamerica looks at GAAP ROE, and GAAP earnings. We are interested in our statutory IRR modified to reflect required surplus. In pricing a specific cell, we may well use another measure. How are all of these tied together consistently? The answer is "projections".

More and more decisions are based on involved projections, thanks particularly to computer technology. We project in force and future business together to see if we will meet Transamerica's GAAP ROE goal and its secondary goal for total GAAP earnings. This projection also tells us whether the pattern of GAAP earnings and shareholder dividends is acceptable when combined with our in force business. By separating out one year's worth of new business, we can investigate the Statutory IRR modified to reflect surplus. Simultaneously, we can calculate any other measure--such as discounted profits divided by discounted premiums--to develop cell-level goals.

Although Occidental is a stock company, we do sell participating business. In 1977, 28% of our annualized premium on U.S. new business came from par plans, although we write no par term. Pricing participating business in a non-par company can be quite complicated. For example, Occidental's charter limits our shareholders to 10% of the par Statutory earnings each year. Therefore, we transfer 10% to the non-par account annually. The balance remains in par surplus and accumulates at 90% of after-tax interest yields. In principle, the limitation to 10% of the earnings carries with it a 10% share in the investment in a contract.

Our new pricing tools carefully track the flow of money between our par and non-par accounts. The primary reason for doing so is that we want to keep a close eye on the par surplus. If any cell builds too much or too little par surplus, compared to our goals, that suggests that a dividend revision is necessary.

This outline demonstrates our handling of surplus:

$$\begin{aligned}
 \text{NP RS} + \text{Par RS} &= \text{Line RS} = \text{Line Surplus} \\
 &= \text{Par Surplus} + \text{NP Surplus} \\
 &\quad \uparrow \qquad \qquad \uparrow \\
 &\quad \text{Actual} \qquad \text{Discretionary} \\
 &\quad \text{Historical} \\
 &\quad \text{Accumulation}
 \end{aligned}$$

$$\begin{aligned}
 \text{NP Surplus} &= \text{NP RS} + (\text{Par RS} - \text{Par Surplus}) \\
 &= \text{NP RS} - \underbrace{(\text{Par Surplus} - \text{Par RS})}
 \end{aligned}$$

Leverage:

- Positive: Shareholders Benefit
- Negative: Shareholders Support Policyholders

Our total required surplus for the Ordinary Line equals the sum of our non-par RS and our par RS. Par RS tends to be lower than non-par RS because of the option of reducing dividends to policyholder. As mentioned earlier, our idle surplus provides low yield so it should all be reflected in our pricing. Therefore our total Required Surplus should equal our actual surplus. If there is a discrepancy, we can either adjust our formulas for Required Surplus, or we can request funds from or pay dividends to our shareholders. Of course our total surplus must remain satisfactory to regulatory officials.

The Line Surplus is simply the sum of actual non-par surplus and actual par surplus. But the only funds that can be released from par surplus at the discretion of management are dividends to the policyholders. Therefore, given a particular experience and dividend scale, the par surplus is completely determined.

Solving for the discretionary part of the fund, actual non-par surplus, we see that, in addition to NP RS, we must set aside shareholder funds in the non-par account equal to the excess of Par RS over par surplus. By changing signs, we obtain the quantity which we refer to as leverage; that is, the excess of par surplus over par RS. If any such excess exists, we can lower the amount of funds set aside in the NP account by paying a larger shareholder dividend. Eventually the money will be paid out to policyholders, so all that we gain is temporary use of the money. Such positive leverage benefits the shareholder, but we also frequently find negative leverage. Especially on an after-overhead basis, the shareholders are apt to support the par policyholders. In determining the expected incidence of shareholder dividends, this leverage must be considered. Because we set up a par policyholders' account in our GAAP statement, but not in our statutory statement, some of our profit measures get very interesting. For example, par earnings could perhaps be transferred to shareholders faster than they appear in a GAAP statement.

Illustrated dividends are usually based on conservative assumptions. Consequently if we run asset shares with realistic assumptions and illustrated dividends, we project a lot of leverage that will benefit shareholders. This leverage causes the par business to look quite profitable, but it ignores the certainty that policyholder dividends will be increased if the realistic assumptions actually materialize. Accordingly, we use higher, projected policyholder dividends rather than the lower illustrated dividends in analyzing the profitability of our par business.

Another significant point about our par business is overhead allocation. To preclude our using of overhead allocation to sneak additional funds out of the par line, we have an overhead allocation formula which has been agreed upon between Occidental and the California Insurance Department. This overhead allocation is therefore used in determining our dividend scales.

For pricing purposes we might want to use a different overhead allocation. Perhaps the fixed allocation really undercharges the par line. Perhaps we would like to view par as a marginal line and treat its contribution to overhead as a source of profit. Either way, we simply run an asset share using the desired overhead factors with the policyholder dividends reflecting our annual statement allocation of overhead to the par line.

Par pricing, in summary, involves a recursive process.

Par Pricing in a Stock Company

<u>Step</u>	<u>Assumptions</u>	<u>Overhead</u>	<u>Dividend Scale</u>
1	Conservative	Statement	Illustrated

Purpose: Establish That Parameters Result in
Acceptable Surplus Targets

<u>Step</u>	<u>Assumptions</u>	<u>Overhead</u>	<u>Dividend Scale</u>
2	Realistic	Statement	Illustrated
	Purpose: Determine Projected Dividend Scale to Hit Surplus Targets		
3	Realistic	Pricing	Projected
	Purpose: Check for Acceptable Profitability		

First we use our conservative dividend scale assumptions, annual statement overhead, trial premiums and trial dividends in order to determine if acceptable surplus goals can be projected.

If a marketable product seems possible, we then change to realistic assumptions, maintaining annual statement overhead, to determine a more realistic dividend scale that will satisfy our surplus targets.

Lastly we test with realistic assumptions, our desired pricing overhead allocation and the projected, realistic dividend scale to see if acceptable profits develop.

It should not be too surprising that we find that our par results are pretty stable across scenarios because of the likely changes in dividend scale. However, some results can be very enlightening. For example, although higher inflation rates cause our real yields to decrease, they also provide additional investment income, thereby forcing us to increase our policyholder dividend scales.

Actually, all of our business appears to be fairly stable.

In closing my presentation, I would like to note that we are creating a new on-line asset share system on a DEC mini-computer. It will utilize rate files heavily and allow speedy changes and retesting.

MR. PEYTON J. HUFFMAN: In my experience the development of surplus for a par policy in a stock company is a very complex process and in general simplified approaches fail dismally. I think Claude's discussion will prove very useful to other stock companies issuing par business. In addition, it should prove useful for food for thought for others. Claude, with your very elaborate system of objectives are you seeing any difficulty in guaranteeing consistence between products?

MR. THAU: We have not yet developed cell level criteria. We will probably try to categorize each plan as being similar to a cell that we have tested more thoroughly, so that we can avoid the inconveniences of using scenarios for all cells. In this way, we feel we can come up with a cell level criterion which is consistent for all plans. We will use projections to make sure it is consistent with our ratebook goals and with our corporate goals.

MR. ROBERTS: The question going through my mind listening to Claude's presentation centers around the equity considerations involved in participating business in a non-par company. Claude, what do you see as any equity problems in the use of that leverage you describe where actual surplus on the participating business is larger than the required surplus for the participating business? What equity consideration do you see in the shareholder getting the benefit of that versus the participating policy?

MR. THAU: One of my friends in the company thought it was amazing that I was assigned to this project, because I seemed to have such a consumerist and non-shareholder leaning to begin with, so I considered this question carefully. The leverage does work both ways, so I decided there was a trade-off there. Besides, there can be a tremendous advantage to having par policies in a non-par company and Occidental is a current example. Our par statutory surplus is quite negative and has been negative for quite a while. A mutual company could not survive with a negative surplus. Despite our negative par surplus, we have enough surplus in our non-par line that our overall surplus is quite adequate from a regulatory point-of-view. Our par policyholders actually benefit because we are in the process of instituting a dividend scale increase despite the fact that our statutory par surplus is negative. I do not think a mutual company could do that.

MR. PEYTON J. HUFFMAN: The following discussion concerns current issues regarding actuarial assumptions as outlined for this concurrent session:

(a) Are fractional premium loadings self-sufficient?

The customary approach in rate making is to compute a premium based in annual mode asset shares, and assume the fractional premium loadings compensate for lost premium and investment income. Fractional premiums can be calculated. However, it is uncommon for such fractional premiums to be actually used unless the policy is only issued in that mode.

I have calculated fractional premium loadings for a whole life policy issued at age 35. I assumed that the policy fee fractional premium loadings cover the additional collection expense, that there is no variance of lapse rate between modes, and that there is no return of unearned premium at death. The fractional premium is determined such that the accumulated profit after 30 years is the same as for the annual mode. The ratio of the annualized modal premium to the annual premium is 1.0181 for semi-annual, 1.0278 for quarterly, and 1.0336 for monthly. I have broken down the components of the ratio for the monthly mode case.

3.54%	Lost premium income (net of percent of premium expense)
.60%	Lost interest on premium income
<u>-.78%</u>	Reduced cash surrender values paid
3.36%	Total

Hence, for this coverage, with the caveats noted above, the customary loading percentages are self-sufficient. Introduction of different lapse rates for the various modes would tend to increase these ratios and percentages. True fractional premium loadings would vary with issue age, plan of insurance, and the refund of unearned premium at death provision. Generally, the fractional premium loadings are not set to be "self sufficient." They are more usually determined by tradition or marketing expediency.

There is a better solution. It is possible to compute cash flows for each mode, according to the methods described in my paper. The cash flows may then be weighted in proportion to the expected modal issue distribution and then accumulated. The result is an asset share which automatically makes provisions for modal loading. I call this the Aggregate Mode Method.

This approach is thoroughly practical even for an actuary in a very small company (as I am now). I have used this method on all our new products. To test my approach I began with a modal distribution of issues resembling our new business experience. I assumed each mode's lapses were equally distributed over eligible lapse dates. I then derived a theoretical average duration of lapse and compared it with our actual experience first year average duration of lapse. The difference was less than .05.

It is possible to provide for differences in lapse rates between modes. To do so, one would need to estimate the expected modal distribution in future policy years. There would be a shift of the distribution from high lapse rate modes to low lapse rate modes.

(b) Where are lapse and mortality differences reflected?

The trend toward greater and greater refinement of premiums has led to a greater and greater differentiation of lapses and mortality between products. Large companies, of course, can develop their own statistics. Even smaller companies have more published data available. Joseph Brzezinski's LIMRA 1971-72 Expected Lapse Tables are valuable additions to the literature. David Green recently provided us with a modified graduation of 1965-70 Select and Ultimate mortality. Both mortality and lapse rates appear to be in a state of transition with mortality rates heading downward and lapse rates upward. It is noteworthy that the 1977 TSA Reports show a further decline in mortality. It appears that a number of companies are banking on this downward trend continuing.

My suggestion here is that sensitivity to adverse deviation may well be a key item. How much adverse mortality and lapsation can the policy handle? For example, I recently developed a new minimum deposit plan. To test sensitivity to lapses LIMRA high cash value lapse rates were doubled. The result was to reduce the 30 year profit from 12% to 5% of premium and to defer the break even year from 12 to 19. This was adjudged to be acceptable.

(c) How should inflation be reflected in the pricing process?

The obvious items to examine are the maintenance costs of policy service, valuation, commission processing, etc. As with mortality and lapses, this should be sensitivity tested. Note that it is inappropriate to use

a conservative interest rate and assume excess interest will cover inflated maintenance expenses. For example, a twenty year endowment policy will incur about the same maintenance expenses as a twenty year term, but will enjoy much more excess investment income if interest rates exceed those assumed in pricing. Also, there is no necessary relationship between interest and inflation over short periods of time. Large policies will, of course, be more immune to the adverse effect of inflation. Another potential area of "inflation" is premium tax.

- (d) How do we estimate mortality and persistency in renewable and convertible term?

I really do not have a lot to say on this subject. This is one of those areas where the actuary must balance prudence with the practical realities of life. The best method, of course, is to use one's own company data. Where using published statistics, it is especially important to examine them for appropriateness. For example, the 1971 LIMRA term lapse rates exclude extra lapses at renewal anniversaries.

The traditional way of pricing such coverages is to use the theory of select and ultimate mortality to set rates so that each renewal period funds the deterioration in mortality in subsequent periods due to the aging of the business. The utility of this approach for computing rates is problematic. It fails to recognize the fact that people who lapse their policies are not always the fully select lives. In fact, it completely avoids the issue of renewal lapsation. It does, however, provide a very useful test which should be applied to any contemplated set of premiums.

- (e) What impact will the new valuation and nonforfeiture amendments have on pricing?

I will begin this topic by outlining the recent valuation and nonforfeiture amendments.

1972 Amendments. The 1972 Standard Valuation Law Amendments temporarily raised the maximum valuation interest rate to 6% for group annuities, pure endowments, and single premium immediate annuities and prescribed the 1971 Individual and Group Annuity Mortality Tables for individual and group annuities, respectively. The 1972 Standard Nonforfeiture Law Amendments basically raised the interest rate.

1976 Amendments. The 1976 Standard Valuation Law Amendments were much more extensive. It raised the maximum valuation interest rate to 7½% for individual single premium immediate annuities, 5½% for other individual single premium contracts and 4½% for non-single premium business. A six year age setback for life insurance on female lives was included. It also liberalized the deficiency reserve clause so that some of the illogical results of the previous law are eliminated, and, in effect, some relief is provided for contracts reserved at interest rates less than the minimum valuation standard. The 1976 Standard Nonforfeiture Law Amendments raised the maximum interest rate to 6½% for single premium contracts and 5½% for others and provide a 6 year female setback.

The 1972 Amendments have been adopted in virtually all states. The 1976 Amendments have been adopted in about one-third of the states.

Because of the way the laws work, the 1972 Standard Valuation Law is the law to which most companies will conform. On the other hand, companies which wish to do so may compute nonforfeiture benefits based on the 1976 Amendments for use in states where the 1976 Amendments have been adopted. One problem is the possibility of producing nonforfeiture benefits based on a six year setback, while reserves are limited to a three year setback. There has not been a great rush to nonforfeiture benefits computed under the 1976 Amendments.

The deficiency reserve provision of the 1976 Amendments, on the other hand, is worded in such a manner that it applies to currently issued policies as well as those insured subsequent to the enactment of the 1976 Amendments. Hence, it may be anticipated that deficiency reserves requirements on policies currently being developed are likely to be eased.

The higher interest rates of both sets of amendments can reduce companies' Taxable Investment Income, since the distortion of the 10-for-1 adjustment is reduced as the valuation interest rate rises. The higher allowable valuation interest rates will not, of course, reduce Federal Income Tax on pension coverages. The impact of the 1976 deficiency reserve clause on Federal Income Tax can be substantial. I think, however, the IRS will come up with some new rules, neutralizing this benefit.

For those of you awaiting the rewriting of the Standard Non-Forfeiture and Valuation Laws, do not hold your breath. A new valuation mortality is expected by the end of the year. I understand that both laws will be rewritten from the ground up and will be at least twelve to eighteen months in the making. The result is likely to be controversial, producing further delays. The year 1985 is probably a good date to expect the new laws to become effective.

MR THAU: I could benefit from an example of how to use Peyton's method for pricing. The main benefit in his formulas seems to be the incorporation of the calendar year approach. It is obvious to me how that would really be beneficial in projecting future company profits, but for an asset share it is not clear how much difference it would make. What difference in premiums do you get with a calendar year approach as opposed to a policy year approach?

MR. HUFFMAN: That is a very relevant question. There are maybe two major differences between calendar year and policy year asset shares. They are both really timing; the first timing difference is in the area of cash flows. You get cash flows distributed a little bit differently when you are looking at calendar year calculation rather than a policy year calculation. For example, with an annual mode policy you will get the entire premium coming through in the first calendar year withdrawal benefits in the second year and death benefits straight across the two years. Another timing difference is in the area of reserves where the incidence of premiums is recognized in the net deferred premium calculation.

There are basically two methods of calculating premiums when you get right down to it; one is the Hoskins, Jenkins, Cammack present value method, which is basically a cash flow accumulation, present value calculation. On the other hand you have the Anderson or Internal Rate of Return method. These are basically approaches which stress the investment of company surplus and subsequent repayment thereof and are a function of the incidence of the profits expected on a policy. In fact, there is a material difference in timing on both the cash flows and reserves. Take a look at the cash flow accumulation methods; timing differences have a very minor impact here coming

into play only at the last duration used for pricing. For example, over 30 years on a Jenkins formula it is just the last year that is effected and the differences actually tend to be off center. Unlike the cash flow accumulation methods, the investment of surplus of Claude's methods functions most logically, if not most practically, on a calendar year basis. This is because of the nature of the results which these methods replicate, reported on a calendar year basis. In addition to the cash flow and reserve differences noted previously, investment, credited as a part of the book profit, must be allocated before proceeding on the calendar year investment of surplus method.

On a practical basis the additional refinement of the calendar year calculation seems unwarranted. For example, the differences of an annual mode contract with no first year cash value are negligible. The only first policy year cash flow occurring in the second calendar year, is that of a category of deaths and they are offset by the average reserve with very little effect. Hence, the first year's bookloss is about the same for policy year and calendar year methods. The same is true for a non-annual mode policy for which the loading approximates the percent of premium cost of collection. Where there is a first year cash value or a premium cost of collection in excess of the loading the first policy year bookloss will be spread over the first two calendar years. This delayed capitalization will reduce the present value of book profits and hence the break-even premium just slightly. The reduction is of such small magnitude you would not particularly want to go into it.

MR. R. STEVEN RADCLIFFE: I am with American United Life in the Reinsurance Line where it is difficult to give business away let alone price it reasonably. This is a two part question, first of all, how much can you allow the profit margin to be dictated by the market studies? If you are using the most liberal assumptions possible and still are not meeting the market place you have to cut your margin. This contradicts the theory that margins are conventionally necessary. So how do you resolve that difficulty? Second, can the current normal surplus in your company affect the profit margins used? If you are sitting on top of a large surplus can you use this in your pricing? Is the surplus solely for existing policyholders or are you allowed to use this consideration?

MR. ROBERTS: The first part of the question related to what extent profit margins should be dictated by the market place. My view is that this again brings into play equity considerations and if you are going to have equity between your various classes of participating business then there is a need to be consistent in the profit charges between these classes of business. I personally find it difficult to justify different profit charges between various groups of participating policyholders unless those different groups have different exposures to risk. That comes down to me saying that profit margins should not be dictated by the market place. The concern I have is that does not seem to be the scene in the market place today.

The second part of the question I think related to what extent could current surplus affect profit margins. Again, from a mutual company standpoint, it would be relevant to project ahead just what our current surplus pattern is going to be. Now this is going to be influenced by our projections of gains or losses from our non-participating insurance lines like group insurance. It is going to be influenced by how fast or how slow you are growing and the surplus commitments required for that growth and again the level of profit charges you can equitably justify between all lines of business. Now, those projections may indicate that as an example you cannot grow as fast as you are

anticipating and still maintain surplus at an adequate level. To that extent, I would think management is faced with the prospect of either slowing down growth, increasing the profit charges in order to generate more surplus or looking to the non-par areas in either of terms of increasing their profitability or possibly slowing down their growth. From an equitable standpoint, I find it difficult to justify how current levels of surplus should be affecting the profit margins that are going into pricing.

MR. THAU: I agree that profit margins are going down, on a per unit basis at least, although with average sizes going up, it is not clear that per policy profits are going down. Some people probably do not realize how much margins are dropping. By cutting down the delta that they add to their experience, their assumptions become less conservative. Maybe with these less conservative assumptions, they generate the same expected profits, but it is really not the same. Secondly, the difference between real and nominal profits is particularly important. In our pricing we are trying to reflect the "real" profits. A lot of profits may come in later durations, but if the current rate of inflation continues, those profits are not worth very much. In today's economy I think you have to explicitly convert everything into real dollars or at least use a higher discount rate. A product that has a front end investment and pays off in later profits may not be quite as profitable as you thought.

The market place does influence your premiums quite a bit, but it may not be true that it significantly distorts risks. The little that I have done so far indicates that all our products seem to be fairly stable across scenarios and seem to have at least the same ballpark returns. In a non-par company it is not important as in a par company that the profit margin be comparable for each cell. If you do have a cell that you can make more money on than another cell, there is really no moral compunction not to do that. Presumably, in a free market environment, competition will hold you in line. We have to recognize the market place, but we want to decide which products are riskier and which products provide better returns. We are not going to change our premium structure drastically, but we will try to become a little more competitive in the areas where we feel our greatest profits lie and a little less competitive on the other side.

As far as the use of surplus and its impact on pricing goes, if you have idle surplus in a non-par company, your investment return on it will be taxed highly. It is not going to help your returns look much better. Consequently, idle surplus must either be used for expansion or else it should be eliminated to avoid making equity too large and hence the return on equity (or any other type of measure which relates the return to some definition of investment) look poor. It could affect our pricing in one respect. If we have very much surplus available and neither we nor our shareholders (in our case Transamerica Corporation) have any desirable insurance or other investments to use the money, then we might try to invest it as best we can by lowering our rates. Lower rates might generate enough new business to improve our yield because we would be investing more of our surplus.

MR. DONALD PETERSON: I have a mutual company question for Mr. Roberts. You brought up an interesting point with respect to surplus objectives and overall management being involved in pricing policies when you mentioned the non-par line. Would you relate how the group insurance line fits in. Would you indicate how this might contribute to lowering the price of life insurance as those contracts are treated as participating?

MR. ROBERTS: We gave much thought to that question and it is not an easy one to answer. We decided that company management as representatives of our policy owners must decide the reasons why they would invest in any activity other than non-participating insurance. Those reasons can vary a great deal, but they should be in the best interest of policyowners. In our own case we feel non-participating lines of business should allow our participating prices to be lower than they would be in the absence of the non-participating operations. Now that in turn, particularly in a line such as group health which has had very volatile results in the past puts a good deal of pressure on management to manage that operation so it can demonstrate that their participating policyholders are better off with that line than without it. Essentially we came to the point that the investment of company funds in non-participating activities is a decision for the Board of Directors and the reasons for making that decision could vary from company to company.

MR. BURTON JAY: As I understand it, Claude, you are using a sort of a required surplus in measuring your profit in terms of greater return which is related to your appraisal of the amount of risk in a particular line of business. Is that correct? What are some of the elements that you considered in determining the amount of risk in a given line of business that leads you to making judgements as to how much required surplus a unit of business in that line would need?

MR. THAU: Our current method for determining the amount of required surplus is to evaluate potential catastrophes to make sure that we could remain statutorially solvent. We basically look at a mortality catastrophe and an investment catastrophe (which would involve a certain amount of asset loss each year) in years. Each line or each block would be normally expected to earn a certain amount of money. We reduce that by the impact of the mortality catastrophe or the asset loss and find out how much surplus it has to have on hand now in order to be able to remain statutorially solvent at the end of the catastrophe period. That could turn out to be negative because you might have a product or a line which will bring in enough funds over that period of time to more than handle whatever happens to it. It would actually produce positive profits even during the catastrophe. You can use those profits to support some of your other lines or other products which would be suffering more.

MR. TILLER: I might add a comment on that since I was heavily involved on that project. My company is known as a term writing company and I never thought about the investment side of the risk until this project. It amazed me that something like 50% of our required surplus was the result of the investment risk and that the risk there was not the loss of income but the potential loss of the asset itself. I think you will find this same thing applying to all companies really. The life insurance industry is much more in an investment risk business than a mortality risk business from a surplus standpoint.

MR. RALPH GOEBEL: What effect will the current valuation amendments have on pricing?

MR. HUFFMAN: There has not been a great rush to utilize the 1976 amendments. One company has recently produced a life insurance policy at the higher non-forfeiture rate designed specifically to produce a very low net cost, but most companies are just not moving very rapidly at all. Some companies have one ratebook for Indiana another ratebook for Texas and another

ratebook for some other states. We already have the complicated factor of the multiple policy loan rate. Our primary market is not the policyholder although everybody here seems to be assuming that the primary individual is being sold insurance. In my particular instance, it happens to be the agent and we are attempting to emphasize reasonable commissions.

MR. TILLER: I think the emphasis needs to be placed on the market a company is in. If the company is in the brokerage market or emphasizes large policies then anything that can lead to a reduction in rates will do so almost automatically. The last year or so since the Texas deficiency reserve situation was cleared up in a relatively favorable manner illustrates this. We saw deficiency reserves drop from a level of say \$30 per thousand to maybe less than a dollar. This has led to a number of companies adopting much lower non-par ART rates. I think you will see the same thing happening with permanent products when the deficiency reserve laws or interest rates go into effect. The impact of the new laws is really a question of timing and your company's market for new business.

MR. GODFREY PERROTT: Claude said he felt the benefits of deriving calendar-year asset shares did not justify the extra work that was required. I do not feel that developing calendar-year asset shares or profit studies is significantly more difficult than developing policy-year asset shares or profit studies. Attempting to reflect the effect of Federal income tax practically requires you to go to a calendar-year basis. We have been doing some work recently trying to reflect Federal income tax in plan/age profit studies and to use the after-tax profits for pricing. We have found that several of the normal pricing approaches break down, because the tax saving in the first year substantially reduces or eliminates the initial investment. I think we will conclude that pricing on an after-tax basis needs to be done at a rate book level by projecting the results of the entire rate book. I am not sure how much success the other panel member will have, going from a rate book to a cell level in developing after-tax pricing criteria.

The last comment I would like to make is that it seemed that Claude implied lapse rates do not vary by mode. I think the variation in lapse rates by mode is extremely important and should receive more attention. It is probably more important to run separate profit studies by mode than to worry about some of the other refinements we concern ourselves with.

MR. HUFFMAN: It is not necessary categorically to split a calendar year method to calculate federal income tax. There are variety of ways that federal income tax could be incorporated into an asset share at the plan inception. My prior employer was in tax position G minus 250,000 and used Marginal Tax Rates. In that situation only a few marginal tax rates have any effect at all; the asset marginal tax factor, the reserve marginal tax factor and the investment income marginal rate. The federal income tax law requires a company to average mean reserves at the beginning and at end of the year. If you look at Diagram 2 in my paper and at the meaning of mean reserve, you will discover that the reserve you are looking for, the one to which you want to apply the marginal factor is actually the mean reserve for the inforce for the year. Some people have the idea of trying to reduce investment income slightly and ignore federal income taxes; other simplified approaches also exist.

I did not mean to suggest in the discussion that variations in lapse rates by mode could be ignored. If one mode has a particularly high lapse rate, you would want to estimate how much of that is lapse loss at the end of 10 years and 20 years. Now, you would want to estimate how much of the lower lapse rate mode has lapsed at 10 years and 20 years. Much of what you have results from shift in the distribution of modes. Using lapse rates for pricing purposes is generally not going to be the result of annual mode but the result of lapse study that incorporates all the different modes. To account for the shift in mode I have recalculated the distribution factors and recognized the shift in modes.

In dealing with calendar year asset shares, a small change in one factor can produce a rather unreasonable shift. You have to be very careful and that is one reason I looked so hard for an exact method of calculating a calendar year asset share.

MR. THAU: Peyton's points on the mode distribution are well taken. The studies of our own lapse experience which we use for setting our pricing assumptions are also "all modes combined", so if we anticipate that our distribution is going to change between modes, we have to adjust those lapse rates. We also do have studies that show what our experience is mode by mode, but that is not our basic source for our pricing assumptions.

We are aware of the problem of shifting modal distribution by duration, but we do not try to do it in our asset shares. It is more work than it is worth and it requires some more assumptions on the part of the actuary. The modal distribution which we incorporate in our asset share is not the modal distribution that we expect at issue of the policy. We project it to what we would expect the modal distribution to be at duration 5. Then we assume that that modal distribution applies in every year of our asset share.

MR. TILLER: I would like some clarification from Mr. Perrott. Are you trying to reflect the federal income tax only at the ratebook level? If so, how do you insure that a policy is not contributing pre-tax profits and after tax losses?

MR. PERROTT: No, we are trying to reflect Federal Income taxes at a cell level. The point I was trying to make is that on an after-tax profit study for a company which is taxed on gain from operations, writing CRVM business and taking the 818 (c) election, the negative Federal Income tax caused by the artificial first year loss can more than offset the statutory first year loss and so there is no basis left for a return on investment criteria. Thus, to do a realistic job of pricing you have to project the entire rate book you expect to sell and look at that.

MS. BETTY TOVIAN: The LIMRA lapse study referred to has been the standard. LIMRA now has about 10 companies reporting by mode of premium payment.

MR. HARLOW B. STALEY: I just wanted to comment on a few things. One has to do with the discussion of the differences in the policy year asset shares and unless I am missing something the two results come out differently. If so, there has got to be something wrong with one of them or else we will need different ratebooks in January and July. The other point concerns situations where you are using the return on investment criteria, but the investment dis-appears and the criteria falls apart. It seems to me wrong to use a policy

year for the return on investment criteria in the first place. What you do have is a criteria that uses the time value of money for the investment risk and a completely separate charge for the insurance risk.

MR. THAU: I do not agree that the rate of return method is fallacious just because it does not work in all situations. When you come to that conclusion you can rule out almost anything; nothing works in all situations. In certain cells it does not work, but we find that at our ratebook level there is a significant front-end investment. As long as you are making a significant investment, it is quite reasonable to expect to get a return on it.

MR. HUFFMAN: In the pricing process generally speaking, I felt obliged to look at more than one criteria; does a product produce a reasonably quick return to a breakeven point? Does it produce a 5% or 10% premium profit margin? What Claude has done, what is so remarkable about his presentation, is that he has developed a systematic approach for aggregating profit objectives in several different ways at different levels using whatever approach seems appropriate at that level.

If required surplus is a reflection of your risk, then the riskier is the business written the larger should be the profit charges going to required surplus, therefore reducing the amount available to be returned to the shareholders.

