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RELATIONSHIP OF PRODUCT DESIGN AND INVESTMENT PHILOSOPHY

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1. Have significant changes occurred in the past year or two in the maturity distribution of debt instruments?

2. At what intervals is the yield assumed to change in current pricing of new products and the setting of dividend scales?

3. What philosophy and methodology should be used for pricing products that necessitate greater asset liquidity due to terms of withdrawal privileges and their utilization?

4. What devices are being used to allocate specific classes of assets to specific products or product lines?

5. What practical impact has immunization theory had on product design?

6. How do current surplus objectives reflect the increased awareness of the need to match the maturity distribution of assets and liabilities?

MR. LOUIS GARFIN: The year 1980 was a year of awakening for the life insurance industry and its actuaries. There may have been some stirrings in 1979 but I think everyone heard the alarms loud and clear by April 1980. Nearly every report to stockholders or to policyholders has something to say about the high interest rates and their volatility, the problem of inflation and changes in the level of future investment commitments by the company. Many of the annual statements show interest paid on borrowed money, capital losses on asset sales, or both. For extended periods, interest rates on short term investments were higher than long term and "money market funds" became a household phrase.

From the inside of the insurance companies, we all know some of the things that happened during 1980. Cash flow had always been enough to cover benefits and expenses with enough left over to fund investment commitments which had previously been made. Cash flow suddenly started to dry up. Policy loans increased dramatically; surrenders of individual life insurance and annuities also increased; new pension deposits went increasingly to short term investments instead of insured contracts - and so did existing pension funds which could be transferred from the insurance companies at book value or even with market value adjustments. Company managements looked more and more fearfully at the possibility that they might have to liquidate investments at huge market discounts.

An article in the March 26, 1981 issue of the Wall Street Journal discussed the situation for property-casualty companies. It said, "Major insurance companies, facing substantial deterioration in their property-casualty lines this year, probably won't be forced to dump stocks and bonds to maintain cash flow, as they were in 1974-75. That's the bright side...The dark side is that unrealized, or 'paper,' losses in the companies' bond portfolios are so horrendous that price competition in commercial lines, if it continues this year, could pose real dangers to cash flow." The article continued to state that the paper losses for 14 major companies were calculated at nearly 25% of book value. Later, analysts were quoted as saying "that there's some permanence to these bond losses and that they won't be eliminated anytime soon. If these losses were, in fact, realized losses, managements and investors would be in a deep state of shock."

The lesson of all this is that guaranteed cash and loan values for life insurance companies are valuable benefits that have a cost. Even permanent life insurance is not necessarily a long range obligation. The world has changed around us and it is no longer enough to set liabilities and premiums on the premise that the asset side of the balance sheet is a cinch. Product cost is clearly related to investment philosophy and investment performance.

MR. RICHARD K. KISCHUK: There appears to be a consensus in the financial community that high and variable inflation rates, and the unwelcome gyrations that follow, are here to stay. At the same time, the life insurance industry's liabilities have become substantially more interest-rate-sensitive. Disintermediation is now a critical problem for our industry.

Traditionally, nearly all of the industry's funds have been used to acquire fixed-rate long-term bonds and mortgages at a substantial opportunity cost to stockholders and policyholders. It is always easy to overreact to short term movements in securities markets and to extrapolate last week's trend ahead ten years, but it appears that recent convulsions in the fixed income markets are a watershed which may lead to some fundamental changes in the life insurance industry's investment practices. Even if financial markets return to normal, new types of products will dictate new investment strategies.

Many knowledgeable observers expect the typical bond maturity in the U.S. to fall to the 5- to 10-year range more typical of Europe and Canada, with variable rates fairly common. Some even predict the bond market will completely disappear. However, it is important to avoid being too negative. The industry's general investment strategy is likely to be one of reducing its concentration on privately-placed, fixed-rate, long-term bonds and mortgages, and increasing its emphasis on shorter-maturity securities and possible floating-rate instruments.

Today, there is much interest in building pools of short-term investments. The purpose of these liquidity pools is two-fold: first, to have cash on hand to meet above average demands for cash payouts, and second, to be able to take advantage of high long-term yields and other investment opportunities should they occur.

In evaluating such changes in investment strategy, it is important to keep in mind at least three factors. First, a lot of what we hear today about new investment strategies is what many people would like to see, rather than what is actually happening. It is relatively easy to talk about new investment strategies when there is little uncommitted cash flow available. Once the financial markets return to "normal", it remains to be seen whether the industry will stick to its new strategy, or whether it will revert to old habits.

Second, it is relatively easy to convince management to build liquidity pools when the yield curve is inverted, and short-term interest rates are significantly higher than long-term rates. It is important to keep in mind that, under normal conditions, the opposite is true, that is, long-term rates are higher than short-term rates. As the yield curve returns to "normal", there will be increasing pressures on investment people to invest the short-term pool long.

Third, even if companies are able to avoid these two pitfalls, it will still be many years before the industry is able to change the average maturity of its investments significantly. Because the market value of most companies' long-term investments are still far below book value, few companies will be willing to sell old investments at a loss in order to restructure their portfolios. Thus, for the most part, restructuring will not take place any faster than new cash flow and the rollover of old investments. This means that life insurance companies will remain vulnerable to high and volatile interest rates for many years, even under the best of circumstances.

What philosophy and methodology should be used for pricing products in this type of environment? What follows is a generalized framework that might be used in pricing annuity products. Similar methods could be used to price the investment element of other products, such as permanent life insurance.

Separate account business is the easiest to price becuase all of the investment risk is passed along to the policyholder. Because there is no investment risk to the company, there is no associated statutory surplus required to support this business. However, there is surplus strain because of acquisition costs. So, for separate account business, the profit margin should be set so as to provide a reasonable return on surplus invested in acquisition costs. For example, if unamortized acquisition costs are equal to 3% of annuity assets, then a profit margin of 45 basis points would be necessary in order to provide a 15% rate of return on money invested in acquisition expenses.

For general account business which is truly immunized, there is no risk from changes in interest rates. The additional element is that the company is now assuming the risk of asset depreciation. The statutory surplus allocation to cover this risk might be 2% to 3%. Using a 15% return-on-surplus objective, this translates to a profit requirement of 30 to 45 basis points, including after-tax earnings on the allocated surplus. The required return on acquisition costs would be in addition to this profit margin. So the total profit margin would be 75 to 90 basis points.

Other types of annuity contracts which are not fully immunized can be classified, for example, according to the categories used in the 1980 Amendments to the Standard Valuation Law. This classification can be used as a guide in assessing the relative risk level of various types of contracts, and in assigning surplus allocations to cover the risk of asset depreciation and interest rate change. This can be supplemented by computer simulations and the actuary's best judgement of the risks involved. For example, suppose that a surplus allocation of 7% of assets is appropriate. Then, using a 15% required return-on-surplus, the profit requirement would be 105 basis points, including after-tax earnings on surplus funds. Adding 45 basis points for the return on acquisition costs, a total profit margin of 150 basis points would be appropriate.

Contracts often include "surrender charges" which grade to zero after a period of years. The intent of these charges is to recover unamortized acquisition expenses. If surrender charges are high enough, they would totally eliminate any risk associated with recovery of acquisition expenses. The return on acquisition costs could then be reduced to the risk-free rate, about 12-13% at today's level of interest rates. This type of surrender charge is fundamentally different from "market value" type surrender charges, and does not reduce the interest rate risk in any meaningful way. Thus, the impact on required profit margins is generally minimal. For example, addition of a surrender charge might reduce the required profit margin for acquisition costs from 45 basis points to 35 basis points or so. But, for a product with a significant exposure to interest rate risk, this might only reduce the total profit margin from 150 basis points to 140 basis points.

Obviously, a critical ingredient in this pricing method is arriving at a surplus objective to reflect any mismatch between assets and liabilities for a given life insurance or annuity product. It is important to realize that even under the best of circumstances, it is impossible to fully immunize most types of products. Thus a certain degree of mismatch is inevitable.

Many companies are probably in the process of revising surplus objectives upward to reflect the increased risk associated with many products in today's interest rate evironment. At the same time, investment strategies are being changed to reduce the level of risk.

Surplus objectives that were set two or three years ago would have assigned a fairly low probability to the type of interest rate scenario that we have experienced recently. Now, the possibility of even higher and more volatile interest rates must be considered. It must be remembered that, in each of the last several interest rate cycles, short-term interest rates have peaked at a level 50% higher than during the previous cycle. If that trend continues, then during the next interest rate cycle, the prime rate will peak at between 30% and 35%.

Different observers will assign different probabilities that these interest rates might actually occur uring the next economic cycle.

But the possibility must be considered. In setting surplus objectives, management should also consider the possibiility, remote though it may seem, of entering into a prolonged deflationary downturn. In today's uncertain economic environment, executives should carefully assess the financial position of their companies and determine the amount of interest rate risk they are able to assume. Senior executives should also assess their own attitude toward risk, and determine the level of risk they are willing to live with.

Many companies will find that they have already assumed more financial risk in some product lines than they are willing or able to assume. For these companies, the question of surplus objectives will be less important. The real task will be to reduce the interest rate risk to a tolerable level through changes in product design for new sales, changes in investment strategy, and careful management of business already in force. In many cases, management will have the eerie feeling of "walking through a mine field." While restructuring the product line, management will seek to minimize current losses, while at the same time trying to avoid taking any action that might trigger sudden demands for cash payouts to policyholders.

Companies in the fortunate position of being both willing and able to take on additional risks will need to carefully consider the surplus requirements for each new type of product. Surplus objectives should be set considering both the liabilities that will be created and the investment strategy that will be followed. Surplus levels should be carefully monitored and compared with surplus objectives, so that management action can be taken at the first sign of danger. In addition, surplus objectives should be reevaluated as economic conditions change.

Overall, there is a need for very close coordination among product design, investment strategy, and surplus objectives. When interest rates were low and stable, this coordination was not as critical. Today, it is absolutely essential.

MR. JAMES G. BRIDGEMAN: I want to address the question of what practical effect immunization theory has had on product design. It is apparent that the process of grappling with product design and pricing has had a practical effect on immunization theory.

Classical immunization theory works with present values of assets and liabilities and the conditions under which theoretical present value relationships are immune to adverse developments if interest rates change. The classical theory has seen a lot of elaboration lately, particularly in the literature of financial anaylsis. I'm no expert on this literature, but one presistent theme is "active portfolio management," trading responses to interest rate movements which are required to preserve an originally immunized position, how changing yield curve patterns affect such trading, and similar questions. This literature would suggest that classical immunization theory could be characterized as "active immunization" requiring active portfolio management, at least in theory.

I will discuss another concept that could be called "stationary immunization" because there is an analogy with the stationary population theory of life contingencies. This stationary immunization theory deals with the conditions under which a portfolio managed on a buy-and-hold strategy and accounted for on the amortized cost basis can produce year-to-year investment profit/loss results which are reasonably well immunized from interest rate volatility. Such a theory, if implemented in practice, can provide actuaries with a basis for pricing, reserving, surplus management, and risk analysis that does not depend on an assumption about the adroitness of the investment department in implementing active immunization. One only needs to assume that any active management steps at least don't hurt the stability of the situation that would prevail absent trading.

Since the financial analysis literature suggests that active immunization sub-optimizes total yield over time, there should be theoretical interest in a concept of immunization that allows a buy-and-hold approach, staying away from the short end of the yield curve.

Just about anyone who looks at the asset/liability problem begins with a simple "two-risks" view of it. If assets are longer than liabilities, there is a risk that rates will rise producing capital losses, or their practical equivalent in terms of lower or even negative spreads, when liabilities are refunded. If assets are shorter than liabilities, there is a risk that rates will fall, producing reinvestment losses when the assets are refunded. If the liabilities feature compounding (rather than paid out interest) there is obviously a reinvestment risk, so eventually compound interest guarantees (or present-value reserving models) must be the moral equivalent of longer liabilities.

The natural way to get a better grip on all of this is to build a computer model that keeps track of interest requirements associated with the liabilities and interest earnings from the assets in a buy-and-hold portfolio. This approach is useful and probably essential to any study that is to be free of gross simplifying assumptions. Those of us who have gone down that road have found one drawback. The volume of results that even a simple model can produce is overwhelming. It's devilishly difficult to wrap your arms around just which aspects of an assumptions-change produce the results change. Hit-and-miss is the order of the day.

One useful fall-out from wrestling with model outputs, though, is that you soon disabuse yourself of the "two-risks" view of things. Model results that are immune to up rates or down rates get clobbered by sawtooths. There is really only one risk and it's mismatch. Depending on the situation you model that one risk can materialize in different ways, but the different ways are all linked in a continuous maze of possible outcomes. Perfect matching is impractical, so one looks for a simple key to measuring all the faces of mismatch.

It occurred to us at Aetna that we should start with basics. Draw a picture of the maturity pattern of a typical fixed income asset or a typical guaranteed interest contract. The illustrations display several maturity patterns. Two analogies suggest themselves. The first analogy is with a survivorship curve, that is, mortality theory.

In this analogy you must be willing to accept resurrection as well as death. The second analogy is a probability distribution function run backwards. In this analogy you have to be willing to accept negative probability and probability greater than one.

We took up the probability analogy first. In theory, all the information about the maturity pattern is contained in all the moments of the distribution function. We were in fact able to develop reliable empirical relations between variations in the moments of the asset and liability maturity patterns, on the one hand, and the sensitivity of profit and loss over time to trends in interest rates, on the other hand. Soon we had proven analytically that the profit and loss response to straight line interest rate trends is predicted completely by comparing the ratio of the second moment to the first moment for the asset maturity pattern with the same ratio for the liability maturity pattern. We called this ratio the "maturity index" and it finally provided a tangible result. A fairly quick calculation could give us a feel for how sensitive a given set of new contract and new asset maturity patterns would be to interest rate movements over time. Better yet, it provided a handle on what adjustments would be required if we wanted to reduce that sensitivity. The hit-and-miss approach with the computer was no longer required.

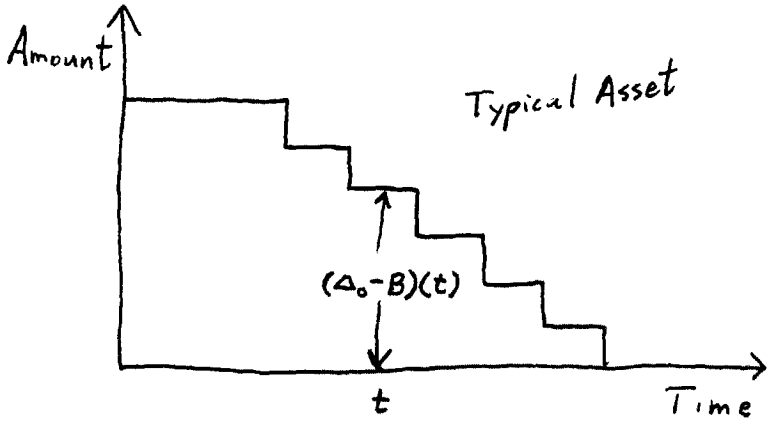
Straight-line trends in interest rates are not the only trends to worry about. However, the elegant and simple solution to the straight-line situation gave hope that a theoretical approach, rather than a computer-driven empirical approach, might pay off. It did, although the level of elegance and simplicity dropped off dramatically as soon as straight-line interest trends were left behind.

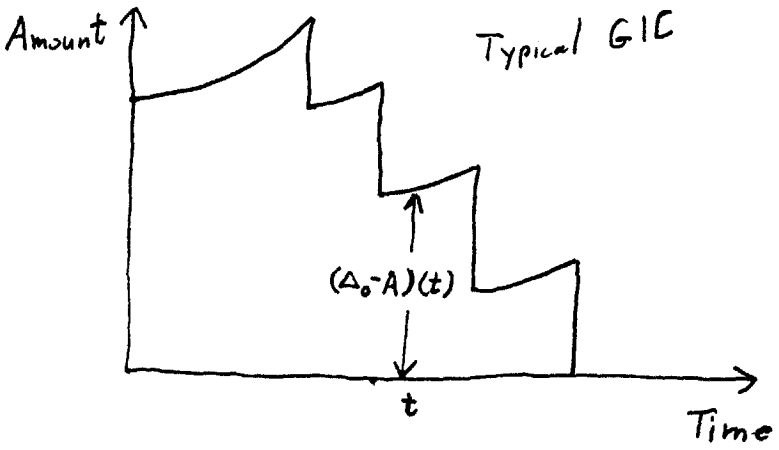
With enough notational short-cuts a formula can be written for the profit or loss each year in a population of contracts and assets driven by a level, or steadily growing, volume of new contract sales. This is illustrated by Profit Formula I.

I will omit the details of the formula. I will furnish a copy of the mathematical development upon request. Broadly, the interest rate at each prior point in time appears as δ. The formula is an integration over past interest rates. All the A and B terms relate to maturity patterns such as were previously illustrated. The upper case variables are distribution functions while the lower case variables are the corresponding densities. Variable G is an exponential sales growth factor.

Profit Formula II provides an integration by parts for each year's profit or loss in terms of past changes in rates, rather than absolute levels. I have supressed some complex algebra under the word "transients" since certain profit/loss contributors cancel each other once the portfolio has been in operation for a while. This is an assumption which greatly simplifies the formula. The μ terms are partial integrals of maturity patterns - "moments" enter the game at this stage.

MATURITY PATTERNS





PROFIT FORMULA I

$$P(Y) = \{(A_0 - B) * [([G * (\partial_0 - a)] * (\Sigma b^{**(n)})) \cdot \delta] - (A_0 - A) * (G \cdot \delta)\}(Y)$$

PROFIT FORMULA II

$$P(Y) = \left[\left(\frac{K_A \hat{M}_{\tilde{A}}}{K_B \hat{M}_{\tilde{B}}} K_B \hat{\bar{M}}_{\tilde{B}} - K_A \hat{\bar{M}}_{\tilde{A}}\right) * (G\delta')\right](Y) - \text{"transients"}$$

PROFIT RATE AFTER ONE MOVE

$$\left(\frac{\hat{\bar{M}}_{\tilde{B}}(Y-X)}{\hat{M}_{\tilde{B}}} - \frac{\hat{\bar{M}}_{\tilde{A}}(Y-X)}{\hat{M}_{\tilde{A}}}\right) \frac{G(X)}{G(Y)} \delta'$$

TOTAL EFFECT OF ONE MOVE

$$-\frac{1}{2}\left\{\frac{\widehat{(\mu^2+\sigma^2)}_{\tilde{B}}}{\hat{M}_{\tilde{B}}} - \frac{\widehat{(\mu^2+\sigma^2)}_{\tilde{A}}}{\hat{M}_{\tilde{A}}}\right\} \delta'$$

The third formula shows the profit effect, measured as a percent of the entire portfolio in year Y, of a single move in interest rates that took place at some prior time, X. Since the whole model can be built as a sum of such moves, the whole story of mismatch (in this model) is in that formula. It says that you measure mismatch not by comparing maturity schedules directly but by comparing schedules of partial integrals of the maturity schedules. If a stochastic model of changes in interest rates, δ', is used, this formula yields the coefficients to derive a stochastic model for annual investment profit and loss. The smaller the coefficients, the less the profit volatility from a given level of interest rate volatility. Finally, the last formula shows the total future profit and loss effect of a single move in interest rates. The total profit or loss depends on the difference between the ratio of a generalized second moment to a generalized first moment for the asset and liability maturity schedules. These ratios, which we call "maturity indexes," give the best simplified measure of the overall vulnerability one builds into a portfolio by taking on mismatched assets and liabilities. The ratios also suggest something about reserving. We are learning that generationally stratified present value reserve models can produce distorted margins in the absolute sense and, for some products, margin build-up and release patterns whose timing is totally inappropriate to the risk at hand. The maturity index formula suggests a reserving model that recognizes interest rate movements, without at the same time falling into the market-value error.

For product design, these formulas provide a machine to translate an assumed level and pattern of volatility in long term interest rates into a resulting level of volatility in year-to-year profit and loss. Moreover, they provide a handle on which aspects of contract and asset maturity patterns drive what aspects of the volatility. With a tool like this, it is obvious that a rational approach can be taken in reserving and setting surplus levels, product design parameters and product pricing for contracts in which maturity relationships are critical. The details of how that approach is implemented are less important than the concept that a rational approach is feasible and the fact that a rather tight set of constraints on the allowable volatility and on the risk/reward aspects of that volatility can, for example, govern a portfolio of guaranteed interest contracts actually sold in the market.

Once some facility with these relationships is developed, it is possible to obtain useful intuitive insights into many aspects of portfolio behavior. Consider, for example, the practice of committing for long-term mortgages at today's interest rates, one to three years in advance of disbursement. Putting a layer of such commitments into the model just outlined will show that it enhances investment profit stability against a liability portfolio consisting of guaranteed cost life insurance and traditional deferred annuity liabilities. However, against a modern portfolio of liabilities dominated by participating unallocated pension funds, such pre-commitments increase investment profit volatility. When interest rates were not so volatile, companies either did not notice the structural change or did not want to depart from competitive practice. Then came 1980. Standard new money interest allocation methodology typically, and mistakenly, transferred the volatility entirely to the new money rate. In 1980, most companies

saw this volatility surface in the form of relatively unattractive new money rates. These in turn translated into lower deposits to participating general account contracts, which in turn translated into uncomfortable cash positions versus existing commitments. A change in commitment practices (to reduce volatility) or in allocation methodology (to put the volatility where it belongs), or both, was called for. We are seeing some of each from most companies. On the other hand, the stationary immunization model suggests that a properly sized layer of long pre-commitments for instruments with relatively short maturities can reduce profit volatility against certain portfolios of guaranteed interest contract liabilities.

MR. IRWIN T. VANDERHOOF: I want to discuss the essence and implications of the radical change in the attitude towards investment that has taken place in the Society during the last ten years. This particular session and the topics to be considered are an example of that change. Ten years ago such sessions were not held. The emphasis of the Society's interest was not on the integration of investment and operations performance as it is today. The world has changed from a placid economic pool to an economic maelstrom. While we used to be able to assume that interest rates in the future would not differ radically from those in the past, we now have a new generation of actuarial students who have only seen radical changes during their entire working life.

The prediction of cash flows, and their variability in an unstable economic environment, is now a crucial part of the operation of a life insurance company. I believe that what we are actually seeing is the evolution of a new kind of approach towards investment operations. The concepts of Modern Portfolio Theory (MPT) and the Capital Asset Pricing Model (CAPM) are readily identified. However, these concepts are stock-oriented rather than bond-oriented. I will introduce a discipline, which I refer to as Actuarial Investment Management Systems (AIMS). AIMS differs from MPT in several crucial ways. The first is that it is bond-oriented rather than stock-oriented. This automatically takes it out of the area of interest of the CAPM, because a requirement of CAPM models is that the results of each period be serially uncorrelated. The whole point of AIMS is not to base investment operations on analysis of some great stochastic process; rather, AIMS intends toward certainty.

The principal AIMS techniques that have been discussed are, of course, immunization, absolute matching, the linear programming models of James Tilley, the investment results control technique, the variant of these techniques just discussed by Mr. Bridgeman, etc. All of these techniques are devised to produce specific investment results, usually in terms of cash flow, independent of an unstable environment. That is the essence of these techniques. They are designed to overcome instability in the environment and produce the required cash flow and investment results independent of what is going on around us.

The world of the past no longer exists. We were not receiving a real rate on long term investments and could not even assure ourselves at the Equitable that we would not experience substantial capital losses because of calls for cash when our portfolio market value was under

book. I am certain that we are all reacting to the challenge of matching assets with liabilities. Market rate guarantees of interest rates are now restricted to shorter periods. We have a popular single premium deferred annuity product in which we make interest guarantees for the next year only. Ten years ago I would have thought that a guarantee of only one year by a life insurance company was inappropriate for our function in society. Now, it seems to be the only prudent course.

This idea of matching assets with liabilities has been taken a step further by us. Like some of the Canadian companies, we have actually restructured our general account into six separate general accounts with their own cash flows, investments and investment philosophies. Assets as of December 31, 1980 were assumed to be one mass, with each of the lines of business taking its own proportionate share of the total. After the end of 1980, the cash flows related to each line of business are used as the basis for investment for that specific line of business.

We are now working with six different portfolios of assets, and over a period of years the composition of these portfolios should become substantially different. However, in one important characteristic these accounts will be similar. Except for the account that takes large nonparticipating pension business, all the other accounts emphasize short-term inflation-adaptable investments.

There is nothing peculiar about the decision to either segment the general account portfolio or to concentrate on short-term inflation-adaptable investments. We have an obligation to get some real return on our investments and to protect our companies against disintermediation when our porfolios are showing a market value loss. The best way to provide for our policyholders during a period of instability is to actually match the characteristics of the liabilities against the assets that support them. While a short-term strategy does not provide the same level of real return that we used to think we could get, it is the surest way to provide at least a non-negative real return.

The last thing I would like to mention is the current status of immunization as a specific investment technique. It is obviously part of the total AIMS discipline. All of the various techniques that are used for the pricing of fixed guarantees are generally equivalent to immunization and produce immunized portfolios. Few insurance companies have, so far, come forward and said that they are using this technique. However, this technique has become a standard method of portfolio management by banks.

MS. GRACE V. DILLINGHAM: How does the concept of the segmented general account operate? Do the various subaccounts buy and sell among themselves?

MR. VANDERHOOF: We have a protocol of the order in which investments are made for different accounts. The accounts cannot make deals among themselves. We believe that that is something that would be nice to do but we have not been able to feel comfortable that we could have the life portfolio making a transaction with the group portfolio and avoid any possibility of criticism later. There were too many cases in which it would have been too advantageous or too disadvantageous from the point of view of one of the portfolios. The portfolio transactions are strictly with the outside, and we have many years of experience in allocating investments among the subaccounts.

MR. JOHN O. MONTGOMERY: About five years ago when the NAIC was setting up the actuarial certification process, one of the items debated was the matching of assets with liabilities. At that time it was decided that there was not a sufficient number of actuaries qualified to perform that type of certification. Thus, we did not make that a part of the requirement. I believe that we should change the specification for that in the future and perhaps require it for particular cases in which a product requires a segregated account. This is particularly the case for products in which the investment income is indexed to the Treasury Bill rate, the prime rate, or something similar. Those products require regulatory observation so that we can monitor the guaranteed yields and ascertain that such yields are being matched by investment experience.

MR. BRIDGEMAN: I think the day is coming when that sort of certification will be appropriate. One of the problems of today is that we are still on the upside of a learning curve. There is not a standardized methodology by which one can educate students as they come up and certify that they are competent in that methodology.

MR. VANDERHOOF: I believe that the proper question for state insurance departments is: Is it important that there be a reasonable match between the assets and the liabilities? If the answer is "yes", then appropriate regulations should be implemented. It would be frightening from a regulator's point of view for an insurance company to come in and say, "Here we have 100 million dollars in assets and there is nobody in the company qualified to determine whether they are reasonably matched with a liability."

MR. MONTGOMERY: I agree. In a situation like that we intend to make a proper examination if required.

MR. GARFIN: There is a Committee of the Academy of Actuaries which has this issue as one of its agenda items for consideration. Surely we will need to consider this as a potential future obligation for actuaries, but it is also true that we do not presently have any generally accepted practice or guidelines by which an actuary would be entitled to say that he has made this investigation according to such practices. I submit that this problem be addressed with some diffidence. Any requirement for an opinion by an actuary with a special product situation might, perhaps, be treated as a supplemental kind of opinion rather than seeking to modify the general opinion which is required on our annual statements.

MR. CHRISTOPHER H. WAIN: With respect to the restructuring of the general account of the Equitable into several segmented accounts, are there any special provisions to take care of the possibility that one of the segmented accounts gets into financial difficulty and has to borrow from the other accounts?

MR. VANDERHOOF: If one segment ran into difficulty, it can only be one kind of trouble, and that is lack of cash. There is a predetermined interest rate at which one account may borrow from another, which is the rate at which the company can borrow. We have continuously open lines of credit with the bank, so a line of business would borrow at a rate at which the Equitable would borrow.

MR. MICHAEL J. KINZER: My question is for Mr. Vanderhoof and relates to the segmentation of the Equitable's general account. I would think there would be some surplus attributable to prior operations, which could be held as general surplus or given to each of the various accounts. How did you resolve this matter?

MR. VANDERHOOF: Obviously, each line of business requires sufficient assets to match liabilities and provide some margin for surplus. The amount of the surplus which was allocated to those accounts was a compromise between the historical surplus by line of business and the surplus which we believe the line of business required because of its risk characteristics. The Equitable has sophisticated models to establish the kinds and levels of risk, for each of the different lines of business. The allocation of surplus in a particular account was a compromise between the two approaches. The surplus which remained after allocation to the segregated accounts was credited to a corporate account.

MR. PAUL D. YEARY: Over the years I have asked questions on this. You spoke with some pride that about how the current economic situation seemed to justify your advocacy of imunization theory. Do you think, from observation of the flood of cash surrenders and policy loans, that applying immunization techniques fifteen years ago would have made the industry's current problems any easier?

MR. VANDERHOOF: If we had all done our immunization or absolute matching based on the information that was available to us, the companies would probably be in worse shape now. On the other hand I would like to believe that we as a profession have been able to learn something during the past 5-10 years.

MR. BRIDGEMAN: I don't agree that immunization ideas would have made the current situation worse. First of all, these ideas tell you right away that immediate cash non-forfeiture benefits (including low interest loans) are not sound. The British, who invented immunization, don't offer these benefits. Other examples are long precommitment periods for fixed interest mortgages and new money allocations that rigidly ignore the financial dynamics of pre-commitment. Had we taken immunization ideas seriously for the whole balance sheet (instead of just a few accounts for Guaranteed Interest Contracts) a few years ago, we might not have allowed these financially incompatible practices to loom quite so large, at least not without appropriate risk charges.

MR. MILTON L. BROWN: Mr. Bridgeman, what do you do with this beautiful mathematical model of what you have? Does it tell you what to buy, or how long to hold it?

MR. BRIDGEMAN: There is a two way street, you keeping an eye on what products are being sold to policyholders and what the investment department tells is available in the market. There must be constant communication between the product and the investment departments.