

**RECORD OF SOCIETY OF ACTUARIES  
1982 VOL. 8 NO. 4**

**IMMUNIZED AND DEDICATED PORTFOLIOS FOR PENSION  
FUNDS**

*Moderator: T. THOMAS SIMESTER. Panelists: ROWLAND DAVIS, WILLIAM A. FARQUHAR, ANDREW F. SHEWAN*

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MR. T. THOMAS SIMESTER: Immunization and Dedication have become rather hot topics. This is evidenced by the tremendous volume of articles appearing in the various financial publications. For example, I have scanned the latest issue of *Pensions and Investment Age* for articles or ads on either dedication or immunization. The feature article is on immunization and is entitled, "Investment Strategies Must Change With the Times." Another article is captioned, "Goodrich Dedicates." An ad by a brokerage house says, "Bond Immunization - A New Procedure To Secure Pension Benefits By Locking In Today's High Real Rates of Return." Another ad, by a bank, refers to immunization as, "A New Flexible Investment Strategy."

I keep running across the same terms, such as "locking up," "down-side protection and up-side potential," and "managing assets and liabilities in relation to one another."

Firms such as Chrysler, Firestone, Sante Fe Industries, American Airlines, and Goodrich have all either immunized or created dedicated portfolios. It is interesting that most of these companies belong to industries that are currently facing hard financial times.

There are also many new twists to this topic such as "contingent immunization," "mixture immunization," "money market immunization," and I have even run across immunization through the use of interest futures.

Our first speaker is Andrew Shewan. Andrew is a Fellow of the Scottish Faculty of Actuaries and has had experience in Scotland working as a life company actuary and as an investment manager. He is a consulting actuary and principal with William Mercer in their New York office.

MR. ANDREW F. SHEWAN:

### Historical Aspects

The central event in the creation of immunization was that F. M. Redington, then Chief Actuary to the Prudential Assurance Company, Ltd. of London, was asked by the Institute of Actuaries to write a paper on the "Principles of Life Office Valuations" for presentation in April, 1952. One of his many concerns had been that, in general, assets had been neglected in the valuation process. The implicit assumption was that the asset values were known without actuarial help, and the problem of the actuary was to value the liabilities.

More important in the present context was Redington's concern that no actuary could absolutely attest to the solvency of a life insurance company since it appeared to depend on the validity of his interest assumption (among others). So Redington's original paper began by noting the uncertainty of future investment returns. He remarked on the prudence of matching assets against liabilities as to term, currency, risk, and so on. This was the conventional wisdom of the day and applied to all financial institutions which took money in with one hand and lent it out with the other.

He went on to discuss the solvency of life offices, noting that if assets and liabilities were exactly matched, then the value of liabilities and assets associated with a particular interest rate would both go down or up by an equal amount as the interest rate went down or up. Thus if the office were solvent at today's interest rate, it would inevitably be solvent at a different interest rate, and so in these circumstances the solvency could be certified even by an actuary who did not know what future interest rates would be.

Redington noted also, that if the fund were invested short, insolvency might result if interest rates fell, for then the value of liabilities would increase much more than the market value of the assets, which I should add, were at that time chiefly bonds. If the fund were invested too long, insolvency could result from increasing interest rates. The latter reflects the circumstances of a savings and loan institution whose liabilities are short-term deposits and whose assets are longer-term fixed-rate mortgages.

The paper was completed 10 days ahead of the deadline, and early one Saturday morning while lying in bed in a particularly relaxed mood, Redington realized that if the discounted present values of assets and liabilities were equal at one rate of interest and remained equal on a shift in the rate of interest, then the differentials of the present values with respect to the rate of interest must be equal. Obviously, we only have Redington's word for it, but he says he got up early, did some differential calculus and at the last minute added two sections and an appendix to his paper. The well-known historical results are shown on Chart I.

What is Redington's result? Well, it tells us that if we have a given obligation represented by  $L_t$ , and we construct a portfolio of assets

CHART I

GIVEN:  $L_t$  = LIABILITY PAYOUT AT TIME  $t$

$A_t$  = ASSET INCOME FROM COUPONS, DIVIDENDS, MATURITIES

AND:  $\sum v^t L_t$  (PRESENT VALUE OF  $L_t$ ) =  $\sum v^t A_t$  (PRESENT VALUE OF  $A_t$ )  
AT INTEREST RATE  $i$

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PROBLEM: UNDER WHAT CONDITIONS CAN WE BE SURE THAT

PRESENT VALUE OF  $L_t \neq$  PRESENT VALUE OF  $A_t$

AT RATE  $i \pm \Delta i$  ?

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SOLUTION:  $\frac{\sum t v^t L_t}{\sum v^t L_t} = \frac{\sum t v^t A_t}{\sum v^t A_t}$

AND  $\frac{\sum t^2 v^t L_t}{\sum v^t L_t} \neq \frac{\sum t^2 v^t A_t}{\sum v^t A_t}$

"IMMUNIZATION CONDITIONS"

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SPECIAL CASE:

$L_t \equiv A_t$  FOR ALL  $t$

"EXACT MATCHING"

represented by  $A_t$  to satisfy these equations, then some interesting results follow. If, for example, \$1 million in assets is enough to meet liabilities valued at \$1 million at today's interest rate, and the \$1 million is invested to satisfy these formulae, then the \$1 million will be at least enough to meet the liabilities even if interest rates change a bit. If we constantly adjust the asset structure to ensure that the equations are satisfied, we can cover a series of small changes in the interest rate. We can, in other words, ensure that the liabilities will be met by the \$1 million in assets, no matter what happens to interest rates.

I would just add, as a historic aside, that Haynes and Kirton were writing a paper on a similar subject for presentation to the Faculty of Actuaries, and their paper, with a similar philosophical position on valuation, beat Redington's by one month. Their paper, "The Financial Structure of a Life Office" was much more directly concerned with tacit related issues, and it is ironic that Redington, in a paper on valuation, should have made the key discovery about asset management, while Haynes and Kirton did not.

#### Immunization Versus Dedication

I'd like to define some terms before we go on. An "immunized" portfolio is one structured to satisfy Redington's equations. A special case is the "matched" portfolio, where the portfolio is structured so that each payout is exactly matched by coupons and maturity proceeds of assets. In a "dedicated" portfolio, exact matching is the goal, but proceeds of investments are allowed to come in a little early where exact precision is not possible or practical.

Chart II summarizes the relative advantages and disadvantages of dedication and immunization.

The obvious advantage of immunization lies in its flexibility. The number of portfolios satisfying the general equations is vastly greater than the number of exactly or nearly matched portfolios. We therefore have much greater scope to choose one portfolio that suits us on grounds of superior yield, superior quality, absence of call possibilities, or whatever it might be.

Advantages of matching are that it offers more complete protection against interest rate changes, and that it is more easily understood by clients and, I fear, by actuaries too. There is a definite communication problem with immunization.

On some other points of comparison, the two techniques come out more or less equal. Matching brings some cash flow management advantages although we can organize immunized portfolios to take care of cash flow too. There is also the possibility that liabilities will be too long in duration for Redington's equations to be satisfied, but it should be obvious that since matching is a special case of immunization, any liabilities too long to immunize will also be too long to match.

This point about duration is an important one because it seems to have been misunderstood in some quarters. I will not go into details, except to say that you should not underestimate the possibility of satisfying

## IMMUNIZED AND DEDICATED PORTFOLIOS

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CHART II

	<u>IMMUNIZATION SUPERIOR</u>	<u>DEDICATION SUPERIOR</u>	<u>NEUTRAL</u>
CHOICE OF SECURITIES	X		
PROTECTION AGAINST INTEREST RATE CHANGES		X	
COMMUNICATION		X	
CASH FLOW MANAGEMENT			X
LIABILITY DURATION			X
TRADING COSTS		X	

Redington's equations. In particular, it is unlikely that the liabilities associated with a block of retired employees in a pension plan will present a problem.

I started with the question of flexibility or range of choice. Suppose we have a single obligation to pay \$100, five years hence. Matching demands a zero coupon bond of five years' duration in the amount of \$100. Perhaps we can find one, but if we do we may find that its price has been bid up by individuals using it for their IRA, or by other institutions seeking a matched portfolio for their similar obligations.

Immunization allows us to use a mixture of three- and seven-year zero coupon bonds, or two and seven, or T-bills and seven-year zero coupon, or coupon bonds, so long as the receipts from coupons and maturities before five years are balanced by receipts expected after five years in such a way as to satisfy the equations. The number of possibilities is immense, in fact so immense that organizing all the possibilities in order to choose one may be a major effort. However, by using these possibilities, we can choose bonds with high yields, eliminate bonds with awkward call provisions, and still have left a multitude of possibilities.

Earlier I said that matching gives better protection against interest rate changes. The way that immunization works is that if interest rates rise, the enhanced reinvestment return on the coupons and maturities coming in the early years exactly match the loss of value of the longer dated maturities. Conversely, if interest rates fall, we lose on the reinvestment of early receipts, but the value of the longer maturities goes up to compensate.

Clearly this would break down if rates on the later maturities went up more than the rates on the shorter ones. The reinvestment gain would no longer be equal to the market value loss on the longer maturities. In other words, immunization other than matching is vulnerable to a counter-clockwise shift in the yield curve. Redington's analysis, incidentally, assumed a single interest rate for all maturities, a flat yield curve, but that assumption is needlessly strong.

The risk associated with this kind of shift in the yield curve clearly increases as we depart from the fully matched position. The art, therefore, is to balance the increase in yield available from the wider choice of securities against the additional risk inherent in departing from the fully matched position.

### Insurance Products

There are many ways of using insurance products to achieve a result similar to immunization, that is to "lock in" a rate of interest. One is to buy annuities, thus "locking" the rate for the remaining life of the plan members covered by the purchase. This procedure also takes care of the mortality risk, which immunization does not. Many insurers will issue contracts which simply guarantee a series of payouts without mortality guarantees.

From the plan's standpoint, such an approach differs from immunization in a number of ways from which I've selected three:

(i) The risk of adverse movements in the shape of the yield curve is totally absent from the plan's standpoint, since it is now transferred to the insurer.

(ii) Instead of direct ownership of a portfolio of securities, the plan holds an insurance contract. This has a number of consequences, most notably that the penalty for changing direction may now be greater.

(iii) Since this freedom to alter course may be restricted, the insurer may invest in less marketable securities than a direct money manager might consider proper. In this way, a higher yield may be available through insurance.

Other kinds of insurance products can be used in connection with immunization, including single payment or "bullet" GICs. If a plan holds such a contract, it may be possible to use it in constructing an immunized portfolio. Viewing the GIC as a security, we can solve Redington's equation to determine possible maturity structures for the remaining assets. In this way, we may be able to build an immunized portfolio around an existing GIC, thus avoiding any penalties which would be incurred through early surrender.

MR. SIMESTER: Our next speaker is Rowland Davis. Rowland is a consulting actuary with TPF&C and has authored TPF&C's background paper on this topic. His presentation will address the question, "Does immunization reduce pension costs?" He will also discuss new forms of immunization.

MR. ROWLAND DAVIS: I have the privilege of speaking on some of the softer issues related to why someone should immunize. What kind of decision is it and what kinds of things influence that decision? Picture a real world scenario which takes place as follows: The consulting actuary is sitting in his office contemplating the philosophical niceties of whether his long range inflation assumption should be 4-3/4% or 5%. Suddenly he is jerked to reality by a somewhat hysterical call from the treasurer of one of his larger clients. The client announces that they have just reached a decision to adopt a dedicated bond portfolio and he needs to know immediately what the cost impact will be on the pension expense. He also needs a disbursement forecast for the plan. The actuary, being completely unaware of this decision in advance, bewilderingly inquires as to how and why this decision was reached. The simple answer is that the chairman of the board was playing golf over the weekend with the president of XYZ Corporation and they immunized and saved \$2 million a year on their pension expense, and that's that.

I personally have had this happen to me and I suspect that there are others in the audience who have had the same situation arise. The fact is that immunization from this perspective is conceived of as a neat little gimmick. It is getting a lot of attention at very high levels in companies among people who may have a low understanding of pension funding concepts.

Does Immunization Reduce Pension Costs?

The environment prevailing prior to the last couple of weeks was very high interest rates, poor economic conditions, and perhaps a general perception of actuaries as being overly conservative in their funding approach to pension plans. All these conditions add fuel to the fire, and an actuary who finds himself in the aforementioned situation can be quickly put on the defensive. Only rarely, I think, will you find an actuary who has a package of assumptions already in place which recognizes in a direct way the current yields that are available in the market place. Typically, this would be through some sort of a select and ultimate approach. This fortunate actuary could then lean back in his chair, glow with pride and tell the treasurer, "Relax, I have already recognized the impact of bond immunization for you." The treasurer will hang up, mutter what a great actuary he has, and then try to figure out some way to get credit for the decision himself.

In the more typical case, with a more typical kind of assumption package, the actuary is on the defensive and has to deal with the question of whether or not costs are really reduced. It is an educational process that he is now faced with. Obviously, from the client's perspective, costs are reduced. Next year's pension expense, if assumptions are changed, will in fact be down X percent. From the actuary's viewpoint, of course, the answer is that on a longer-term basis, costs are not reduced. The fundamental pension equation is that costs will equal benefits paid less investment income on the fund. Immunization certainly doesn't affect benefit payments. Whether or not it affects investment income is unknown, in advance, anyway. So what we really have is a situation where the change in assumptions stimulated by immunization represents a change in the pattern of costs. It represents a compression or capitalization of future investment gains that would have occurred.

A typical situation may consist of a long-term interest rate assumption of 6½%, the portion of the fund which is going to be put into a dedicated bond portfolio representing about 5% of an \$80 million fund, and an immunization rate of 14½%. If the interest assumption applicable to the retired group is changed to 14¾%, an immediate reduction in pension expense of \$700,000 would occur in the following year, assuming 30-year amortization of the change. In future years, however, we are going to be realizing smaller and smaller investment gains than we would have realized if the interest rate had not been changed. This is going to eat away at the cost differential and eventually the costs with the change in assumptions will exceed what they would have been if you hadn't changed assumptions. The crossover point is eight years, assuming that you are amortizing investment gains and losses over 15-year periods. They will continue to be higher, at least nominally so, until 15 years after the bond immunization fund is used up, which potentially is a very long period of time. If you look at the period beyond the eight-year crossover point, you will see that the cost differential continues to increase for the next five to six years due to the cumulative impact of reduced investment gains. From that point on, your cost differentials tend to come together. All of this then is set in the context of an immunization decision being primarily an actuarial type of decision, one that influences the desired funding pattern of the plan.

If the decision is not made in a defensive posture, there is certainly room to use immunization as a conscious funding strategy. As long as the client is made aware of all the implications, I personally see no problem with utilizing a set of assumptions supportable by immunization. There is also a presumption that immunization is only required if the actuary is uncomfortable adopting fully realistic assumptions without immunization as a backbone support for them. I also see no reason why fully realistic assumptions could not be adopted in the absence of immunization. Because immunization is a potential low-risk investment strategy, the actuary should think carefully about whether his assumptions should be such that they should influence the investment decisions of the pension fund.

The immunization decision is an investment decision. As such, you have to investigate what kind of investment strategy should immunization be viewed as. I think it is properly viewed as a strategy that reduces risk. It is a low risk investment strategy in that it narrows the range of return on both the downside and on the upside.

I think the bond immunization fund is sometimes mistakenly approached as a way to maximize the yield on part of the fund by locking in high returns when interest rates are high. Obviously, if interest rates are high and the expectation is that they will go down, this is not the best way to achieve maximum yields. The best way would be to go to very long-term maturity bonds and get the capital appreciation when the interest rates fall. The last few weeks have illustrated this fairly dramatically. So, sometimes what appears to be the most obvious point in time to immunize is maybe the worst time to immunize. This fact is not always fully realized by plan sponsors.

Another issue often discussed is whether the immunization approach is an active or passive strategy. The proper actuarial answer to whether it is active or passive is "all of the above." By definition, a bond immunization fund is a passive strategy with respect to what the future interest rate changes will be, and passive in the context that you are not trying to guess which way interest rates are going. At one extreme, a dedicated bond fund with exact cash matching which is entirely invested in government securities with no call or default risk, can really be operated as a buy and hold type of approach. This is the ultimate in a passive approach. In the non-dedicated bond immunization fund, you cannot operate on a buy and hold strategy since you have to rebalance the portfolio periodically and keep the duration in line with what your target period is. Also, within any kind of bond immunization fund there are opportunities for the manager to pursue an active strategy with respect to trading within industry sectors or between quality sectors and so forth, in an attempt to maximize the overall yield.

#### New Forms of Immunization

Finally, moving towards the more active kind of strategy, there is this approach called "contingent immunization." Contingent immunization really does not start out as immunization. There is a bet being placed on which way interest rates are going to move, but that bet is made within some constraints. The maturity structure of the portfolio is constrained within limits and a certain floor return is established at the outset. The

floor return will be set at some level below what a regularly immunized fund could achieve, typically one to two percentage points below. At that point, the manager follows an active strategy while constantly monitoring his progress relative to achieving this floor return over the set time frame (typically a five-year time period, as in a regular immunized situation). If he has bet wrong on interest rate movements and at any point in time he sees that the only way he can achieve his floor return is by immunizing, that then triggers immunization of the fund and from that point on it is a regular immunized fund. Hence, this is really a way of controlling the down-side risk while allowing more up-side potential than a typically immunized fund. It does constrain the up-side too, but it is not quite as obvious.

Another phrase that Tom used in his introduction is the catch phrase "you are managing your assets in relation to your liabilities." I think this is an interesting idea and one that is a little difficult to deal with. If you look at a dedicated bond fund, on the face of it you are doing exactly that. However, you must recognize that only a segment of the assets are matched to a particular segment of the liabilities. To my knowledge, no one has really come up with a concept to broaden that idea to cover a whole pension plan so you could really fine tune your asset management techniques with respect to all of your liabilities. This is due to the long range nature of the liabilities.

Nonetheless, does a segmented approach to the liabilities and the asset management make sense? I think, as actuaries, there is perhaps a tendency to feel that it does make sense because our funding methods and techniques tend to make us think in terms of funding liabilities over a working career, i.e., building up a pool of funds and then using that money to pay off the benefits when they come due. We tend to think of it in terms of an individual in the fund and how we fund for him. In effect, what we are doing is adopting a first-in first-out approach to pension funding. This view, I think, necessarily implies that part of any fund is there for the near term liabilities and parts are for correspondingly longer periods of liabilities and the future money coming into the fund is for even the longest period. If you step back through and take an aggregate view of the fund, take yourself out of your actuarial frame of mind and put yourself in an investment frame of mind, you might question whether that first-in first-out approach really is the right one to take. Probably the majority of clients that we deal with have contribution flows which exceed current benefit payments. In that case you could take a last-in first-out approach, where benefit payments are first being paid out of any contributions that are coming in with the net amount of money going into the fund as net new money. If you take that approach then none of the current fund is really required to meet current benefit disbursements, and the investments of the entire fund can be considered in the context of a long-term horizon. I think this concept is more correct in terms of an investment viewpoint.

Although there is some legitimacy to the segmented view, it must be utilized with some care and caution. If the segmented approach is taken, you cannot ignore the impact of the dedicated fund on strategy for other assets. In particular, if part of the assets correspond to near-term benefit payments, then other assets must be for longer-term liabilities.

Also, if a low-risk strategy is more appropriate for the remaining assets, the segmented approach takes on more legitimacy if there is a possibility that the plan will terminate and contributions will be discontinued.

Finally, I would like to discuss some situations where perhaps immunization can be construed as a useful approach. I think it is useful whenever a low-risk investment strategy is called for. Maybe this is the case with the financially troubled corporations that can't afford down-side risk in their pension fund at this point in time. Perhaps dedication, even in the absence of a change in actuarial assumptions, is a proper strategy for some of these companies. For more mature pension funds, it might also be a proper kind of strategy. The more mature a fund is the shorter the investment time horizon becomes and immunization might make more sense.

There are some special situations where the investment horizon is being shortened due to a specific event and immunization might be the proper approach. For example, if there is a potential that the plan will be terminated, or even a partial termination at some point in the near future, immunization may be a strategy for dealing with the ultimate liabilities that you will be faced with. Potential divestiture of part of a company is a similar situation. If you want to guarantee a certain funded status of a plan or portion of a plan at some point in time, you might be able to develop an immunization strategy that would deal with that.

Immunization as a low-risk approach could also serve as the core portion of an overall fund and allow the remaining portions of the fund to be invested on a higher risk investment strategy.

Finally, we have to go back to the original situation where the immunization process has triggered a change in assumptions and, therefore, an immediate reduction in pension expense. The fact is that it is very effective in doing that, and there are a lot of plans that have gone that way. If it is done with open eyes, I see nothing wrong with that kind of an approach, especially where the actuary is not comfortable incorporating current yields into his actuarial assumptions without immunization.

MR. SIMESTER: Thank you, Rowland. Our next speaker is Bill Farquhar, Vice President with Meidinger. Bill has been a consulting actuary for the last 15 years. He will discuss IRS and FASB considerations.

MR. WILLIAM A. FARQUHAR: I would like to begin with a few general comments and then get into some of the specifics. I spoke with several of the actuaries in our firm who attended the Conference of Actuaries meeting in Cambridge earlier this month. They mentioned two things: that a similar session to this was probably one of the best attended, which seems to indicate that everyone has an interest in the subject; and that there seems to be very little new or detailed information on the subject. I am hopeful that, both after we finish our prepared remarks and also at the workshops, all of you will be willing to share some of your practical experiences in this whole area.

I have heard that the Internal Revenue Service has circulated internally a draft which goes into five or six approaches to handling the funding of

plans in these immunized situations. My understanding now is that the draft is being rewritten. I also understand that the Internal Revenue Service is viewing what I consider to be a change in the interest assumption, with respect to this immunized block of retired liabilities, as a change in method. I personally disagree with that position because I don't believe it is a change in method and, as you know, a change in method requires IRS approval. I would certainly welcome any corrections to my comments or any updates to the information I have.

There is, though, one change in method that is a part of this whole matter of funding with respect to immunization. That is the valuation of assets. If you are using an asset valuation method which is other than market, then you would have to make a change in asset valuation method, whether it be for the block of assets that are being immunized or possibly for all assets. Clearly, in that situation, whether we like it or not, we would have to go to the IRS for approval.

Lastly, I would like to mention that I am not going to get into, at least in my comments, the merits or the pros or cons of using different interest assumptions, but only to state that this is a given, and then we can discuss it, or argue about it, or whatever, later.

Let's assume that the interest assumption used in the valuation for both the active and retired people is 7%. Let's further assume that we are immunizing this block of retired liability at, say, an interest rate of 13%. I am making it a given, for the purpose of my comments here, that these two sets of interest rates in aggregate are a reasonable set of assumptions considering salary increases and all the other assumptions that are involved.

I think the actuary must be comfortable that the investment manager, in fact, has the capabilities to immunize this block of assets that are backing up these retired liabilities at 13% or whatever rate they are being immunized at. As we have discussed earlier, there are really two areas of risk here as to whether or not we are going to attain that 13% return. One is the risk in the investments themselves. Typically, the way this is handled is by essentially investing in government securities which are not callable and are basically risk-free, although some of the portfolios will contain a number of high grade private bonds, principally to solve some of the problems of duration and amount. The second thing that the actuary ought to be comfortable with, with respect to the investment manager, is that the investment manager has the capabilities to be able to continue to reimmunize this portfolio as these yield rates are twisting and turning and bending over a period of time. In theory, at least, if you were to immunize on a continuous basis and you have available all size bonds and all durations, you could continuously reimmunize this block and obtain your 13% return. In practice, there may be some shortfall but you want to be sure that the investment manager basically knows what he is doing and that there is a very tiny probability that much less than 13% is going to be achieved, so that you, as the actuary, can be comfortable with making that assumption.

There are basically two types of approaches in handling the funding of a plan once you are immunizing. There seems to be developing a terminology

of what these two approaches are called. I am going to first mention the approach that makes the most sense to me because I feel it is actuarially sound to recognize these changes in assumptions, and I also feel that it is a simple method. It has been called the group annuity purchase approach. Basically, how it works is that in the valuation process you set aside the block of assets valued at market that are required to immunize your retired liabilities. You also set aside a liability which is valued at this immunized rate of return, in my example 13%, so that it is in exact balance.

Then the decrease in the unfunded accrued liability (UAL), if treated as a change in assumptions, would be amortized over 30 years at the valuation rate, which is the 7% you are using in your valuation.

This is similar to what would happen if you had actually gone out and purchased annuities at a 13% rate and given up the assets and liabilities. The plan would have a decrease in the UAL and it would obviously be amortized at 7%. However, one thing would be different. If you actually purchased the annuities, it would be considered a gain and you would amortize it over 15 years. So I think that there is some merit, even if you don't purchase the annuities, to amortize this decrease in the UAL over 15 years.

The second approach has been called the spin-off approach. Here you would spin off the assets at market again, but you spin off the liability at the valuation rate of 7% interest. Then you would revalue the retired liabilities at the immunized rate, 13%, and that decrease in the UAL would be amortized over 30 years as per a change in assumptions but at the 13%. The thing that really makes this method very artificial is, in order to get this to balance, you would have to go back to your original retirement base and develop an additional charge amortized at 7%. The amount you would amortize would be the differential between the 7% and 13% interest rates. As I say, you would have to develop an artificial way of determining what portion of these various amortization bases is attributable to the original retirement base that has been spun off and is being immunized.

Just briefly, what happens in future years is that each year the current internal rate of return of this portfolio would be measured, and it might go up to 15% or it might go down to 11 or 12%, but this is sort of the magic, if you can call it magic, of this whole immunization process. If it is being done properly, what should happen is that if the internal rate of return goes down, and you value these retired lives at 11%, the liability will go up. But if you have immunized it properly, the market value should also go up because of this decrease in interest rate; hence, the liabilities and the value of the assets on the market value basis should be still balanced. The converse is also true. In practice, there are going to be mortality gains and losses. People are either going to live longer or they are not going to live as long as you assume. So what you are going to have to do is transfer assets either into or out of this immunized portfolio in order to reach this balance point each year. Clearly, those transfers of assets (these gains and losses, if you will, for mortality) would be reflected in the UAL if you are funding it either on an entry age normal or a unit credit basis. If you are using FIL,

which is one of my favorite methods, it would be reflected through the assets and would flow into the present value of future normal costs and then be spread as an increase or decrease over future normal costs.

Last, I would like to comment on the accountants' position on this. I don't have any firm information at this point, however, my experience would indicate that I don't see that there should be any problem with the accountants under FASB in reflecting charges against the earnings of a company because of a change in assumptions, or if you want to call it a change in method, assuming that change in method is approved by the IRS. The only problems I have come across with the accountants are in situations where either the firm has reduced their pension contribution to use up the balance in the funding standard account, or in situations where they have adopted the alternate funding standard account, which results in a lower contribution. However, these areas are really not relevant to the immunization subject and, in fact, if you are using the alternate funding standard account, immunization would have no impact on the contribution because of the fact that the contribution would be basically the normal cost under either the entry age normal or the unit credit, so the decrease you have in the UAL wouldn't flow through to decrease the contribution in that situation.

MR. SIMESTER: As actuaries, we have always been involved with some aspect of the design of group annuity contracts. Consulting actuaries may prepare specifications requesting proposals from insurance companies and the review of these proposals. Actuaries with insurance companies may be involved in the proposal itself.

Recently, consulting actuaries have had to set forth the specifications to be used by banks and investment brokerage firms in preparing their proposals for dedicated portfolios. The following are some do's and don'ts that may help you if you are involved with designing a set of specifications:

1. If you are sending out a number of invitations to bid, it is important to set a common valuation date which would be prospective. Just a couple of days difference one way or the other can make it very difficult to compare proposals.
2. Specify the quality of the portfolio that you wish to consider, i.e., double B, triple A, or all government issues.
3. State the maximum percentage of the bonds of the dedicated portfolio that can have call features.
4. Since there is never an absolute matching of the benefit payments with the cash generated through coupons and maturities, we should stipulate the reinvestment assumption to be used in calculating the internal rate of return of the portfolio. I prefer a 0% return which places a premium at having a close match.
5. Any other special guidelines, such as a specific mix of corporate versus treasury bonds.

Another thing I have found out, particularly in dealing with regional banks, is that often this business is contracted out to an investment brokerage firm.

There are also practical, as opposed to theoretical, problems that you may run into. The bond issues indicated by the computer program may not be available for purchase. Bonds aren't traded as actively as common stocks, and hence, determining the value of a bond as of a specific date may pose more of a problem than for a common stock. Also, the people who create dedicated portfolios claim that their computer can match any payout stream that the actuary provides. In practice, this has not been true, particularly if you throw in COLA increases or work with a segment of the active lives. Their computer programs apparently are designed to work with a benefit payment pattern that starts at a high initial level and decreases to zero after 30 or 40 years. If instead you present them a payout scheme that increases for five or ten years and then decreases until it runs out, you will often get weird results. I can think of one proposal that we reviewed where the fund started out with \$30 million and after the last death the dedicated fund ended up with \$50 million, more money than they started out with.

As a final comment, I would like to mention another answer to this whole subject of matching assets and liabilities which is used quite frequently with public plan valuations. Under this approach, the actuary uses an asset valuation method that discounts the future cash flows from investments at the actuarial investment return assumption to develop the actuarial asset value.

MR. EDWARD FRIEND: I would like to address myself to the last observation by Mr. Simester concerning the use in public plans of a valuation technique wherein the bonds and coupons are brought to present value at the actuarial rate. This is as powerful as doing the same kind of thing as immunization and dedication in the sense that you are not allowing bonds to create an artificial impact. It seems to me that this approach, which has been used for decades in Great Britain, is one that deserves a lot more attention than it has been getting.

Two very fine papers were written on the subject for the International Association of Consulting Actuaries. One was written by Tom Bleakney of Milliman & Robertson and the other by Jim Clare, a Canadian actuary. Jim's approach was particularly unique in suggesting that when one does this and is confronted with an unusually high value of assets, one should take the difference between the assets obtained in this discounted fashion and the assets at market, and subtract that difference from the liabilities. The assets would then be valued at market. I am curious to know the reaction of the panel as to whether, in fact, the IRS would perhaps be satisfied with such an adjustment of the liabilities while leaving the assets at market.

MR. DAVIS: I might add that the approach of discounting a stream of income can be applied more narrowly to just the bond immunization fund or dedicated portfolio using the valuation interest rate. The advantage of this approach is that every year you can continue to value all your retirees at the same long-term rate, eliminating the problem of identifying that

group of retirees you had previously set up the dedicated fund for and valuing them differently than other retirees. Also, the roll forward of the asset value is pretty smooth. You just roll it up at the valuation interest rate, take the benefit payments out, and you have got the next year's expected value of the bond fund.

One potential problem is that it could be viewed as a method change, a change in the actuarial value of assets.

Also you are faced with the 80% - 120% corridor. However, you can test for that and if the immunized portion is not too significant relative to the total fund, it may be very unlikely that there would ever be any problems.

MR. JONATHAN SCHWARTZ: As long as Ed Friend dragged the public sector in, here are two more problems that he didn't touch on concerning this approach:

1. As some of you may be aware, our portfolios include a fairly large chunk (over 20%) of essentially New York City paper or city-related paper. Given that we use a valuation interest rate of 7½%, if we adopt this kind of approach, low and behold we find that our city paper, which everyone keeps telling us is worth nothing, is all of a sudden worth more than 100 cents on the dollar.

2. While it is true that ERISA doesn't govern the public sector in this area, New York City has for the past several years been required to demonstrate that its budget is balanced pursuant to generally accepted accounting principles (GAAP). This means that the pension contributions have to be determined consistent with GAAP. My auditors tell me that they would have a great problem, if in developing a pension cost we used a technique that was contrary to ERISA, even though ERISA doesn't govern the public sector.

MR. SIMESTER: I wouldn't say we are talking about something that is contrary to ERISA, but something the IRS has been very quiet on.

MR. SCHWARTZ: Well, let me turn it around. Are you aware of anybody in the private sector who is using discounted cash flows as the valuation method, because I am not?

MR. WILLIAM McDONNELL: The IRS has approved a change in asset valuation method using the discounting of cash flow at the valuation rate subject to the 80% - 120% corridor, and with amortization of the gain over 40 years from 1976.

MR. THOMAS LEVY: Prior to this last statement I was going to comment that an early version of ERISA, I believe, actually explicitly permitted the discounting at the assumed rate but that in the final version it was dropped. One would interpret this as an intentional demonstration that they didn't want to include it.

One of the things that concerns me most about the immunization issue is that when we calculate unfunded liabilities we look at a closed group of present participants. The actual liabilities that are going to have to be funded down the road include future participants as well - an open group

kind of concept. The impact on the annual cost is substantially greater for the closed group valuation because you are looking at a limited range of liabilities for the present participants, rather than your entire liability as in an open group valuation.

The second thing that concerns me is that our charge under best estimate is an all assumptions charge, and we are now looking at one particular assumption, the investment return component. I guess there are two possibilities:

1. You haven't had a recurring pattern of total gains, and now you are going to anticipate a substantial portion of your gains from one source. Doesn't that leave you with the expectation that in the future you will have a pattern of recurring losses? I don't think that is acceptable.

2. On the other hand, if you do have a pattern of recurring gains, isn't that raising a question as to what you are already doing?

As somebody said, you haven't really changed. Also, you are unlikely to have increased your investment income. I don't know of any investment managers that are going out and doing a literal dedication in the absence of the actuary saying he is going to reduce the cost if that happens. I am not comfortable with that kind of situation.

MR. SIMESTER: When you read articles on dedication, it is stated that pension costs have gone down because of this maneuver. What we are saying up here is that this is not true, that perhaps your ultimate costs are going up. Really, what we are talking about is an assumption change.

MR. IRWIN VANDERHOOF: I would like to make some comments about the reasons employers might immunize.

First, people in general like a high return on assets which is easy to understand. However, people don't like variations in the return any too well either, and I think over the past five or ten years some employers have had substantial variations in the contributions they make to their pension plans.

The second factor is communication with the investment manager. At least knowing the investment manager's position on immunization is of some value. If the investment manager has decided that he knows, because he saw it in his teacup this morning, that interest rates are going to go down and he therefore wants to be long in the bond components of the plan's investments, he has got to know how much is long as compared to the sensitivity of the plan itself. The baseline, the zero-point, is created by the nature of the pension plan. The liabilities and the assets have to be judged with respect to that zero-point.

The third point I would like to mention is there is a large amount of academic research in the finance area being done with respect to this material. George Kaufman, Gerald Bierwag and C. Khang out of the University of Oregon, are published rather regularly in the Journal of Finance and the Journal of Financial and Quantitative Analysis. A book is coming out late this year, edited by George Kaufman, discussing all of the

different academic approaches to this. Basically, they have investigated different kinds of stochastic processes and they have done statistical analysis to see which kind of an immunization process actually works. George has come up most recently with one interesting point which might be held in mind by anyone who is going to try and do an immunized portfolio, and that is, if you are dealing with corporate bonds which are not default free, then the duration of the bond probably is reduced when you take defaults into consideration. I think nothing has been published on that yet but obviously there is some kind of a correction for the use of corporate or risky bonds if you are trying to do an immunization calculation.

MR. SEMESTER: One reason immunization has become so popular recently is that now the bank trust departments have an answer to the GIC. The banks can't guarantee a rate of return but they can "promise" one.

MR. JOE BROWNLEE: It seems to me the plan actuary really has three different problems here. After the valuation date, he gets his data and he also gets the assets. If the plan sponsor says he has a dedicated or immunized portfolio, then the actuary must satisfy himself that this has, in fact, been done. This determination must then be made every year. One must look at the liabilities and assets and decide whether this thing was, in fact, immunized as of last December 31. If he agrees that it was, then he has to decide how this affects his valuation. There may be a problem in determining the asset value for that piece, but the asset value and the liability value are equal if it has been successfully immunized. As mentioned previously, he must also figure out what effect the assumptions for the immunized segment of the fund may have on his assumptions for both the assets and liabilities for the non-immunized portion of the plan. The third thing he has to determine is how does this affect the funding standard account and the minimum contribution. It seems that employers are often coming to the actuary wanting him to commit himself as to what the minimum contribution will be before he has even had a chance to determine whether the immunization has in fact happened.

MR. DAVIS: I have actually heard of a situation where a company with a very large pension fund with a lot of fixed income investments has come to an actuary and said, "There is a dedicated portfolio in there somewhere, take my word for it."

MR. RICHARD SCHREITMUELLER: I would like Rowland Davis to expand on something that was said earlier. It seems to me that immunization rightly is a manifestation of the select and ultimate syndrome in the economic assumptions area whereby, if you have got a well conceived package of select and ultimate assumptions, things kind of come out in the wash. I wonder if this could be explained in a more practical way to the hypothetical client who has just come off the golf course. Are there "savings" and if not, why not?

MR. DAVIS: If the actuary is on the defensive, it is because immunization may be striking at the heart of conservatism that he is trying to maintain in his package of assumptions. It is a very difficult issue to deal with.

I have set up assumption packages that recognize the potential for immunization on certain segments of the liabilities and have, in an indirect way,

recognized current yield opportunities on that segment of the fund. If the client did come and say, "O.K. I've immunized," my answer would be, "No immediate impact, it is already there." It is a floating kind of assumption. It is a dynamic kind of assumption that has to change every year, which would be different than if immunization really did take place. Then you could lock in that kind of assumption. I am still exploring those waters myself. I wish I had good practical answers. Select and ultimate interest rates, as you know, are very painful, in a practical sense, to work with.

MR. SIMESTER: The first day of a dedicated portfolio is rather straightforward. You have the assets on one side and the liabilities on the other, and both are valued using the same rate of return. Everything is in balance. However, the next day the interest market changes and the assets have a different value and the assets and liabilities are out of balance creating problems for subsequent valuations. Either the interest assumption for the dedicated block of lives must be changed with every valuation or the value of the assets must be controlled to maintain the balance of assets and liabilities, which implies using amortized value for the assets. The first alternative, changing interest assumptions yearly, sounds complex. However, using amortized values for the assets can also be complicated.

I can think of one case where a company with 15 pension plans created a pooled immunized fund with each plan buying units in the pool. Everything operated cleanly until they sold five plans. The question then arose as to what was the value of this pooled, dedicated fund. Amortized or market value? Units in the pooled fund were sold back to the divested plans at the current market value and now things are probably out of kilter.

Other problems may come up using amortized value. Plan sponsors may not realize that the Internal Revenue Code says if you amortize one bond, you must amortize all bonds. Plan sponsors may use the amortized value for the immunized portfolio but value the other bonds at market. Also, FASB 35 doesn't recognize amortized value. It stipulates the use of market value if the bonds aren't in default. There is no option regarding the plan financial statements.

MR. DAVID HALL: Rowland made a comment that we all laughed about, but I think maybe it has some profound implications. We all laughed at the story of the plan sponsor who came to the actuary and said, "Here's my portfolio and somewhere in there is a dedicated one." Let us carry this a step further and suppose that a sponsor then says, "Well, if you don't believe me, I will go out and hire somebody to pluck those investments out of that portfolio, and I will identify those retired lives that this is a dedicated portfolio to." The sponsor then comes back to you with the dedicated portfolio identified. Well, assuming you still have those same investments, nothing has changed at all. Should we then be more willing to change our assumptions of the plan just because somebody has been able to point out those investments or, if we should change assumptions because we can identify that portfolio, why should we not have considered that in our original assumptions?

MR. SIMESTER: On the other hand, something may have changed. The action of taking the bonds and putting them on another list and reordering them may have resulted in a change of investment philosophy, i.e., a hold philosophy on those bonds where the day before it was an actively traded portfolio.

MR. BROWNLEE: A comment on that. Let's assume in addition that he has successfully picked out bonds which actually match the cash flows. Then for that portfolio and for that group of liabilities he has eliminated the reinvestment risk, which is very, very nice. However, that reinvestment risk has not disappeared, it has merely been transferred over to the active lives. Hence, assuming you did a good job of setting assumptions before and you now change your assumptions for the retired group, then, in theory, shouldn't you be doing something to recognize this increased reinvestment risk for the active group?

MR. DAVIS: The more I wrestle with this, the more I come to the same conclusion, that the whole problem is with our assumptions, and the inadequacy of our assumptions to deal with the kind of dynamic economic situations that we find ourselves in. I think the challenge is to find sets of assumptions that do deal with that. I don't think the actuary's assumptions should influence the way the plan funds are invested.

MR. VANDERHOOF: I think something has changed. What has changed is the amount of information in the hands of the actuary. Now, presumably if the actuary has additional good and valuable information, he can make a reasonable change in assumptions.

I don't think that you have reduced reinvestment risk on this portion and correspondingly increased it on the other portion. You originally were considering a reinvestment risk on the whole thing and now you have to consider a reinvestment risk of the same order of magnitude on a smaller piece. Suppose the portfolio were capable of being dedicated to all of the lives. The reinvestment risk would then be totally eliminated. So, it is not clear that you are not ahead in terms of the information. I believe I read that the State of Wisconsin has actually done this.

MR. DAVIS: If you are in an ongoing situation where contributions exceed benefit payments, then you have shifted the reinvestment risk. The reinvestment risk is with respect to the new money coming in. With respect to having additional information, this is true, but there is also an implication that there is a permanence to the dedicated portfolio and there really isn't. The plan sponsor can dissolve the dedicated portfolio at any point in the future. I have difficulty with thinking that things are really that much different with or without dedication in terms of what the actuary's assumptions ought to be. ▶

MR. FRIEND: I think that the observation that Dick Schreitmueller made a few moments ago needs to be reemphasized. When you do take advantage of dedication and increase the interest rate with respect to this particular section, you are really suggesting to yourself that you need to decrease the interest assumption with respect to the rest of the investment portfolio or future expectations. Hence, this whole thing comes to a zero-sum game, and it is really a matter of incidence allocation of cost to this

year. If the president is concerned about this year's incidence because this is his term, then that is what this seems to be all about. But, in fact, nothing really is happening.

