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IMPACT OF PENSION PLAN DESIGN ON INVESTMENT STRATEGY

Moderator: ERIC P. LOFGREN
Panelists: HOWARD A. FREIMAN*
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Recorder: ERIC P. LOFGREN

- Embedded design options
- Shutdown benefits
- Calculating the duration
- Effect on target surplus level of the pension fund
- Executive benefit considerations

MR. ERIC P. LOFGREN: I'm Eric Lofgren, a consultant with The Wyatt Company. Carl Hess is also a consultant with The Wyatt Company. Howard Freiman is a Senior Vice President at Fidelity, which is the country's largest privately owned investment firm. At Fidelity, he works with institutional clients on investment strategy. Before joining Fidelity in 1988, Howard was an investment banker with Morgan Stanley, focusing on pension issues. Prior to Morgan, he was Director of Pension Fund Management at RCA Corporation. And he began his career at General Motors, where he held several positions in the Pension and Treasury areas. Howard has an MBA from Columbia and a Bachelor of Science from Vanderbilt and he is a Chartered Financial Analyst.

The session is divided into three discrete areas. Howard will start with a broad philosophical basis. Carl will bring it back to the nuts and bolts of particular pension plan provisions in a defined-benefit area, and then I will talk briefly about executive benefits. At this point, I'd like to turn it over to Howard Freiman.

MR. HOWARD A. FREIMAN: I'm going to be talking about pension plan design and how that relates to the asset allocation decision. And I'm going to try to cover a number of different areas, a number of different ways people design plans. And I'll be moving a little bit out of the realm of pensions. Pensions are really just sort of a subcategory of all asset allocation decisions and really a specific problem. So if you think about the question of asset allocation in general, pensions are just a little bit of a subset of that, and I think it will help you to focus on the pension problem by focusing on some nonpension asset allocation decisions.

Before I start, I always like talking about asset allocation, because it gives me the opportunity to tell one of my favorite stories in the investment business. And the story goes something like this. When Albert Einstein died, he went to heaven. And I don't know if you know this, but when you go to heaven, you find yourself in a room with some other people. And Mr. Einstein, being a gregarious individual, decided he was going to start a conversation with his three roommates. Well, he says to the first gentleman, "Sir, what's your IQ?" The man stands up, he's very proud, and he says, "Mr. Einstein, my IQ is 180." Einstein says, "180, that's great.

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We can talk about thermonuclear physics, and I'd be interested on your views of general relativity." He says to the second gentleman, "Sir, what's your IQ?" Well, this man's a little bit embarrassed. He says, "Mr. Einstein, my IQ's only 120." Einstein thinks for a second and says, "That's O.K. We can talk about Dostoyevsky and Tolstoy, and maybe discuss Hemingway's short stories." Finally, he says to the third gentleman, "Sir, what's your IQ?" Well, this man is very embarrassed. He says, "Mr. Einstein, my IQ's only 70." Einstein thinks and says, "Well, what do you think of the market?"

With that as an introduction, I'm going to be talking about asset allocation, and let's think about how people have traditionally focused on asset allocation, both from an actuarial and from an investment point of view. Most people, when they talk about asset allocation, analyze it in one of two ways. The first is that they construct an efficient frontier, and we all know how to do that. We basically calculate expected returns and risk correlations, and we basically create points that have the greatest expected return per unit of risk that are efficient portfolios. And then we use some sort of utility function to determine where we want to be on the efficient frontier. The second type of traditional asset allocation, which was really, I think, developed to a large extent by the actuarial community in the early 1980s, was stochastic asset liability modeling. We no longer looked at what would happen in a single point in time, but we tried to forecast the future by using Monte Carlo simulations and various scenarios of both assets and liabilities, based on such things as inflation and expected return. Out of that came a lot of graphs, none of which at least when we first started doing this, could be understood very easily until we got used to talking in terms of things like 95th percentile, 50th percentile, and what's the probability of not achieving your goals. So I would say that these, in the late 1980s, were the two prominent ways that most pension plan investment people, either being directors of pension fund management or pension consultants or actuaries, would look at the pension asset allocation decision.

Since then, the world has gotten a little bit more complex. And what I'd like to do is spend some time on some different ways of analyzing the problem. And the reason why we may want to analyze the problem in a slightly different way is that the problem is defined slightly differently. And I listed five different variations on the theme of traditional pension asset allocation modeling. The five variations that I'll cover are as follows:

1. Short-term contribution hedging. If you want to make sure that your contributions don't go up over a very short period of time, what sort of investment strategy do you want to use to accomplish that.

2. Underfunded liabilities. The asset allocation strategies for underfunded liabilities are usually very different than an asset allocation strategy for a plan in the surplus position, or a plan that's fully funded, and I'll go into some of the reasons why that's so.

3. Multiple-tax-rate investing. This is not really a problem for pensions per se, but it is a problem that comes up when you start talking about retiree medical, or nuclear decommissioning trust, or personal investing. Most of us who have, for example, IRAs, 401(k)s or your clients who have IRAs and 401(k)s, and

then have monies outside the plan, are investing monies at two different tax rates. And how do you make the asset allocation decision when you have multiple tax rates?

4. Downside risk analysis. A colleague of mine at Fidelity, a man named Van Harlow, has pioneered this; it takes a look at the fact that sometimes risk is not symmetric.

5. Multiple-year time horizon analysis. Most models, or efficient frontier models, assume a one-year time frame, that is, expected risk over one year. How does that problem change an efficient frontier problem, if you assume you're no longer in a one-year time frame, that is, you're in a multiple-year time frame?

First is variation in short-term contribution hedging. This problem actually came about in a slightly different way. When I was at Morgan Stanley, we did a lot of work on plan terminations. And the question there was not how you could hedge your contributions over the next three years, but how to make sure that the annuity that you had purchased from the insurance company would be worth a certain amount. That is, how could you manage your assets and liabilities so that if you thought you had a $20-million surplus today, you knew you would have a $20-million surplus six months from now. The same sort of techniques work well when you talk about trying to manage your contributions; because over a relatively short time frame, your assets will change by a great deal and your liabilities (that is, your interest rate sensitivity of your liabilities) can change by a great deal. But what probably won't change is inflation. That is, you can have a reasonably good estimate of inflation over the next two to three years, or at least actuarial inflation. So even if you have to change your discount rate for *FAS* (Financial Accounting Standard) *87* purposes or if your assets change dramatically, you can still be hedged in a fairly certain way. And let's take a relatively simple example of how this may work. Let's assume a pension fund has $100 million in assets, $80 million in liabilities, and the liabilities have a duration of 11 years. And the goal is not to contribute over the next three years. That is, I have a $20-million surplus, and that surplus will allow me to pay for three years' worth of pension contributions. Currently I have an asset mix of -- fairly standard asset mix – of 60% equities and 40% bonds, with the bonds having a duration roughly equal to the Lehman Brothers index.

Well, how do my assets and liabilities change if equity markets change -- if the equity markets change, or if interest rates change? Table 1 is fairly simple, but I think it's nice to illustrate the point: if equity markets don't change or if interest rates don't change, you'll have a $20-million surplus. And all these numbers are instantaneous numbers; that is, if we have instantaneous changes, what would happen? If equity markets change, obviously your surplus would go up. A 20% rise in the equity market would translate into a $12-million rise in your pension surplus. And likewise, if interest rates change by plus or minus 200 basis points because you have a mismatch between your assets and your liabilities, for every 200-basis-point change in interest rates your surplus goes up or down by $14 million. So you're exposed to two things. You're exposed to both the equity markets, and you're exposed to the fixed-income markets to the extent you have this mismatch, a short-duration asset and a longer-duration liability.

TABLE 1
Pension Surplus

Equity Market Change	Interest Rate Change (Basis Points)		
	−200	0	200
−20%	−6	8	22
0	6	20	34
20	18	32	46

Table 2 is fairly simple, but I think it's useful in terms of illustrating different ways of manipulating the numbers. And what's your goal or what should your goal be? Your goals should be that, no matter what happens, your pension surplus instantaneously will be hedged to be $20 million. That is, you want to lock in the surplus, therefore, by assuring that your client doesn't have to increase contributions. Well, to the extent you lock in your surplus at $20 million, you automatically lock out any possibility of gains. So what type of client would this make sense for? Clearly, not for the client who's doing well in the corporation and doesn't have a three-year time frame, but has, like most companies, maybe a 10- or 15-year time horizon in terms of managing the pension fund.

TABLE 2
Pension Surplus

Equity Market Change	Interest Rate Change (Basis Points)		
	−200	0	200
−20%	20	20	20
0	20	20	20
20	20	20	20

But what about those companies that are in a recession? What about those companies that are affected tremendously by the recession, which are really trying to conserve cash every way they possibly can? Maybe that calls for a change in investment strategy. So how do we accomplish basically changing the world so that, no matter what happens, you have a $20-million surplus? And it's a relatively simple thing to do. You basically sell off all your equities. And if you just sold off all your equities and kept cash, you still would have the mismatch between your assets and liabilities, and to correct for that, you manage your fixed income to a nonduration, a relatively simple thing to do which, as actuaries, we're all familiar with. But I think you'd be amazed at how few clients actually implement something if they have a shorter-term time frame.

This technique also works well with underfunded liabilities. That is, if you don't have a surplus, but you have an underfunded position, and your goal is not to make it any worse over the next three years, you can use these same techniques. And finally you can use option strategies. It's relatively easy to incorporate option strategies. Remember, with a 20% rise in the equity market, your surplus would go up by $12 million. Well, it's basically easy to sell off your equities and, in effect, either buy a put or sell a call or whatever. But how do you create a strategy, let's say, on a cost of

$2 million, that will give you that 20% rise in the equity market? So instead of having $20 million there all around, you might have $18 million in the top two rows, and $30 million in the bottom row. So you give up something on the upside for downside protection.

The second real world variation on a theme is underfunded liabilities. And what I'm going to talk about is not underfunded liabilities as we might think about, but underfunded liabilities in an extreme case, and I can think of two good examples. One is retiree medical, which corporations are just beginning to fund. If you make the decision that you're going to fund your retiree medical program, it's unlikely that you're going to fund the full Other Postretirement Benefits (OPEB) liability from day one. Another example of an underfunded liability is nuclear decommissioning trusts, which is probably something you're not familiar with unless you have a public utility as a client. But the NRC has recently regulated that public utilities have to start putting away funds today to fund the ultimate decommissioning of their nuclear power plants in the year 2020. And there's a whole host of intergenerational equity problems associated with that.

Well, how are underfunded liabilities different from traditional liabilities? The first point is that your liability risk is much greater than your asset risk. And let me just use my hands to illustrate this. If I have a fully funded pension plan and assets are my left hand and liabilities are my right hand, or if I have an overfunded pension plan, again, where assets are my left hand and liabilities are my right hand, then capital market changes, that is, changes in interest rates, changes in inflation, or changes in the equity market, are going to affect my left hand to a greater degree than they're going to affect my right hand. Now let's switch the position of my hands a little bit. And now let's move my right hand up and say my liabilities are significantly greater than my assets. Now what happens? Your liability risk, that is, capital market changes, will affect your liability to a much greater extent than they will affect your assets. The implication is that you have to be much more concerned with liability risk than asset risk, in the case of an underfunded liability. And once your definition of risk changes, the way that you view the world changes.

Also, that effectively increases the duration of your liability to the extent that you're going to be putting in money in the future to fund that liability. Let's say that you have a liability 20 years from now of $100 million, present value of $100 million. But you were going to be funding that liability over the next 10 years, or over the next 20 years, putting in $3 million a year. In the first year, with your $3 million in your plan, versus a $100-million liability, if you went out and bought a 20-year bond, you would not be hedged. Because you would not be hedging the effect of future contributions or the effect of interest rate changes on future contributions. You would be hedging only the assets that you have in the plan today. Then, in effect, all those cash flows, those future cash flows coming into the plan in years 2, 3, 4, 5, 6, 7, 8, 9, 10, up through year 20, effectively lengthen the duration of your liability. And that's a subtle but, I think, important point.

So your goal is to minimize those contributions, in years 2 through 20, if you have an underfunded liability, and to minimize the variability of those contributions. Now that's a very different problem than maximizing investment return and minimizing investment risk. In fact, the results that we come up with are very different in terms

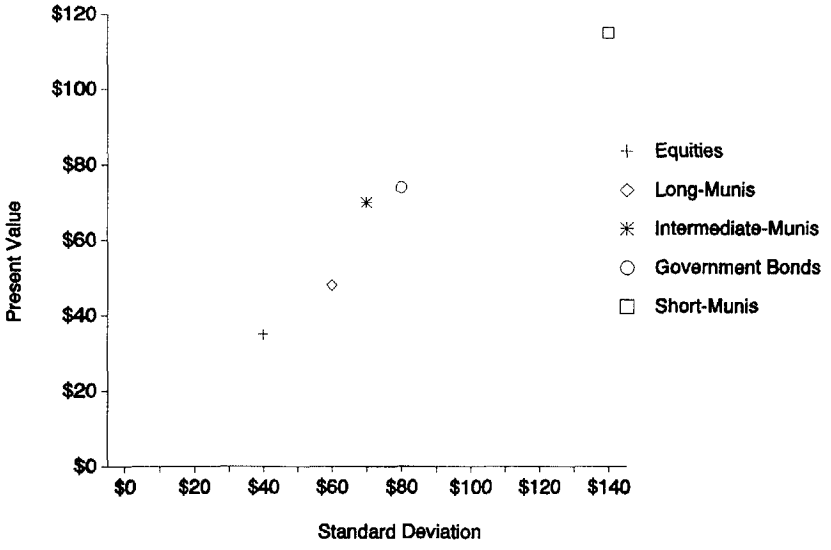
of where you should be in terms of an efficient frontier. And the results that we show, and this is for a nuclear decommissioning example which I've pulled together, is that equities and longer-term bonds result in the lowest trust contributions and greatest certainty of contributions (see Table 3). That might be a little bit counter-intuitive, that equities in long bonds not only have the lowest cost (that is, will result in the lowest contributions) but also had the minimum volatility in terms of getting you there.

TABLE 3
Present Value of Trust Contributions

Scenario	Average Contribution	Standard Deviation
Short-Term Munis	$118	$148
Intermediate-Term Munis	65	74
Long-Term Munis	47	58
Government Bonds	67	77
Equities	33	39

We ran a simulation using a stochastic model for one of our clients, a nuclear utility. And this might look like a traditional efficient frontier, but it isn't. It's not quite a traditional efficient frontier, because the axes are changed (see Chart 1). The Y axis is present value of trust contributions, and the X axis is standard deviation of those contributions.

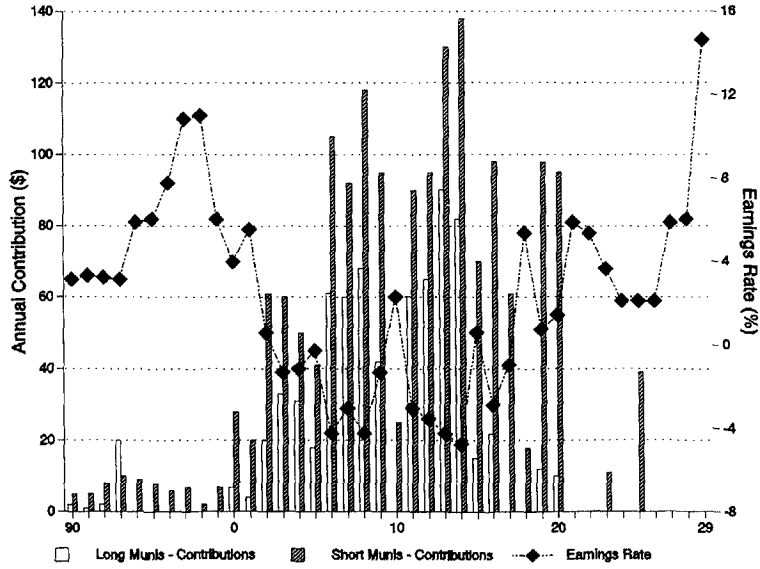
CHART 1
Present Value of Trust Contributions



Now the goal no longer is to have maximizing return but to minimize contributions. So your efficient frontier, sort of like an arc, starts at the y-intercept and goes to $160 million. That's your efficient frontier. And the only point on the efficient frontier is equities. And as you move away from equities, you're becoming less efficient; that is, you're increasing the present value of trust contributions, and you're also increasing the standard deviation of those contributions.

Now that might be a little bit counter-intuitive. Let me try to show you why that counter-intuitive statement that I just made -- that equities are the least risky investment -- is actually the case. And here, as I mentioned, we did a stochastic model, in which we simulated the world 1,000 times (see Chart 2). This is one time out of 1,000. And what you can see happening is that over the first few years, as interest rates rise, the long-bond contribution investment strategy rises also. But as interest rates fall, because you're underfunded and your greater risk is the liability risk, contributions with a low-risk asset strategy, that is, short bonds, rise fairly dramatically. Whereas if you own the long bonds, at least you're somewhat hedged; as your liability goes up, your assets are also going up to a fairly significant extent. And in this one example, the present value of the liability was approximately $100 million. The difference in present value of contributions between the two investment strategies over the 30-year period, on a present value basis, was over $100 million, a fairly significant difference.

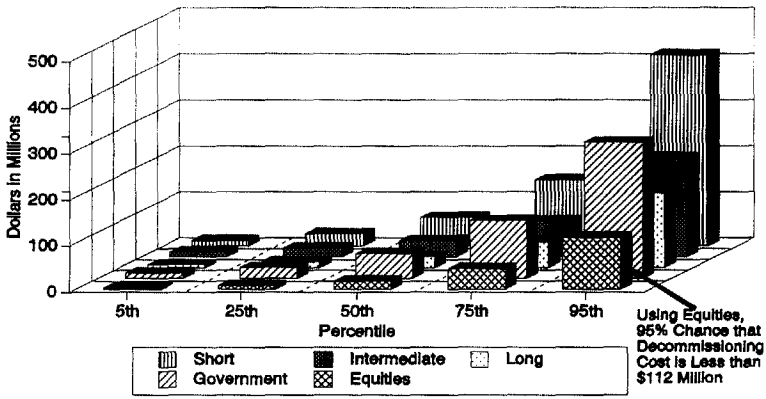
CHART 2
Comparison Between Short- and Long-Muni Contributions



Now let's take a look not at 1 scenario out of 1,000, but all 1,000 scenarios out of 1,000, and now graphed, as I promised, in sort of percentile form (see Chart 3). When we first started doing stochastic modeling in the early 1980s, we didn't have 3-D graphics on spreadsheets. Now we do, which apparently will just confuse most

people, but let me take a second to try to explain how to read this chart. Taking a look at the 95th percentile, using equities, there's a 95% chance that the present value of your contributions will be less than $112 million. We ran the simulation 1,000 times: 50 times out of 1,000, the cost was greater than $112 million; 950 times out of 1,000, it was less. Take a look at short bonds, and the cost was $415 million. Your worst-case scenario is that your present value of future contributions would not be $100 million, $200 million, $300 million, but $400 million. At the best case, your 5th percentile, basically it doesn't matter what you do, everything looks great. But one of the advantages of having a 3-D chart is that you can look at the data two different ways. And if you look at equities, and take a pencil, or just imagine a pencil drawing a line from the top of each bar, basically that represents your risk, the risk of equities, going from the 5th percentile to the 95th percentile. Do the same with short bonds, and look how your pencil, if you were using a pencil, would explode off the page. Fairly significant differences in risk.

CHART 3
PV Trust Contributions



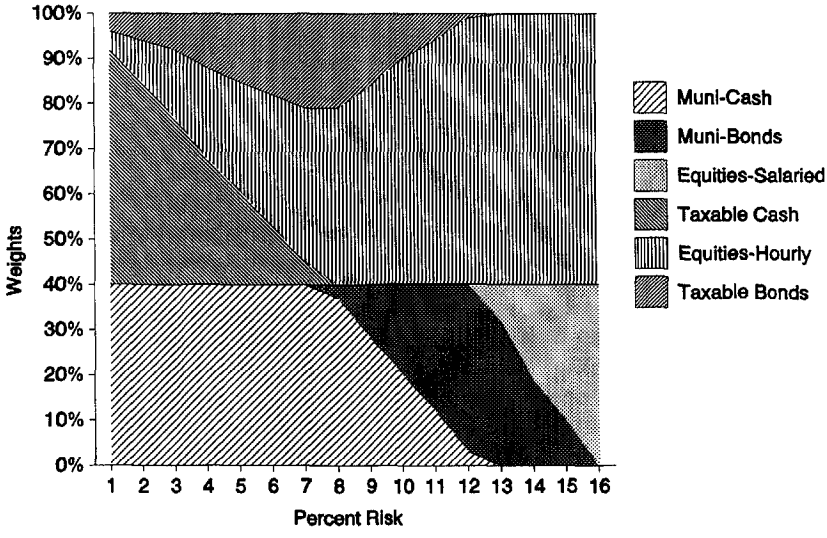
	5th	25th	50th	75th	95th
Short	12	27	62	144	415
Intermediate	10	19	35	77	215
Long	7	13	24	56	162
Government	12	24	54	125	296
Equities	4	8	18	45	112

The next variation on a theme is multiple-tax-rate investing, something that we have only begun doing a lot of work on. I have actually been interested in this question for a number of years, ever since they came out with IRAs in 1981. And the question was, should I buy zero-coupon bonds for my IRA, or should I have equities in my IRA and have all municipal bonds in my personal account? I didn't know. Well, fortunately, or unfortunately, in 1981, I didn't have spreadsheets with optimization features to help me solve this problem. Today we do. And the old methodology is to treat each pool separately and determine the optimal mix. If you have a client with two different pools and with two different tax rates, the way you might think about doing that is to take pool one and pool two, create an optimal solution for each, and then add the two at the end, and say that's your optimal solution. We have just finished

writing a paper (a colleague of mine, Glen Holton, who's an actuary, and myself, which proves that that's a suboptimal solution) to basically take all of your assets together as one pool and add constraints. That is, the sum of all the assets in one pool has to equal something less than one, and the sum of the assets in the other pool has to equal one minus the sum of the assets in the first pool. And then we have to create risk-return correlations incorporating all the tax effects. So this could be in a low-tax, high-tax bracket, or a zero-tax, 34-percent tax rate bracket, and the mathematics work the same. But the point is if you do create two pools, you are adding additional constraints, which creates a suboptimal solution. And as I mentioned earlier, this will come up quite a bit in retiree medical. For salaried employees, 501(c)(9) trusts are taxable; for hourly employees, they are tax-free. And the corporation wants to develop one investment strategy for its 501(c)(9) trust, how does it manage the mix between municipal bonds and corporate bonds? It's not a trivial question. I was reading *Tax Notes* the other week, and basically what it said about 501s was that the IRS has recently come out with a letter ruling on 501(c)(9) trusts, which says that you don't have to specifically require that the funding mechanism is collectively bargained for your hourly worker. That is, you do not have to collectively bargain putting the money into a 501(c)(9) trust with your hourly workers, as far as tax law goes. I'm not sure how that's going to affect some labor law issues. But from a tax law issue, the IRS is allowing you to put money into a 501(c)(9) trust, into an hourly trust, even if it's not collectively bargained.

Let's take a look at a solution that we've developed for our client. And this is asset allocation now, not just considering the hourly piece and the salary piece, but putting them both together. We didn't come up with an optimal mix for the top and the optimal mix for the bottom, we just solved the problem using one optimal mix. And I think there are some fairly interesting results (see Chart 4).

CHART 4
501(c)(9) Asset Allocation

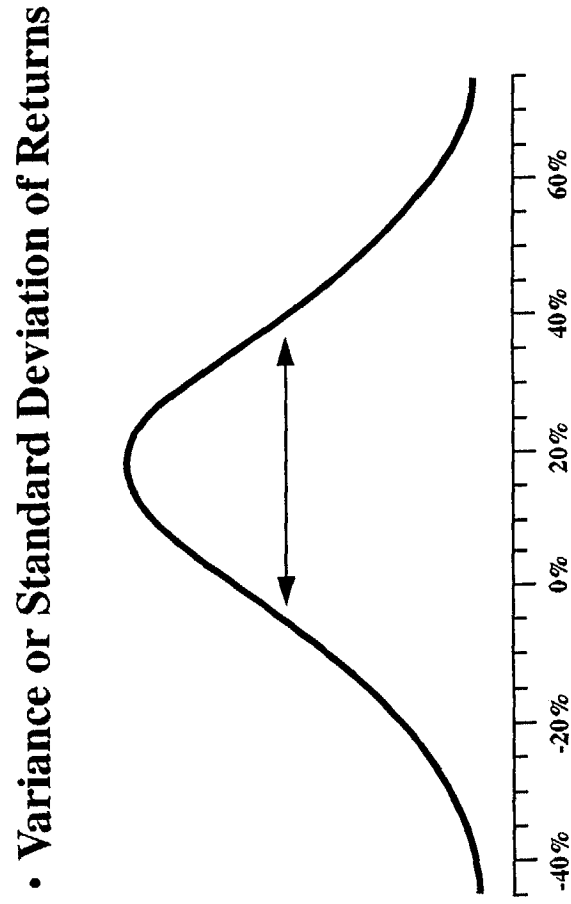


The Y axis is weighting, weightings of the different assets classes. The X axis is different levels of risk. Each one of these would also have an efficient frontier, an associated expected return with these. What you notice is that if you're going to have equities, you're better off having them in your taxable account, as an alternative to buying taxable bonds. Tax-exempt fixed income dominates, in terms of percentages, the taxable fixed income, which isn't surprising. What is a little bit surprising or maybe intuitive if you think about it (but nice to be able to quantify) is the fact that you do have equities, and you're much better off having the equities in your hourly piece. So it's an interesting result, and again, you can use spreadsheet optimization programs, which I'll get into in a little bit more detail in a second, to help solve this problem. Or if you have a client, I guess you could call me up, and I could help them solve the problem. But as a third alternative, we're writing this up as a paper, which will probably be published in the *Financial Analysts Journal* sometime next year.

The fourth point that I want to cover is downside risk analysis. And another colleague of mine, as I mentioned, Van Harlow, has been the pioneer of this area. And he has told me not to speak too much about this subject, because he is speaking before the Society of Actuaries at the September 15 conference in Chicago. So if you want to hear the real scoop on this whole area, you should sign up and come and listen to Van talk about this subject. Or, alternatively, he wrote a paper that was published in the *Financial Analysts Journal* in the September/October 1991 issue on this whole area of downside risk analysis. Well, what's the traditional measure of investment risk? Variance or standard deviation of returns? (See Chart 5.) What are some of the problems with that? And I think they are easy to point out. First, most peoples' utility curves, most of your clients' utility curves, don't look like a normal distribution or a lognormal distribution. They're skewed. And they usually want to cut off the tail, and they want lots of upside, at least most of the clients that I work with. That's the way their utility function looks. The other problem with standard deviation is that it counts positive risk just as highly as negative risk. That is, if you have a lot of positive upside, that counts as standard deviation. That's not a good thing, in terms of trying to measure real risk. So, alternatively, what are some other ways of measuring risk? And I just mentioned a few. What's the probability that I'm actually going to lose money? What's the probability that I'm going to underperform a benchmark-type return? Say I want to earn at least a cash return on my investments. What's the expected magnitude of a loss, should one occur? And finally, what's the volatility below a certain target range or return? To the extent that I miss my return, what's the chance that I'm going to miss it by a lot?

Why haven't portfolio managers used downside risk approach in the past? There are lots of reasons. One is that standard deviation is a relatively simple concept. Another reason is that it's a nonlinear problem. That is, it just isn't solved easily – or it's not solvable at all – by linear techniques. You're showing the differences, if you target, instead of standard deviation, semideviation. What's the difference? How does the mean variance frontier differ? And basically, you can see the mean variance frontier is suboptimal, if you no longer target standard deviation, but semideviation, that is, deviation below the mean. Getting back to why people haven't used this technique in the past, it's a nonlinear problem. And it used to be that if you wanted to solve nonlinear problems, you had to go out and buy expensive computers and hire programmers and all these other things.

CHART 5
The Traditional Measure of Investment Risk



Well, today, I don't know how many of you know this, or how many people have explored this, I use Excel, and I think there's a similar function in Lotus, though I'm not sure, but there are some good solver functions in these spreadsheets that allow you to solve nonlinear problems. And it's something in Excel called Solver. And you can set up the problem in a nonlinear fashion to do downside risk optimization (see Charts 6 and 7).

Here we're trying to minimize H21, which is risk, and it's just the sum of risk, constraining the different asset weights, which are a little bit difficult to see, and constraining the fact that the asset weights have to add up to 100. We just put in asset returns on a projected basis – actually on an historical basis – but you could do it on a projected basis as well. If you have not used Solver in Excel, it's incredibly easy to use, and it gets incredibly powerful, and it's also very quick. So you can solve a whole host of problems for which traditionally you had to use some sort of mainframe statistical package. In terms of solving things like downside risk-type problems, it's a very powerful tool.

The last topic that I want to cover is multiple-year time horizon analysis. And if you look at most investors' perceptions of risk, this is how it looks like (see Chart 8). And this is something I call the random walk perception, because if you believe random walk, this is in fact the way the world looks. This says that, no matter what your investment horizon is, your risk of your S&P (Standard & Poor's) 500 is about 15%, currencies is about 13%, intermediate bonds is 5%, and 1-year T bills is about 1%. That's nice, but how does the real world work? The real world works slightly differently. And that risk is not only a function of asset class, but also a function of time horizon. Now think about this.

When you talk about risk and you talk about asset classes, you go through very fine gradations of assets classes; that is, you'll talk about the risk of a stock with a beta of 0.8 or 1.1. And you'll talk about bonds, whether they're corporate bonds or treasury bonds or government-backed securities or mortgages or whatever, and you spend a tremendous amount of time trying to fine-tune risk and what you mean by risk in terms of various asset classes. One doesn't spend very much time focusing in on an investment horizon and the risk associated with that investment horizon. And as you can see in Chart 9, time does have a major impact on risk.

Let's take a look at currencies. Currencies are not mean-reverting. You can have currencies move in a certain way for hundreds of years. I mean, there's no reason to believe, on a priori basis, that the Russian ruble is going to come back in the next 20 or 30 years. Or the U.S. dollar, for that matter. The British pound has been in a secular decline that hasn't lasted 1 year, 2 years, 3 years, but is in a 20-, 30-, 40-year period. And that really has a lot to do with the way the economy works, as opposed to any sort of random walk theory. Currencies behave in very much a nonrandom walk basis; that is, there are some good trends that you can find in currencies that are – I guess the mathematical term is – serial correlation. There is serial correlation in currencies.

CHART 6
Downside-Risk Optimization

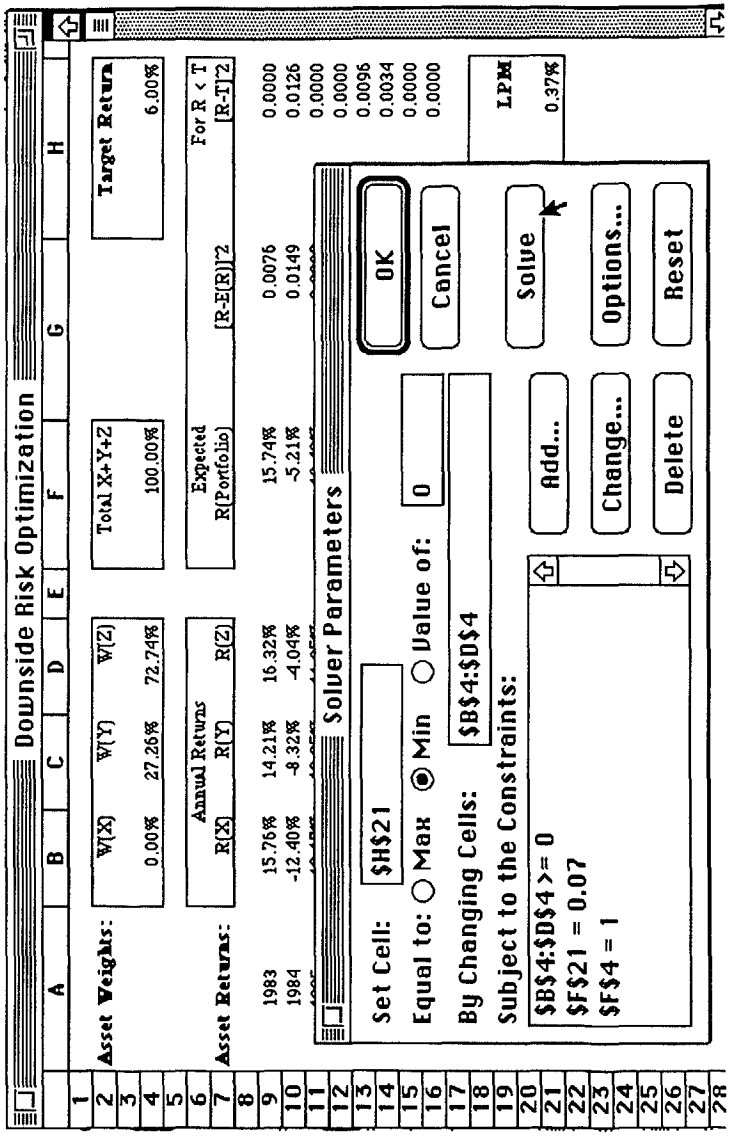


CHART 7
Spreadsheet Optimization of Downside-Risk
Asset Allocation Problems

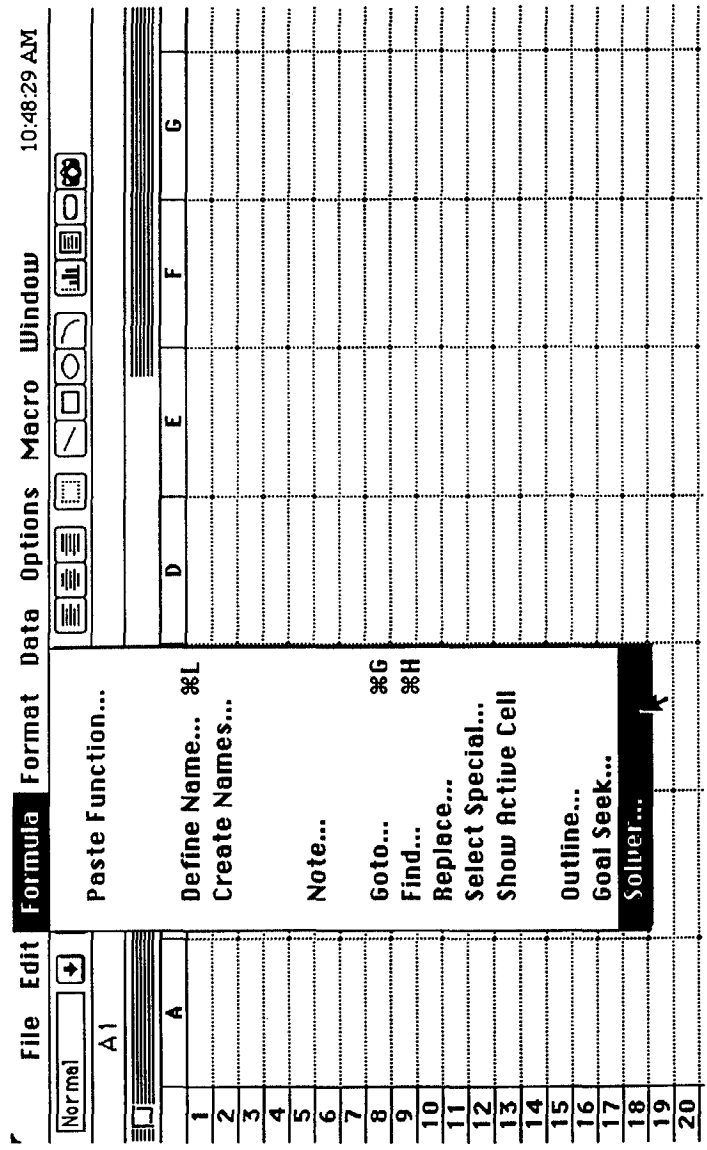


CHART 8
The Random-Walk Perception

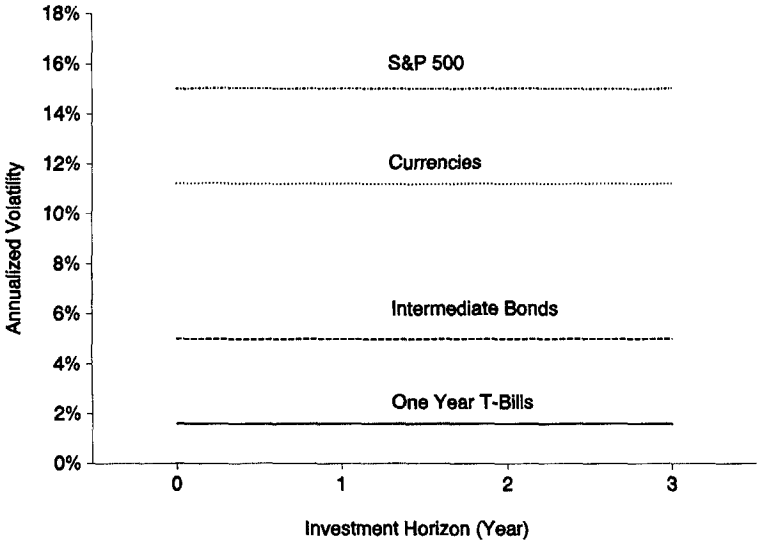
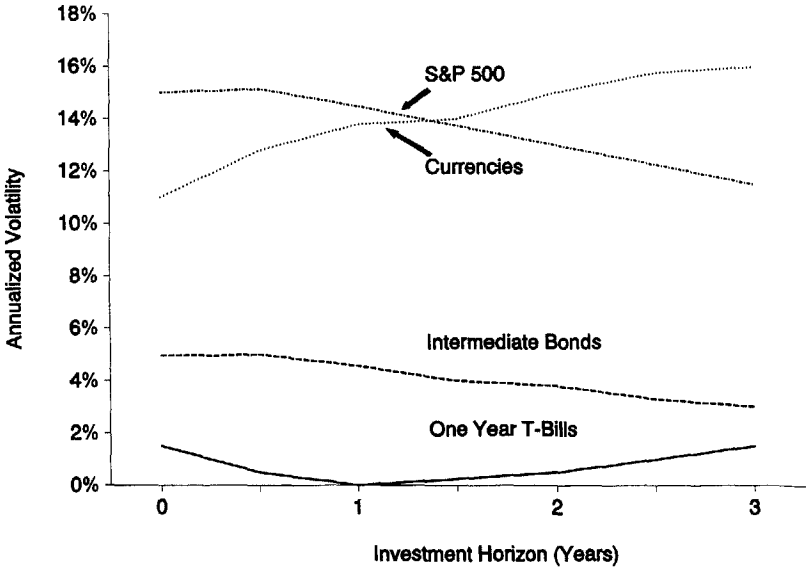


CHART 9
Risk — A Function of Investment Horizon



For equities, and I'm sure we've all seen this study, if you have a two- or three-year time horizon, the annualized standard deviation goes down. And you can compute that and prove it to yourself, and it goes down by the square root of time. For intermediate bonds, as you get closer to a five-year time horizon, if you have a five-year bond and a five-year time horizon, your risk is, in effect, zero. On the other hand, if you have a 1-year bill, or a 90-day bill, your risk is exactly zero at one year; but as you start moving away from one year and you have reinvestment risk, your risk increases. So the whole different dimension of risk is called time, which people ignore, and there's actually an article which is, again, coming out in the *Financial Analysts Journal* called "Time, The Second Dimension of Risk."

Just to summarize, in the old world we had the efficient frontier. And everyone was very comfortable with the efficient frontier. It's an easy concept. People use efficient frontiers. We've dissected the efficient frontier every which way to Sunday and talked about Ibbotsen-Sinquefield until we're blue in the face. The new world is a nontrivial combination of assets, liabilities, tax rates, time horizons, and risk tolerance. And basically what it requires is a flexible approach where you treat each problem, each client's problem, separately.

MR. CARL A. HESS: I'm going to be concentrating a little bit more on the liabilities side, and I've really got a grab bag of topics. I do a great deal of work in modeling assets and liabilities for pension plans on a stochastic basis, and this is kind of a summary of my experience and the types of misestimates I see going on in liabilities. There tend to be two types: One is just having a wrong estimate, and I'm just as guilty of that as anybody else; and the second is measuring the wrong thing -- and that's just kind of accepting things, on a prima facie basis, as being what's really there.

Why does plan design matter for investment strategy? There's more than one answer, but most of the answers have a meaning of their own. For one thing, a pension plan is not a Christmas Club. It's a pension plan. If you're thinking about how to manage the investments of a pension plan, you should recognize the fact that it's a pension plan and take that into account and do things accordingly. Furthermore, this pension plan has a sponsor who has goals of his or her own, and those goals matter. They're goals for the pension plan and goals for the sponsor, and the investment strategy for the plan should naturally take that into account. On the legal side, ERISA says, you've got a plan here. You're supposed to manage the assets in the interest of the participants and beneficiaries. And the participants' benefits are really what's at stake here. Knowing what their benefits are all about should help you to better understand how you're supposed to invest the assets of that plan. On a mathematical side, we've got this fundamental equation: contributions plus the investment income have to equal, over all time, benefits and expenses of the plan. If you want to rephrase that equation, investment income is a function of benefits. Again, your investment strategy -- you're trying to get a target level – investment income has to be dependent on the benefit structure of a plan. We've got practical reasons for doing this. There are investment strategies out there, and I'll get to them, that consider liabilities. If you don't measure your liabilities, you can't do things with these strategies. So it's important to take a look at what the liabilities are in order to effect these strategies.

Finally, what are these liabilities? What are they really worth? Section 3(18) is one of my favorite sections of ERISA, and it talks about "market value." And market value takes a willing buyer and a willing seller, and between the two, the price that they would pay without coercion is market value. And a lot of these strategies deal with market value of liabilities. Now, it's very difficult, unless you're trying to wrap up a plan or place the liabilities with an insurance company, to determine the market value for a liability. So you really have to do the work yourself; as the actuary you're kind of what I call an estimator – you're an assessor. You're trying to determine what these liabilities are really worth.

Out in the real world, and this is very much only a partial list of things that take plan design explicitly into account, you have cash-matching, immunization, contingent immunization, horizon-matching, and annuity purchases that have the liabilities in there. In fact, the latter are when you're actually pricing these things with a "willing seller," though the market's been rather less than willing recently. Surplus insurance is another strategy which says you're targeting *X* percent of liabilities as an investment target. I mean, it's very direct. Your liabilities in the plan structure are very much being considered. So for all these things and just a matter of general policy, it's a good idea to get the liabilities right, I mean, really know what you're dealing with, before you get into it.

I keep using the plural "liabilities," and that's because there's, of course, more than one, we all know that. You've got your VBO (Vested Benefit Obligation), ABO (Accumulated Benefit Obligation), PBO (Projected Benefit Obligation), all these FASB terms we throw around, but can also be used on the regular funding side, too. You've got the present value of benefits. You can go a little further and, even though your plan might not contain postretirement cost-of-living adjustments, recognize the fact that you put these in every three, five years, and take that into account when you're trying to determine a liability target. Expand this, and you get to a concept of total benefit obligation, not just what's in the plan right now, but what's going to be in the plan in the future. And there's a lot of plan designs out there, they're very common – flat dollar is one, career average is another – that really are what you see on the paper is *not* what you get. Everyone knows the benefits are going to change. It's important to take that into account when you're trying to formulate a strategy that's based on liabilities.

Howard had said before that there was a real problem in the fact that liability risk can dwarf asset risk. Salomon Brothers, I think, is the one who uses the term "noise" to describe what's liability misassessment. And that's created by a couple different reasons. One is the fact that the assumptions you make just might not be correct. The other is the fact that what you see isn't really what's going to be there. The point is that we all make actuarial assumptions for doing a valuation. When you're talking about investment strategy, those same assumptions aren't necessarily appropriate. *Usually* they aren't appropriate.

Let's take the example where you're considering buying an annuity because of, say, a plan termination, or just a settlement for *FAS 88* with an insurance company, and you find out that these same plan liabilities you've been measuring, whether it's ABO or VBO, suddenly have a much different price tag on them. And it's not just insurance company profit; it's the fact that the assumptions you made were not the

assumptions that that willing seller, or willing buyer, is willing to make. They're just not an accurate assessment of what someone else views could happen. Furthermore, there was no need for you to do that on a going-concern basis. But, nonetheless, that situation arises there. I like to call this WYSIWYG plan design, in my next point. (WYSIWYG stands for What You See Is What You Get.) And the point is that a plan document is not the be-all and end-all of plan provisions as they will be in the future. I'll get back to some more examples of just the situations you should be looking out for when you're doing this. But the point is that you've really got to, when you're doing things that are related to real dollars, start moving more toward explicit assumptions and an explicit grasp of the real plan design. Try and get your targets right.

Until the Tax Reform Act, we had the juggling act of having to say our assumptions were reasonable in the aggregate. That certainly did not mean they were reasonable individually. That's just fine, as long as the only thing they're going to be used for is in the aggregate. When you start moving toward investment strategy, you find that a lot of the economic assumptions you're making, in particular the interest rates, aren't relevant any more. You're being asked to produce a series of cash flows. And whereas before you might have had an interest assumption that was counterbalanced by a mortality assumption (one was too liberal and one was too conservative), now that balance falls apart, because you're not being asked to do anything about interest rates any more. So, when you were doing something for smoothing purposes, you were doing something to be conservative, that's not necessarily the way it should be any more, because your results are being taken and being distorted. So the answer really is to go to a much more explicit picture, where you're trying to be accurate with each individual assumption; that way people can't pick it apart and get a distorted picture just because they're only using four out of the six assumptions you made in producing the valuation results.

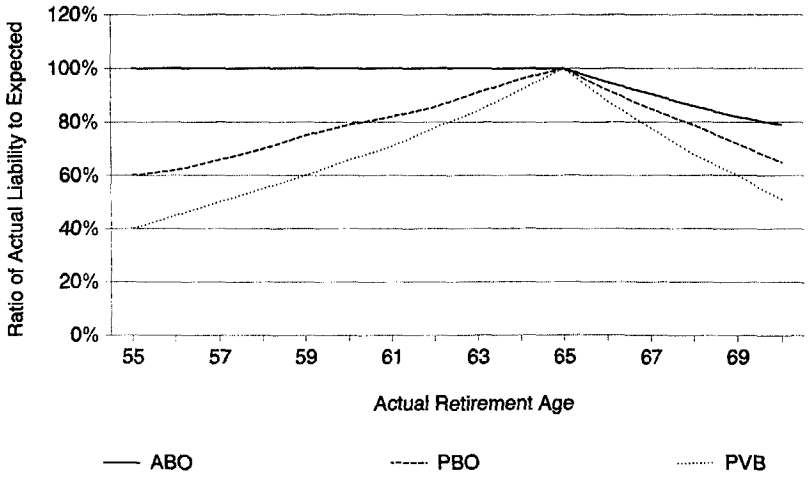
In particular, I mean, pension actuaries were doing valuations using a UP 84 (Unisex Pension Table) table, or maybe the GAM 83. We all know that, 10 years from now, we're going to be using GAM 98, or something of the sort, that's been updated. The point is that when you're trying to do a forecast, maybe UP 84 isn't the correct basis. You should be using something that's going to have those updates in it, since we all know that's where we're going to be ending up, in terms of real experience anyway. Retirement assumptions are often much too simple for getting accurate cash flows. Typically, this is more in the late-retirement side than the early-retirement side. We often put in decrements for early retirement. But when you assume your 100% retirement age as 65 and if you have a significant population of over 65 people, all of a sudden, your first-year cash flow shows many people going out right away. And that's going to overstate the first couple years' worth of cash flows, and make cash management and cash-matching a very difficult job to get right.

Let's just look at a couple of examples in particular. First, mortality. To take the result to extremes, let's say you're using a GAM 71 table in your valuation. I mean, how accurate is this? What's the risk for liability noise? Well if actual experience turns out to be GAM 51, let's say you're valuing coal workers or something, you're going to overstate the liabilities, depending on your discount rate, anywhere between 6-8%. On the other hand, if mortality turns out to be more like GAM 83, you have about a 4% understatement of liabilities. Whereas if we go to something like

GAM 83 with one and a half percent improvements or a projection scale, you're understating the true liabilities that are going to develop by something like 15%. Now, that result is not particularly sensitive to interest rates. And it's just something that's there. It's something that you're ignoring. It's a liability that's not appearing in any of your calculations.

On the retirement side, if you're using an age 65 assumption, with a plan that's got, let's say, completely flexible actuarial equivalent benefits (so it's just going to pay you, no matter what the discount rate is, the discounted value of the age 65 benefit if you retire early, or your accrued benefit if you retire late), you're doing just fine, no matter what pre-65 the person actually retires at, for ABO purposes (see Chart 10). For PBO purposes, you're overstating what's going on by up to 40% if the person does actually go out. Similarly, if the person goes out late, you've got a similar overstatement. You didn't take into account the fact that he or she was going to pass up getting his or her benefits at 65. For PVB (Present Value of Benefits) purposes, it's even worse. And I think, as I go along a little later, we'll see that if you don't have actuarial equivalents in your plan, this picture gets much more distorted.

CHART 10
Retirement: Assumption vs. Experience
Valuation Assumption is Age 65
Plan Pays Actuarial Equivalent Benefits



55-Year-Old; 20 Years of Service

Moving on from assumptions to plan design, we've been locked into this theory of using what's on the paper, because ERISA says you should. That is, when you're doing your valuation, you can't include amendments that haven't happened yet and that may not happen. You just fund for what's in there right now. And to counterbalance that, we've often used conservative assumptions. Career-average plans, again, are a typical case where you use a low interest rate so that you have a little money left over to fund those updates that you know are coming a couple years

down the road. And so there's been that balancing act, which can fall apart, depending on what these numbers are being used for. When *FAS 87* came in, it said you've got to go to explicit assumptions, and under certain circumstances, you go to an implicit approach to benefits, where you're supposed to be reflecting what is really happening. For instance, if you've got an hourly plan that's putting in increases every few years, you should be amortizing that increase over a much shorter period than expected working lifetime. It's over a two- to three-year period, the life of the contract. They've recognized that approach. And, again, if you continually update benefits in a career-average plan to the point that every year you're doing it, they're going to make you say, this is a final pay plan in disguise and account for it that way. So there is that recognition from the accountant's point of view that the implicit plan design is really what you should be looking at on occasion. How bad does this put things off? Well it depends on what you're doing with the liabilities, which one you're using, and what kind of plan design really is on that paper. Certain plan designs are more explicit; they really are what they are, they seem more than others.

For career-average or flat-dollar plans, nobody but nobody in these plans thinks that what you see is what you get. It's a big game. The plan sponsor's just limiting the inflation risk on the piece of paper. But we all know that career-average plans have updates. So do flat-dollar plans, those flat-dollar benefits keep going up, especially if the plan is collectively bargained. So you're really in a situation where the numbers you put down there for the valuation don't mean a lot on a real plan, going-concern basis. Your numbers are "valuation going concern," but they really don't have a lot to do with the reality of the plan. What does matter here is the update policy, and it's something that's not reflected in your valuation. How much and how often? What's really going on here? What are the true liabilities of the plan, not just what's in the plan document right now, today? Well, here's what we're ignoring in a plan that hasn't had any updates. When you go to put that first update in, for the ten-years-of-service employee, if they're a slow tracker, so that their pay growth has only been maybe 2% a year, you're only ignoring about 5%, not much of a mismatch there. On the other hand, if this person has been a fairly fast tracker and had 8% raises over his or her career, you're ignoring about 10-15% of the liability. For more service, the answer is even worse. So if you see a plan that hasn't had an update in a few years, what you're looking at is a situation waiting to jump. You're looking at a situation where the liabilities are going up 30%, 40%, 50%, and it's really because the paper liabilities haven't gone up at all to move into line with the real world liabilities.

Multiemployer plans have a shorter time horizon, because every three years, the length of the collective bargaining agreement, the plan design is up for grabs. Blinders are on both sides here. Usually the employers have one set of goals, and it's to not have any withdrawal liability and to minimize the contribution rate. And as a result, they're in the position of trying to, at least on paper, keep the VBO down, so that they have no unfunded vested benefits. And they're looking at a situation where we can get out any time we like. The union's more concerned with long-term benefits. They want benefit levels to be as high as possible and to have as much in their pocket as possible, so that it can't be taken away in the future. And they want the contribution rate maintained for now, as long as it's not being taken away for wages. And they, therefore, want a front-loaded ABO. They want a plan design that's more there on the paper. They are not concerned with the future, because that's theirs --

that is ours now – they can't take it away from us. You're in a situation where you've got two diametrically opposed forces. And the plan document is a compromise between the two.

When we get to final-average-pay plans, we're back in a situation where what you see is more like what you get. Career-average plans are really final-average-pay plans that haven't quite gotten there yet. They're always chasing final-average pay, as you do updates by a few years. Here, with a final-pay plan, at least prior to retirement, we really do have, more or less, what you see is what you get. Benefits are dependent on future wage levels; that is, when you retire or terminate, that's when we finally lock in the commitment to you. What's really a question here is how are we going to model salary growth? What do the liabilities really look like in terms of future wage growth? What effect do economic conditions have on pay? There are two main schools of thought on this. The question is, how does pay interrelate with interest rates? If pay is fully responsive to inflation, that is, if you assume your discount rate is a real interest rate plus inflation and pay is therefore some real pay rate plus inflation, then you're looking at the situation where you have very little responsiveness to interest rates in the PBO. That is, prior to retirement, growth in wages and growth in inflation cancel each other out, and so you end up with, for people who do it this way, a PBO whose duration is less than ABO. On the other hand, if you're saying discount rates are just spot rates, long-term inflation expectations aren't changing in the real world and therefore my long-term salary growth isn't going to change, because that's a long-term assumption versus spot-rate assumption, you end up with a curve much steeper. And so you end up with a duration that's higher than the ABO's. And so there are just two different ways of looking at it, and which one you choose does have a profound effect on the numbers you're coming out with, and they're certainly going to have a big effect on any duration-matching scheme, if it's involving PBO.

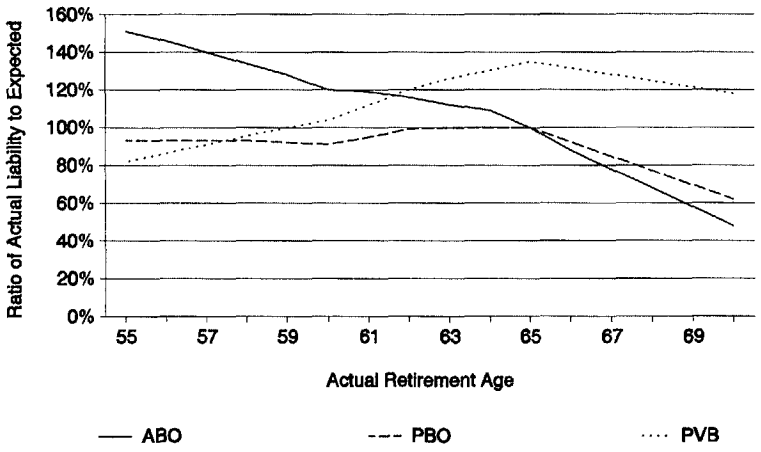
As promised, I am now going to get around to disability benefits. Disability income benefits, at least from an insurance company perspective, were a huge risk during the 1930s. Now these were mostly on an individual basis, but during the Depression, everybody went out on disability and drove companies bankrupt. Now you've got less risk on the corporate level, because you're not doing it on an individual basis. The sponsor's really insuring this on a group basis. But if you're looking at very subsidized disability benefits, there is a tremendous risk, as you go through downsizing in times of economic hardship, that you'll see increased use of the disability benefit. And so decrements that are based on true experience alone aren't necessarily appropriate. I'd like to suggest that there is some correlation between economic conditions and use of the disability benefit, in plans that heavily subsidize it. And thus, under downsizing conditions, you're at risk for increased use of the benefit among your work force.

Early-retirement benefit liabilities are often under- or overestimated. Subsidized early retirement is prevalent in many plans; the actual pattern of employee retirements really determines what the actual costs of these subsidies are. If no one ever retires before 65, early-retirement subsidies are free. If everybody does, they get very expensive. What is the effect of early-retirement subsidies? Well, it depends on how stable your corporate environment is. If you're downsizing, again, the value of these subsidies jumps as people scramble for the open door and take them while they can. Is there a

correlation with interest rates? Well, is downsizing correlated with interest rates? Recessions certainly seem to be correlated with downsizing, and interest rates seem to correlate with recessions. The sum of that is, well maybe it is, maybe it isn't. I'm not sure you actually have to get into it until you're in a very specific example, but it's just something to be aware of when you are trying to model your liabilities. To quantify the amount of distortion this can cause, let's go back to our retirement age 65 example, now with somewhat subsidized early retirement.

In Chart 11, where before the ABO stayed constant no matter what age the employee retired at prior to 65, because it was actuarially equivalent, here it kind of meanders down on its way up to finally getting to 100%. So there's a lot of sensitivity there. There's some exposure to late retirement, but it's all on the positive side. On the other hand, with the PBO, we're steady. The effect is largely muted in PBO because of salary increases. So if we're on a PBO target from asset-liability matching, we're basically okay. There's no real effect here for this particular plan. We're meandering around 100% anyway, no matter when he or she actually goes out. PVB has the reverse pattern of ABO, if you're in such a well-funded plan that you have a PVB target. This is good news, not bad.

CHART 11
Retirement: Assumption vs. Experience
Valuation Assumption is Age 65/Plan Reductions: 1/15-1/30

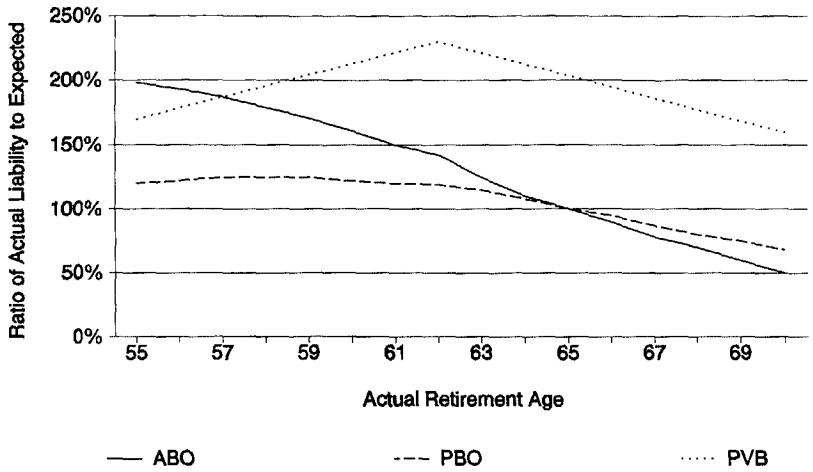


55-Year-Old; 20 Years of Service

Now, if we look at a plan that's got hugely subsidized early retirement (see Chart 12), note that the amount of the scale has changed rather significantly. On an ABO basis, if he or she goes out at 55, the benefits were double. So, if we've been ignoring early-retirement patterns, or at least been missing them badly, we're in the situation where suddenly the liabilities jump up at us. I mean, liabilities for a 55-year-old have just doubled overnight, once he or she retired. So it's something that we have to pay a lot of attention to. PBO, again, is hanging in there at around 120%. It's not nearly

as sensitive, again, because of the offset for a future salary. PVB, on the other hand, as you can see, jumps. I mean, it's up there, and it stays up there, to the point where it's not really in the declining mode for some time.

CHART 12
Retirement: Assumption vs. Experience
Valuation Assumption is Age 65
Plan Reductions: 5% from Age 62



55-Year-Old; 20 Years of Service

Let's move on from preretirement to postretirement. Postretirement COLAs (cost of living adjustment) are included in your valuations if they're in the plan as automatic. That's because we have to. If they're in the plan and you're valuing them, and common sense would say that, for investment strategy purposes, if we're going to consider liabilities we probably should take them into account. If you're doing these on an ad hoc basis, as a plan sponsor, and you're doing them every three to five years because that's your policy, and you do it at 50% of inflation because that's your policy, ERISA says you can't actually fund for them until they happen. But common sense still says that you should consider them in your investment policy, because they're still going to happen. You know it and I know it.

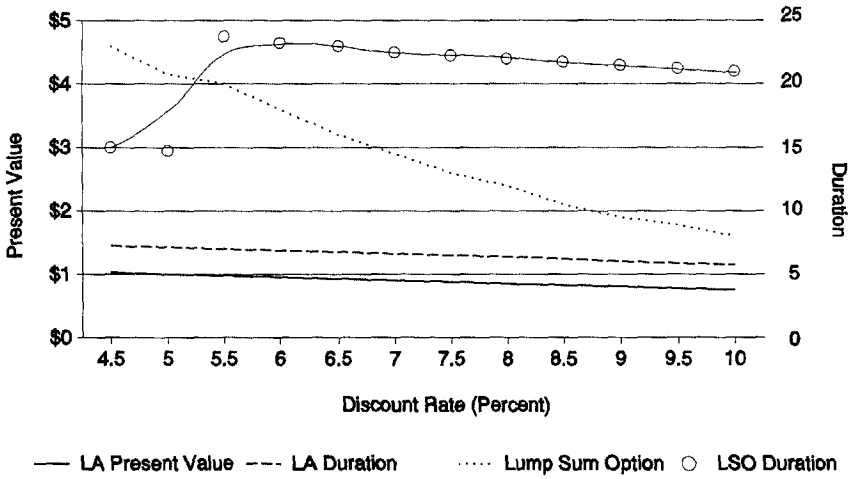
The effect of these on the duration of the liabilities depends on, again, the sensitivity -- on whether you're considering interest rates as the sum of inflation plus a constant real rate or varying real rates plus inflation. It's again whether you're looking at discount rates for liabilities as spot rates or as a building block approach of real rate plus inflation. And the two methods, again, lead to fairly different approaches in the duration of the liabilities. For a 65-year-old, if we're looking at a real interest rate of 3% or so, our nominal rate is always 3% plus inflation, there's basically no sensitivity whatsoever in the liabilities to the discount rate. Because the moment the discount rate goes up one percent, the COLA goes up one percent, too. So it's completely offset. So the best answer is no change. On the other hand, for the 45-year-old,

you've got a small slope to it because you've got 20 years to go until retirement. So with a final-average-pay plan, we had the effect of cancelling out until retirement; we've got the reverse here.

Most likely, unless your plan provides for a subsidized, normal form other than the life annuity, you just assume that everyone takes the life annuity at retirement. Cash balance plans are an obvious exception, where you may have an assumption on who's taking lump sums. Durations of lump sums work very differently than durations of life annuities. If you assume that everyone's going to make a rational choice and choose the lump sum when it's more valuable than the life annuity, and not the reverse, you've got a very different duration pattern for the lump sum than you do for the life annuity.

The life annuity present value in Chart 13 is somewhat sensitive to inflation. Its duration for a 65-year-old is going to be about six. There's some slope to it. On the other hand, the participant is not going to pick the lump sum unless he or she is at a point where the lump sum is more valuable. So the life-annuity duration stays fairly constant, but the lump-sum duration starts moving up. In this case, we've got the lump sum moving up because the PBGC rates don't go below four percent. So it's still a fairly level picture, until you get to the point where the deferred rates would have gone below 4%; we've got that four-percent floor.

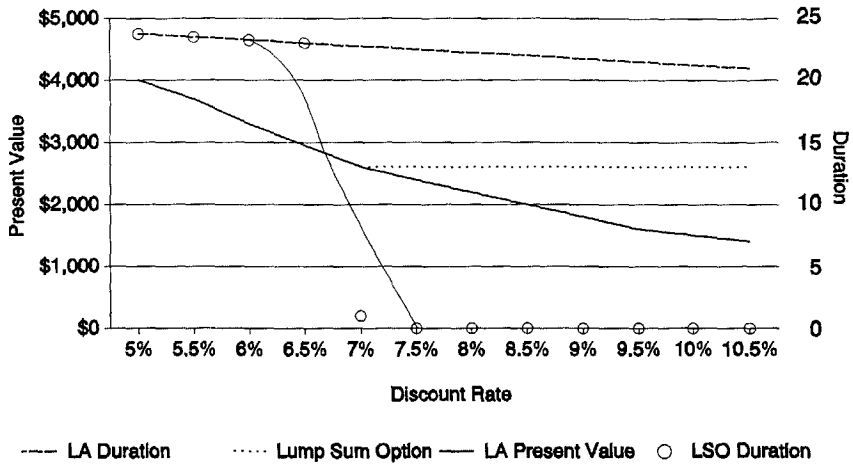
CHART 13
Effect on Optional Forms
PBGC Lump Sum Option



PBGC Immediate Rate = Discount Rate

Now, on the other hand, let's say we've got a fixed PBGC rate of eight percent immediate, and the deferred structure below that. And the discount rate, whatever it is, is a spot rate (Chart 14).

CHART 14
Effect of Optional Forms
Lump Sum Option



PBGC Immediate Rate of 8.0%

Here, the lump sum's duration, the option value of the lump sum, falls down as rates increase. Because at low interest rates, the participant chooses the life annuity, it's worth more. At high interest rates, he or she has an 8% lump-sum option, and they will exercise it. So the value of the option has a very interesting duration pattern. It's not sensitive to interest rates, once you get up past about 7½%, which is the net interest rate for the PBGC structure of an immediate rate of 8%, and associated deferred rates. You're at a point where the participants always choose the lump sum, it's being valued at a fixed rate, so they take it. There's no sensitivity of these liabilities to interest rates once you move past the magic 7½% number. So depending on your environment, you're in a very different position as far as your cash flows are concerned.

To sum up the effect of optional forms of benefits, actuarial equivalence for plan purposes doesn't mean actuarial equivalence for investment purposes. You've got to specify actuarial equivalence in your plan. That doesn't mean that that plan basis holds true – is economically equivalent – over all conditions.

Once you move to extraordinary economic conditions, you end up with a very different effect of these options. That is, you granted options to participants, and they actually have a value. And the value can be reflected on the investment side. On the new breed of plans, like cash balance, where you've granted very big options, for instance, where participants can always take a lump sum or an annuity, they create the most difficulties. One thing I've always wondered is, how do you terminate a cash-balance plan without really getting hosed by an insurance company? Unless you want to just pay out participants their credit balance (with consent).

You're really on the hook for a tremendous option that can swing either way, and the insurance company will really make you pay for it.

To conclude, numbers you use for a valuation, accounting or funding aren't necessarily appropriate when you start using them for investment strategy purposes. You really have to go back and take a first look at the assumptions you're using, and the benefits you're valuing. You probably want to at least think about making both as explicit as possible, so at least you recognize what you're not looking at as much as you recognize what you are looking at. So, basically, either you're going to end up with a lot more detail, if you end up paying attention to what I've been saying (which I don't necessarily recommend), or alternatively you're going to end up with much less detail as you throw up your hands and say, oh, maybe we should just ignore the liabilities completely, and go back to 60-40, where we were comfortably ignorant.

MR. LOFGREN: Howard got into the old world and the new world. Carl's talk was in terms, I guess, of the real world. Well I'm talking about executive benefits, so let's visit kindergarten. It's a much more simplistic problem, ironically as a result of much more complex considerations on the executive benefit side. Executive benefits were not funded, to speak of, as recently as five years ago. There is a lot more funding now, if you look in proxies. The reason is to provide the same level of security for SERP (Supplemental Executive Retirement Plan) or excess plan benefits as for qualified benefits, so as to give the same benefit security to executives as to the rank and file. Funding protects against takeovers, and a lot of arrangements happen to have windfalls built in, but there is a justification for executive benefit funding.

Now, unlike the qualified pension plan, there is not an optimal funding vehicle for executive benefits. I'm thinking SERP benefits, but you could have similar considerations for postretirement medical.

What is an optimal funding vehicle? It should have three characteristics: (1) contributions are deductible at the time they occur; (2) investment income within the trust is not taxed as earned; and (3) executives have deferred taxation until distribution. That doesn't exist on the executive benefits side. These are benefits that are not allowed in a qualified trust.

Now, in looking for ways to secure benefits, there are a number of approaches that have been used. I call some of them funding, some of them financing. The difference is that in funding, assets are set aside for the benefits, and the beneficiaries and the participants, whereas financing is simply earmarked corporate assets. We're going to be talking only about funding because, in terms of talking about investment strategy for benefits, if the money can be taken away to be used for other purposes at a moment's notice, it's hard to talk about the optimal investment strategy.

Now there are two possible approaches that you could come up with, within what's available, if you are trying to fund executive SERP benefits or excess plan benefits within a secular trust type of approach. If you try very hard to preserve the defined-benefit characteristics of the plan, as people have forfeitures of benefits (for example, if salaries go down or if they die and have a spouse left who gets a 50% benefit), you will have a situation where, thinking in terms of individual by individual assets, they would shift from one life to another. Because the key of all executive benefit

secular trust or vesting trust or springing trust-type funding is that you're going to have individual accounts for each executive who's in the plan. But if the money can be shifted from one to the other, they don't really have it. When they don't really have it, they don't get taxed, the trust does. The participant will get taxed at the point in time that there's a distribution. If the money hasn't really been set aside for a particular executive, the contribution will not be necessarily deductible. So you have double taxation, like a rabbi trust. You are preserving defined-benefit characteristics, but you can't deduct the contribution right away, which is a hardship and a problem. Suppose you have real cash in a corporation, let's say $1 million. You put it into something like a secular trust, except you really want to preserve these defined-benefit characteristics. As a result, you can't deduct the $1 million. However, the $1 million has disappeared from the corporation. From a tax perspective, it's as if you threw the $1 million away. You don't get a tax break on the other side in place until far, far later. So this is an unsatisfactory solution from a tax perspective.

In the second possible approach, instead of trying to avoid taxation to each executive at the time the contribution is made, instead of trying to avoid the defined-contribution nature of the individual tax accounts, you simply accept it. There will be defined-contribution accounts within the trust or annuities. By definition, individual annuities would have separate accounts. The contribution, in that case, will be deductible to the corporation, and it will be taxed to the participant. Investment income will be taxed to the participant each year. Now, as I'll get into later, one of the difficulties of this approach is you have a possibility of windfalls. The real difficulty you have is a conflict between the plan design and the trust structure. One is defined benefit, and one is defined contribution. Yet in terms of funding vehicles for executive benefits, that's really all there is. So starting with the basic proposition of this session, which is, look at the interplay of pension plan design and investment strategy, we find that you just can't do it. You have to look at the interplay of at least three items. The plan design, the investment strategy, *and* the trust structure.

Let's go on. I have to give you a few more details on secular trusts, for those of you who don't know, before we can really talk about the investment strategy. I mentioned there is a possibility of windfalls. Here's why. You have a defined-benefit plan, which defines the benefits to be provided. And you're putting them into a trust that has individual accounts that people own. Suppose there's a pre-retirement death of a single individual. No spouse. He or she is not supposed to get anything from the plan. The trust has an individual account for this person. You can't avoid the windfall. Suppose tax rates change. We owe an executive $100,000 pretax. With a secular trust, given that the person is taxed up-front, by the time you eventually distribute something to him or her, he or she has been taxed on it already, and doesn't get taxed again. Suppose tax rates are 40%. So if we had an unfunded plan, this executive would be owed $100,000 a year pretax, which would be worth $60,000 a year, posttax. And we fund it; we put enough money in at this tax bracket to cover $60,000 a year aftertax. Suppose next year tax rates go up to 50%. All we needed to deliver to this executive, in that case, would be $50,000 aftertax, the $100,000 benefit minus the 50% tax rate. But we've already delivered, because we've already paid tax at a different tax rate, $60,000 a year aftertax. You can have a windfall if tax rates go up, which is what we all expect, or most of us. Consider interest rate changes. Let's suppose, again, the executive's aftertax benefit to be provided is $60,000. And you have enough money in that executive's trust

account to provide $60,000 per year aftertax, and it's sitting, typically, in some type of short bonds. And interest rates go up quite a bit. Annuity prices are a bargain. You can buy more annuity. You'll overprovide for the executive.

One last primary windfall that can happen to the executive as a result of the defined-contribution accounts in a secular trust is if early-retirement subsidies are not taken. In a qualified plan, with 100,000 people, or with 1,000 people, or with 100 people, you are funding the benefits of all of them together, evaluating actuarial gains or losses in aggregate. That is the aim. In the secular trust, you're funding each executive individually. If there's not enough in the account when the executive reaches retirement, you've got to get it there. And you can't move it from somebody else's account. This means that at the point that somebody is 55 and might retire with an early-retirement subsidy, in order for them to have the equal amount of protection that a rank-and-file employee has in a qualified plan, you would have to have enough money in that specific individual executive's account to fund that early-retirement subsidy. Which means if that executive doesn't retire, then you've got too much funding unless the projected benefit goes up enough with extra year of service and salary increases and so forth.

Now there seemed to be ways to handle these problems until the recent series, just a month ago, of four private letter rulings on secular trusts. We want elasticity. By elasticity, I mean the ability to reallocate among accounts. The problem is that if you do that within the trust, then you get to that very first unsatisfactory situation, where the money doesn't belong to anybody irrevocably, and the employer doesn't get the tax deduction on the contribution, and the money disappears from the corporation. Elasticity outside the trust is difficult. The way this would work is as follows: take the example from before, where we were funding towards a $60,000 aftertax benefit, and there were changes in tax rates so that we only owed the executive $50,000. Let's convert this from an annuity to a lump sum. We had put enough in the account for $60,000, but under the terms of the SERP or the excess pension plan, we only owe $50,000. In that situation, you might try to put elasticity outside the trust. If we have too much in your account, once we get that out of the trust, you will give it back. I have seen it written this way, but I have not seen anybody actually give any money back.

Now, let's go forward. I want to explain the aftertax benefits. Even if the money is invested tax-free, the principal would be taxed to the executive as it is contributed. At least that part of the corpus of the trust in an executive's account would have already been taxed. Taxation is by Section 72 of the code. Consider an example of a $100,000 benefit with a 40% tax rate, so we owe $60,000 posttax. Suppose that we have used an investment policy of tax-free bonds, or of an annuity within the trust, with a tax deferral on the investment income. When the annuity, or the benefit, comes out of the trust, and we buy a nonparticipating annuity, it's only going to be taxed at perhaps a 20% rate under the exclusion allowance formula of Section 72, where a portion of the payment each month is already-taxed principal, and the rest of the monthly retirement income payment is untaxed-as-of-yet investment income. Well, suppose the tax rate comes in at 20%. Then we need to fund towards a $75,000 benefit, so after the 20% tax rate, I'm left with the same $60,000.

Moving to the next page, we can finally tie investment policy into plan design, on the executive benefits. The first question is, who has the investment direction? Now in any secular trust that I've ever seen, the plan sponsor retains investment discretion up to such point as there may be a change in control. After the change in control, the trustee will insist on investment discretion. If there's enough money, the trustee is going to buy nonparticipating annuities of the type that lock in a fixed amount of retirement income individual by individual, so there's no chance of assets being insufficient. If the trustee started out with enough money and, as a result of investment losses, assets became insufficient, the trustee could get sued and lose. There's no upside for the trustee from generating extra investment income. He or she doesn't get any medals. There's no upside, but there is a lot of downside, so he or she locks it in.

Now in terms of asset classes, when the plan sponsor makes the choices, the executives are going to get any investment gains because the trust is defined contribution in nature. On the other hand, the funding rules are just like a regular qualified defined-benefit plan. You have defined-benefit funding rules for a defined-benefit plan funded through a secular trust. So if there are losses, you've got to make them up. Which means you're going to avoid equities. Again, similar to the trustee situation, there's no upside to equities for the plan sponsor, just a lot of downside, under current law.

So what are feasible assets? One feasible asset would be an immunized bond portfolio, but because investment income is taxed, it would be valued at aftertax rates. Because the investment income is taxed to either the trust or the individual, whose rates are the same, one should use individual aftertax rates rather than reflect corporate tax rates. Or you could invest in tax-frees, but to about the same results. I don't much care if you invest at 10% and pay income tax of 4% for a net yield of 6%, or if you get 6% tax-free in the first place. It doesn't avoid the risk of tax rate changes. No matter what you do here, if tax rates go up and you've funded earlier at lower tax rates, you've provided too much. Another feasible asset might be what I call a CD annuity, which is an individual annuity that feels like a CD. You still have a risk of nonparticipating annuity price changes, in addition to the one of tax rate changes, because you're essentially investing in cash, whereas the liability is like a long bond. But at least your investment income might be tax-deferred with some luck on Section 72(u) tax treatment, which wasn't addressed by the private letter rulings. The yields would be more competitive than real short-term rates. In practice, people do a compromise strategy of short-duration bonds.

In summary, we find that in order to make any sense of this at all (and it doesn't come to a nice, happy, sensible conclusion), you're looking at plan design, funding rules, and investment strategy and contribution strategy all at the same time. All you can try to do, because there are executives that want to have their benefits funded, is to avoid an excessive asset buildup. But, remember, since you're funding individual by individual, executive by executive, you have to have enough in there for the person's early-retirement benefit, or you will hear about it. Part of the solution, and it's an imperfect solution, is to fund towards accrued benefits. There's just no other choice. You're already going to have too much; it would just be crazy to fund towards projected benefits. And then, all those embedded options that Carl was talking about on the qualified plan apply here too.

Summing up, there are only inadequate funding vehicles for SERP benefits. The investment strategy for executive pension benefits must be simplistic and inadequate. In order to fund adequately under government rules, you are allowed to fund only in ways that create potential windfalls for executives. This cannot be in the interest of public policy, but that is the way it is. In my view, the government should allow the defined-benefit funding of executive benefits on at least an equal footing with defined-contribution funding.

In terms of the original mission here of the interaction of plan design and investment strategy, the primary impact of the plan design and investment policy is not through matching or anything like that. It's simply through its clash with the code.