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ANALYZING THE ASSETS FOR ASSET/ LIABILITY MANAGEMENT IN PENSION PLANS

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Panelists: ROBERT L. HOLZ*
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Recorder: MATTHEW T. SLOAN

- This session will discuss the various items that are needed to perform necessary projections.
  - -- Pension asset/liability models
  - -- Strategies for asset/liability risk reduction
  - -- New approaches to asset modeling
  - -- Quality spreads
  - -- Liquidity
  - -- Investment strategy
  - -- Investment policy and objectives for pension

MR. CHESTER R. SCHNEIDER: With my background, both as an actuary and a mathematician, I want to talk about how the economy and returns on assets might be simulated when doing a pension forecast. The way you simulate returns is tied to the way assets are priced, therefore, more consideration should be given to this area of actuarial work.

Pension forecasting can be used for a variety of applications, including benefit policy, funding policy, and expense policy. In addition, pension forecasting can help in determining asset allocations and in evaluating various strategies which take both the assets and liabilities into account.

As we find more uses for forecasting, we will see that more sophistication and more complexity becomes appropriate. Most actuaries are very concerned about liabilities, and actuaries are known for being very precise in their liability calculations. In doing forecasting work and other applications of actuarial work, though, there's a trade-off between precision and approximation.

For example, you can do each calculation on an individual basis, or you can do various groupings of the data when doing a deterministic forecast.

There is a second variety of forecasting for which the term "stochastic" is used, and "stochastic" essentially means that you are trying to come out not only with the right average result, but also trying to determine the distribution of results. This can be the range of confidence intervals for various statistics of interest, such as expense levels, funded ratios, etc., for both today, and in the future. As the type of forecast tends more toward stochastic than deterministic, there is actually a need to use approximation techniques because of the level and complexity of the computations that would otherwise be required.

In the past, pension liabilities and costs were fairly stable. When assumptions were changed, they were infrequently changed by the actuary. With new rules, such as financial accounting standard (FAS) 87 and the Omnibus Budget Reconciliation Act of 1987 (OBRA), there will be more frequent changes in discount rate assumptions and potentially other assumptions. This will lead to more volatility in the results that actuaries and plan sponsors will have to deal with, and forecasting can be used to evaluate some of the degree of volatility.

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Actuaries tend to put a lot of effort into simulating or calculating the liabilities. On the asset side, most simulations are much simpler and there is much less attention to detail. Some forecasts try to forecast each single asset, but these are often limited to deterministic forecasts. As you do a stochastic forecast, there is a need to simplify things to a portfolio level, but to deal with the complexity necessary to doing stochastic forecasts correctly.

A second point is that once we begin studying things like volatility of expense, the stability of funded ratios, and items of that sort, there is a need to model interest rate changes and asset and liability returns in a consistent manner. Any lack of consistency in this area potentially invalidates asset liability studies. Models are a funny thing. They only have the features that are built into them, so the considerations as to what is the appropriate structure of the model are very vital. This happens not only in pension forecasting, but in economic forecasting in general. Models, by what they leave out, make judgments about how the world works.

Many traditional forecasting models, to the extent that they are stochastic, tend to begin with the assumption that returns are constant. The problem is that this seems to be all right for equities at first, but it breaks down seriously when applied to fixed income asset classes. In my way of thinking, they serve a level in a chain of complexity that cash is the simplest, bonds and fixed income securities are up the chain of complexity, and equities add a third level of complexity. The certain scientific method for models is to apply a theory to the simplest cases, and if it does not work in the simplest case, it should be rejected in general. What we will see is that constant return type models are really inappropriate. If we look at cash, the return on cash varies from moment to moment, and the expectation of returns on cash is tied to the current level of interest rates. So any model that begins by saying that the expected return is constant, plus a random term is making a fundamental error. The basic point is that constant expected nominal returns is really inconsistent with stochastic interest rates. If we maintain constant expected returns and look at what happens to interest rates over time, we find that we get a nonstationary interest rate process. What this means is that if we do a long term forecast for ten or 20 years, the dispersion of interest rates increases year by year, and an unrealistic range of possible interest rates results. If the forecast period is long enough, interest rates of 50%, 100%, even 150% can occur.

What is clear is that it is necessary to build a more complex model than has been used in previous years. This model should look at economic history and incorporate whatever lessons are appropriate. There are at least two aspects of this: first, determine what are reasonable average levels for various quantities of interest, and second, what are reasonable distributions of these results around the average.

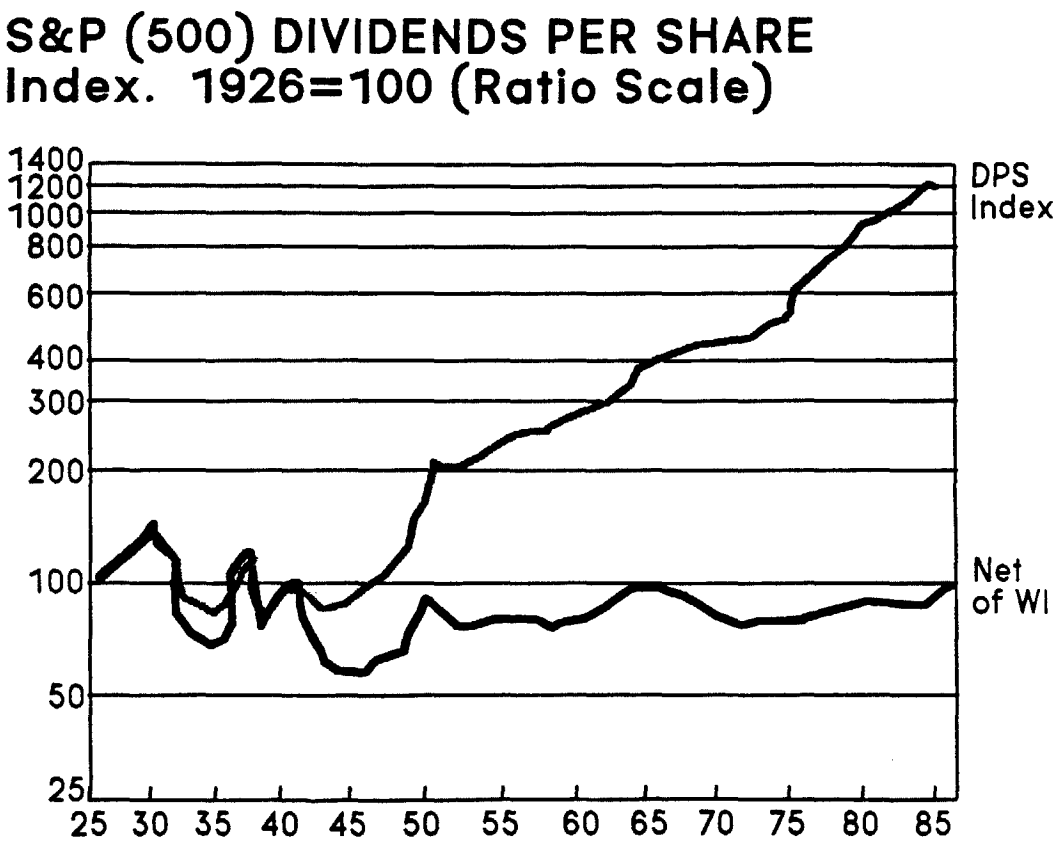
In determining these relationships and the extent to which a model should reflect them, a key concept is that of conditional probability. If, let us say, we are at a point in time where dividend yields on equities were 7%, would your return expectation in either real or nominal terms be different than if I said the dividend yield on the S&P was at 3%? Some people might say that their expectations are the same; others might say that there is probably a difference in return expectations. The question, then, is exactly how the factors such as this change expected returns.

Changes today in one variable affect other variables. For example, large price increases over a period of a couple of years will generally be felt in wage increases in years later down the road. So there is a viewpoint that some relationships are persistent; that there is a relationship between one item that is being simulated in the average results, and another measured over significant time periods. Price and wage inflation and dividend growth seem to have some long-term interconnections.

Graph 1 shows S&P dividends per share deflated by the wage index. What is interesting is that since about 1951, there has been very little variation in the level of this deflated dividend index, which indicates that there is some sort of relationship between wages and dividends. You might conceptualize that by saying that dividends are related to capital's share of productivity in this society, and that the wage increases are related to labor's share of productivity increases in society.

I would like to describe the general structure of an asset forecasting model that we've developed and called our "structural economic model." Essentially, we start with a model of the economy, interest rates, and price and wage inflation, and then we have separate models for fixed income

GRAPH 1


S&P (500) DIVIDENDS PER SHARE
Index. 1926=100 (Ratio Scale)
1400
1200
1000
800
600
400
300
200
100
50
25
25 30 35 40 45 50 55 60 65 70 75 80 85
DPS
Index
Net
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and equities. Once we have fixed income returns and equity returns, we can model asset classes which are regarded as hybrids or derivatives; things like convertible bonds, options, and various strategies involving assets. Various strategies that involve both assets and liabilities can also be modeled. For example, constant proportional portfolio insurance and other asset and liability strategies can be evaluated.

The structure of the economic model, in brief, is that there are several interest rates, and they can be categorized as either real interest rates or nominal interest rates, long and short interest rates, etc. We model the real, riskless interest rate as a component in the model that affects all the asset classes. Inflation is then modeled based upon the relationships between real and nominal rates, and short and long rates.

The return simulation process is somewhat different than in many models out there, which assume returns are lognormally distributed. As I mentioned before, if you apply lognormality to cash, you get something that is inconsistent with the existence of riskless interest rates. The structural economic model goes back to basic principles and models the total return for an asset class as the cash flow from the asset class, plus the change in price. Many models start with modelling total return and then run into conceptual problems trying to break this return into its component pieces, cash return and change in price.

The fixed income model starts with the interest rates that are simulated. Then using the yield on a bond index, say, the Shearson-Lehman index, and the duration of the portfolio, the total return and the income return from this asset class can be modeled.

The equity model has a similar structure. We have a model which gives the dividend yield, and another model that determines the dividends per share on the S&P equity index. The dividend yield is tied to the interest rates that we have modeled. The dividends per share are determined more by wage and price history that we have simulated. Again, from these the price and income return are developed.

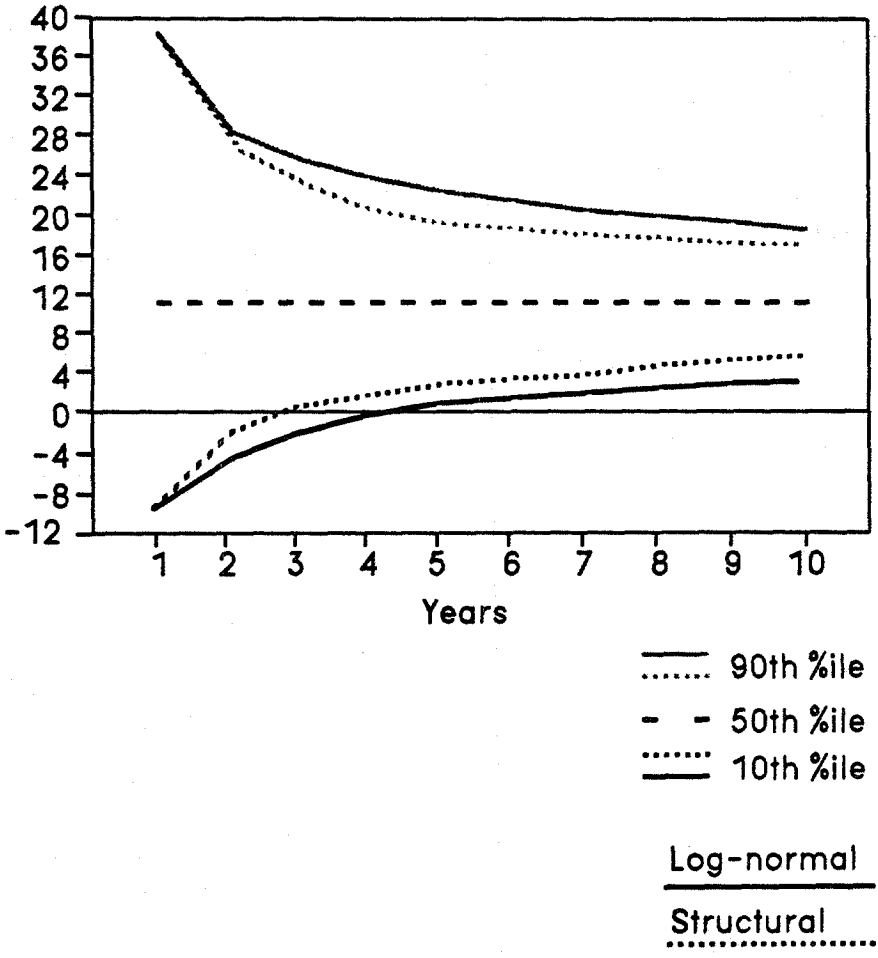
One of the interesting things about this model is that it produces results that are different from traditional models in a variety of ways. Graphs 2 and 3 illustrate several of these points. The initial one-year dispersion of returns, and the average level of returns are the same both in the structural model and a traditional lognormal model. But the average compound rate of return has less dispersion in the structural model. There is some tendency to mean reversion over time. This characteristic of the structural model corrects one of the primary criticisms of traditional models. Graph 3 illustrates the dramatic difference in the way returns compound for a 30-year treasury bond. Essentially what is happening is the 30-year treasury bond has a duration of roughly ten at current interest rates. So, if our portfolio was immunized with the duration of ten, essentially there should have been no dispersion at the end of ten years. What we have is a security that starts out at the duration of ten, and has remained constant at about ten. So the dispersion in the results reflects the average difference in duration between what we are modelling and an immunized portfolio. You can see that there should not be much dispersion from that, as well as from the fact that the interest rate model that we have is stationary, and has mean reverting tendency.

The implication is that the variance of returns and dispersion of returns is much less in the structural model than under traditional lognormal assumptions. There is also an interconnection between dividend growth and wage growth. This is important, because a lot of asset/liability management for pension funds has been modelled on what is necessary for our banks and insurance companies. This is essentially looking at durations of assets and durations of liabilities, and trying to match on that basis. Some people have advocated that for pension funds; other people have been uncomfortable with that sort of analysis, feeling intuitively, that equities are a better fit to the long-term needs of pension funds if you have a sufficiently long perspective. The point is that most asset/liability models have not built in that relationship. But, it is clear that there is a tie in between equities over the long term, and liabilities which are driven essentially by wages. Models that incorporate this relationship, like the structural model, add a new dimension to asset/liability studies.

With this, I want to conclude and introduce my next speaker. Bob Holz is a Vice President with National Investment Services of America in Milwaukee, and has been responsible for client relationships and product development in the pension field. Prior to joining NISA in

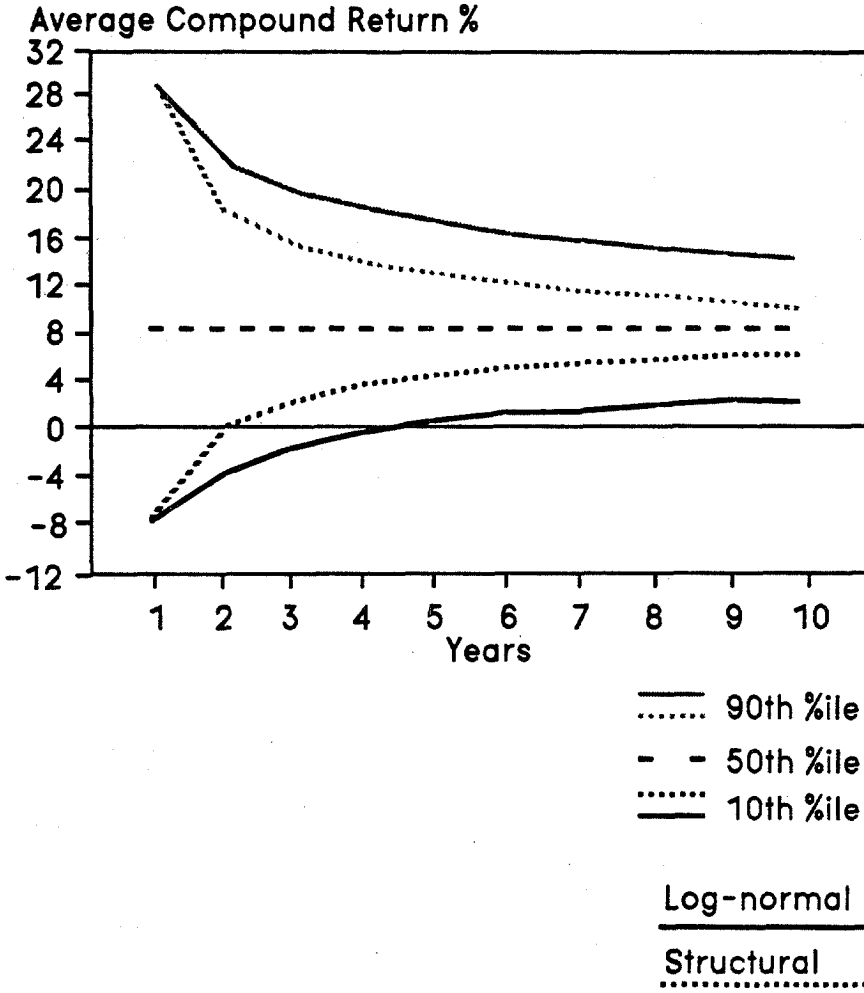
GRAPH 2

DISPERSION OF AVERAGE COMPOUND RATES OF RETURN
Stocks
Log-Normal v. Structural Model



GRAPH 3

DISPERSION OF AVERAGE COMPOUND RATES OF RETURN
30-Year Treasury Bonds
Log-Normal v. Structural Model



January 1987, he was a shareholder at Kidder Peabody, and developed the first futures and options program of its kind in the midwest region. He helped institutions in employee risk management techniques to control asset and liability mismatch while attempting to maximize expected return. Before that, Bob was in economics forecasting consulting with Data Resources in Chicago. He's an economics graduate of Harvard.

MR. ROBERT L. HOLZ: I am with National Investment Services, and to give you a little bit of background: we manage about $5.5 billion, have been around for about 20 years, have about 30 employees, and primarily manage assets so that they coordinate to specified liabilities. For example, fixed-income portfolios that are dedicated to retired lives that do not have cost of living adjustments. Another fixed-income portfolio application would be immunization, as Chester was just talking about. We focus on immunizing to a liability duration or the liability duration component, and at times there is a dispersion between the liability duration and the duration of the assets. The other primary business that we are in is developing equity portfolios that are dedicated to tracking other liability characteristics; in particular, liabilities that do have inflation components to them. This, by the way, is a relatively new business. It has been in development for three to four years, and we are now getting to a stage of actually implementing some of these strategies.

A brief overview of what I would like to discuss is, first, this issue of liabilities and the importance of liabilities and their volatility. Chester has already alluded to it in some ways, but what I would like to do is address the issue of defining those liabilities in ways that can be helpful to asset management and some of the issues that are related to that. In addition, I would like to introduce this new element of configuring assets to conform to liabilities that not only have interest rate variability characteristics, but also inflation variability characteristics. And finally, I will discuss the nature of asset liability management as we go forward trying to coordinate liabilities and assets, and the processes that are involved in that. We, as professionals (investment managers and actuaries) in a service business and servicing pension sponsors, are going to be working more closely together. The challenge extends to plan sponsors to manage these relationships so that they get the most out of each of our individual expertise.

What are the forces that are forcing us to recognize the pension asset liability management problem? It is fairly clear that FASB and OBRA have at least made us recognize that liabilities are volatile with regard to interest rates, and that the discount rates that we use, in fact, are volatile. The other thing that forces us into the direction of thinking in terms of asset liability management is that the sheer magnitude of pension assets has become a very large percentage of corporate total assets. As that has happened, it has certainly increased management's awareness, as well as security analysts' awareness, that pension assets are indeed more and more important in the management of a corporation.

These new regulatory and accounting standards have, in effect, shifted plan management emphasis (albeit ever so slowly) away from controlling just asset returns and asset volatility to controlling the surplus volatility. One of the areas that is lacking though, is the issue of inflation with respect to current FASB and OBRA accounting and regulatory issues, as well as some of the other elements of the liabilities. This might well be a cause for all of us in the pension industry to help the regulators and help the accountants as we go forward in the coming years, to redefine these issues and help coordinate the way that these issues should be reported and structured -- hopefully to help guide us toward better solutions.

The first main issue is that companies must decide which liabilities to fund. There are two basic types of liabilities; there is a termination liability, which we think of as an ABO, and there's a going concern liability. Once we have defined that there are two types of liabilities, which one are we going to address, and how are we going to fund it? Then we have to choose what kind of assets we must use to fund that liability. In the case of a termination liability, its principal focus is to minimize funded status volatility, and we have historically thought of doing that through bond immunization. The fault of this is no recognition of the inflation issue. The fault of not looking at inflation growth is that if we do not recognize inflation growth, we are not funding the liability with the appropriate assets, and that forces the plan or the company itself to fund that inflation growth through larger contributions, and, in effect, pay the opportunity cost of being in bonds and not being in equities. In a going concern perspective the liability does include an inflation component. We can fund with stocks and bonds, stocks having an inherent inflation or growth component to them. But the problem with this is that we are going to have to allow for

greater volatility than we would in a termination perspective between assets and liabilities. If we look at it in the going concern perspective, we have to allow for greater surplus volatility.

We have restated the pension problem as defining this liability in terms of a termination and a going concern view, so now let us move to allocating assets to best fund these liabilities. Let us look at this in a structured portfolio sense, structuring portfolios to meet these objectives. Liabilities have traditionally been funded with structured bond portfolios, as we have just discussed, to cover this termination liability where there is no inflation included.

Now we are going to move to introducing a new set of stocks that can help address this inflation component. For the lack of a better term, let us call this set of stocks dedicated stocks. These are basically stocks that move with the liabilities that have inflation growth in them. We can do this by finding equity securities and assembling them in portfolios that have a character similar to liabilities. Rather than capitalization weighing these securities and making the asset class look like a market index, what we are suggesting here is to produce a portfolio of securities that has weights in accordance with the characteristics in each equity company that, when assembled in a portfolio, helps provide us with a portfolio that moves with these liabilities. This is important because it enables us to control the surplus risk as we have done with bonds, and it also allows us to capture the equity growth component which lowers long-term pension contributions.

In the rest of this discussion, I would like to refer to two generic liabilities; a termination liability that has no inflation, no cost of living adjustment (COLA), and no wage growth, and I would also like to refer to a going concern liability that has inflation, and a 100% cost of living adjustment for the retired lives portion. We will also assume some dampening of inflation volatility. Without going into a lot of detail, if inflation goes from 5% to 10%, we will assume that it does not stay at 10% for the rest of the life of the liability for the next 20 years, but over a ten-year period will bring it back to a mean of, let us say, 6%.

The objective of the research that I am going to show is to measure historical correlation in commonly used asset classes; correlation with respect to these representative liabilities; and finally, to identify the equity process that produces high correlation to these representative liabilities. Our research shows this can be done, not unlike the realization in the mid-70s that immunization was certainly capable of diffusing retired lives liabilities.

Table 1 shows some of the characteristics of various asset classes. You will notice on the bottom that dedicated stocks have been included. Average return from 1976 to 1988 is just the experienced return, and the volatility of the return is the volatility over that period in terms of the standard deviation. The liability correlation for both the terminating and the going concern relative to each of those asset classes is shown.

TABLE 1

Alternative Investment Characteristics (1976-1988)

Sector	Average Return	Volatility of Return	Liability Correlation Terminating	Going Concern	Expected Return
1. Small Stocks	18.12%	20.48%	-.318	.046	17.74%
2. Foreign Stocks	21.00	21.95	.219	.358	15.46
3. S&P 500	14.77	12.73	.319	.470	15.46
4. Growth Stocks	14.84	17.39	-.170	.036	15.46
5. Value Stocks	15.91	14.49	.162	.419	15.46
6. Treasury Bills	8.97	3.23	.167	-.179	9.00
7. Long-term Governments	10.25	14.64	.939	.858	9.82
8. Long-term Corporates	14.59	14.59	.883	.803	10.48
9. Dedicated Stocks	19.64	14.33	.568	.701	15.46

Expected return is the expected return that was used in our modelling. We use the risk-free rate to be 9%, and then we added the historical 1926 to 1988 premiums to each of the asset classes. Here we assume that all equities have similar expected returns, except for small stocks to which

there is serious evidence of having a higher real return. Bonds have a slight premium to T-bills; corporate bonds a little bit more, and we are assuming dedicated stocks will show no premium to other stocks. It is interesting to note that, in fact, we can find correlations for dedicated stocks that are very high with going concern and with terminating liabilities and significantly greater than the S&P.

It is interesting to see what effect including dedicated stocks can have on the risk/return trade-off for a pension plan. We might do this by looking at a Markowitz efficient frontier. In Markowitz' framework, we subtract asset returns from liability returns for both the going concern and a terminating liability and look at what a traditional asset mix might look like. Then we include these dedicated stocks, and see if, in fact, we can help the performance in terms of lowering risks relative to the liability, and potentially optimizing the return.

The two portfolios that we are going to look at are summarized in Table 2. The current portfolio which is 60% in equities -- some growth, some value stocks -- and 40% in bonds -- half government, half corporate, both long term. What we are going to do is add some diversification to this portfolio by putting some small stocks, which give us a little bit more return, and foreign stocks which we are not assuming have any higher expected return, but do, in fact, have good correlation characteristics relative to liabilities. We are going to have 10% in the S&P 500 stocks, no value stocks, and a big chunk in these dedicated stocks. We are going to add some treasury bills in, and we are going to just have corporate bonds as the long bond class.

TABLE 2

Asset Weights: Dedicated Stocks Available

	Modified Weights %	Current Weights %
AMEX Small Stocks	10.00	0.00
EAFE Foreign Stocks	10.00	0.00
S&P 500 Including Dividends	10.00	20.00
Growth Stocks	0.00	20.00
Value Stocks	0.00	20.00
Dedicated Stocks	45.00	0.00
Treasury Bills	5.00	0.00
Long-term Government Bonds	0.00	20.00
Long-term Corporate Bonds	20.00	20.00

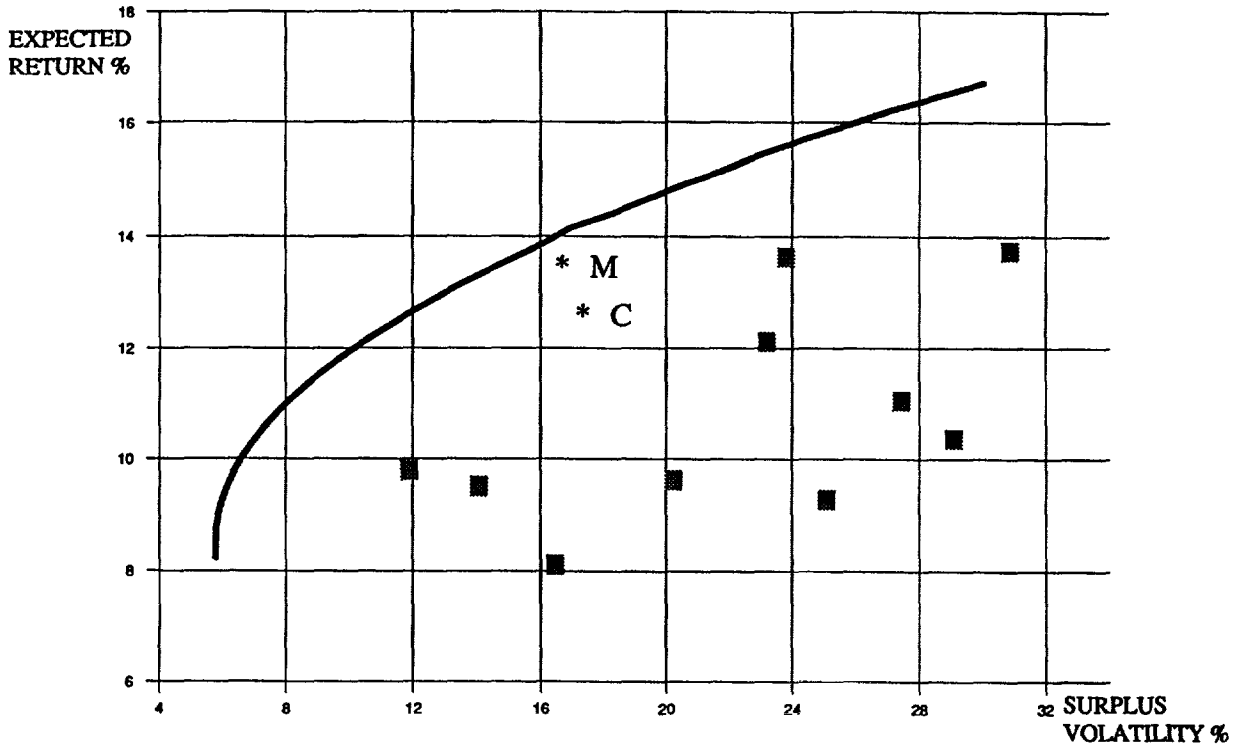
Graph 4 shows an efficient frontier, where the expected return is on the Y-axis, and surplus volatility is on the X-axis. In this case, this is the terminating liability. The current portfolio has 60% stocks and 40% bonds. Movement to the modified portfolio both raises return and lowers volatility. The other points show the returns from all the various asset classes at their expected returns that we have shown before. The line is the efficient frontier, i.e., the best portfolios that could, in fact, fund this liability. The closer we get to this line, the more efficient that portfolio might be.

Graph 5 is surplus volatility again, but for the going concern liability with our 100% COLA. We are also including dedicated stocks in the modified portfolio, but we are not including them in the current portfolio, which is again 60%/40% stock/bond.

Notice also in doing this, you will change the shape of the efficient frontier to some degree. That is one of the caveats with optimization techniques. While they might be able to produce efficient or best solutions, we also have to be concerned about the nature of the inputs and the assumptions that we make about the inputs that we provide, because they do, in fact, have an implication and bearing on the outcomes.

The asset management world looks at asset management and creating efficient frontiers in an asset only framework. It almost invariably excludes any discussion of the liabilities. That is beginning to change, and it has only been changing as a result of the attention on FASB 87. So the technology levels are not as high on the asset management side of the business as we might like for them to be. But our modified portfolio including dedicated stocks did go closer to our efficient

EFFICIENT ASSET ALLOCATIONS - RISK AS SURPLUS VOLATILITY

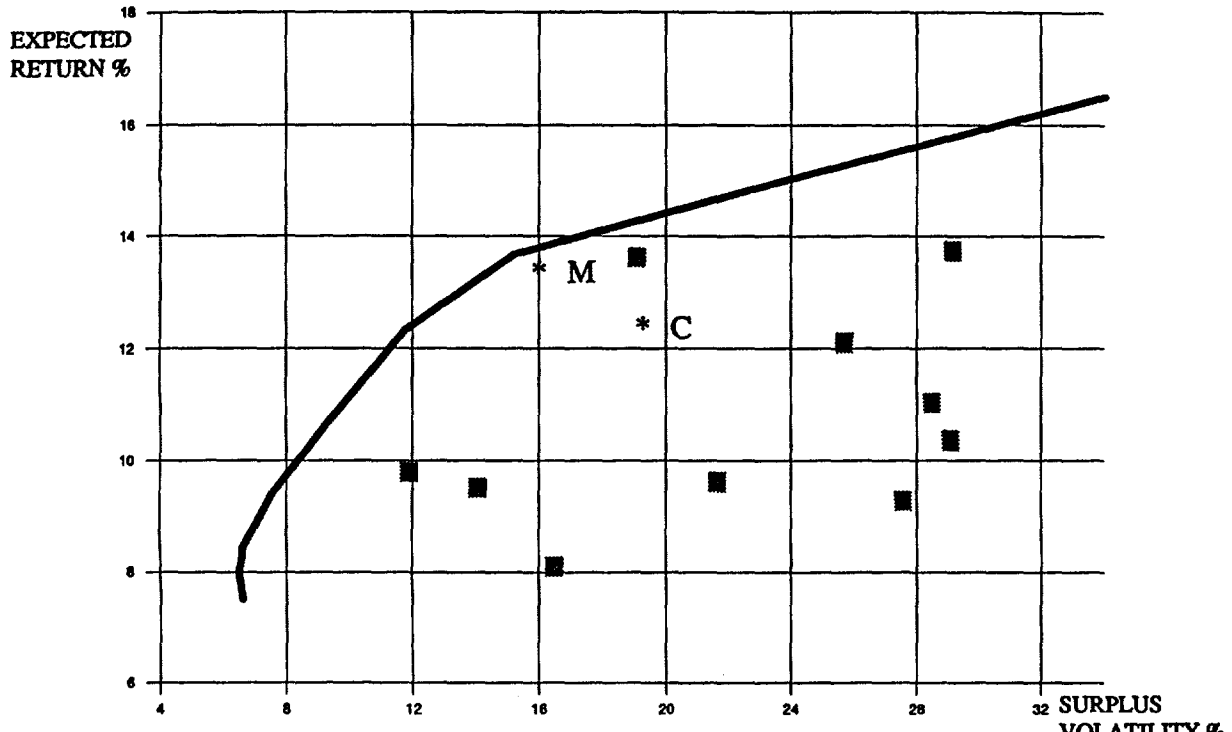


Terminating Liability

(Dedicated Stocks Available)

GRAPH 5

EFFICIENT ASSET ALLOCATIONS - RISK AS SURPLUS VOLATILITY



Going Concern Liability (100% COLA)

(Dedicated Stocks Available)

frontier, lowered risk, and did not hurt return much relative to the liability. The point here is that we do not necessarily have to give up return in the conventional framework to be able to get closer to our targets in looking at it from an asset/liability sense.

So, finally, I think there are several steps that seem to be emerging as we move to this asset/liability management framework. First of all, defining the liability to be funded for each particular sponsor. Secondly, it is probably important for the asset managers to have some understanding of the complexity of the liability. It is important for us to learn more about the character of these liabilities. I do not think any of us profess to have an innate knowledge about the character of these liabilities, but I think we certainly need to learn about them. As we do learn about them, we are certainly moving in the direction of finding asset classes that have historically been described by capitalization weighing to best meet the sponsor's objectives for funding those liabilities. I would like to also suggest that the technology, in fact, does exist to reach inside each of these asset classes, in particular, the equity asset class, and optimize for security selection to augment the asset class selection.

To the extent that this is a changing environment where we are moving to an asset liability management framework, we need to be at least somewhat concerned about the interaction that we have with the people that are servicing the pension plan sponsor. I think currently the plan sponsor is served by actuaries, investment managers, and asset consultants somewhat independently. I think one of the implications that I have seen in bank and savings and loan asset liability management, and to some lesser extent, insurance company asset liability management is that there becomes increased interdisciplinary intellectual cross-fertilization. That is going to be an important part of our next five- to ten-year learning process for all of us. I think it is also incumbent upon the plan sponsor to manage these challenging, new interrelationships.

MR. SCHNEIDER: Next I would like to introduce Joan Lee, who's the Manager of Investment and Economic Research at the Ameritech Investment Management Department here in Chicago. Joan graduated from the University of Michigan in 1972, and received an MBA in Finance in 1976. She was then hired by Michigan Bell and has been with what we used to call the "Bell System" ever since. At Michigan Bell, she spent time in a variety of areas of corporate finance, including a stint with the pension fund. Joan later came to Ameritech in the fall of 1983 as a result of the AT&T divestiture.

MS. JOAN M. LEE: With all of Bob's discussion as to what plan sponsors ought to be doing, I am going to try and tell you something about what Ameritech is doing. Chester actually asked me to speak to you from the plan sponsor viewpoint. I am not sure that we are a good choice for that because I am not sure that we represent the norm in the industry. In fact, I know in some regards we differ from the norm. We have an article coming out in the "Financial Analyst" journal shortly which discusses how we distinguish between the industry use of tactical asset allocation, and what we think the definition ought to be. Some of that will creep into my remarks this morning.

Chester and Bob have talked about some work that they have been doing on specific models. We have done a little bit of research on what models were available to us generally as plan sponsors, and I thought you might be interested in just a brief rundown as to what we have found. Secondly, I will try to relate that specifically to what we are doing at Ameritech.

This research has been going on for the last two years. With the help of one of our consultants, we reviewed about 90 firms that offer some type of asset allocation product. That included investment managers, consulting firms, software vendors, and models that the brokerage firms have been working on. The types of models that I found can be generalized into five basic types:

- Portfolio optimizers
- Dividend discount models
- Indicator models (monetary sentiment, value)
- Alternative economic scenario models, and
- Economic business cycle models.

Our objective in going through this research was to try and find out what models were available for us at Ameritech to systematize our tactical asset allocation decision, but we did not limit ourselves to just looking at tactical asset allocation models. We wanted to determine what the

universe of models was out there, so we looked more generally. Of these five models, by far the first three are the most commonly used, and I include the last two because they seem to me to represent some distinct types, although there are only one or two firms using each. Therefore, I am going to deal with those last two very quickly and then go on to spend a little more time on the first three.

The alternative economic scenario model refers to forecasting all of the alternative economic scenarios that you think could reasonably happen; determine what returns would be under those scenarios, then estimate the probability of each of those scenarios occurring, and then take and multiply those probabilities times the expected returns for each asset class. That gives you a probability weighted likely expected return for the various asset classes. This process has a lot of subjectivity in it, but if it is done right, it is very systematic and very disciplined. You would probably find that sort of simulation type approach in many finance textbooks, but I am only aware of one or two firms that are actually operating that way.

Economic business cycle models refers to the type of analysis that really concentrates on the economy or the business cycle, and from there determines what interest rates will do and what the stock market will do. Again, there are only a few firms that concentrate on that, although these types of indicators are certainly included in what I have called indicator models.

Going back to look at the first three models, the first one is the portfolio optimizer which is based on the Markowitz mean-variance efficient frontier theory, which Bob introduced. What we found is that this model is readily available out in the industry. It is typically used for long-term strategic asset allocation, and you can find it primarily through consultants or through software vendors.

For as little as $5,000 you can take this home and put in on your own system to do all the runs you want. However, it is rarely used by the investment management community, at least for asset allocation purposes. As an approach to asset allocation, the advantages are that it can include any asset class that you want over any time frame that you want, so it is very versatile in that regard. However, in terms of disadvantages, this model is really a statistical number cruncher. The quality of the output is very heavily dependent upon the quality of the input.

Another model that is commonly used in the industry is the dividend discount model. This is the model that is used by some of the largest and longest established firms that we would now call tactical asset allocation firms. Note that this model derives equity returns, and in order to use it for asset allocation, you must somehow or another determine the returns of the other asset classes that you are going to compare it to. The exact methodology for determining those other returns is not specified here. The advantages of this model are that it certainly has theoretical justification, and the firms that have been using it do have some track record which indicates they have had some success with it. On the disadvantage side, as I mentioned, it is basically an equity model, and as we learned in 1986 and 1987, just because equities are overvalued does not mean they will not get more overvalued before fundamental valuation reasserts itself.

The third category that we found a lot of is what the industry calls "tactical asset allocation" models. I have put that in quotes because, as I indicated, we would differ with the use of that terminology. But, from an industry standpoint, these are generally proprietary models used by investment managers to run money, and of course, each firm has its own version, and each firm is willing to share varying amounts of information on that version. But it seems that generally they use a variety of ratios which are primarily in the areas of liquidity, sentiment, momentum, and value. The purpose of this type of indicator model is to forecast market turns, and then to move in or out of asset classes based on that forecast. The term "tactical asset allocation" is frequently equated with market timing, and I will argue that by our definition, they are not the same.

Each of these models has some useful information, but there is no one model with all the answers. One of the reasons is that these models have different time frames. The tactical asset allocation or indicator models that show up here as market timing models, by definition, have a very short orientation. Dividend discount models are used with a time horizon of from about six months to two years. Multiple economic scenario models have a one- to four-year view. Portfolio optimizers can be used for the very long term. In fact, they tend to be used for a five-year horizon and longer. So, it is clear that the models aim at different things. From a plan sponsor viewpoint, the second characteristic of the models is that we need to look at all of the asset classes that are in our

portfolio when we make asset allocation decisions. With the exception of portfolio optimization, which is generally applied very long term, most of the other models that are out on the market which bill themselves as asset allocation models (particularly tactical asset allocation models), look only at U.S. bonds, U.S. stocks and cash, and some models look only at the U.S. equity market and cash.

So, with that kind of overview on the models, I want to talk a little bit about Ameritech and what we do. Ameritech stands for American Information Technologies Corporation, and came into existence on January 1, 1984, as a result of the divestiture of AT&T. We were the parent company for Illinois Bell, Indiana Bell, Michigan Bell, Ohio Bell, and Wisconsin Bell. Since then we have added some other subsidiaries, but the five Bell companies still constitute the bulk of our business. Currently, the size of our total assets under management is about $12 billion; we have about 77,000 active employees, and about 43,000 retired employees.

In terms of the Ameritech approach, I want to talk first about some of our philosophical underpinnings that determine how we approach the whole question. The first and most important one is that asset allocation is perhaps the most important decision that we make. The asset allocation position explains 94% of a fund's performance; security selection is 6%. Our second major philosophy rests on the importance of the liabilities to the asset allocation process. In fact, we would say that our asset allocation is driven by our liability concerns. Even before FASB and OBRA, we considered the reason for our existence to be to fund those liabilities, and that is why our assets are there.

When we were first divested in 1984, the first thing that we did was take a look at our liability string to put together a strategic plan. Having inherited a large base of retired employees, Ameritech had a high current pension liability with significant cash requirements. That retired liability, we felt, had a lot of characteristics similar to a bond. Therefore, we set up a dedicated bond fund to cover our commitments for our existing retirees. We continue to periodically fund that dedication as our participant population changes. From our standpoint, the dedicated bond fund was set up to plan for those cash flow needs. We are cash matched in the early years, which means that we never have to sell an asset to pay a benefit payment. And since our cash flow needs are covered, that permits us to take a very long-term perspective with the remaining assets. That helps us to be able to commit funds to asset classes like venture capital, which may take a very long time to come to fruition. The dedicated bond fund helps us to ride out currency swings in terms of investing internationally, and just in general gives us the opportunity to take higher risks because we have a longer time horizon. The dedication also reduces our risk. For the portion of our fund where we have matched the assets and the liabilities, we have certainly reduced the surplus volatility, and since volatility is typically the measure of risk, one of the ways that we have reduced our risk is we do not need to raise cash, i.e., sell assets in unfavorable markets. This permits us to focus on total return instead of yield, and that can be of help, for example, in evaluating real estate investment where some of the most profitable deals have heavy cash commitments up front, and no cash flows until later in the life of the project. And finally, our original dedication allowed us to use interest rates that were higher than the actuarial assumptions that we were using, which allowed us to finance our liabilities at a lower level. We like to think of our dedicated bond portfolio as the foundation to our strategic asset allocation plan. Based on that foundation, then, we can allocate the rest of our assets on top of that.

Perhaps a third tenet in our approach is that the strategic asset allocation policy provides the framework for all of the rest of our asset allocation decisions. We think strategic asset allocation can be defined as a long-term plan to achieve financial goals while controlling financial risk through diversification. Notice the emphasis on financial goals. When we put together our strategic plan, a number of inputs were needed. Naturally, we needed long-term financial market assumptions, but we also looked at our liability stream, we looked at our current funding status, we looked at our management objectives, we looked at our risk tolerance, and we looked at the ability and/or willingness of the plan sponsor to make future contributions.

We view the strategic asset allocation policy as being long term in nature, but not cast in concrete. The liabilities certainly change; they can change as you get new information, they can change as the company restructures itself, or they can change based on regulatory changes. Even in the financial market assumptions, though they are long term, we find changes over time. As I indicated, we put together our first strategic plan in 1984. We are currently in the process of reviewing our strategic plan. After almost five years, we know that our liabilities have changed,

and we suspect that we can make some changes in our financial market assumptions. So we would argue that periodically, the strategic plan should be reviewed.

A typical strategic plan might look like the one shown in Table 3. The asset classes that are shown might be a little different, there might be some venture capital, there might not be any international. But one of the things I wanted to point out was that most strategic plans have ranges for asset classes. How one determines where in that range he should be at any point in time is tactical asset allocation. Tactical asset allocation is part of the total asset allocation process. It is not market timing. It encompasses the short-term investment strategies which capitalize on the cyclical nature of financial markets. The assumptions behind tactical asset allocation are basically the same assumptions that you have for strategic asset allocation. Over the long term, higher risk assets will have higher returns. The one assumption that's a little different, is that markets behave in a cyclical manner, and that long-term averages are just that, they are averages. At any point in time the market may be above or below that long-term average. So investors can add value to the fund by tilting the asset allocation to those undervalued asset classes.

TABLE 3

Typical Strategic Plan

Equities	
-- U.S.	35-60%
-- International	5-10
Fixed Income	
-- U.S.	30-50
-- International	0-10
Real Estate	5-15
Cash	0-15

I would characterize the industry definition of tactical asset allocation as one of short-term forecasts of the market that requires quantitative models in order to come up with a magic answer. Since it requires a quantitative model that these investment managers have, it should be the responsibility of the investment manager. In our view, these are characteristics of market timing, which may be a bad choice of words, but for lack of a better term, that is what we call it. We think that this market timing has been intentionally labeled tactical asset allocation to try and get around some of the negative connotations that market timing developed in the 1970s. But we view asset allocation as a continuum of decisions. We start with our long-term strategic plan, but we have to implement it on a daily basis. Even if we do nothing in terms of tactical asset allocation, market movements will carry our percentage allocations away from our strategic plan. If we make a conscious decision where to be within those ranges that I showed you, then that is tactical asset allocation. Contrary to the industry definition, it does not have to be a quantitative model. In fact, I would argue that plan sponsors have been doing tactical asset allocation since they had money under management, perhaps more by feel than by model. I would argue further that tactical asset allocation is limited by the same constraints that set up your strategic asset allocation, that tactical asset allocation includes all of the asset classes that are included in a strategic plan, and that it can focus on the valuation that is currently reflected in the market price, rather than requiring a forecast as to what is going to happen to the market. Furthermore, tactical asset allocation is the responsibility of the plan sponsor because only the plan sponsor really knows the constraints of the strategic asset allocation. If investment managers act independently, two or more can make conflicting moves which generate a lot of transaction costs, but then leave the plan sponsor in essentially the same position in terms of asset allocation.

Our last major tenet is that market timing is a separate decision, and tactical asset allocation is not market timing. That is not to say that the market timing decision is not important. Market timing can certainly be one strategy that you employ in your whole basket of strategies. But the important point here is that they are two separate decisions, and we think that the plan sponsor should be looking at tactical asset allocation as part of his strategic asset allocation process.

To sum up, let us go back to the models that I mentioned at the outset. Ameritech does not believe that any one of these models has all of the answers, so we use them all. There is no magic in terms of how we put them together, and sometimes our tactical asset allocation conflicts with our strategic asset allocation. If we think that the equity market is going to take a real nose dive, we may think that we ought to be even lower than our strategic asset allocation. But our job is try and balance those two views where they do conflict. We look at valuation both in the long term and in the short term, and the long-term view is contained within our strategic plan, and the short-term in our tactical asset allocation. We look at assets relative to each other and relative to their historical returns.

MR. WILLIAM B. SOLOMON: I have a question for Bob Holz. You described a dedicated equity portfolio because it had certain characteristics which make it suitable for use in, say, immunizing retired life liabilities. Could you give me some of the characteristics of that equity portfolio in terms of, say, yield, and price to earnings ratio? What does a dedicated equity portfolio look like?

MR. HOLZ: To start with the objective in finding this particular dedicated portfolio that I showed was to try to minimize the variance between that portfolio and the movements in 30-year bond returns. So it had a very high correlation to bond movements. The characteristics of that particular portfolio are slightly higher yield, although not dramatic. As you saw, in the components of the portfolio there is some higher degree of concentration in financial and utilities, but not as dramatic, I think, as a lot of people might expect. Another thing that we have done with those portfolios is aggregate them into one company, and then we aggregated the S&P into one company and looked at the balance sheet and the income statements. What, in effect, we seem to find in those portfolios is that they have slightly more debt than S&P capital weighted companies, or the capital weighted S&P portfolio. They tend to have higher sales and higher earnings during periods of growth. They tend to have a little bit less in low growth than high growth environments. These are the only ones that really strike me off the top of my head.

MR. CHARLES S. LINN: You mentioned that there are only a few models out there that you found that did any kind of work with alternative economic scenarios. I was wondering, on the portfolio optimizers, what kind of scenario is assumed going in, especially since some of those you mentioned are long term? And the second part, are there any models that you have seen that do any kind of random yield curve generation or is it all pretty much set going in based on your own assumptions?

MS. LEE: If I understand your question correctly, it concerns the economic assumptions that are usually used in a portfolio optimization. You have to make some assumption about inflation. From there, the model usually uses the real risk premiums that you have gotten over inflation for each of those asset classes over very long historical time periods.

So if the future is any different from the past, there is really no accounting for that. Now sometimes people try to adjust for that by trying to forecast what they think is going to happen over the future which, theoretically, is really what you should do. For the most part, that is generally a judgment call. What we have done is surveyed some people who we think are very prominent in the field, such as Marty Liebowitz at Solomon Brothers, Steve Einhorn at Goldman Sachs, and others and asked them what their best judgments are. Then we try and make some determination from that. But that is exactly where you get to the problems in terms of the quality of the input being really significant in terms of the value of your output. There are a few firms that have been trying to come up with some other ways to do that. Some of the material that Chester talked about relates to that issue. But in my experience, he is the exception rather than the rule in terms of how that is done. The second question on the random yield curve I would like to defer to Chester because I think if anybody is doing it, he is.

MR. SCHNEIDER: As Joan mentioned, the model that I described here has short rates and long rates, and there is relative movement there. So let us say if you started at today's market conditions, you would have some yield curve inversion, and your assumptions about where you wind up over the long term might be that this inversion would go away. Actuaries would probably like to assume something like 8% for long-term rates, and maybe 6% for short-term rates. Based on historical relationships, our model makes it possible for these to evolve into a situation of yield curve inversion. Are there any other questions?

MR. LANE B. WEST: I have a question for Joan. There was a recent article in Pension & Investment Age that Ameritech is now funding, I think the number was $100,000,000 of their post-retirement medical benefits. I am wondering what differences you see in asset strategies, or choosing your strategies to match this type of liability, particularly given the fact that the expected inflation is so much higher than it would be under a regular defined benefit plan?

MS. LEE: Well we did look at some of those issues that you have raised. And because of the inflation factor we did, in fact, find that the duration of those liabilities is about four years as opposed to the duration of our pension liabilities at about ten years. With this first chunk that we have funded, we are using fixed income securities in a duration matched strategy, although it is not locked in quite that tightly. As we go forward, we will certainly look at diversifying that portfolio, and look at how our mix ought to be changing, but that is as far as we have gone as of right now.

MR. ERIC P. LOFGREN: Chester, you had one sentence that I was hoping you would expand upon. You said something like, the assumption of a lognormal distribution of returns is inconsistent with the existence of a risk-free asset.

MR. SCHNEIDER: There is an inconsistency with a statement that returns on cash are lognormally distributed, and the statement that a risk-free interest rate exists with reasonable properties. Without getting into too much complexity, essentially you must think about what happens when you divide time intervals successfully in half and try to determine an appropriate interest rate in each half of the time interval. What will happen is that the risk-free rate will begin to jump around fairly violently. You try to take a derivative of a function that has a derivative at no point, as it turns out, so the risk-free rate will not exist if returns were lognormal.