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FORECASTING OF ASSETS AND LIABILITIES

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Panelists: CHESTER R. SCHNEIDER
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Recorder: MARK A. CAVAZOS

- o The panel will review current issues and applications for pension funding, accounting, investment and benefit policy.

MR. DONALD G. BRACKEY: Our objectives for this discussion include identifying current pension issues and ways in which the modeling process can be used to assist plan sponsors like Axia in addressing those issues. We would first like to have our panelists share some of their thoughts, after which we'll invite questions and comments from the audience.

By way of review for those of you who have participated in modeling assignments and as an overview for those of you who have not, modeling has many applications. From the actuarial standpoint, those applications include testing alternative actuarial cost methods and assumptions, asset valuation methods, and evaluating the impact of favorable or unfavorable demographic or economic changes on the financial condition of the plan. From the investment standpoint, they include testing alternative investment mixes of greater or lesser risk in terms of the exposure to equities versus fixed income investments or also testing additional diversification involving other asset classes such as real estate, international equities and venture capital.

More recently, plan sponsors have also begun to examine other investment strategies such as portfolio protection strategies which use either the futures markets or the options markets. The underlying idea with these strategies is that the plan sponsor will identify a floor rate of return, say minus 5% or minus 10%, that he doesn't want to go below over a one-year or longer period and then attempt to construct a portfolio to meet that goal. The net result of these strategies is that the distribution pattern of potential outcomes is changed and is no longer symmetric, which may be more consistent with a particular plan sponsor's objectives.

A third type of strategy which can be tested through the modeling process is fixed income portfolios of greater or lesser duration. Many of our friends in the investment community are recommending these kinds of strategies as ways to stabilize pension expense or funded ratios.

There are two types of forecasts that we talk about generally -- deterministic forecasts and stochastic forecasts. In contrast with stochastic or probabilistic

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PANEL DISCUSSION

forecasts, deterministic forecasts involve specifying all the assumptions rather than letting them vary randomly, and then getting one set of results for each year of the forecasting period. However, you can obtain a range of outcomes by examining those projections under expected, unfavorable and favorable demographic and economic conditions. Deterministic forecasts also serve to increase plan sponsor understanding and intuition.

Stochastic modeling introduces variability. The variables will always include asset performance and may include other variables such as the rate of inflation, settlement rates and Omnibus Budget Reconciliation Act (OBRA) interest rates. The assumptions for each asset class will include expected returns, standard deviations of returns and correlation of returns between each asset category and also possibly with inflation. These assumptions are frequently based on long-term historical experience in the capital markets with judgment adjustments to reflect current expectations and to maintain consistency within the assumption package. Thus, at root, the assumptions are subjective. In John's presentation, he will illustrate both deterministic and stochastic forecasts.

Exhibit 1 provides illustrative assumptions for a stochastic forecast. The correlation coefficients are in the top part of the chart; expected returns and standard deviation of returns for the bond, stock and cash equivalent categories are in the bottom part of the chart. These assumptions are fairly consistent with what has been experienced in the capital markets over the last 60 years. Optimization programs which use this information, excluding the inflation variable, as input are becoming more prevalent in the plan sponsor community today. With these programs, the plan sponsor is able to identify a rainbow of outcomes, effectively a series of target returns which have a minimum level of portfolio volatility or conversely, at each level of volatility, a maximum rate of expected return. To link this to the liability side, some plan sponsors will attempt to select the policy which provides what they consider a reasonable likelihood of realizing the real return objective implicit in the actuarial investment return assumption.

Historically, pension funds have been primarily invested in those three asset categories we just examined. However, more recently, we have seen a slow, but steady, trend toward further diversification into other asset categories which have become a larger percentage of the investable capital market. As Graph 1 illustrates, at the end of 1986 the international equity market was larger than the U.S. equity market; in fact, the Japanese part of that market was about the same size as our market. Non-U.S. bonds were about equivalent to U.S. bonds, and real estate comprised about 10% of the total investable capital markets. Most asset allocation studies suggest that increased diversification into those asset categories is appropriate for the risk adverse investor.

Many asset allocation studies ignore the inflation variable. While this type of analysis is beneficial, it is important to note that many of the asset categories behave quite differently during periods of unanticipated inflation. As you would expect, bonds tend to perform very unfavorably when inflation is rising and favorably when inflation is declining. In this regard, investment strategies which are constructed to stabilize pension expense or funded ratios should be carefully examined to ensure that they are consistent with long-run benefit objectives which may be inflation-sensitive.

In contrast with bonds, the real estate asset class behaves relatively well during periods of rising inflation. Graph 2 displays results from a study by Ibbotson

ILLUSTRATIVE ASSUMPTIONS

	Inflation	Stocks	Bonds	Cash
Inflation	1.00	-.20	-.60	-.70
Stocks		1.00	.30	.10
Bonds			1.00	.60
Cash				1.00
Return	.05	.12	.08	.06
Std. Dev.	.04	.20	.10	.03

EXHIBIT 1

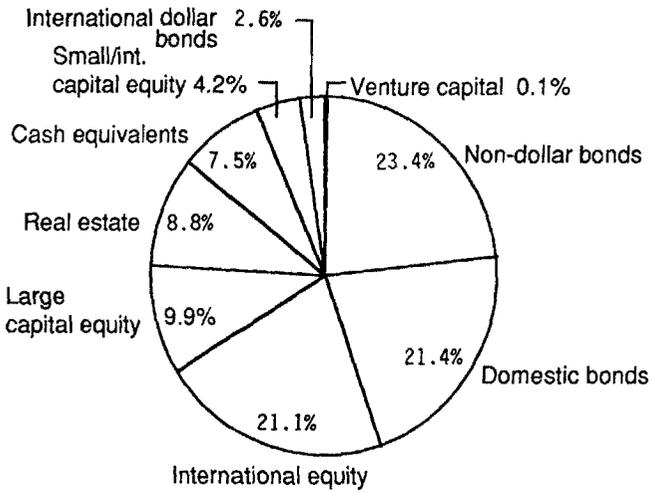
FORECASTING OF ASSETS AND LIABILITIES

PANEL DISCUSSION

GRAPH 1

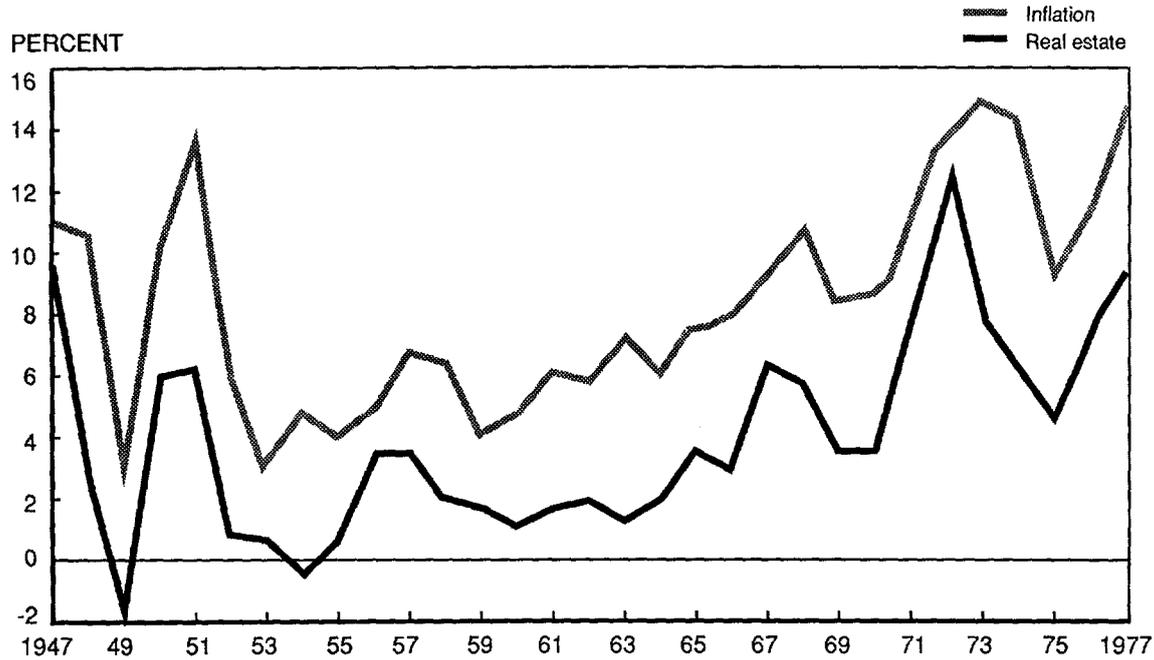
TOTAL INVESTABLE CAPITAL MARKET 12/31/86

100% = \$16.3 trillion



Source: First Chicago Investment Advisors

REAL ESTATE RETURNS AND INFLATION FARMS AND RESIDENTIAL HOUSING



GRAPH 2

FORECASTING OF ASSETS AND LIABILITIES

Source: "The United States Market Portfolio" by Roger G. Ibbotson and Carol L. Fall, *Journal of Portfolio Management*, Vol. 6, No. 1, Fall 1979, pp. 82-92.

PANEL DISCUSSION

and Fall of residential and farm real estate returns during a 30-year period through 1978. The results would be quite similar if you were examining recent results of open-end real estate commingled funds offered by insurance companies and banks.

Asset allocation tools are useful not only for pension funds, but also for other investors like defined contribution plans, endowment funds and individual investors. However, to formulate an investment strategy for pension funds, it is important to reflect their particular characteristics and objectives. In order to fully reflect plan sponsor sensitivity to levels and volatility of some of these actuarial variables, an asset and liability modeling study is almost essential.

MR. CHESTER R. SCHNEIDER: I will give a brief overview of some of the uses to which forecasting can be applied. First, as most of you know, in working with a pension fund there are a variety of considerations. At the time that benefits are being reviewed, funding is always an issue, the expense determination is an issue, and how the plan assets should be invested is an issue. The point is that we tend to look at each of these issues separately without looking at the interactions among these variables. The important point is that these variables affect one another in sometimes subtle ways. For example, improved investment return over the long term will probably have a beneficial impact on the types of benefits that will be offered by the plan. Inferior investment performance could possibly lead to plan termination, so types of interactions among different policies are important longterm considerations and they need evaluation. Forecasting is one way to begin to approach these problems.

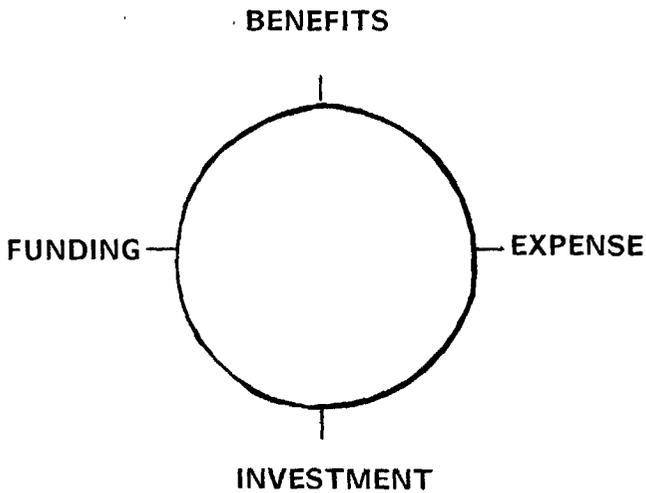
Graph 3, which shows a circle, indicates that we tend to look at things at one point in time. In many cases, what we find today is that the world is changing; that we are in a more dynamic situation. For example, the actuarial assumptions underlying funding policies historically have been changed at infrequent intervals. Under OBRA, we may begin seeing fairly rapid changes in funding assumptions, but certainly expense assumptions are being changed, benefit policies are being changed from time to time or benefit improvements are being made year by year in, for example, hourly plans. So we can look at each of these policy areas and think of them as dynamic variables instead of static objects. And, of course, the experience of the plan, both on the asset side and the liability side, will affect the way we change the funding policy, expense policy, etc. If interest rates go up, that will affect the way we determine our plan liabilities. For example, if the plan has a lump sum option where the computation rate is fixed, the interest rate will affect the rate at which benefits are paid out. Graph 4 may not be too familiar from actuarial literature, but these types of pictures have come out of an engineering view of the world, a systems analysis view.

In the current environment there are a variety of issues to which some form of forecasting accounting should be applied. Certainly today, postretirement medical is a hot topic. Actuaries and people in the investment community, all sorts of players in this game, want to get a handle on what the liabilities are for a given company or for companies as a whole. What our experience at TPF&C has been is that certainly these liabilities are very sensitive to the types of assumptions that are made about future events, both employee demographics and medical cost inflation and growth in the gross national product, for example. Also, we are faced in the current time period with the need to redesign in one or more ways virtually every defined benefit plan due to the Tax Reform Act of 1986. In some cases, of course, static evaluations will be used for this purpose,

FORECASTING OF ASSETS AND LIABILITIES

GRAPH 3

EMPLOYEE BENEFITS POLICIES

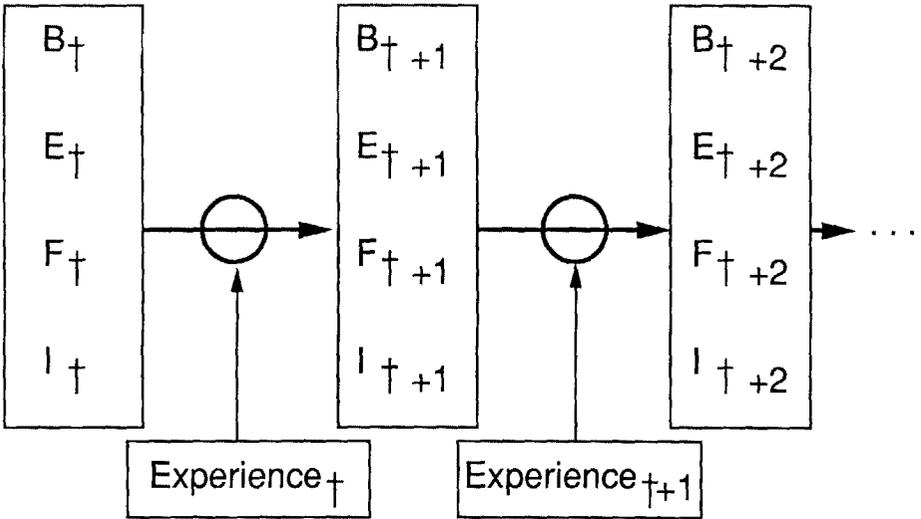


- O POLICY AREAS INTERACTIVE
- O LONG-TERM INTERACTIONS
NEED EVALUATION

PANEL DISCUSSION

GRAPH 4

DYNAMIC VIEW OF EMPLOYEE BENEFITS



FORECASTING OF ASSETS AND LIABILITIES

but in many cases, employers would like to see what the impact on benefit cash flows and expenses will be on a more long-range basis. There is a difference between the short-term impact and the long-term impact, and this needs to be evaluated.

Certainly today there are a variety of retirement benefit vehicles available: defined contribution plans, Employee Stock Ownership Plans (ESOPs), cash balance plans, and floor plans should be included among these. It is important to try to model how all of these will fit together with what are you doing when you change from one plan design to another, what you are doing today, but also what you are doing tomorrow, because you are making a commitment that is not easily reversed in many situations. So you want to see under what situations you'll be benefited and under what situations you'll be hurt by a given plan design.

Historically, during the 1950s, 1960s, and 1970s, for most companies the work force and payrolls were generally increasing both due to general prosperity and inflation. We are in an era where in many cases the number of employees that many employers had has been cut back significantly. That means that actuarial techniques in which your funding is a level dollar amount may actually be rising as a percentage of payroll in such situations. So changing demographics impacts the early retirement windows. The impact in the short term and long term on the plan and on the company is an interesting area for study.

Also, we are generally facing an aging of the work force. The plan populations may tend to age. In most forecasts, new entrants are added into the forecast. As many of you know, when you do a window in a forecast comparative evaluation, as people leave the work force they are generally replaced based on certain assumptions and, typically, we tend to try to keep the age of the work force constant. That is a test of if you are doing things correctly. In fact, we may be seeing an aging of the work force due to the end of the baby boom. The future new hires will tend to be on average a bit older than in the past. That may have some impact on the plan.

There is a need to investigate the possibility of future experience changes. One person has written a book that this is the last generation that will experience death as a normal event. That may be a bit extreme, but on the other hand, I think a lot of the mortality tables that actuaries use for pension valuations are a bit out of date. To modernize the tables generally increases costs by 5% to 10%. That's been deferred for a period of time. But there is something that should be discussed with clients -- what is the range of impact of possible future improvements in mortality? Again, for a period of years, retired mortality at higher ages has been fairly constant and for the last several years we've begun to see significant improvement and, hopefully, that trend will continue.

Similarly, retirement ages are an area in which we can expect changes in the future. The last 10 to 15 years we have generally seen a decline in average retirement ages; on the other hand, my Social Security retirement age is not 65; it's somewhere beyond that. In general, as people are healthier longer, there is going to be a need or there may be a desire to work longer productive lives. So what are the impacts of these forces on the pension plan? And, possibly, as a result, part of this will certainly mean that changes in Social Security may be required.

PANEL DISCUSSION

Currently, we are in the situation where OBRA 87 has created a variety of changes that sometimes are quite shocking to a classically trained actuary. First of all, there is a requirement for explicit assumptions which we have already seen in FAS 87: the shorter amortization periods that are generally required, the role of full funding limits, but also the higher minimum and maximum contributions for underfunded plans. In a sense, OBRA has done away with the traditional actuarial funding techniques. As a result of OBRA, it is clear that volatility of contributions may become an issue. In a way, there has always been some volatility in contributions when you have been close to the full funding limit. It was like an on and off switch; in some years you can make your contributions, in other years, your maximum tax deductible contribution would be 0 and, in a small range, you could contribute all or part of the normal cost but, with the lower full funding limit under OBRA, this may impact more plans and become more of an issue. This is particularly going to affect, I guess, younger companies with fairly low current liabilities compared to their projected benefit obligations so that their funding patterns may become very irregular.

One way of getting around some of the OBRA requirements may be to use spread-gain actuarial methods instead of immediate-gain methods, which is sort of a reverse of FAS 87. There may be advantages here in going back to more old-fashioned actuarial techniques. But also what this raises is the issue of possibly resetting funding assumptions annually as one way of responding to the requirements of OBRA. The impact of that on the pension fund is something that is best studied by a forecasting model.

With FAS 87, you see somewhat similar issues to those raised by OBRA. Certainly, there is the potential for volatility and, I think, to date this has been somewhat of a non-issue for most plans. The impact of the 10% corridor, the moderate changes in interest rates from year to year and a relatively favorably investment performance have not created too many disastrous situations. However, I think eventually many pension funds will find that their unamortized gain or loss will wander outside the 10% corridor. This would lead us to believe that most pension funds will always remain inside the 10% corridor. Once you get outside that 10% corridor, however, the level of volatility increases dramatically. So there is potential for volatility; it may not be a current issue, but it is working in the background. Some plans may be approaching one end or the other of the 10% limit.

Of course, FAS 87 requires or at least suggests changes in the discount assumptions from year to year based on market changes in interest rates. One thing that has happened to date is that FAS 87 has not really been applied too literally. In doing forecasting studies, one has to try to model certain rules, but we live in a world where rules are not necessarily adhered to, so there is some unreality in the forecasting. However, I think the stochastic forecasting gives you some sense of what the impact on levels of volatility are for different rules for resetting interest rates and that these things should be discussed with employers to get a feel for the level of volatility that may occur, both in the shortterm and the longterm.

There are different ways of calculating the value of assets. A currently popular notion is to use the market value for bonds and use a five-year smoothing technique for equity assets. It is helpful to have demonstrations of what that impact is and forecasting is a proper vehicle for making those judgments.

FORECASTING OF ASSETS AND LIABILITIES

Again, another aspect of expense accounting is the long-term internal return on market-related value. Most people say, "Well, we'll pick a number and stick with that and I think that is sort of an overly simple viewpoint to the extent that," you are adding together a certain number of long-term inflation plus some interest plus an equity premium. If inflation turns out to be a much lower number, if interest rates decline significantly, it may be clear that some reduction in that rate may be appropriate. The point is that the pension expense number is very sensitive in many cases to this long-term return on market-related value. The question here is whether it is better to do a series of small changes in place of infrequent large changes.

Another issue that has recently arisen is accounting for taxes. There is a possible loss of credit for future deductions on the differences between expenses and contributions. Some of the determinations here actually may require some forms of short-term forecasts, but also there is an issue as to what the impact on the bottom line will be for different patterns of pension expense relative to contributions.

Don has discussed a bit with you the two types of forecasting -- the deterministic forecast is based on essentially best estimates of certain scenarios which might be high inflation, low inflation guesses, and essentially you check the aspect of experience that goes into this model as prescribed. The virtue is clarity and simplicity. The difficulty is that there is no probability weighting of the likelihood of the scenario.

Stochastic forecasts are based on multiple runs where we use, for example, 100 runs. Some people use more. So 100 multiple runs based on simulations of various aspects of experience and, to date, most of the focus has been on the impact of various economic factors, essentially investment returns, interest rates and inflation. This is important because clearly FAS 87 and OBRA 87 focus on the interest rate environment.

It is important to consider how you're modeling the economy. I think there is a need for many people to reexamine the way they are simulating investment returns and interest rates to make sure that the methods are internally consistent. There are questions as to what are reasonable models of the economy. There is no way of actually getting a right answer to something like that, but there are always different degrees of rightness or some things that at certain points in time are clearly wrong. Traditionally, people look at the expected return and standard deviation of different asset classes. There is a fundamental question as to whether the only difference between stocks and bonds is the difference in means and standard deviations and correlations. Aren't there structural differences between these two types of assets? Also, the model should really reflect the economic environment at the initial valuation date and make some sense of how interest rates and inflation move from the values at the initial date to the hypothesized future environment.

One of the issues in dealing with stochastic forecasts is that stochastic forecasts tend to produce a lot of results. Actuaries tend to like numbers and sometimes they have too many numbers in a stochastic forecast. In those cases, there are ways of analyzing this, of boiling down all the computer output to a simpler language. Some studies tend to look at distributions of result. We've done a lot of work that way. In many cases, people find it hard to compare one probability distribution with another. Summary statistics are helpful. For the forecast as a whole, it is typical to look at the mean and variance of a variety of

PANEL DISCUSSION

different statistics that come out of a forecast. Or you can look at another type of statistic. You can look at numbers that I would refer to as risk premiums, the measures of the frequency and extent to which things are wrong, like pension expenses rising above a targeted level. Another formula analysis would be to use the notion of present value. This is particularly applicable when you are looking at the impact of different funding strategies and different investment strategies and their interaction.

Some aspects of stochastic forecasting systems might need to be improved. Most systems, as I said, focus on the economic variables. We don't really model what happens if demographic experience fluctuates, such as if turnover changes are not what is expected. Also, there is a need to model the interaction of the economic and demographic experience. For example, if interest rates and inflation go up, the likelihood of taking a lump sum in some circumstances changes so that these types of factors today are generally not really modeled in the stochastic forecast.

One example of the use of our forecasting system was a study of portfolio insurance. First, we looked at the average time-weighted return over the forecast period. Our conclusion was that portfolio insurance doesn't really help you manage your surplus very well from an FAS 87 viewpoint, although some of the early advocates of portfolio insurance two years ago were saying things along the line that portfolio insurance would be helpful. We also concluded that portfolio insurance is not a good idea if your main concern is regulating pension expense, that there are probably better ways to go about doing that. I think some of the investment strategies coming out of Wall Street are fairly complex and take a bit of effort to model and, on the other hand, there is a need for actuaries to give unbiased analyses of the pros and cons of different strategies.

MR. H. JOHN VOGT: I am the Vice President of Finance and Treasurer of Axia, Inc., a manufacturing company. I am also one of the two members of our pension committee. Our committee is charged by the Board of Directors with the responsibility for managing our pension plan and also, obviously, by default, managing the assets of that plan.

I would like to discuss the modeling process. We went through it in 1985 and talked about our experience. Before I begin, let me emphasize that I don't have a mathematical background. That will become more obvious as I go through my talk. This is important, I think, from your perspective in that when you are dealing with a client or a plan sponsor, you have to make sure that you are extra careful in communicating in a way that a person like myself or others can understand what the message is, what the results are, what it is you are saying. In our case, when we went through our study, I felt very good about the way it was done and I thought that was very important at the time.

Let me tell you a little bit about Axia before I go too much further. Axia is a small company located and headquartered in Oakbrook, Illinois. We have sales of just over \$150 million a year, we have just over 1,100 employees with five operating companies spread around the United States. Those five operating companies have 13 plants and a total of 67 retail-type outlets. We are not publicly traded; we are a private company. Over 1,000 of our employees are covered by one of several defined benefit plans. We produce and distribute a diverse range of light metal products and hand held tools. We sell masonry and trowel trade tools; anything that a mason needs to do his job. We sell tools for use by drywall tradesmen in finishing drywall. We both sell and rent those tools

FORECASTING OF ASSETS AND LIABILITIES

through the retail outlets that I mentioned. We sell tool kits which we distribute by mail order only. These are fairly high-tech tool kits, the kind that computer or copier repairmen carry in a briefcase. He opens it up and all the tools are in the slots. We sell coated wire products. These are dishwasher baskets primarily. We are the only company in America other than the dishwasher manufacturers themselves who make dishwasher baskets. We make 25% of all the baskets in the United States and everybody in the country who makes dishwashers buys at least some of their baskets from us. Two of the major manufacturers buy them all from us; we are the sole supplier. Finally, we make machines for making and closing bags. The bag closers are just sewing machines, the kind that put the thread in. It is our competitor's machines that make the thread that won't open when you try to open the charcoal and the string breaks. That's the competition, that's not us.

Prior to October 1984, we were a much larger and more diverse company. We had some changes in 1984 which led to our need to do the study. Prior to October 1984, we were a company of \$250 million in sales. We were public; we were on the New York Stock Exchange. We had ten operating companies at that time. For reasons that I won't go into in detail, we decided to take the company private in a leveraged buyout-type transaction and we were able to do that in October 1984. It was about a \$175 million transaction at that time. As part of the leveraged buyout, we sold three subsidiaries and the sale of these three companies had a pretty profound impact on our pension situation. At the time of the sale, we had about \$25 million in pension assets. We sold a steel subsidiary which had 400 employees and \$6.6 million in pension assets went with that subsidiary. I should mention here that these employees were generally older employees, very senior. We sold a caster manufacturing subsidiary with 350 employees and \$2.5 million in pension assets. Once again, the employees in this group were very senior. In fact, the sale of those two subsidiaries dramatically changed the demographics of our total group. We sold an electronics subsidiary right here in Anaheim which had 100 employees and about \$1 million in pension assets went with that subsidiary. Those three sales and a couple of smaller transactions, are some of the items that dramatically changed our pension plans.

Our assets, which had been \$25.8 million in December 1983, had dropped to \$20.5 million in June 1985. The number of employees dropped from 2,100 employees covered by the various plans down to 1,050 employees. We had been overfunded in December 1983 by \$3.4 million. It had climbed to \$5.5 million. In 1983, we did make contributions, but that was elected by us. We were very cash rich and at that time would make as high a deductible contribution as we could make. In 1985, we made no contributions.

Our investment mix was very interesting. We had traditionally had an investment mix of 35% or so in equity, 65% or so in corporate and government bonds. By the middle of 1985, for a lot of reasons, we just found ourselves, in fact, we woke up one morning and looked, and there we were at 14% in equities and the rest in corporate and government bonds.

Exhibit 2 shows the five forecasts we took a look at. Forecast 1 was our present plan with actuarial assumptions that we had in effect at that time; we were assuming a 7% return on assets and we had a frozen entry age method that we were using. We then took a look at the present plan with revised actuarial assumptions calling for an 8.5% return on investments and switching over to prorated unit credit method. We looked at that in both an expected and a pessimistic economic scenario with the difference primarily being that inflation in

PANEL DISCUSSION

EXHIBIT 2

FORECASTS

	<u>PLAN</u>	<u>ACTUARIAL ASSUMPTIONS</u>	<u>ECONOMIC SCENARIO</u>
1	PRESENT	PRESENT	EXPECTED
2	PRESENT	REVISED	EXPECTED
3	PRESENT	REVISED	PESSIMISTIC
4	TERM/RESTART	REVISED	EXPECTED
5	TERM/RESTART	REVISED	PESSIMISTIC

FORECASTING OF ASSETS AND LIABILITIES

the expected economic scenario was set at 5.5% and in the pessimistic scenario, we raised it to 8%. The assumed salary increase in the expected scenario was 7.5% and in the pessimistic we raised it to 10%. We also threw in an assumption of termination and restart on the plan we were looking at. I will say right up front that we weren't very interested in doing it, but we wanted to take a look at what would happen if we did this and got the excess cash out of the plan.

We got a fairly extensive report back from our actuaries and I think I'd rather just talk from one graph that was a part of that report. This report represented our annual contributions to the pension plan as a percent of payroll. We decided first that we would not do a termination and restart. We actually decided that before we got the results back because we decided that the effect on the employees in terms of their feeling that we might be trying to finance a leveraged buyout on their backs was not something that was satisfactory to us; we were not willing to risk the adverse situation there, so we decided to stay with the present plan.

Graph 5 represents the effect on the plan if we go with the prorated unit credit method with an 8.5% assumed return on investments. It shows, in effect, that with the expected economic scenario we would make no cash contribution until 1992 and that would be under 3% of payroll, 2.75% roughly. Even under the pessimistic economic scenario we have no contribution that would be required until 1989, which didn't look too bad to us. It said if we could just bumble along and get 8.5% on our assets, we could do this well. That met our objective of not having to make any cash contributions at least for the first few years when we were highly leveraged. We then decided to take a look at the asset mix.

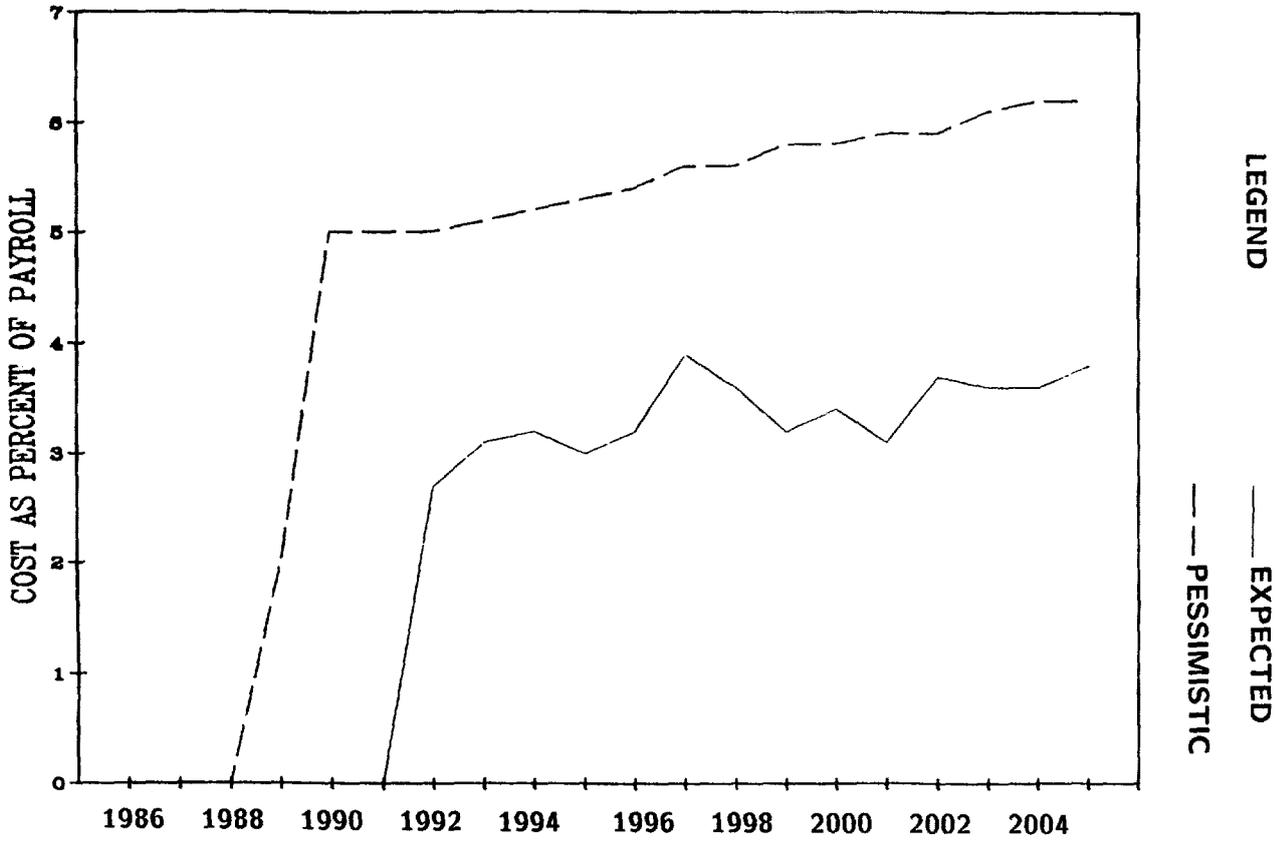
As I mentioned earlier, we had a historical mix that we had used over the years and suddenly found ourselves with that strange mix of only 14% equities. We looked at our historical characteristics. We had been very conservative in our approach to things, even in the equities we had invested in. We were concentrated in the Fortune 500 blue chip types of companies. We really had not taken a lot of risk, even when we were cash rich and didn't have any problem in this area. We decided to identify and study several alternate policies which would give us varying characteristics of aggressiveness or conservatism and see what the result might be in a stochastic study. We identified ten policies. We worked very closely with our actuaries in doing this. We first identified seven classes of assets that we felt we would invest in, equities and corporate government bonds being the first two. We looked at small stocks, identified as companies with capitalization \$100 million or less, cash, real estate, foreign equities and venture capital. I think it is safe to say that the small stocks, foreign equities and venture capital are very unusual for even large established pension plans, and for a small plan like ours, this was an interesting approach; one that we were a little worried about taking, but we did want to see what the results would be.

For the various policies that we considered (Exhibit 3), we started out with Policy 1, which I called the Base Case, which is where we had been in December 1983 and represented our historical mix. Policies 2 and 3 were just a little change from Policy 1. Then in Policy 4, we brought in some small stock and in Policy 5 some real estate. Policy 6 is the first time we get into what we call the diversified portion of the portfolio, putting 5% of our assets into small stocks, 10% into real estate and then 5% each in foreign equities and venture capital. Policy 7 is another variation of Policy 6. Policies 8 and 10 were our

AXIA INCORPORATED

ANNUAL CONTRIBUTION

PRESENT PLAN, PROPOSED ASSUMPTIONS



PANEL DISCUSSION
GRAPH 5

ALTERNATIVE INVESTMENT POLICIES EXPRESSED AS PERCENTAGES

POLICY	ASSET CLASSES						
	EQUITY	BONDS	SMALL STOCKS	CASH	REAL ESTATE	FOREIGN EQUITIES	VENTURE CAPITAL
1	34	66					
2	24	76					
3	44	56					
4	24	66	10				
5	34	56			10		
6	19	56	5		10	5	5
7	29	46	5		10	5	5
8	20	20	15		15	15	15
9	20	30		27	15	8	
10	20	35	10		15	10	10

EXHIBIT 3

FORECASTING OF ASSETS AND LIABILITIES

PANEL DISCUSSION

aggressive scenarios, very heavily weighted toward the small stock, the foreign equities the venture capital. This was highly aggressive. Policy 9 with 27% of assets in cash and 50% in equities and bonds was our conservative scenario.

After selecting these ten policies, we then sat down and looked at some data for asset parameters as we called them (Exhibit 4). This is where I think the actuaries played the critical role. You could talk all you want about whether it's in the same field, I don't know that much about that to be honest with you. Our actuaries are very important to us in this part of the thing. We decided on assuming rates of real return, for example, 6% on the equities, 2% on the bonds, etc., as shown. Standard deviations are indicated. We also made an assumption that inflation would be 5.5% during the 20 years of the study.

After making these determinations, we received a report from our actuaries which was pretty extensive. Chester mentioned the fact that you can get too many data, or you can get too little data. I thought that we got data that were just about right. We got a series of tables and graphs which displayed for each of the ten policies that we had selected expected rates of return at a mean, and at the 80th, 20th, 95th and 5th percentiles.

We were able to look at the graphs and the tables and make some conclusions. The first thing we were very interested to find was that the historical mix that we had used came in by any measure as the second worst of the ten cases. We had been way off base in what we had been doing. Secondly, we took a look at Policies 8 and 10, which were highly aggressive. These two scenarios, just as you might expect, had an unacceptable level of volatility for us. For example, under Policy 8 in any one year we could expect at the 50th percentile to realize a 13.2% return on our investment, but if we hit the 95th percentile, we are down to -14%, and that was something we could not afford to have happen to us in any one year or any two year period. Obviously, over 20 years the volatility was significantly reduced, but we weren't looking at 20 years; we were looking at the fact that we couldn't afford to have that kind of situation in any one-year period. So we threw out the two aggressive scenarios.

We also threw out Policy 9, which was very, very conservative. It had no volatility at all, or very little, but the return was pretty average. We went with Policies 6 and 7, sort of a mix of the two. They had very similar characteristics in terms of their return on investment and the volatility over any given period of time. We actually ended up with a mix that has us right now at about 30% in equities, 45% in corporate and government bonds and 25% in the four categories of diversified assets; 5% each in small stocks, foreign equities and venture capital and 10% in real estate. We felt that this mix gave us an acceptable return on investment and it gave us an acceptable expected level of volatility.

When we looked at these (Graph 6), then, we got a look at what we could expect in terms of our contributions to our plan as a percent of payroll if it performed at the 80th percentile. Under Policy 6 it would say that we wouldn't have any contribution to make until 1996 and then only a small contribution. Then the next one after that would be the year 2000. So performing as low down as the 80th percentile, we had a very acceptable situation toward meeting that one objective of minimizing contribution. If we went to the 95th percentile (Graph 7), we still were in pretty good shape. We wouldn't have to make any contributions until 1989. At the 50th percentile, we would not make any contributions

FORECASTING OF ASSETS AND LIABILITIES

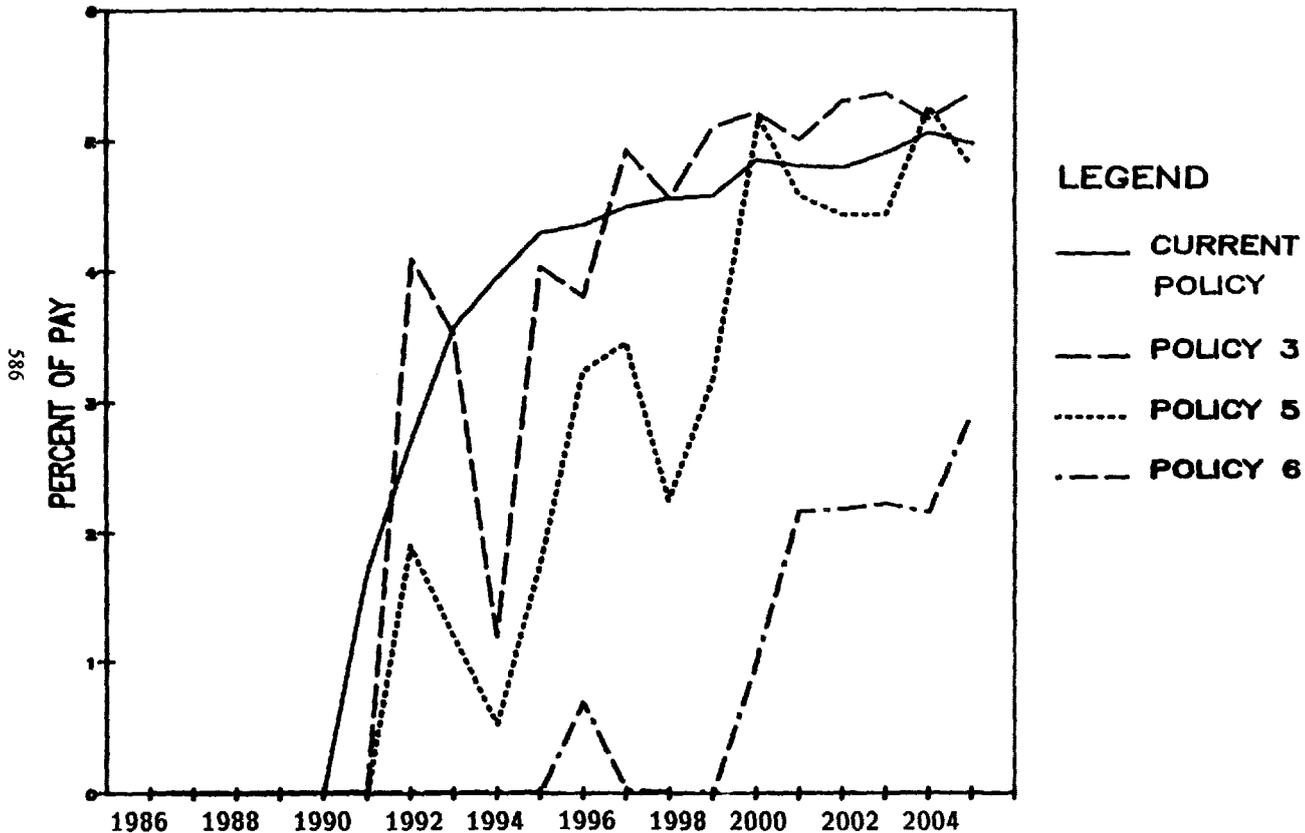
EXHIBIT 4

ASSET CLASS PARAMETERS

Percent

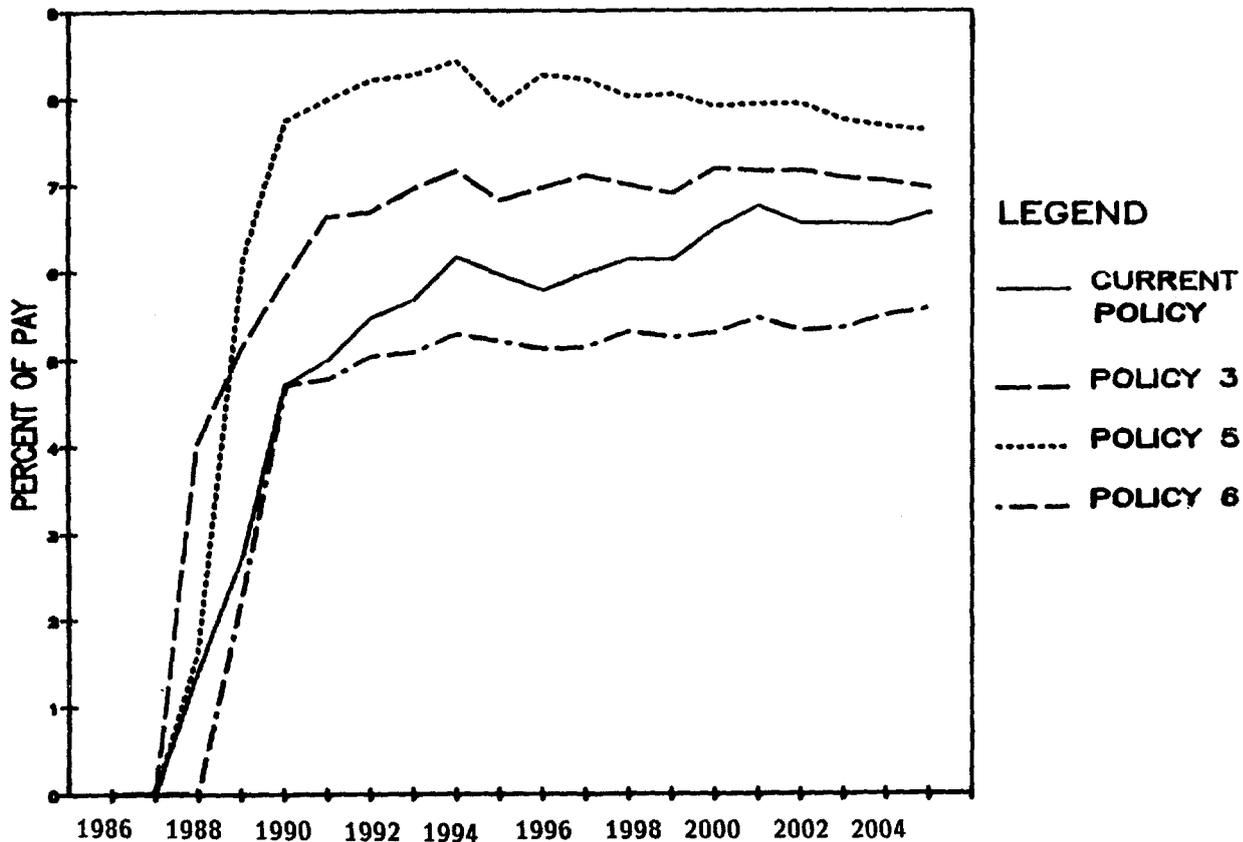
	REAL RETURN	STANDARD DEVIATION
EQUITIES	6 %	20 %
CORPORATE AND GOVERNMENT BONDS	2	8
REAL ESTATE	5	12
SMALL STOCKS	9	30
FOREIGN EQUITIES	7	18
VENTURE CAPITAL	12	40
CASH EQUIVALENTS	1	3

AXIA, INCORPORATED CONTRIBUTIONS/PAY - 80TH PERCENTILE



PANEL DISCUSSION
GRAPH 6

AXIA, INCORPORATED CONTRIBUTIONS/PAY - 95TH PERCENTILE



587

FORECASTING OF ASSETS AND LIABILITIES
GRAPH 7

PANEL DISCUSSION

until I think it's the year 2001 or 2002. We felt very good about going with the asset mix that we identified in Policies 6 and 7.

We then went about implementing this strategy. We developed and finalized, once again working with our actuaries on this, a policy statement and guidelines for our money managers. We then went into a process of selecting managers and, for a plan sponsor, this is an excellent opportunity to do this. If you're not really happy with one of your money managers, if you want to take a look at a lot of them, this is the time for a change. We went through a long interview process, interviewing many managers. We made some selections, moved some assets around and ended up with the asset mix that I mentioned just a minute ago.

The process itself took for us from July 1985 until March 1986. The bulk of that time, though, was taken in selecting asset managers. For example, we were looking, as a small company, for one-stop shopping on the diversified portion of that portfolio, and there aren't a lot of people in the United States who can manage real estate, foreign equities, aggressive small equities and venture capital with one account officer handling it for us. We found one, but it took us a while to do that.

The results of this study for us have been, then, very nice. I guess I can put it that way. We did have a lot of increased scrutiny. You will find that in a lot of plan sponsors. I don't think we were unusual. Here we had a \$20 million asset that nobody was paying any attention to, quite frankly, and yet we have our general managers of our divisions concerned about return on assets and they are responsible for \$4, \$5, \$8 million in invested assets. So our CEO, our Board of Directors and many members of our management group got a lot more interested in the performance of our pension plan. We found that there was a great temptation to shift assets, and I had many discussions with my boss about it, especially when the equities market got hot. "Get out of bonds. Get into equities." I heard that over and over. Don mentioned that I had spoken to a professional group of other chief financial officers and controllers and I had several of them tell me, "Go into equities and hedge the portfolio," but we decided that we had done this and, right or wrong, we were going to give it time to work. I think that is the essential thing for the plan sponsor -- to give whatever you pick time to work and resist those temptations to move the money around among categories.

We even needed to monitor mix compliance. We found that one of our equity managers had shifted into small equities a little bit and, as a result, the desired mix of assets was askew. We made a correction on that, but the plan sponsor does need to monitor that regularly.

We had everything in place by March 1, 1986. Everything was really in place in 1985 except for a couple of small things. Our return on investment for 1986 was 12.5%. In 1987, our return was 6.3%. We felt very good about that in view of what happened, especially in October 1987.

A few final observations. There are some benefits I think that we feel we have gotten from this process that were really helpful. Number one, a study of this type helped meet any fiduciary responsibilities we had. You are always talking prudent man rules and everything else. Something like this, we felt, was certainly prudent and helped us meet those responsibilities in case of some future criticism. I don't care how well you do in pension plan management,

FORECASTING OF ASSETS AND LIABILITIES

there is always somebody who has done better. You only meet them at cocktail parties, but they've always done better. The study helped deflect suggestions and quotes. Talking about cocktail parties, my boss, the CEO, comes walking in. He says, "I was at a party last night and old Joe down the street has got 22% on his plan this year. We've got to find out what he is doing." This study helped us to deflect that kind of reaction. It provides a benchmark. Right or wrong, it gives us some basis. Kentucky windage certainly, and believe me, I think Kentucky windage is how a lot of our objectives were set in the past. During this process, you get some nonquantifiable reactions. One that was interesting -- our actuary said, "We could look at this plan at the 99th percentile." Our CEO said, "Why would we want to do that? If we perform at the 99th percentile, chances are the whole economy is in the toilet and everybody is in trouble and nobody's going to be talking to us about the pension plan anyhow." So, you get unquantifiable gut reactions that sometimes do make some sense.

We are aware, and I think it is important to be aware, that changes in conditions would require a restudy. Chester mentioned demographics. We are in the process now of trying to buy a company. If we brought them into our plan, it would change the demographics considerably. It would be like the company we vested, an older group of employees. We would want to then take another look at this thing under those conditions or a divestiture might also trigger this kind of a study. Overall, I think for us, as a user of this kind of technique, it was a very beneficial exercise and one that we are happy that we did. We are very happy with the results so far, and we think that it was well worthwhile.

MR. BRACKEY: One of the comments that you made was on the different confidence levels that you used in the study, the 5th, 25th, 50th, 80th, 95th. As a plan sponsor, given all that data and all those various confidence levels to consider, what do you focus on? How did you decide which pieces of that information to use?

MR. VOGT: Really, in making our decision as to which one of those ten cases, we looked at the 50th percentile. We looked there first and determined which one of the cases was most desirable for us. We used the 80th and 95th percentile data to make that a volatility screen more than anything else.

MR. BRACKEY: Chester, there have been a lot of changes since John completed his study. We have different accounting rules and different legislation under OBRA. You mentioned a number of considerations from the actuarial and investment standpoint. Which of those, in terms of priority, would you suggest that a company like Axia be focusing on at this point in time?

MR. SCHNEIDER: Based on the talk, it seems like contributions shouldn't really be a concern for the foreseeable future, so the current consideration would be implications of FAS 87. Certainly, the concern for contributions is not an issue in this case since the plan is well funded, and so it is a question of how should expense be determined and looking at the various details in that to see what are the best ways of doing things, both today and for the future. Again, I think in the current framework the accountants haven't been too rigid as to exactly what you can do this year compared to last year, but that may change in the future. We may be locked into certain policies after awhile; it may be difficult to change. So some of the alternatives in that area seem to be appropriate.

PANEL DISCUSSION

MR. BRACKEY: Chester, there are a lot of different sources of assumptions. Some firms put a little more weight on things like economic forecasts.

Everybody tends to spend time reviewing historical returns, long-run returns of 60 or 80 years or shorter time series of 30 years or under. And many times, we treat these assumptions like they are very objective. What kind of guidance could you give us in terms of developing those assumptions?

MR. SCHNEIDER: That's an interesting question. As I mentioned, there are two questions that should be addressed. One is, given a certain model, "What are the right assumptions?" And then the other question is, "Do we have the right sorts of models?" The types of models most people are using today tend to rely on Ibbotson-Sinquefeld as the basis for historical experience for at least the major asset classes. For things like real estate, that becomes hard to do. Most of the historical data for investment type real estate only goes back about 15 to 16 years and is based primarily on appraised values as opposed to market values, so it tends to show very low volatility. If you use assumptions based on the historical data, you tend to overly favor real estate. So our general approach has been to look at all the data that are out there.

One of my minor responsibilities is to produce what we call our economic tables, which is a compendium of available data and calculations of correlation coefficients and standard deviations. But then we get together from time to time with people involved in forecasting and discuss these matters and try to put some judgment into this process.

One of my other roles is to try to develop models further. I think the basic model that we are using in many cases has a lot of problems with it. As I mentioned before, to say that stocks and bonds just differ by a few parameters and don't have a different structure misses certain key points that could potentially have an impact on the forecast.

For example, there are some recent papers which look into the question of whether returns are independent over non-overlapping time intervals and most of the forecasting models are essentially based on that assumption. That is the key to forecasting of the levels of dispersion of results that occur over time. The somewhat surprising conclusions of very recent papers are that that assumption is not very valid. Over short-term time periods, say a year or so, it seems to be some trend-following for stock returns, and over long periods, it tends to be some mean reversion for stock returns, which is a very interesting conclusion because it says there is something structurally wrong with most models. There are other implications from observations like this. All these things need to be considered in the next generation of forecasting models.

FROM THE FLOOR: Mr. Vogt, to what extent did you consider the interrelationships between your pension plan and external business conditions? For example, the cash richness factor?

MR. VOGT: Before we had gone private, we were cash rich. At that time, of course that was also before we did the study, we made the maximum contribution we could make and still take the tax deduction each year even though we were overfunded and did not need to not make any contribution at all. When we did the study we had gone private and our cash richness was no more. We had used the cash that we had on the balance sheet plus borrowings to buy the

FORECASTING OF ASSETS AND LIABILITIES

company, so we had no cash rich situation. That led to the objective of no cash contributions at least in the foreseeable future.

MR. WILLIAM W. BUSH, III: Have you compared recent studies that you have done with what happened in October 1987 and seen how your prediction came out?

MR. SCHNEIDER: In some sense, not really. In looking at stock returns, the typical type standard deviation number that I guess you've seen here, I guess 20% was on the board, but the numbers tend to range from 16% to 20% depending on exactly what's being calculated, and that equates to approximately 1% a day depending on how many market days in the year you want to use. Is the market really open when trading stopped on the New York Stock Exchange? The point is that the bulk of the decline was approximately 20% percent on October 19, which translates into 20 standard deviations, which translates off the scale.

That type of event is certainly inconsistent with virtually any type of model. What that means is very hard to determine. Of course, if you look at it over a year, the return for the year was not particularly remarkable. But at this point, the notion that returns are independent over nonoverlapping time intervals may not be perfectly true. It may be that there's something else, that there are other things, notions of value operating in the marketplace. But in some sense it is a hopeful sign. The concept that returns are independent over nonoverlapping time intervals says that, to a large extent, manager selection is a fairly helpless process and you might as well just index. If there are other factors operating in the market, then it says that maybe people can be smart enough to make use of these factors and outperform the benchmark index.

MR. BRACKEY: Bill, to respond a little further to your question, that event, has raised a lot of concern among plan sponsors. It does not fit the modeling framework very well, but I think it is of great concern to those who are involved in this process. In the academic community, we are hearing from a lot of people who are focusing on mathematical models relating to managing chaos. There are ways to attempt to do that, particularly through the options markets. What we are seeing today among people who are offering portfolio insurance strategies using futures, which were not too effective in many cases, is that they are now looking at a mix of futures and options strategies or options only strategies to provide protection on the down side and possibly selling calls on the upside to cover some of that cost. There are a variety of options strategies which can be used for the purpose. I think these strategies are worth careful evaluation, but they can, nonetheless, be costly to implement if handled improperly.

MR. KENT HARRINGTON: I don't work in this area at all, so I am way out of my depth. It seems to me if everybody does this and everybody follows the best advice and you have an entire market of people who have just taken the best advice and gone one step further, so nobody is any better off than they were when nobody was taking advice. What about the cost of doing all the tests and the benefit that you got by doing the test and saving the money? Have you done any studies, any of you, to assess the extra benefits people have from having all these studies done, as opposed to the people who don't have these studies done, and just pick their investments by the seat of the pants or throwing darts at the secretary?

PANEL DISCUSSION

MR. VOGT: I haven't thrown any darts at the secretary; she usually throws them at me. In our case, just like any study in which you have professional consulting advice, which is really what this boils down to, cost is an important factor. We thought that the study was a reasonable cost at the time. When we looked at our results for 1987, we felt like the study may have been a bargain because we had 6.3% return for the year. I know we outperformed many, many other pension funds for that 12-month period. In our small plan we had \$20 million in assets. A tenth of 1% in return is enough to more than pay for the extra effort and the extra money that we put into the study. As users of this approach, we feel like it was a very cost beneficial approach for us.

MR. HARRINGTON: Have the people who offered the studies considered gearing their fees to the effectiveness, the increased yield that they try and get, rather than a flat fee basis?

MR. SCHNEIDER: The issue of performance fees for investment managers is currently a hot topic. It would be hard to give full accountability to the recommendation for the asset allocation, although you could conceivably do it based on how well the mix does versus some baseline mix. And that's an interesting proposition if you make the relationship strong enough, that might be worth taking on. The other point I was going to make is that certainly actuarial fees are much less than the potential cost of free studies, possibly from certain people in the investment banking community. These studies tend to involve fairly large trades at some point down the line and 1% of several million dollars tends to be a little more expensive than the \$20,000 to \$100,000 that the forecasting study might cost.