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The Practicing Investment Actuary

Track: Investment

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Summary: Leading practitioners in investment-related roles share insights and techniques. Panelists discuss general investment-related issues facing the financial services industry and describe specific applications to actuarial functions, including valuation, pricing and risk management. At the conclusion of this session, attendees have a better understanding of the investment-related risks facing the financial services industry, strategies companies are using to measure and manage this risk and skills used by leading actuaries in this field.

MR. KENNETH P. MUNGAN: Our goal today is to cover, from many different directions, what investment actuaries do on a day-to-day basis. We've assembled a panel of people with different spheres of practice and perspectives.

I'm a principal and consulting actuary with Milliman USA and the head of the Financial Risk Management practice in the Chicago office. Jeff Johnson is the director of Stable Value Product Management at Hartford Life, a member of the Hartford Financial Services Group. Prior to Hartford, he worked in the Asset/Liability Management Center of Expertise at Allstate. Dick Mattison is a vice president and actuary at Standish Mellon Asset Management. He works with strategic asset allocation for insurance clients. And finally, Dan Manghirmalani is a fixed income portfolio manager with Deutsch Investment Management.

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I am going to give you an idea of what day-to-day work as a consulting investment actuary is like. To do so, I'm going to talk about three different types of activities.

One activity is the support that we give to large-scale transactions. I'll talk specifically about mergers and acquisitions (M&As). The second topic is supporting clients in developing new skills, which has been associated with equity guarantee analysis over the past few years. Then, there are the international efforts. The globalization that's taken place in the life insurance industry may have personally affected many people. I'll talk about how it's affected me, and then give some conclusions.

Investment factors are clearly a primary risk-and-return driver for life insurance companies. When thinking about where they take their risk and how they're exposed to wild swings in income, investment-related issues top the list.

Investment actuaries typically focus on strategy development and evaluation and investment risk management. We do not tend to focus on relative value and trading decisions. We do not look at which bonds to buy or sell this week, how to execute particular derivative trades and so on. It's more of a strategic level analysis.

Peter Bernstein's comments this morning in Session 1GS were especially appropriate for this session. He mentioned that the capital markets are not stable, and do not have well-understood parameters. He said there is constant change, which requires us to focus on tail events. The consequences require the analysis of the probabilities. That's especially true for life insurance companies because the consequences of a tail event could be insolvency. That in and of itself creates the need for a strong focus on tail events.

Now I'll go through the type of analysis we do for a large-scale transaction and cover how investment factors come into play. First, there is investment analysis for M&A transactions. Other things like reinsurance and demutualizations motivate similar analysis.

I'll then go through a quick case study regarding equity modeling of variable annuities (VAs) with guarantees. My goal is not to talk about the technical details associated with such modeling, but instead to discuss the process that investment actuaries go through and how we can add to that type of work.

Finally, there is international work. The general theme is that all liabilities are local, but investments can be global. Investment actuaries can lend a global perspective to the management of different companies that may be united in a global financial services organization.

The basic goal for M&A support is to determine how the investment portfolio and strategy will affect deal valuation. Deal valuation could be impacted not just in the base case where you look for the most likely outcome of the portfolio and basic strategy, but also when you seek how this could perform in the tail end.

The nuts and bolts of this could be to model the existing portfolio, which involves reconciling all the items to the balance sheet, validating market values and yield and doing cash-flow projections. Assets these days are much more complicated if very detailed, structured finance transactions that may have many embedded options and conversions, as well as assumptions for non-fixed income assets are taken into account.

Figure 1 is a sample of the existing portfolio. Often the best place to start is a very simple table in terms of how to quantify, under current market conditions, the broad investment strategy for the line of business or company being analyzed.

Figure 1

Investment Strategy

Asset Allocation Strategy Sample SPDA Strategy Market Conditions on 8/30/02									
Asset Class	Credit Quality	Allocation	Maturity	Treasury Rate (BEY)	Gross Spread (BEY)	Investment Expenses	Expected Defaults	Net Yield (AEY)	NAIC RBC 100%
Cash	AAA	1%	0	1.69%	0.16%	0.10%	0.00%	1.75%	0.30%
Corporate, Public	AA	9%	5	3.22%	0.98%	0.10%	0.02%	4.12%	0.30%
Corporate, Public	A	11%	7	3.78%	1.43%	0.10%	0.03%	5.15%	0.30%
Corporate, Public	BBB	12%	10	4.14%	1.85%	0.10%	0.31%	5.66%	1.00%
Corporate, Private	A	10%	7	3.78%	1.83%	0.10%	0.02%	5.57%	0.30%
Corporate, Private	BBB	12%	10	4.14%	2.25%	0.10%	0.31%	6.07%	1.00%
MBS Pass-through	Agency	8%	5	3.22%	1.89%	0.10%	0.00%	5.07%	0.30%
CMO	Agency	8%	5	3.22%	1.57%	0.10%	0.00%	4.74%	0.30%
ABS	AA	15%	7	3.78%	1.51%	0.10%	0.02%	5.23%	0.30%
High Yield	BB	6%	5	3.22%	5.51%	0.10%	1.10%	7.67%	3.40%
Commercial Mortgage	BBB	6%	20	5.06%	2.35%	0.10%	0.31%	7.13%	1.92%
Alternative	High Risk	2%	30	5.06%	3.00%	0.10%	0.00%	8.12%	3.40%
Total		100%	8	3.77%	1.96%	0.10%	0.17%	5.54%	0.81%

This is a table of a limited number of sample investments that span the space of public versus private placements, a range of credit qualities and straight debt versus structured assets. Once we decide that allocations can get exposure to the different components of the market where the maturity structure is consistent with liabilities, we measure the yields and spreads that are available today. This was done at the

end of August. We can then make some assumptions about investments and defaults.

This is really just the very beginning, because after Enron, WorldCom, Global Crossing, K-Mart, and so on, expected defaults can often be very different from reality. In the data of the past few years, defaults have run at triple the long-term average level. These expected numbers happen over a 30-year period. Values double and easily triple these long-term expectations.

This is a sample static strategy. Often, a company may not be able to express its strategy in static terms for some of its lines of business. You may need a much more complicated exercise that involves a dynamic strategy that could potentially use derivatives, swaps, caps, floors and equity derivatives to match the liabilities that one is trying to manage. Those are my brief comments on transaction support.

One other area of activity for consulting investment actuaries is to help companies understand and analyze the derivatives that are embedded in separate account products, particularly variable annuities. I will go through a sample analysis of equity guarantees, but the goal is to discuss the process and not the technical details.

The first step is always to understand the unhedged risk and return, based on actions that the company is taking and its current position. Doing that requires creating a standard framework that covers several different dimensions. One step is to decide up-front what the financial performance measures are going to be. You may ask what the primary concerns are and if they are cash flow, statutory income or GAAP income. Second, what time horizon or multiple time horizons is one interested in analyzing? And finally, what are the trigger points? Exactly where in the distribution would one focus? Do you understand the level of risk? What levels are acceptable and what levels are unacceptable? Again, all of these questions can be answered in advance. Don't go through a process where one does the analysis first, then try and rationalize or justify the level of risk.

In these sample results there is a set of actuarial assumptions, which are shown up at the top of Figure 2. Then there is a set of investment assumptions, such as fund allocation or volatility. Lastly, there is a description of the products that you are evaluating.

Figure 2

Sample Results - Baseline Assumptions

Sample Model Summary		Lapse Rates	
Mortality = 100% of Annuity 2000, Basic		Contract	Lapse
Male / Female = 60% / 40%			
Issue	Total	Year	Rate
		1	2%
		2	2%
45	10%	3	3%
50	25%	4	4%
60	30%	5	5%
70	25%	6	6%
75	10%	7	7%
		8	20%
Total	100%	9	10%

Fund Allocation = "Total Block"

GMDB = Annual Ratchet to Age 85

Initial Account Value = \$10 billion

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Figure 3 shows baseline results. In this example the financial measure is simply cash flows, and the time horizon is the entire life of the block of policies or block of variable annuities that has been issued. Risk could simply be a percentile value. I've summarized some of them here.

Figure 3

Baseline Results

Distribution of Present Value Results (Millions)				
	GMDB	GMDB	Net	Net CF
	Premiums	Death	Cash	as % of
		Claims	Flow	Init. AV
Average	185.1	118.2	66.9	0.67%
Percentiles				
1	127.3	339.5	-212.1	-2.12%
5	108.1	199.1	-91.0	-0.91%
10	191.6	239.5	-47.7	-0.48%
25	127.1	107.6	19.6	0.20%
50	157.2	78.4	78.9	0.79%
75	173.5	51.5	122.0	1.22%
90	243.6	75.0	168.7	1.69%
95	262.6	65.0	197.7	1.98%
99	301.6	60.3	241.5	2.41%

Significant tail risk

Assumes 20bp annual premium

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With this type of product, if you see distribution of results and look at a net cash flow as a percentage of initial account value, numbers vary over a wide range. The typical capitalization levels for a company writing this business show that there is significant tail risk. Then, investment actuaries are critical in understanding what can be done about that. They may ask if there is a hedging strategy to put into place.

It's important to test the sensitivity to key assumptions. Sensitivity to volatility can be indicated and risk could easily double, depending on the policyholder's allocation to more or less volatile funds.

Finally, the complex hedging strategy is a whole new area of practice for investment actuaries. In the past few years, I've been significantly involved in this area where companies are starting to either execute or seriously study dynamic hedging. For example, they're looking at treating each of the options embedded in a variable annuity as an actual option for which one can calculate a market value, then hedge fluctuations in that market value with offsetting instruments.

That will be very operationally intensive, and the cost will be based on realized volatility. I won't go into all the details of how to actually carry that out. However, I want to make the point that within the different groups in the actuarial profession, one needs a very significant investment background to do that type of work.

In developing these strategies, there are two very different types of activities. One is developing a model to evaluate alternative strategies. The other is actually carrying out one's selected strategy. These two activities are very different. One

involves a fairly slim model that captures the essence of the risk and reward trade-off one is evaluating, and the other activity is much more detailed and intensive.

In evaluating strategies I will go through a sample company that's trying to make a decision about reinsurance. These numbers are purely made up. I don't think one could actually find these values in the reinsurance market today. However, I will discuss four treaties with different terms, as summarized on one sheet.

The question is how to decide among these different types of risk management strategies. When looking at the summary of terms, it's not clear which one to take. This motivates an analysis where one comes up with a measure of return that I've shown as the average present value of cash flows with some measure of risk, which is the average of the bottom five percent of scenarios, as shown in the far right-hand column (Figure 4).

Figure 4

Cost / Benefit Analysis

Reinsurance Treaty Analysis						
Summary of Results (in Millions)						
Treaty Number	Min Prem	Max Prem	Limit	Attachment Point	PV Rider Cash Flow	
					Average	5% CTE
No Reinsurance					66.9	-157.8
1	0.15%	0.15%	100%	90%	-19.2	-62.2
2	0.13%	0.25%	100%	90%	-1.6	-52.1
3	0.15%	0.30%	1%	100%	19.8	-108.7
4	0.20%	0.20%	1%	100%	-24.8	-142.8

- No treaty completely eliminates risk.
- Cost / benefit varies widely from treaty to treaty.

Thus, we can draw a few broad conclusions that no treaty completely eliminates risk, and the cost benefit varies widely from treaty to treaty. Also, it's important for us to do these calculations and to lay them out on the table. This is not to say that there's a definitive magic formula that will help one select a magic strategy to make all of the risk go away, but to focus the conversation and to assist senior management in making a decision.

To conclude that process and make a decision, it is very helpful to boil it down to as few numbers as possible. That's why I have calculated the efficiency index on the far right, which is the ratio of how much risk is reduced per unit of reduction in return. I must find out where to get the best value for each risk management

strategy. In this example there is a great reduction in risk for giving up very little in return (Figure 5).

Figure 5

Treaty Selection

Reinsurance Treaty Analysis					
Summary of Results (in Millions)					
Treaty Number	PV Rider Cash Flow		(A)	(B)	(A)/(B)
	Average	5% CTE	Reduction in Risk	Reduction in Return	Efficiency
No Reinsurance	66.9	-157.8			
1	-19.2	-62.2	95.6	86.2	111%
2	-1.6	-52.1	105.7	68.5	154%
3	19.8	-108.7	49.1	47.1	104%
4	-24.8	-142.8	15.1	91.7	16%

1. _____ 2. _____ 3. _____ 4. _____

The last thing I want to cover is how investment actuaries are participating more and more on the global stage. Global insurers have very complex multi-currency portfolios of assets and liabilities. One thing that multinationals find as they build their base of companies is that there are different practices all over the world.

I have spent quite a bit of time in Japan, where the norm in the life insurance industry was always relationship investing. Now it experiences a change as North American and European insurers move in and introduce portfolio optimization techniques. This creates the need for investment actuaries to serve both as translators between different paradigms and also as analyzers to understand the potential risks and opportunities of branching out into a new market.

In conclusion, the role of the investment actuary has expanded very rapidly over the past few years. We've gone from being primarily focused on fixed-income, interest-rate risk analysis to understanding and analyzing credit-risk strategy for structured finance asset. We are exposed to leveraged equity investments through separate account and multi-currency portfolios that are common within global insurers. This raises the analytical bar and creates communication challenges as well. Personally, I'm excited about this opportunity and looking forward to continue to practice in this field.

MR. JEFFREY JOHNSON: The talk I'm going to give is born from a couple of themes. My remarks are tailored around the thought that the practicing investment

actuary is practical. That is not said in a compromising manner, it's said in a theme of being talented and technical, while understanding the theory. More importantly, one needs to translate and communicate that theory to people who aren't as talented or technical as investment actuaries.

Before I go into a few figures, I'll mention that I am currently a product manager for a stable value product line. There have been some benefits to this particular product line of the decline in equity markets. However, there have been some challenges. In terms of making sure that as we continue to sell products that provide a fixed rate of interest, guarantee return of deposit and permit a lot of flexibility, we must appropriately maintain our discipline of matching assets with the liability.

I will provide detailed comments that come from two of my experiences. I gained some insight from my role as product manager, where I partner with a very professional and advanced investment actuary, and also from working in the asset/liability modeling (ALM) Center of Expertise. I'm going to share ideas attained from what went well and worked right. I will also say what I would have done differently if given the chance again.

I will start by asking, what is an investment actuary? What does one think of when hearing the words "investment actuary?" For me, it is someone who applies actuarial and financial principles to the selection, management or analysis of asset portfolios with appropriate consideration for the liabilities or contingencies they support. The key message is that one can be an investment actuary without working in the investment department.

It's also important to recognize that one can be in the investment department and not be an investment actuary. For example, a person who only cares about trading or buying the next asset is not an investment actuary. Also, on the liability side, if you are involved with planning and budgeting and only care about hearing the yield from the investment department, then you're is not an investment actuary.

I also want to point out that investment actuaries go by a number of different titles. There is the ALM actuary and the risk manager, and given a broad definition of investment actuary, some product managers even wear the title.

Finally, there is the investment liaison, which is a fancy name for the individual who translates everything the investment professionals want to know about liabilities into a language they understand. They translate everything the product manager should know about the assets being bought. No matter the title of the investment actuary, one common theme is that this person is the focal point for data analysis and synthesis.

To be a successful investment actuary, you must follow the "Three Rs:" relevant, resourceful and results. This person must establish and maintain relevancy. How do you know if you are successful? The following questions should be considered. If

they are answered in an affirmative way, you are probably well on the road to establishing and maintaining relevancy.

How often do people seek out this actuary's skill set? Are recommendations implemented? If not, why? Are the person's skills and tools current? Do others understand what the person is saying? Do they care?

Does the person have the right resources to do the job? How about hardware? We need computers, fancy simulators, the software that supports the hardware and peopleware. Too often we think of the hands and the feet. We consider the different aspects of influence and where those points are within the organization to translate the theory into practice.

Do you have a clear picture of the asset universe and the liabilities they will be designed to support? This question gets at two pieces. One is whether or not you have the right tools in place. Is the data being reviewed in a global manner, as necessary? To clarify, there's a great opportunity in the corporate universe for asset allocation strategies that really cut across a particular product and answer the question from a more global level. Given the next asset purchase at the corporate level, what's the best place to put this asset within the liability context, either on a particular product or across a multi-line of product offerings?

The other dimension of the asset universe and understanding the liabilities is also relating directly to the hardware/software question. What is the company's attitude regarding risk and use of derivatives? It's nice to talk about caps and floors, but if a corporation is not mature enough or prepared to hear the word derivative, forget exercising or implementing an idea surrounding it. Before the theory can be executed, education or persuasion needs to take place.

How might accounting or reserving issues impact the alternatives under consideration? This is where the investment actuary is very well-suited to not only combine and look across the asset universe, but to understand the implications of any reserving or accounting. The buzzword that always comes up with derivatives is Financial Accounting Standard (FAS) 133. To the degree that one understands the implication, and presents it along with the consequences of the alternative, the customer will be better served.

Finally, there are results. Some say that talk is cheap, but it takes money to buy land. In other words, you have to get results.

Now I will expand a bit on each of the Three Rs. The first one I'll talk about is establishing and maintaining relevancy, especially when dealing with corporations whose main goal is to establish and create greater profits. As long as you are conscious of touching on one or more of these points, you're on a path toward relevancy. Business enterprises are generally concerned about generating a fair return for their owners or investors, maintaining a positive reputation with

customers and the regulatory agencies and positioning the business to capture future growth opportunities.

Finally, achieving adequate financial strength ratings is very important. Recent activity, both within and outside the insurance industry, has placed an even greater emphasis on this particular aspect.

A clear line of sight between actions and each of the above dimensions will go a long way toward nurturing an atmosphere of relevancy. How do your recommendations enhance returns to the shareholders or reduce income volatility? What impact could this action have on the company's ratings or reputation? Can this action uniquely position the company in the marketplace for new opportunities? Why did this action place the company in a better position to manage in force or achieve additional growth? And, of course, what are the risks of action versus inaction? Technical expertise, combined with thoughtful answers to the above questions is very important for the practical investment actuary.

Relevancy is in the eye of the beholder. Different audiences or people look to evaluate relevancy. A product manager who wants to exceed or beat goals that center around return or growth, capturing new emerging markets or reducing income volatility has ideas that will be most appealing to hear and take action upon. Also, the investment department is interested in developing and creating guidelines that advance the performance of assets in a context that's responsible, considering liabilities and establishing performance indices that serve as guideposts along the way and provide an optimal purchase strategy.

On the corporate side, the most important piece is proactive issue identification. An investment actuary's theory that doesn't result in capturing or identifying trends is not very relevant. On the other hand, to the degree that you become a partner with the organization and help it build better strategies, you will become very valued and relevant. Also, you will be invited into more conversations regarding the future of the organization.

Ideally, risk management is a seamless implementation across all functions from the top down or bottom up. Realistically there may be bumps, but overall coordination of implementation is important. For example, the cost of a hedging program that theoretically makes terrific sense should not be at the expense of unacceptable risk-adjusted returns. Communication is an overarching theme for relevance to be realized. Two solid pieces of advice are to know your customer and speak English.

Once a destination is known, all you have to do is get there. There are many different ways to get from points A to B. Some methods are more efficient than others. It all depends on when and how you want to get there. Where do you fit in the organization? Are you in the corporate division? Are you within a profit center? Are you in the investment department? Are you a consultant?

Aspect for consideration focuses on the idea of positioning yourself to get to the point of implementation of recommendations and knowing who to influence and how to do so. Is the person accountable for top or bottom lines? Is the risk management function relatively new or established? Is risk management viewed as a compliance formality or as an extension of sound management? Who are the decision-makers and how can you influence them? Answers to these questions will determine the best strategy to move the organization from today toward tomorrow, and from the status quo toward a better risk management opportunity.

I'm going to close by talking about results. The successful investment actuary must be able to identify and present risk management opportunities in a manner that allows the enterprise to take action. The proper application of technological hardware and software, along with a conscious consideration of the best strategy to present and implement recommendations will produce strong benefits for your company and yourself.

Namely, this is a full understanding of the risks associated with an endeavor and its components, a realistic appreciation for the expected return and potential sources of variance and a better appreciation for the practice of risk management and its role in protecting or creating shareholder value. Finally, you need enhanced rating agency understanding and appreciation for the depth and quality associated with risk management processes.

The successful practicing investment actuary is—above all—practical.

MR. RICHARD S. MATTISON: I'm going to talk about what I do, where I work, what I learned along the way, and how opportunity knocks, for those interested in getting into the investment actuary area.

I work at an investment management company here in Boston. I help our clients develop strategic asset allocation. The context is typically within both a one-year and a five-year horizon; it can be longer, but it's typically something like that. A big difference within the firm is the issue of tactical asset management. Our trading desk is worried about what to do today or this week, given cash or our clients' needs. However, I take more of a long-term approach. A one-year horizon is very long from the trading desk's perspective, but this is a strategic asset framework.

I only get involved with analyzing things in the context of assets sometimes. This is like the capital asset pricing model (CAPM), which is one of the tools we use, as well as asset/liability modeling (ALM) and dynamic financial analysis (DFA). We have a number of property/casualty clients, and that's the terminology that they use. It's very similar, in many regards, to ALM.

I am involved with analyzing the assets and liabilities for our clients. Communicating things like risks and rewards of different strategies and perspectives on current

investment strategy is important. For example, how well is it suited to them? Typically we talk about our recommendations and what we would advise to improve the risk reward or return profile.

Continuing education is an important aspect for a practicing investment actuary. I have a role in terms of educating my firm. We're a 250-member firm with one actuary, and the other members of the firm don't know the insurance business the way an actuary knows it. This is why I spend time helping our portfolio managers understand the nature of our clients' business and their objectives. I also spend time educating our clients, so they understand issues on their markets in terms of strategy selection, and with some of the theories we use to develop our recommendations.

There are a few different demos that I use with clients or prospective clients. I use a three-dimensional view on asset returns throughout the 1990s, in terms of rolling annualized returns. I'll go through the view in a few different dimensions, looking at 16 different asset classes. I've got a capital asset pricing model, and I populate it with real data—17 different asset classes and subclasses in which a client was interested—and the red-hot returns are the positive returns. The mountain peaks on the chart I use fall on the equity side. In terms of dimensionality, it is cash.

The very slow-moving part of the surface is six-month Treasury bills—a cash equivalent. We've got stock market returns, which are the red-hot positive returns. Where they've been negative, they're underwater returns. We've got 16 different asset classes. We've got the dimension of positive and negative returns, and time, in terms of rolling 12-month periods.

Shifting this so it's dead-on, there is perspective on the range of risk between a stable asset like cash and predominantly fixed-income assets. Then there is the bond market. Or, to some extent, there is high yield, which means the stock market and high yield bond, as well as international asset classes.

One of the reasons we show a client this sort of a demo is that this axis or line is cash, and the region is predominantly fixed income in 1994, when interest rates rose and bond prices fell. So, in terms of a total return, you see a depression or a negative return in bond prices—negative total returns. What we'd like, given that insurance companies are predominantly fixed-income investors, would be to have asset classes in the mix with some of these other color schemes.

One of the problems faced when looking at something such as diversification and correlation coefficients, is that the correlation coefficient is not a stable variable—it changes over time. Typically, it goes up when you don't want it to go up, and that's what we had in 1994. Some of the asset classes held off. They had a little better immunization against the flu, so to speak, but they ultimately got sick, and the recovery period was different. Again, in talking with clients, we want to have, as

much as we can, a visual understanding of what's going on and the bases for our recommendations. It's one of the tools we use.

That's a brief view in terms of CAPM. Regarding dynamic financial analysis, I will have a demo in terms of results and show what we can learn from that sort of modeling for our clients. One of the interesting assumptions in CAPM is that you have rational investors, which is clearly suspect through various points in time. Usually we are rational, but there are certainly times when we're not. Another key is having the same worldview. It's important to recognize that insurance clients are typically taxpaying entities as opposed to pensions or endowments. They have a different paradigm in terms of what they're trying to optimize.

To simplify results, key in on the fact that coming out of CAPM is the assumption that risk premiums are proportional to risk. If we look back in recent history, in the initial public offering (IPO) bubble of the 1990s, anyone with a great idea could get funding. It didn't matter if there was any actual model or any product underlying it. Cash was easy to get for a good startup idea, and the risk premium was probably zero or negative.

Here is a simple CAPM example with three asset classes—cash, stocks and bonds (Figure 6). Granted, there are some limitations and simplifications, but if you assume it's another tool in the toolbox, it can be useful. We can draw some brief conclusions from it. At the top we show forecast mean returns. We've got 5 percent for cash, 7 percent for bonds, and 10 percent for stocks. If we think about a five-year forecast horizon, perhaps that's not too optimistic on returns.

Figure 6

Three Asset Portfolio Optimization (CAPM)

Forecast	Mean	5.00%	7.00%	10.00%			
Historic	Std Dev	3.00%	8.11%	14.32%			
Efficient Frontier Portfolios:							
		Cash	Bonds	Stocks	Expected Return	Std. Deviation	Sharpe Ratio
	1	93%	2%	5%	5.30%	2.87%	11%
	2	78%	9%	13%	5.83%	3.22%	26%
	3	63%	16%	21%	6.35%	4.08%	33%
	4	49%	23%	28%	6.87%	5.21%	36%
	5	34%	30%	36%	7.39%	6.46%	37%
	6	19%	37%	43%	7.91%	7.79%	37%
	7	5%	44%	51%	8.43%	9.15%	38%
	8	0%	35%	65%	8.96%	10.62%	37%
	9	0%	17%	83%	9.48%	12.37%	36%
	10	0%	0%	100%	10.00%	14.32%	35%
Range		Min	0%	0%			
		Max	100%	100%			
Current Portfolio:							
100.00%	A	10%	90%	0%	6.80%	7.37%	24%
Alternate Portfolios:							
100.00%	B	10%	85%	5%	6.95%	7.23%	27%
100.00%	C	15%	75%	10%	7.00%	6.79%	29%
100.00%	D	20%	65%	15%	7.05%	6.44%	32%
Correlations:							
		Cash	Bonds	Stocks			
	Cash	1.00	0.22	-0.09			
	Bonds	0.22	1.00	0.33			
	Stocks	-0.09	0.33	1.00			

We also show historical standard deviations over the last 25 years. Approximate standard deviations for cash, as represented by six-month Treasury bills, were 3 percent, bonds were 8 percent and stocks were 14 percent.

Thinking again in terms of optimization or efficiency and comparing efficient frontier Portfolio 1 where there is 93 percent cash, 2 percent bonds, and 5 percent stocks, there is a higher expected return than cash, picking up about 30 basis points at a lower standard deviation. Thus, it's a more efficient portfolio. Rather than having the lowest risk asset, 100 percent cash, you can actually do better minimizing risk and having a higher return with something like Portfolio 1.

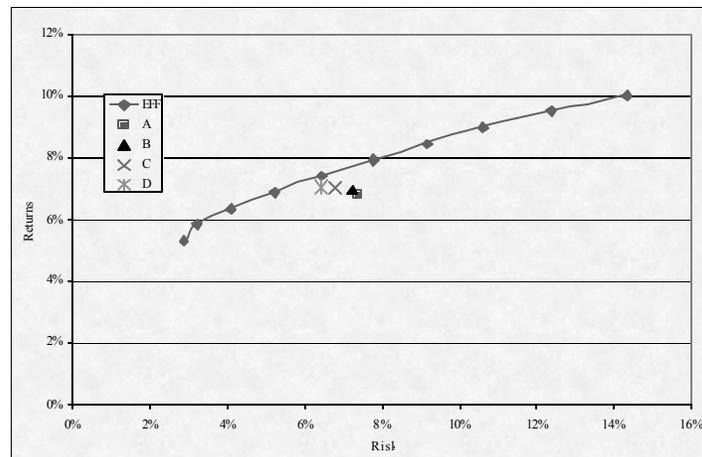
The Sharpe ratio is a measure of incremental return over risk. It's an efficiency measure in terms of evaluating portfolio alternatives. Portfolio 5 is approximately equal weights of cash 34 percent, bonds 30 percent and stocks 36 percent. You pick up about 39-40 basis points over an all-bond portfolio at 7 percent, and a dramatically lower risk at approximately 6.5 percent standard deviation versus

more than 8 percent for the all-bonds. Again, this is a relatively good Sharpe ratio at 37 percent. This is simple in that we showed the graphic for 16 different asset classes. To give some perspective in terms of what CAPM can do, from an analytical perspective, it can help to understand where to diversify your portfolio.

In terms of the efficient frontier, we plotted those 10 points of the curve. Hypothetical client Portfolio A is the box, and we can modify that strategy to get closer to the efficient frontier and to the optimum.

Figure 7

Prospective Efficient Frontier (CAPM)



If, in talking with a client, you can add other asset classes to the universe, this is one way to shift the frontier. For example, by going into international asset classes, you can move the frontier range. However, once you've identified with all of the filters and constraints typical of an insurance entity, there will be a very constrained efficient frontier. This gives a boundary condition for which to shoot.

So that's a bit on the CAPM in an asset-only framework. Dynamic financial analysis is a Monte Carlo simulation approach where we will simulate random claims occurrence and random asset return behavior. We're going to flow that through the balance sheet and income statement, look at a one-year and a five-year plan, and organize the information and the statistical data.

We've got a DFA model built, and turn off the asset side of it. We run with the Monte Carlo simulation on the liability side where you extract information on how volatile the liabilities are for the entity, the insurance enterprise. There is an average claim cost of \$1.4 million if it's a small company and \$1.4 billion if it's larger. There is a \$300,000 standard deviation in result, which is plus or minus 20 percent.

One of the things I find in working for our smaller property/casualty clients is they may not have any perspective yet on degree of volatility. Intuitively, they know that the insurance business is risky, but they might not have generated any statistical information on the matter. So, when we can do something with them like a dynamic financial analysis, it can shed some light on how much risk they've got on the liability side.

We can roll that forward and look at it in terms of a five-year period, with both assets and liabilities and the issue would be on a simplistic basis. If a client uses only cash because it is low risk, and if you can show the perspective of having a better-diversified portfolio—approximately 50/50 cash and bonds—you do not pick up much incremental risk in terms of standard deviation of cumulative net income. For example, this could be \$20,000, but you pick up about \$350,000 in cumulative net income, which is a big bang for the buck.

There is not much additional income from adding stocks to the portfolio, given that a dividend is low relative to the bond coupons, and because we typically run with a relatively low turnover. However, it picks up in terms of expected return on surplus, which is substantially higher there. It does come at the cost of more risk, though.

Typically, we wouldn't tell a client that hasn't been in the equity market to go to a one-third allocation. The company will evolve in that direction. You might set a five percent target for a five-year horizon and grow into that exposure. Again, this is a perspective in terms of the risk-return tradeoff.

What is a company trying to get out of it? We want to come up with asset allocations, be able to talk to the client about how well their current strategy works, how financially healthy they are, and what maintenance program we recommend to improve its portfolio.

Risk awareness is certainly key. How much confidence can we place in that correlation coefficient if using a CAPM framework, recognizing that things change and that where you want diversification, you might not have it when the market goes south? Also, there are return ranges. What's the probability that the portfolio has a negative return in any one- or five-year period? Try to add more color and depth to the recommendation.

I work at Standish Mellon Asset Management here in Boston. We have about \$45 billion in assets under management, with about 200 institutional clients. The largest client group is pension and endowments. The second largest client group is

insurance and corporate asset management for general Fortune 500 accounts and high net worth individuals.

We manage both cash and enhanced cash types of products and bonds. These are municipal bonds because we've got property/casualty clients. Municipals are important when we look to optimize on an after-tax basis for their portfolio. Also, we manage stocks, both domestic and international.

We have about \$8 billion under management with 37 insurance client accounts. They run the gamut from life and health to property/casualty to captives and self-insurance funds. As an investment actuary, it's quite enjoyable to have the diversity of clientele to stretch and learn about dynamic financial analysis and captive insurance programs.

When I was an actuarial student, I managed to convince the chief actuary to let me do a rotation in the investment department. What's important in terms of what I learned there was the language investment professionals use. It's different than the way actuaries talk. There are different types of products and mindsets, which include understanding their perspective. They like to be measured against the Lehman Aggregate or some other benchmark to show that they're good asset managers. However, in the insurance company you want them to outperform the liabilities. So, there are some different paradigms.

I did a stint with the staff at the Society. That was interesting in terms of working with the wide variety of education and examination committees. There, you have to figure out whether you are in the role of leading, managing or following. To get SOA education and examination (E&E) done, sometimes there is a very strong committee leader, and you can serve that role. However, often times you may have a transition. You have to step up and be more of a leader in terms of that role. You must make sure that the right things get done and that the exams actually take place. This is certainly very important.

Being the head of ALM at Paul Revere was an interesting role in terms of serving as a bridge between the investment and actuarial departments. I was able to talk with the investment people about the product so they better understood the needs of individual disability insurance and likewise talked with the actuaries in terms of what was out there in the marketplace.

If you're selling annuities, and you want to credit 8 percent, the products and assets aren't out there. At Standish, I work with a wide variety of insurance clients. Focusing on property and casualty clients, it's been great to stretch and learn on the casualty side, learn about dynamic financial analysis and cross-pollinate ideas from the casualty and life practices. People and client skills are both very important.

If you work in an insurance company with an investment department, you should ask the investment people about their business. Ask them what they do. Ask them

about the markets. Try to go to lunch with them and learn more about their language and their perspectives. Then think of ways to offer to help in the business, offer to talk with them about the insurance products and work with them on special projects.

There are a lot of formal programs like CFA and MBA, which are very good. However, you can also study on an informal basis with items that are on the SOA syllabus or other investment-based textbooks. Education is the call to spread the knowledge and figure out ways to pass it on. This helps the profession, and it gives you a chance to raise your stature as a knowledge worker.

Persist and keep on knocking.

MR. DANIEL J. MANGHIRMALANI: I'm a fixed-income portfolio manager with Deutsch Asset Management in New York. I'm a practicing investment actuary because in addition to being a chartered financial analyst (CFA), I'm also an FSA and EA.

Deutsch Asset Management is one of the largest global asset managers with \$150 billion in fixed income management in the United States. It's composed of four different groups, quantitative fixed income—which is the group that I'm in—active management, stable value and management of insurance assets, which comprises a little over half of that \$150 billion.

We're organized in a three-tier arrangement of research, trading and portfolio management groups. Portfolio managers like myself work with the traders, sector specialists and researchers to glean out values and what's going on in the markets. We figure out how best to configure our portfolios to capitalize on everything that's happening in the markets.

So how does an actuary get into the investment department or become a portfolio manager? The easiest way is with an insurance company through an actuarial rotation in a more traditional ALM type of spot. Then, when an opportunity is presented, see if a role is suited for or available on the portfolio management route.

In my own situation, having worked for a couple of insurance companies, I went to Benefit Capital, which was an in-house money manager for Union Carbide's pension fund. I was originally hired as an in-house actuarial consultant to cut down on some of the consulting fees. Then an opportunity arose on the fixed-income side of the house, and subsequently I made that transition.

Other people I know in the industry have made the transition to investment by getting an MBA. That can be well-suited for someone who wants to go into investment banking, which is a further stretch on the investment paradigm than being a portfolio manager. The CFA program is an excellent avenue to transition into the investment side. Recently someone told me that a CFA is more important

than an MBA in terms of pursuing an investment career. Whether that's true or not, I don't know, but I was certainly happy to hear that.

What skills are required to become an investment professional, or, in my case, a portfolio manager? You need the ability to make quick, effective decisions. Any moment someone could yell over to me, "ABC Company is coming with a five-year, \$1 billion issue. Do you care?" Then I would have a couple of minutes to decide if I want to work on that issue and find out if it is well-received in the market.

You have to have the ability to make quick decisions based on the information at hand. If you're taking too long, you can often miss opportunities. As in all professions, be able to communicate effectively and deal with people in different levels of the organization with various perspectives.

Certain people in research may be more technical than some people in the trading environment who deal with salespeople who work with the pull and tug of Wall Street. The portfolio manager has to go on that tightrope and be able to deal with people on both ends of that avenue. Since the investment markets have been turbulent over the last several years, particularly this year, you have to be able to handle stressful situations when corporate spreads go through widening periods like they have done recently. Be able to explain what's going on in the markets. Are there reasons that customers' portfolios are positioned in a certain way?

Ethical standards are very important. These are things that we tend to take for granted. Certain things are definitely wrong and other things are obviously right. To be practical, there's a huge gray area, and it's important when managing money to act in a highly ethical fashion.

My view of portfolio management is much like risk management. I think that's why an actuary is well-suited to become a portfolio manager. The primary objective in managing a portfolio is to satisfy the client's investment objective within permissible guidelines. A portfolio manager is evaluated based on whether or not the investment objective is satisfied. It doesn't matter how hard the person tried or how many hours he or she put in. The bottom line is the numbers.

You have a stream of assets and a benchmark that can also be viewed as a liability stream. The differences between an asset portfolio and a benchmark are the inherent bets or the risk that you take in the portfolio. This is where the analytical skill set of an actuary can come in handy.

There are various software packages on the market as well as proprietary packages that larger firms, like Deutsch Asset Management, have in place. They allow you to analyze the company's portfolio. The analytical skill sets of an actuary make us well-suited to do these type of analyses. This is because different firms do things differently and subsequently get different results. That will affect the

performance of the portfolio, depending on whether you have done these analyses correctly.

In terms of managing a portfolio, there are various ways to conduct this analysis. The biggest driver of returns is duration. After duration, one of the most important factors is also curve exposure. In managing a portfolio, you think that the yield curve will continue to flatten, or will it continue to steepen?

Based on that view, you can position assets along the yield curve. Certainly another factor is the sector selection, whether it is Treasuries, corporate investment grade bonds, junk bonds, asset-backed securities, mortgages or CMBS. Actually picking those securities is the end result of these types of analyses.

One thing that we find important at Deutsch Asset Management is that we take risk management seriously. Given the turbulent environment that we're in, we believe very strongly in not being too heavily exposed to idiosyncratic risk, and instead, spread it around. What do I mean by that? Every day in the *Wall Street Journal* another company is having a problem. Not being too heavily exposed to any one particular security certainly helps to minimize the risk to individual security selection, which is subsequently basically the diversification argument.

The other thing that's important to note is the availability of issuers and issues. When thinking about equities, most people consider the stock market as opposed to the bond market because that seems to have more sex appeal. In equities you can buy any security you desire. However, that's not necessarily always true in the fixed-income markets. You may decide to buy ABC bond, but if no one is selling it, then you can't actually buy it. That isn't necessarily true in the equity markets, which tend to be more liquid.

The other thing that's important to note is that in equities there is typically one stock per company, whereas in the bond environment there are several different issues within a particular issuer. So, ABC Company may have a five-year bond, a 10-year bond and a 30-year bond, etc. If you're focusing on one particular security, a five-year bond for ABC may be available, but not necessarily a 10-year bond.

Liquidity is also important to note. Liquidity has been severely hampered in the fixed-income markets since 1998. Back then, we had the long-term capital crisis and the Asian crisis. Subsequently the dealer community isn't willing to take the types of risks or hold as many positions as before.

Again, when it comes time to do a trade, and if you want to sell \$10, 20 or 30 million, unless you're willing to take the other side, which sometimes people are and sometimes they aren't, be careful in timing the trade. Not everyone can get out of the door at the same time. That's my brief presentation on portfolio management.

FROM THE FLOOR: Thanks for the good presentations. I thought it was apt that you started with a variable annuity example because we've been fixed income

exposed. Throughout the past 10 years the variable annuity line of business has shown that we're also now equity market derivative participants.

My question for the panel is, wouldn't 1999 or 2002 have been a good time for the investment actuary community to tell management that the emperor is not wearing any clothes? We're writing put options on equities with price/earnings ratios (P/Es) between 50 and 100.

MR. MATTISON: We will no longer write unhedged equity put options. Of course, that didn't happen. However, what did happen, and I was involved in this, is that lots of investment actuaries were doing analyses, raising questions and putting forth strategies. As we look back, it would have been wonderful to have a wholesale change in practices at the right moment, so that in March of 2000 we would have all switched from unhedged exposure to fully hedged exposure.

Realistically, though, we saw some incremental changes. These were not wholesale changes, but we haven't seen insurance companies go insolvent at this point as a result of what happened. So, while there has been some downside, it hasn't been nearly as bad as it could have been. As a profession we've done reasonably well.

FROM THE FLOOR: I have a question for Mr. Daniel Manghirmalani. It's good to see that actuaries are being used to manage portfolios of assets. We have a dilemma in my company, and I'm sure this is true in other companies, too. When we focus on investment we're not quite sure whether to target optimization of book yield versus total return. What are the pros and cons of choosing either one of those two targets?

MR. MANGHIRMALANI: I think that both of those things should be looked into, but I am going to defer the question to Dick because he's more involved in the strategy line.

MR. MATTISON: Dan's world is more about the total return. I think from my perspective it's an issue that first and foremost, we want the asset portfolio to outperform the liabilities for an insurance company. So, what's the right framework there? It might be something like a book yield basis for understanding decisions. Investment professionals have to be motivated to operate in that fashion, but they're typically going to be concerned with more of a total return paradigm. My bias is it's more of a book yield or attempt to beat the liabilities, however those are measured, first and foremost.

MR. JOHNSON: Directly related to that question, the other concern is the benchmark for investment professionals to have a relationship or connection to how bottom lines are viewed for the different products. Otherwise that disconnect will, in and of itself, create additional tension or anxiety.

MR. MANGHIRMALANI: Managing portfolios strictly on a total rate of return basis is different than managing insurance company money, where you have to be aware of the tax consequences. That situation creates a more highly constrained environment where at times you have to take gains and losses based on the insurance company's requirements to manage a financial situation.

In that type of environment it can be more difficult to manage on a purely total rate of return, which would be from a portfolio manager's perspective. This is a more idealistic way to manage money as opposed to having to say that you had to do this trade to manage gain and losses. You may not really operate in an unfettered total rate of return environment. It makes the job somewhat more difficult because it's just another layer of restriction.

FROM THE FLOOR: Investment actuaries are a rare breed. I recognize we're having this meeting today because many of us are interested in this topic, but in a traditional insurance model, there are pricing actuaries, valuation actuaries and investment people who are usually not actuaries. It seems like we're looking at adding staff.

My background is from a very small insurance company where, with ALM issues, for example, there was a feeling about threshold that at some certain size such a position would be available. As it pertains to the issue of staffing and to the issue of the value that an investment actuary can provide, can you give me some additional arguments or tactics for selling the idea of investment actuary to management? It seems like this is where it has to start. Management has to create that position. They have to be motivated. Can you talk about how you've seen that motivation occur?

MR. MANGHIRMALANI: First of all, it depends upon how you're management is configured and whether you're talking with a sales or marketing person or with an investment person. If you're pitching to put actuaries or an investment person to a senior actuarial management person, management will probably be accepting of that idea.

The best way to do it is the foot soldier approach, one person at a time. To say you're going to budget this year to put an actuary in the investment department because it's a neat idea might be a difficult hurdle to overcome. However, it's easier to reinvent yourself or do something different with an existing employer than it is to be out in the job market trying to sell your skills to do something that you haven't exactly done before.

This echoes what Dick said in his presentation. Get to know the investment people, have lunch with them, try to help them in some way so they become more and more reliant. Then they'll find a way to create a slot, but just hope that they're going to budget for it because it's a neat idea. It may seem like a good idea to us because we're all actuaries, but people understand themselves better than they

understand other people. That's true within the actuarial community, and it's true within the investment community.

It is a bit of a hurdle for an actuary to become an investment person because investment people think that the next portfolio manager will be like themselves. So, it takes a little bit of a sell. It's a gradual type of thing, working one inch at a time.

MR. JOHNSON: In terms of selling the idea to a corporation, I thought of two things when you were talking. One thing is how I even got started in the area of what grew into what I would consider investment actuary activities.

Out of cash-flow testing, Regulation 126, an organization for which I formerly worked, it seemed like every profit center had a person who did some cash-flow testing. It was decentralized, so in terms of staffing we didn't have the same issue. It was just a matter of centralizing the expertise and trying to share the best of the ideas that were available.

If that's not your situation now, another dimension in terms of a selling point is based on some earlier comments in the presentation and at the table. In talking with investment professionals, I ended up in a role where I found that they want to do a great job of buying the right assets. Sure, they enjoy beating their indices, but they would like nothing more than for those indices to be as in sync as possible to the types of assets that support the liability, so there's a win-win situation. They beat the indices. They love their bonuses. The corporation has the ability to give them even more money to invest.

You can approach it by saying you has a skill set and knowledge that will help generate even more money to invest and bring even better results for the investment professionals and for the corporation. You can be even more confident that we're exercising our capabilities and abilities to bring the best in risk management practices. Then the best strategy is to create a situation of selling.

MR. MUNGAN: You should have an investment actuary in-house as opposed to just having investment professionals. Look at where companies are taking the most risk exposure. There are very good arguments to be made that it's on the investment side, and a company needs someone with the skills of an investment actuary to understand the considerations that are embedded within the liabilities themselves.

For example, minimum and equity-based guarantees on the variable annuity side, and things like capital requirements and so on will be beyond the professional sphere of an investment professional. There are good arguments to be made.

FROM THE FLOOR: Ken, you showed asset allocations by class or credit risk, and percentage of ownership and spreads. Could you discuss how you came about

these strategic allocations, what process you used as well as timing and some of the other details behind it?

MR. MUNGAN: Sure. There are two different things to view. One is just a stand-alone risk and return analysis. This is so that given the asset allocation and all of the things you can imagine happening, you won't have exposure beyond the tolerance level.

The second thing is simply understanding what all of your competitors are doing, and what is possible in the market. Make sure not to leave money on the table, that those two don't pull in opposite directions, and do both types of analysis, hopefully one can balance out the two and reach a happy medium.

FROM THE FLOOR: I have a couple comments. First, when working with investment professionals, you have to change the mindset into shorter term thinking than what you're used to as an actuary. For example, when doing annuity product development, you're thinking in terms of five or 10 years out, but as an investment professional, you're thinking two or three quarters ahead at the most. I think that's one of the main differences between investment professionals and actuarial professionals.

The second comment is about the top of the bull market in 2000. Why were there not more actuarial people speaking out about hedging? I think there are two reasons. Prior to 2000, derivative was a dirty word. If the company is engaged in derivative investments of any type, it's a very sensitive area because there were some pretty public derivative blowups a couple years before. The only thing that came to my mind is the Procter & Gamble cash derivative.

Also, when we tried to model the equity risk and purchase put options in order to protect our equity exposure, we found that most of our equity exposure was long-term. We were trying to purchase a 10-year put option, but there was basically no market for it. So, the only alternative available is that the insurance companies have to create synthetic options in order to back the derivative.

There was a lot of sensitivity to using derivatives to hedge equity risk, and very few derivative vehicles were available for purchase at the time.

MR. MANGHIRMALANI: Certainly you can make the case that investment professionals have a more short-term focus than actuaries. We are concerned about the performance every single day; when I arrive in the morning, I do look at my performance from the previous day. I generally try to realize that in a prudent investment fashion you can't decide to do a trade on the way the wind is blowing on a particular day.

The consultant community takes more of a three-to-five-year approach in terms of evaluating a manager's performance. As a portfolio manager, I'm evaluated on an

annual basis, and quarter-to-quarter. It wouldn't be 10–15 years, but I hope we can at least get off of worrying what it is every single day.

One of the things I like about portfolio management is that I know every single day how I did because it's clear-cut. The frustrating aspect can be that no matter how hard you work, the numbers are the numbers. It doesn't matter if you work until 10 or 11:00 at night, the performance numbers are what they are.

FROM THE FLOOR: We've talked a lot about structuring an asset portfolio so it meets the needs of the liability. I wonder how much of the actual liability work is done on your side, in conjunction with the liability area, or if the product actuary really sets the tone of the needs. Ken, you may give a different answer than the other three speakers. This is because they manage assets within one structure while you consult. If a company has a lot of liability options, how much of that optionality do you model on your side? Or, do you trust the product actuaries and work within their constraints?

MR. MUNGAN: First, in the consulting work that I do, if there is a team of us, we all work very closely together to build the models. We recognize that each person brings a different set of skills to the table. Generally, embedded options tend to fall in the realm of the investment actuary. So, the kind of work that we've had to do over the past few years is understandable.

How do you build these models in the first place? Often it's required construction of completely new models. How do you talk to the folks on the derivative desk of Wall Street firms in such a way that they can understand what you're saying? Jeff, do you want to answer what goes on inside a company?

MR. JOHNSON: Sure. I've actually seen it work both ways, one where the product manager or the actuary for the line would actually model both the liabilities and the assets. In essence, the database or data warehouse for the investment department would be supplied to the actuary. We'd model both sides.

I've also seen it work in the manner where we still model the liability side. We share that information with the investment liaison, who takes that information to model the assets. Then we have a conversation. Either model can work, but the further one is removed from any particular aspect of the process, the more important it is to talk and really understand what's going on. I'll go back to my earlier comments. It's not enough to hear someone say don't worry about it. It just doesn't work that way.

MR. MATTISON: From the perspective of my work as an investment actuary within an asset management firm, we're not going to be experts on the liability side. The client will know a lot more details. I view our modeling as more of a spotting scope as opposed to the Hubble Telescope. We're not going to see the distant galaxies with the same precision of the client's own liability modeling, but we

can hopefully get in the right region of space, with the recognition that there's so much noise and uncertainty with the models.