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Session 136PD
Communication by Actuaries and Investment Professionals: Breaking Through the Firewalls

Track: Investment

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Panelists: FREDERICK W. JACKSON
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MAX J. RUDOLPH

Summary: Actuaries and investment professionals have developed their own terminology, often having distinct names for identical concepts. Actuaries working in this field must communicate not only with investment professionals, but also with senior managers and board members with nonfinancial backgrounds. Panelists show and critique examples of communicating such information using statistics and graphs.

MR. MAX J. RUDOLPH: Today we will discuss how to communicate risk management tools to senior management, and investment departments in particular. I will be the first presenter. Raghu Ramachandran will follow me. He is the senior vice president and head of the portfolio strategy group for Brown Brothers Harriman Investment Advisory Services, specializing in the insurance markets. Prior to joining them, he was an analyst at Tillinghast Towers-Perrin and at the Texas Workers Comp Insurance Fund. Earlier in his career he designed and built cash flow testing models for the FIC insurance group. He received a BS degree in physics and a BA in astronomy from the University of Texas at Austin.

Rick Jackson is our third presenter. He is a vice president at GE Asset Management in Stamford, Connecticut, with investment relationship responsibilities for several of GE's wholly owned insurance companies. Prior to his recent move to GE, Rick

†Mr. Raghu Ramachandran, not a member of the sponsoring organizations, is senior vice president at Brown Brothers Harriman in New York, NY.

Note: The chart(s) referred to in the text can be found at the end of the manuscript.

worked at Scudder Insurance Asset Management, Allmerica Financial. He started out at National Life of Vermont.

I'm a vice president and actuary at Mutual of Omaha. I'm in charge of our financial risk management. I'm also a past chair of the Investment Section.

With reference to the subtitle of this session, the best way to get through the firewall to the investment department, in my opinion, is to take the chartered financial analyst (CFA) exams.

Whenever we're trying to capture information and communicate it to others that may have different backgrounds than actuaries or investment people, we need to make sure we take that into account. Different individuals have different education, perspectives, goals and use different words. We run into that a lot, and a big part of my role in a corporate area is to be the go-between and tweak what somebody is saying to help it mean more to the receiving audience. The accounting people might need help deciphering what investment people are saying, or the investment people might need an interpretation for what the accountants are saying. That's a big deal.

You have internal audiences and various senior corporate management groups, such as your board, your CEO, your chief financial officer (CFO) and your chief actuary. Maybe the chief actuary took exams 30 or 40 years ago. They have changed so much, especially from the investment perspective, that they are really relying on people like us to help them understand it. They are very capable of understanding it—it's just not something that they had drilled into them as they were taking the exams.

You also have external audiences. Among them are security analysts, rating agencies and regulators. There is not a common risk management language right now. There is a risk metrics group within the SOA that is creating a glossary of risk management terms. It will be posted on the Web site. I think that's going to help us to start using a common risk-management language.

A common theme throughout my talks is that graphics are very important. You can put out a sheet of 8,000 numbers, but you show that to your board and they are not going to invite you back again. That's reality. If you can show a picture that describes those 8,000 numbers and what it means to them, they're going to appreciate that, invite you back and value your opinion much more. Every once in a while, though, you come across a person who doesn't want to see the graph and wants to see the numbers, so you want to have that backup information as well.

What I'm going to present today is an overview of some tools that I use and have used over the last couple of years.

Figure 1 is a risk-return profile, which is a ranked scenario of whatever you're looking at, whether it's present-value of cash flows, present-value of distributable

earnings or whatever. It really doesn't matter for this. You look at the result and rank it, asking which of the results is the scariest. In this case, there's a mean that goes across somewhere around the 40 line. Some did really well. Those don't scare me. The ones that scare me are the worst ones, and even those aren't horrible. But I want to learn what's causing those. I'm interested in the drivers.

This actually was a live case that we had a couple of years ago. We spend a lot of time looking at the duration of various liability lines. This figure reflects the results from one of our universal life blocks. Duration on universal life can change very quickly, and we wanted to make the argument that you don't want to manage to duration on a daily basis or even on a monthly basis. You might want to trend towards the current duration. When interest rates move, the duration changes very quickly and you don't optimize the value when you react quickly. So we were saying, "Okay, across the variety of interest-rate scenarios, here's what could happen if you continue to invest the way that you're investing today."

Figure 1

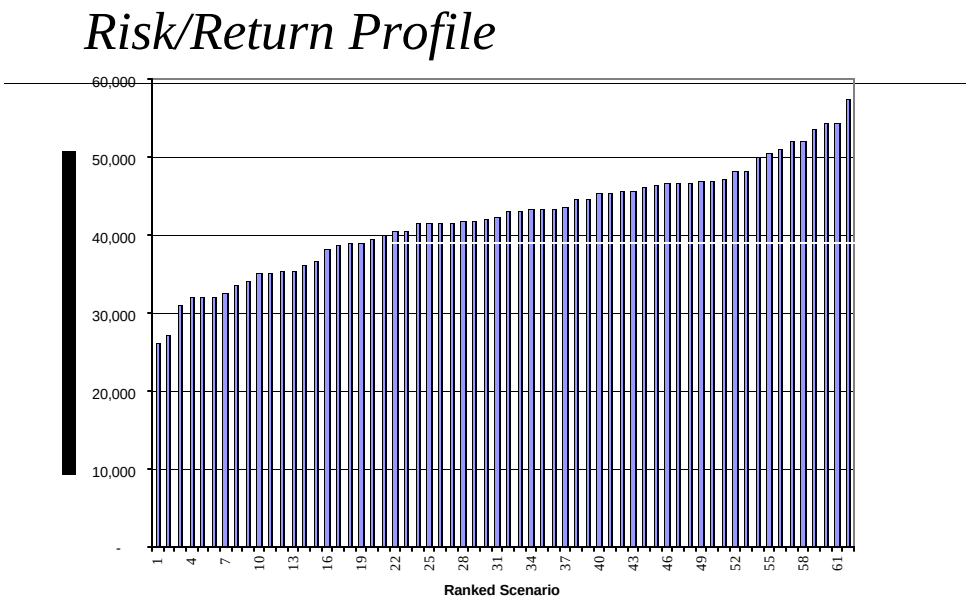


Figure 2 shows what would happen if the duration happened to be less than a year. If you invest with a duration of about half of a year, here's what happens. It's a very smooth result, but how many people would trade the results in Figure 1 for this? A couple of years ago there were a lot of consultants pointing out that they could help us to get rid of that volatility, but they never asked how much it cost. Now it's coming full circle and they're telling everyone to look at the distribution of results. They're treating it like it's some kind of a new thing. It has been interesting to utilize these types of graphs. In this case we were successful in saying, "It

makes more sense to look at your investment strategy in terms of what the results are as opposed to just a single, balance sheet based, point estimate."

Figure 2

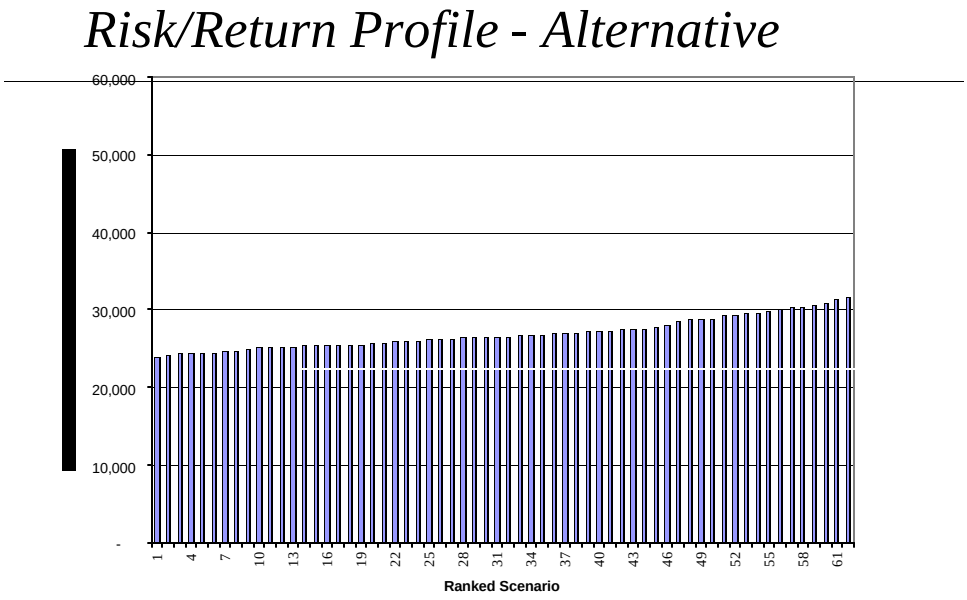
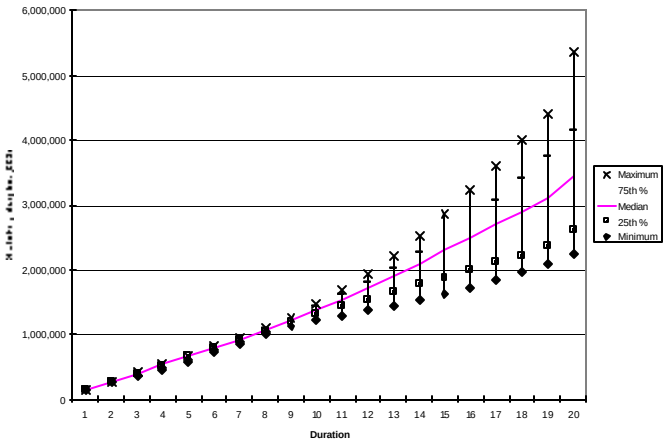


Figure 3 is a result that automatically comes out of our cash flow testing now. The C-3 Phase I project from risk-based capital (RBC) defined 200 scenarios, that were cut down to 50 that are fairly onerous for annuity lines. We have made it part of our regular process to run through all those scenarios and do a graph that shows the median and quartiles—the bottom 25 percent, the top 25 percent and what the highest and lowest are. This one is from a couple of years ago, but it's very powerful. I can put that in front of a rating agency and say, "We're in pretty good shape." Then the next year I show them the same graph, and maybe I don't even talk about it, because it was in the previous presentation. Some of what I argue for is consistency. Get a set of reports and keep the same format every time you show it to somebody. If you leave the same format, people know what to expect and they can compare it to the report from last year, last quarter or yesterday to see if there has been a material change.

Figure 3

Result Distributions

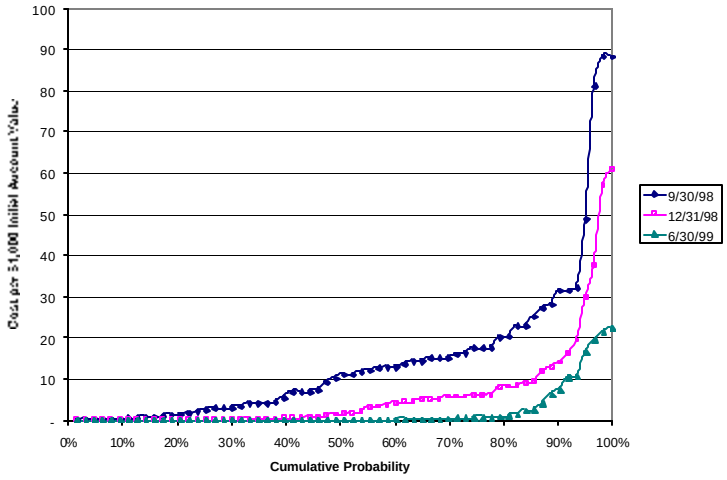


If you want to look up a specific stock in the Wall Street Journal and one day it is in Section C, the next day it is in Section B and the following day it is in the personal section, you wouldn't be very happy about it. I think it's the same thing here.

Figure 4 is from a project that we did several years ago. It actually was a result of the 1998 crisis, where the baht led to problems in Russia and Long-Term Capital Management, with the resulting lower interest rates. They've come down even further now, so we recently pulled this out and updated it. The worst results are based on September 1998. If you run through a variety of interest-rate scenarios from that point it shows there were quite a few of them that had very high cost. On the right side of this graph, the higher the number, the higher the potential cost to the company and the higher the potential value to the policyholder. At that point in time the policyholder who owns one of these deferred annuities really should have recognized that they had something with a lot of value and persisted. They didn't, but I don't think we can rely on that going forward. Policyholders continue to increase their level of sophistication.

Figure 4

Deferred Annuity Value of
X% Guaranteed Credited Rate



I was giving a presentation to accountants and actuaries early in their career, and I used a lot of these graphs the same way. I started off by asking, "How many of you think that you're a sophisticated investor?" No hands went up. Then I asked, "How many people have home mortgages? How many people refinanced their home mortgages in the last two years?" Most of them had. I said, "You guys are my worst enemy. You are the most sophisticated people out there, so don't let anybody tell you aren't a sophisticated investor, because you are."

We, as insurance companies, give options to both our policyholders and to the people who drive the assets that we purchase. Then, depending on what interest rates do, people select against us. We do the best when interest rates are slow and steady and stay where they are. It's the up and down spikes that cause us a problem. In addition, if we get a spike down, and it stays down that's a big problem too. Minimum guarantees are currently much too high.

As a result of this analysis we were able to convince management to pull some of our non minimum-guarantee interest-rate products. This picture was very powerful. What we also found was that in late 1998, when our exposure spiked, it also was very expensive to buy the options to hedge that cost. This isn't surprising. It's supply-and demand-based. What we did next was look at the worst five or six scenarios. We looked for similarities between them. We found some. They were very similar to barrier options, where rates go down and stay down, and then later pop back up.

Today, with the current level of interest rates, we're having trouble with the interest rate generators getting scenarios that go down as far as I think is realistic. I don't see any scenarios coming out of our generators that are the Japanese style deflation scenario, and I think that that's a non-zero probability. Hopefully that scenario is unlikely. Part of me is ready to switch around and be worried about the spike up of the curve that's predicted by the forward curve. I'm especially worried about the resulting deferred annuity lapsation that will come with that. It's using a picture to help you do your analysis.

I included Figure 5 on economic surplus because it's not getting as much exposure as I think it should. I think there are a lot of companies that are mismatching their assets and liabilities and don't recognize the risk they are exposed to.

Figure 5

Economic Surplus

- Difference between the market value of existing asset, premium and liability cash flows
- Spirit of fair value accounting
- $D_S = D_L + (D_A - D_L) * MV_A/MV_S$
  - D_S, D_A, D_L duration of surplus,assets,liabilities
  - MV_A, MV_S market value of (all) assets,surplus
  - Mismatch $D_A - D_L$
  - Leverage MV_A/MV_S

Calculating a surplus duration is important. Note that there are other, algebraically equivalent, versions of this formula. This is the one that I happen to prefer. In this formula, the mismatch, which is the duration of assets less the duration of liabilities, and the leverage get multiplied together. If you have a lot of excess capital, then you have very low leverage. So even if you have a mismatch of three, it doesn't hurt you nearly as much as if you have minimal capital. Under that scenario, all of a sudden this factor can go up to four, five, six or seven. The duration of your liabilities is probably three or four, but that's immaterial in terms of your real risk. Your real risk is this multiplicative effect between the mismatch and leverage. If you have leverage of 10, with little surplus relative to your assets, which is common for a deferred annuity writer, you suddenly have a surplus duration of 30. That means, if interest rates spike up three percent tomorrow,

you're technically insolvent. Think about what's in the forward curve right now. Rates are expected to rise. Forward rates haven't been accurate for quite a while, but it's still something to be aware of. It's like the guaranteed minimum death benefit (GMDB) writers that said, "Well, nobody else predicted that the market was going to come down." Your job isn't to do a best estimate. It's to determine the worst thing that could happen and analyze its solvency impact. You need to look at a variety of economic scenarios and determine which ones hurt, or which ones help and which ones create a solvency event.

Figure 6 is a price behavior curve, which is something that's been around for quite a while. Interest rates have come down now and the left part of the liability curve, which shows a lot of convexity, is coming into play. The policyholder has an option that's in the money, or very close to being in the money. It's the guaranteed interest rate. One thing we do that may differ from other companies is that we look at cash-in, which would include all asset maturities, dividends, coupon payments and things like that, and combine it with premiums. We include premiums with cash-in, and then look at all cash-out expenses, such as surrenders and claims. We find it's a cleaner analysis. We get fewer divide-by-zero problems. If you're netting the two, you'll periodically get a point where the cash flows offset. If you divide by zero, you might report an infinite duration. I don't think anybody really believes that's true.

Figure 6

Price Behavior Curves

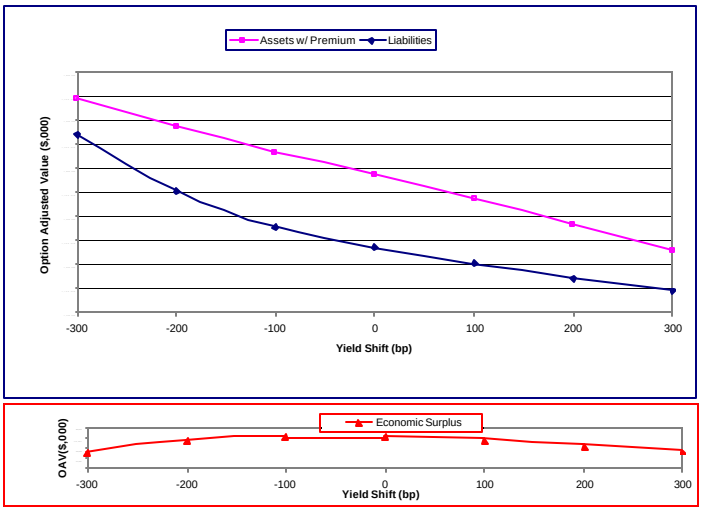


Figure 7 is a graphic I took directly out of my rating agency presentation. We make the argument to the rating agencies that we're pretty well diversified, especially when you look at both our parent company and our largest subsidiary. We created this pie chart to make the argument, and have made it a regular part of the presentation. If the RBC formula ever stays constant for two years, that will help. In the meantime, you have to talk through that. But right now, for our company, this tells a nice story and we don't have to spend an hour trying to explain it.

Figure 7

2001 Risk Based Capital

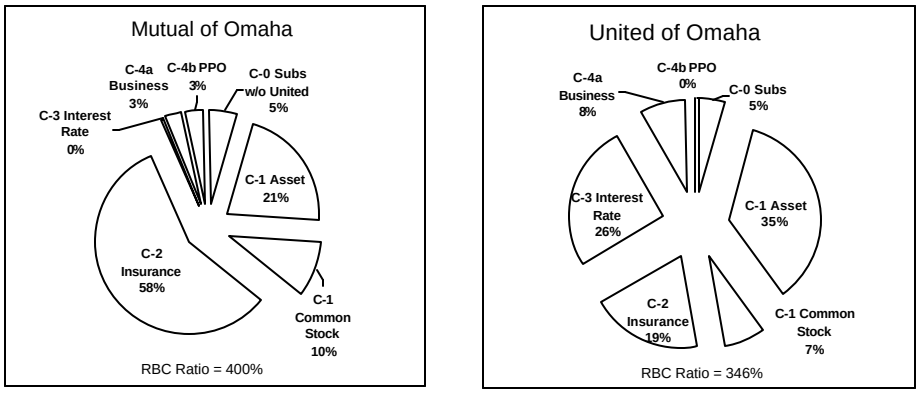


Figure 8 is a teaching tool that I put together for our board and have used in several other presentations. The darker shade (red) is your big risk, the lightest shade (yellow) is your moderate risk, and the medium shade (green) is one that I don't spend a lot of time thinking about. It doesn't mean that a risk shown as red is an immediate solvency risk, just that it needs to be managed closer than the other risks. There are a couple of boxes in here that you could argue with me about what shade they should be, and that's fine. We can have that discussion at some point, but, when you're talking to your board, I think helping them to understand the C-1, C-2, C-3 and C-4 risks gives them a competitive advantage over other boards. I don't think that many think of risk in that way. But if they understand it right away when you say, "For term life you have a lot of C-2 risk, but not a whole lot of asset risk. The driver is the mortality risk," then you can move on to the real issues. It's a tool that we use in order to help our board and other parties understand some of the terms that we're using.

Figure 8

Risk Dashboard

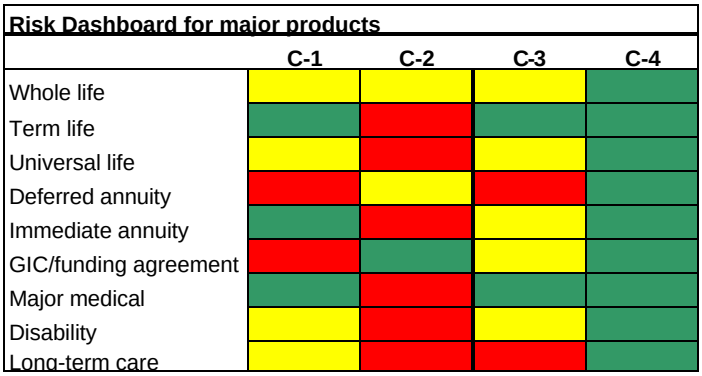
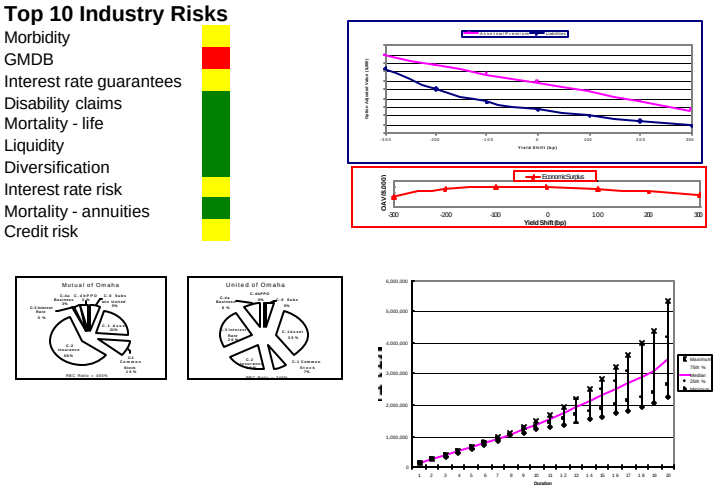


Figure 9 is not currently a live report. I'm developing something similar to this as a risk scorecard. For this example, I took a couple of the figures that were shown earlier in the presentation and combined them. What I'm picturing is a one-page report that would go to the CEO, chairman of the board or anybody who wants it on a periodic basis. Now maybe that's a month, and maybe it's more often than that. Maybe you'll want to have a different report that's monthly versus weekly. But what I think should be on it is the top 10 industry risks. Maybe you add top emerging risks or top internal exposures as well. Each company will have different things. What I tried to do here was look at industry risk and not try to make it specific to my company. When I looked at this figure last night, I found it interesting that when I did this I had GMDB as the only high-risk one. I put together this figure several months ago, so it looks like I did okay. It's a matter of what's important to your company. If your company has a lot of annuities, then that will impact your risk drivers. If your company has a lot of long-term care, maybe you're really worried about deflation risk. It's an opportunity to put together something that you could e-mail to these people. You would also have backup reports, and maybe it would develop into something bigger. Your CEO wants to see something, but he doesn't have time to read a book every month. He is also unlikely to be able to tell you exactly what he wants. I don't know of too many CEO's that are looking for a book from their risk manager on a regular basis.

Figure 9

Risk Scorecard



With a scorecard approach, people can glance at it, especially if they have last month's or last quarter's. They can look for changes. We recently went through a balanced scorecard approach at my company. You have goals that are consistent at the company level, and you set goals in the operations that cascade down like a waterfall. We were able to add several risk-measurement tools as part of that—diversification, liquidity and enterprise duration. I think every company implements new initiatives every couple of years. Any time you are asked to support one, think about how you can push through a risk management tool that will gain exposure.

I believe very strongly that the key is to use more than one tool. Leverage off of what you're already doing from your cash flow testing models. And finally, use graphics as often as possible.

MR. RAGHU RAMACHANDRAN: On the investment side, being a CFA charter holder is essential if you're going to actually be doing the trading, or if you're going to be dealing with the market. It has not been a requirement like an actuarial exam is for investment management in general, and hopefully I'm going to talk to you about some of the things that investment management people look for when you're communicating to them. That will save you three years of exam taking. What I find in insurance companies is that people will come to investment managers with no idea of what investment people do on a day-to-day basis. It's easier just to blow them off than try to explain what's going on.

I have a very simple example before I get into my presentation. I was doing a presentation a couple months ago, and I was talking about fixed-income securities.

In case you don't know, there's no over-the-counter market for fixed-income securities. With the stock market, you buy a stock and within a short timeframe everybody bought the stock at that same price. Whereas, for fixed income, there's no central place to buy a bond, so you go to different people who are selling bonds and say, "What will you give me for GM starting at 5 ¼ paying off in 2010?" They give you different prices, so there's no single price for a bond at any one point. To an investment professional, that's a very simple concept. I spent half an hour trying to explain that to an actuary.

I'm going to talk in general about what risk is, both from a company perspective and from an investment perspective. I think they differ. What is the correct investment strategy strategically or long-term? You might think of that as model risk. Is this the correct model that I'm using? Or, in investment terms, what is the strategic allocation of assets we want to take? Then comes the nitty gritty—how do I implement the strategy? That's analogous to process risk of what actually goes on. In the investment world, that's tactical asset allocation. If you haven't dealt with this before, there's a nice theory room where we sit and come up with nice models that work. Then you give it over to the investment professional and he gets nitty and gritty, and you forget completely what happened in theory, and you're just trying to get through the day.

You've probably seen a graph like that in Figure 10, where you have standard deviation on the horizontal axis, total return on the vertical axis and a set of portfolios that is your efficient frontier. It ranges from something that's safe—Portfolio A, to something that's risky—Portfolio B. It would be nice if you could express everything you wanted to know about the company in terms of standard deviation, but very few people have an idea of what standard deviation means to the company.

Figure 10

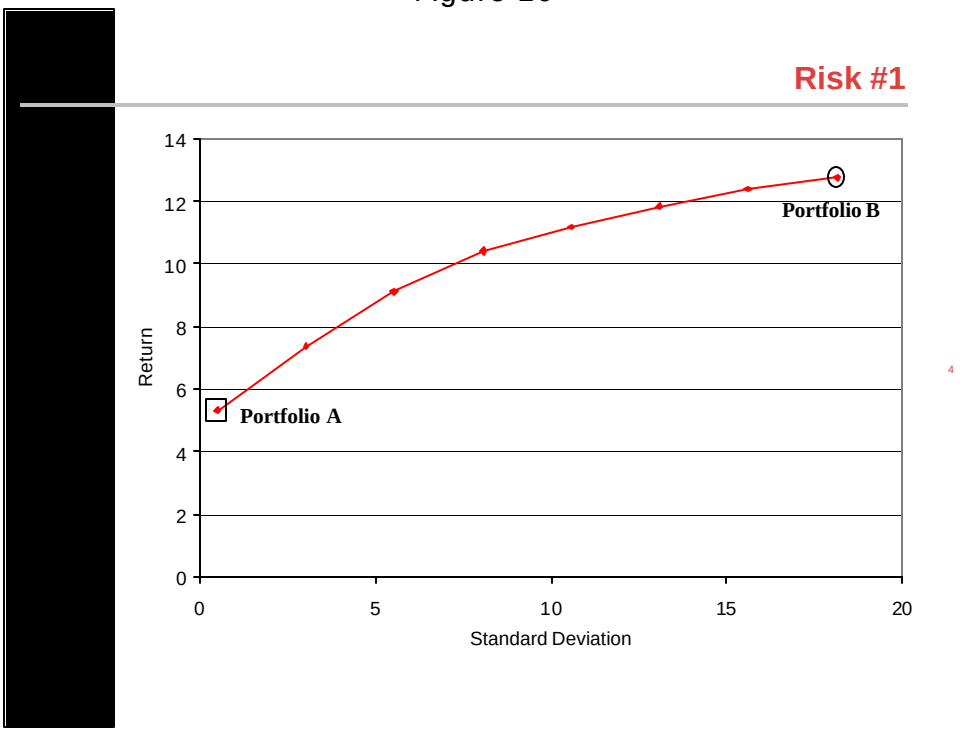
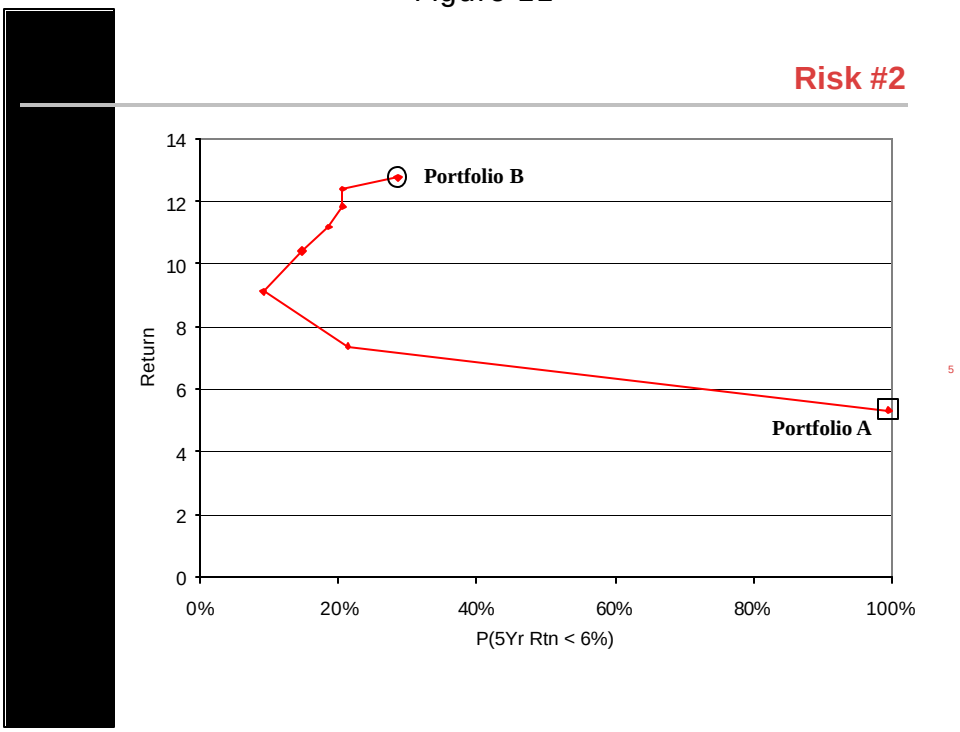


Figure 11 takes the same set of portfolios and asks, "What is the probability that the five-year return is less than six percent?" You get a completely different result. I haven't changed the vertical axis, it's still total return, but now the horizontal axis asks, "What's the probability that the five year return is less than six percent?" You can see that the curve is completely turned around.

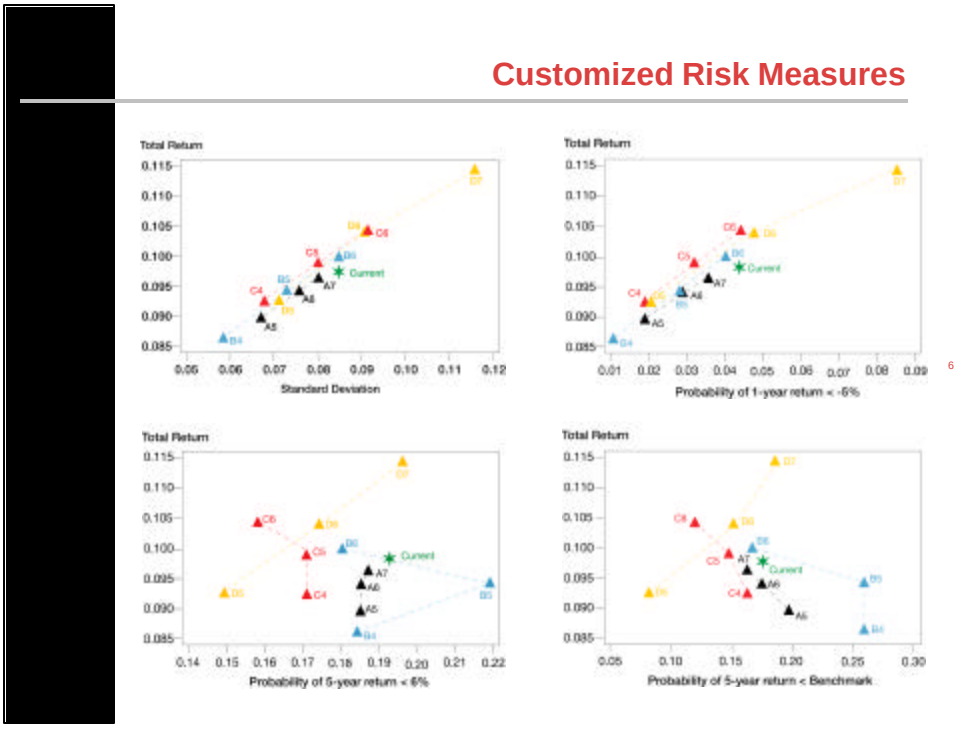
Figure 11



In particular, Portfolio A, which is mostly tax-free and fixed-income securities, has low volatility. It's based on a standard deviation context, and has a very low standard deviation, but the chances of it returning more than six percent are zero. There's a high risk that it won't beat a long-term hurdle rate objective. It's safe in a standard deviation context, if that's what you care about, but it's not safe in a long-term hurdle rate context, because it's the worst portfolio you could have in that measure. These risk measures don't exist independently. They exist simultaneously. I'll show you an example later of how, when you have multiple risk measures, you can have portfolios that are risky and safe at the same time. It's a question of deciding what tradeoffs you want.

Figure 12 actually is a client example. I put all these graphs in one figure because it helps make sense of it. The top left graph is a standard analysis, with standard deviation on a horizontal axis, total return on the vertical access and a series of portfolios. The numbers and letters mean something in the client context. I'll just say that they're the same portfolios throughout the entire exercise. If you were to look only at this analysis, B-6 and C-5 might be better portfolios because there is more return and/or less risk. But, when you're talking to a board or senior management, it doesn't really mean anything, because if you tell them your current portfolio has a standard deviation of eight and a half, what does eight and a half mean to the company? How does that affect the company's performance?

Figure 12



We had talked to the client, and one of the things the CFO was concerned about was that he didn't want to have to get in front of the board and say, "We had a large loss this year." The CFO said, "My pain threshold is having a loss of five percent over a rolling 12 month period." We looked at the analysis and asked, "What's the probability that over this five-year model you have a return less than minus five percent in one year?" That answer came out to be about four and a half. So now you've turned this abstract concept of eight and a half percent return into something that's meaningful to the company. Then the company can decide

whether four and a half is the right amount of risk, based on what they are comfortable with, as opposed to saying eight and a half, which is an abstract concept to most people.

Another interesting thing is that the company also built in a six percent return assumption on the assets. We looked at what the probability is that over this model period they did not return six percent. That's the example I used earlier, because regardless of what underwriting does, if you don't get six percent returns your pricing isn't stable. This is a question of pricing stability. Again, we took the same portfolios and asked, "What are the chances that these portfolios don't get six percent?" The lines don't line up to the right like they did before. In fact, they are jumbled all over the place. In particular, B-6, which was not necessarily a preferred portfolio in the prior analysis because it was more risky, despite its additional return, now has substantially less return in this long-term hurdle rate context than the current portfolio. If you were the company management, this poses a dilemma in that a portfolio that's riskier in one context is safer in another. What they have to wrestle with is that it's not a question of a portfolio that's always better. It's a question of a portfolio that's better in one sense and worse in another sense, and how do you want to do that tradeoff?

In the bottom right graph, the company had given a peer group and asked, "Take the average allocation for them and if they don't change their allocation how does our portfolio and the alternate portfolios compare against that?" Their current portfolio had roughly an 18 percent chance of being worse than their competitors. The best alternative ended up as C-6, which gives them about a 10 percent chance of being worse than their competitors. One other interesting thing about this kind of analysis is the standard way of looking at it. None of these portfolios are worse than the current portfolio, having more risk and less return, but in a different risk context there are portfolios that are actually worse than the current portfolio. So moving down to B-4, which was a safe lower-risk alternative before, would actually do worse in another context.

That's the strategy that you do long-term when you're talking to management. What is risk to the guys who are actually investing the money? Whether it's internally or externally managed, volatility of returns or the company's operational objectives are not something your day-to-day fixed-income portfolio manager or equity portfolio manager is thinking about when they're trading. What they're paid for is the ability to beat a benchmark. So you set a benchmark saying, "I want to invest X percent of my portfolio against the Lehman aggregate or the S&P 500." What they're judged on is the ability to track that portfolio. A question that comes up is, "Is this appropriate?" Shouldn't the investment manager be looking at the affect of his decision on surplus or pricing stability? That would be nice if there's a way to do it at the speed in which you have to do the investing. There's no comfortable answer to this, but that's the way it is.

Now I'm going to focus on fixed income, because that's what the majority of insurance assets are. It's also where I think it's most misunderstood, especially coming from a non-investment universe. People are more used to seeing stock market stuff in the newspapers and fixed income is relegated to the back pages. At best you get something on interest rate movement. If you're looking at a fixed-income portfolio, there are four ways you can make that relative to the index. If you're investing against the Lehman aggregate or the Solomon big index, there are four things you can do. You can take a duration bet, you can take a bet on movement in the yield curve, which you're probably familiar with, or you can take bets with respect to credit risk (should I go into BBB or stay in AA, single A, or NAIC 1 and individual security-level selections. These are things like buying GM versus Ford versus Chrysler. I did this backwards, but a study a couple of years ago by Lehman Brothers pointed out that the best return per unit of risk you can get is from security-selection or credit risk, and the typical kinds of risks insurance companies take are based on duration and yield curves. That doesn't make sense. So why is it that yield and interest rates go up, the price of bonds go down. The impact of an interest-rate movement is very high. But the chances of you guessing that correctly are very low. So, the overall effectiveness of that as an investment strategy is pretty low. You see insurance companies do that a lot with duration matching.

As for credit risk, similarly the ability to predict credit events is very low. The impact of that is very high. If something defaults there is a very big impact. The effectiveness of that is also low. Again, you see insurers using it in terms of RBC regulations, NAIC ratings, especially going to BBBs. One of the things we've seen is how the RBC risk for equity is so much higher than for high yield or even NAIC 2 credits. On an investment basis it makes absolutely no sense why below investment grade, junk bonds are so heavily favored relative to equity. Especially given recent performance.

Finally, I'm going to discuss sector selection. How much should I buy in different sectors? It's not very predictable. The impact is a little bit better and it has a little bit better effectiveness. Then you must pick the individual securities. It's a lot of work, but it's very easy to do. It's very predictable. It's going for the base hit every time as opposed to going for the home run.

I'm going to tell you a little bit about credit spreads. Full faith and credit of the U.S. government guarantees U.S. Treasury Securities, so there's no chance of a default. Everything else is risky, and risk means you have to pay for it. The difference in yield in price using basis points between debt and U.S. Treasury debt of the same maturity is called the credit spread.

Figure 13 shows that there are two components. Here is what a GM bond might be yielding. There's a component of it due to Treasury yields, and then there's the compensation you have to pay for credit, and you can break that up into a variety

of sectors. One of those sectors being liquidity, or how much it's trading, and the other being how the credit is. These move from period to period.

Figure 13

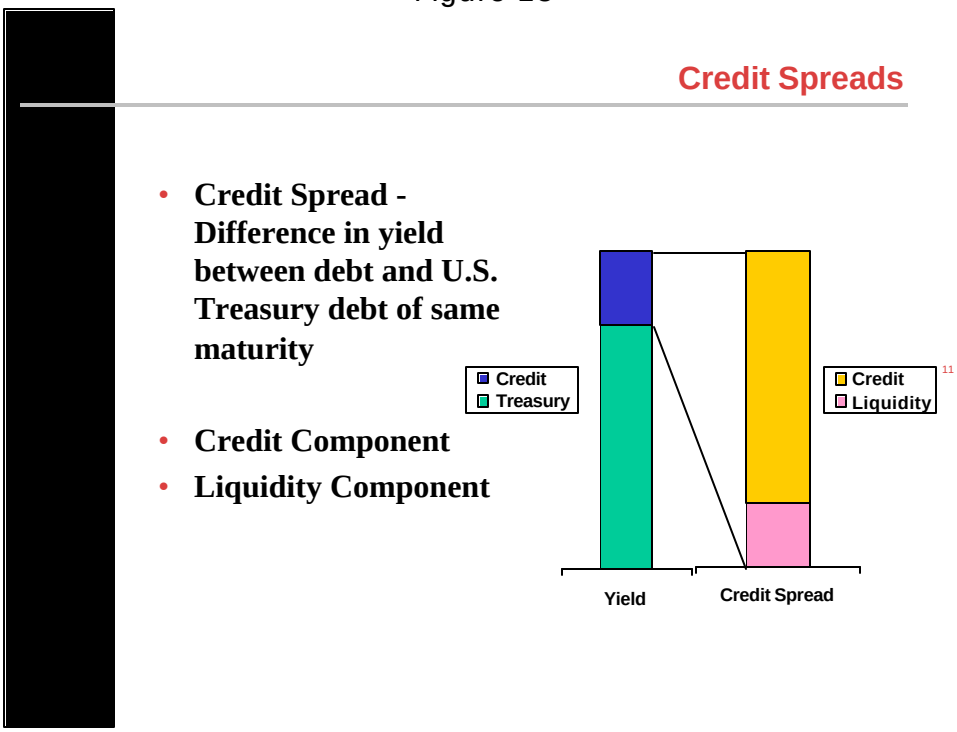
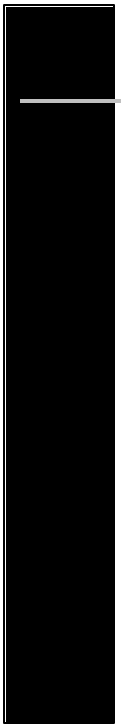


Figure 14 is about one year old. This shows the rating at the beginning of the year and the ratings at the end of the year. And you can see for the most part they don't change over the year. But what you're really concerned about is that these start off at an investment grade and move to a non-investment grade of NAIC-3 or below at the end of the year, which is usually a non-admitted asset. You have a reverse where there are non-investment grade issues going up, but there is usually not investing done here anyway. So that's not a big issue.

Figure 14



Credit Spreads

Ratings at beginning of year	Ratings at end of year							
	Aaa	Aa	A	Baa	Ba	B	Caa	Def
Aaa	96.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Aa	1.8	91.3	6.9	0.0	0.0	0.0	0.0	0.0
A	0.0	2.2	91.4	5.9	0.2	0.3	0.0	0.0
Baa	0.1	0.3	4.7	88.7	5.1	1.0	0.0	0.1
Ba	0.0	0.2	0.3	8.4	78.6	10.3	1.0	1.2
B	0.0	0.0	0.3	0.4	4.5	82.0	6.6	6.2
Caa	0.0	0.0	0.0	0.0	0.0	5.5	74.0	20.5

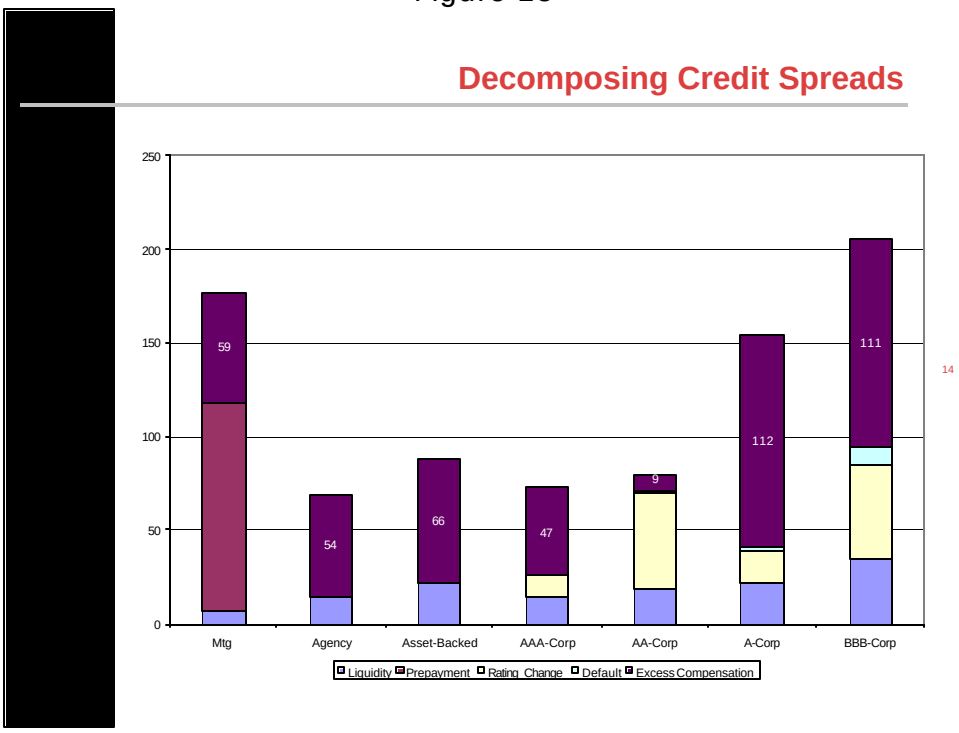
Source: Moody's

Knowing there's a risk involved the question is, how much do you get paid for investing and how do you account for that? Hopefully you get the rewards you need to compensate you for that risk. These credit ratings are not predictive. Usually the rating agencies change the credit rating about a day before the thing defaults, which really doesn't help you in trying to figure out what to do. On the regulatory side, the amount of capital penalties you take for lower-quality fixed-income securities aren't commensurate with what they're charged, for instance, on equity. So how do you go about solving this problem? This is what fixed-income managers do on a day-to-day basis when they're trying to figure out what to do.

I don't have a date on Figure 15, but it is old. Anything is old if it's not done today. There are different sectors in the fixed-income market. On the vertical axis is the credit spread. This is the difference between the yield on a particular security and the treasury for that period. What we do is decompose that into different components. There's a liquidity component, a prepayment component, which applies mainly to mortgages. The rating change assumption, that I told you about before determines what the chances are that this will move down in the ratings or possibly up. There is also a default spread, which is the chance that it will really do a rating change. Then there's what we call excess compensation, which is what's leftover after you take into account all the various risk factors. What you're trying to look for is, for instance, a mortgage that has about 175 basis points spread over the Treasury at this particular point. But a big component of that is prepayment spread because everybody is refinancing their mortgages. So, in the end, what you're left with is about 59 basis points of return. Whereas, if you looked at an

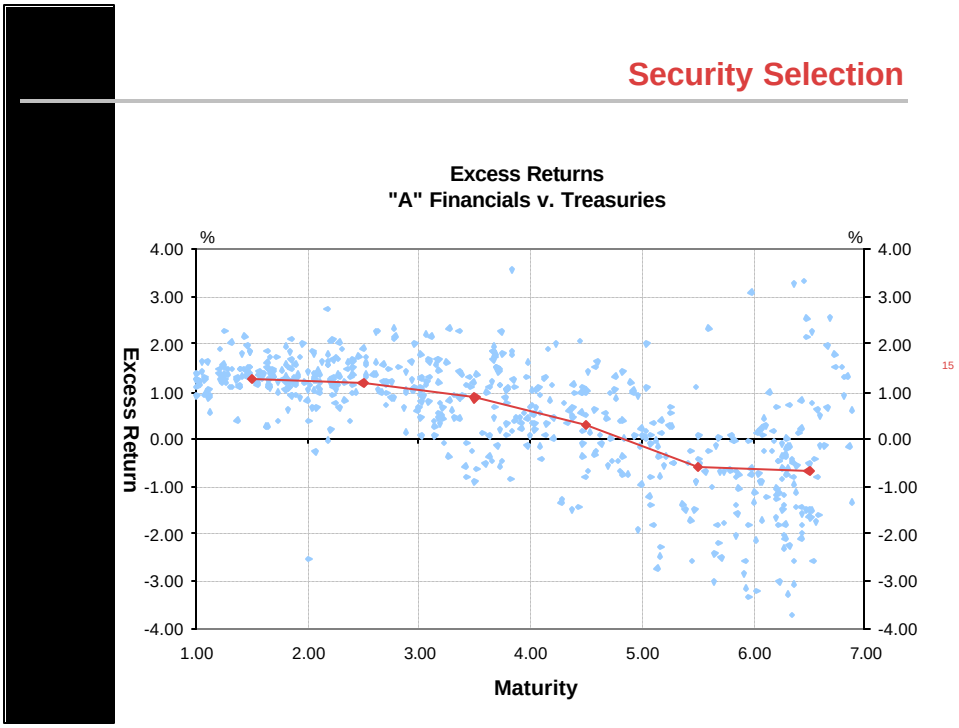
asset-backed security (ABS), it's returning about 80 basis points over a similarly benchmarked Treasury. But the 66 bps of that is in there, so you're getting more return for your risk by buying an asset-backed at this point in time, than you were buying a particular mortgage-backed security. This is the type of thing a fixed-income trader is looking at when he's trying to make a decision, as opposed to what we're looking at earlier for an insurance company.

Figure 15



Finally, what securities should you buy? You actually don't do the calculation in Figure 16 at a sector level; you do it at an individual security level. You look at all the bonds at a five-year benchmark. All are single A financial versus Treasuries at different maturities, and the line is the average excess return. Excess return is what is left over after you account for all the various risk factors. This line is the average excess return at various points, and the dots represent the individual single A financial bond at this point. For instance, if you were to buy single A securities, you want to buy them more at the lower end than at the long end. There might be better things to buy at the long end. But even if you are buying at the single end, you want to look for B securities versus D securities down at the bottom.

Figure 16



MR. FREDERICK W. JACKSON: The subtitle of this presentation is "Breaking Through the Firewalls," and I think that's very appropriate. In my six weeks at GE one of the things that I can't do is break through the firewalls. I'm located in Stamford, Connecticut, where I spend a great bit of my time, but we have offices in Richmond, Kansas City and California. In this business you've got very different backgrounds coming together, and it's very important to know the contacts that you're working with. Are we speaking the same language? Ideally, you want to know that all the people in the room have some understanding of investments, insurance product profitability and accounting. I don't have a great understanding of accounting, but insurance product profitability is often very difficult for the investment people to get their hands around. It seems like the insurance people can start to get some sense of investment issues better than the investment people really understand where actuaries are coming from with product profitability. So it's ideal when you have a situation where you've got all the parties that have worked in each of these spaces and have some familiarity with all these topics.

Another important question is, "Do we know and care how senior management keeps score?" I guess we had better. If we don't, then we miss the way that they're getting paid. If they're getting paid based on how they keep score, then we had better know how they keep score and make sure that anything we present addresses that key aspect of their perception.

Our conversations matter little if senior management is not fully supportive of recommendations we might agree upon. If we're sitting in the room and we're the investment people or the actuaries, and we're not the ultimate decision makers, then we had better know what senior management supports. I remember 10 years ago when I first started with an investment management firm, they had a project to analyze risk in a single premium deferred annuity (SPDA). It was a five-year duration on the asset side, and on the liabilities crediting a market interest rate translated roughly into a duration of one. It was a real risk. They were looking for spread in the first year of maybe 85 basis points, and then the second year the spread went up to 225 basis points. It really was a toaster offer—you buy the product and then immediately the rate is lowered in the second year. Well, this thing was selling like hot cakes, and there wasn't a perception by the people who developed it of the risk that was involved.

I worked with the investment person. I was the new investment actuary coming in and did not initially understand the issues. We worked together for about six to eight weeks putting together a presentation that we thought really analyzed the risk quite well. We made a recommendation that the interest crediting strategy be changed to portfolio interest crediting strategy. We also recommended considering getting rid of that toaster, bait-and-switch, type approach. And we would reduce risk. It was a relatively hot product. We put together about 20 pages of very good graphs. The thing that I missed coming in the door was where senior management was on all this. The chief actuary had to approve our presentation. He looked at it and thought that it might not make him look too sharp. We were delayed three months. We got it set up to go to the second scheduled meeting and were delayed another four months. At the end of the four months it was announced that the company had been sold. We never got to present this elaborate and pretty good risk management analysis of this product. It would have done a lot of good for the company. We messed up and did not appreciate that we had to be politically aware of what we were presenting.

A few years down the road I talked to the former CEO. He said, "If I had known that that was the case I would have fired the chief actuary on the spot." He blamed the chief actuary, but really it was my fault and my cohort's fault. We didn't know the landscape we were working. We didn't take care of the fact that we had to not only do the work, but also know the context that we were working in and be able to present that effectively. We missed on that. I learned from that mistake.

I'm going to talk about my particular background not because I want to talk about my particular background, but because I want to make sure you're thinking very clearly about yours. I've been an actuary for 28 years. I started out at a company and spent 10 years there, finishing my actuarial exams. Initially, my goal in life was not to be an actuary. My goal in life was to be in a situation with senior management where I was able to communicate effectively and deal with the decision makers of companies. I had one calculus course in college. I was an American literature major in college, and my interest was novels and people. But I

did have that one calculus credit. I spent one year teaching English and figured I was never going to own a house or send my kids to college. I very quickly decided that was probably not the best way to go. I started out, got into the exams, struggled through them a bit, and spent 18 years in pricing and product management. I was very investment ignorant. I kept looking at this line in the income statement and wondering what investment income really was. How was it developed? How did it really come about? I spent the last 10 years as an insurance investment manager. I received a CFA certification and had both certifications, which is very useful. But the fact that I came from a background where I really wanted to focus on communicating effectively with senior management so I could get decisions made is the most important one to me. That is why I'm in an investment management relationship role. I think the point there is that I'm in a job that I wanted to be in, with the technical background that helps me do a good job. I'm sure the majority of the people in this room are better technically than I am, but I know where my interest is and I know that I get up each morning and do what I want to do. I go into that environment. I'm giving you my context so that you can scrutinize your own context, challenges and ultimately, your opportunities. Make sure you know what your skills are and what really gets you excited each morning. If there is a deficiency like there was for me on the investment side, make sure you know how to take care of that. Make sure you know how to address that. As Max asked earlier, "How do you get not only the training that you need to do the work, but the recognition so that people will listen to what you have to say?" Does it require a CFA certification? That's helpful. I think I agree with Max. When I came in as an actuary for my first investment management situation, the fact that I was taking the CFA exams was important. If you didn't have a CFA, and you didn't have an MBA, the investment people weren't going to give you any respect.

The important point here is to know your own individual context so that you can decide where you want to be and what you want to be doing, so you can determine how you are going to get there.

In terms of the actual company context, I'll talk about how I got to where I am now. The five very different places that I've been make for different opportunities to be successful. First I spent 10 years with an individual life and disability insurance (DI) writer that had an internal investment department. When I left there many years ago they were just developing an asset/liability modeling (ALM) process. It wasn't really in place. But now they have a very robust ALM process in place, and I would figure this company is reasonably successful. It's a good place for someone with a background of investments and actuarial to work successfully and have an enjoyable working environment.

Company number two, which I spent just one year with, was an individual disability writer. It's no longer a stand-alone company. I would argue that's not the best context to be working in. Morbidity risk led to them being taken over. They didn't assess that risk. They were very heavily concentrated in that area and a lot of

physicians chose early retirement. So, like many DI writers, that has really come to bite some of these folks.

Company number three, which I spent eight years with, was an individual and group life/health writer. It also had an internal investment department, but no robust ALM discipline. It was very similar to company number one, except for no robust ALM discipline. It turned out that company three would not be a good environment for me to work in. I found that as I kept trying to push the ALM frontier I kept getting pulled back into product development and spread management exercises of an import business. I was not able to focus on presentations where senior management felt that an ALM discipline or modeling capability was really that important. Our argument is that it's not the best environment for somebody with a skill set or the interest of most of the people to work in.

At company number four I spent about 10 years in an asset management environment. I was an insurance company focused investment manager. People in the organization are very much focused and they are very knowledgeable of insurance company operations. There's a lot of cross discipline in this situation. So I think that's also a very good environment to work in.

Currently I'm all of six weeks into a situation with GE Asset Management. I've been running and learning and learning some more. Lately running more than learning. I'm just now settling down and learning what possibilities exists in this kind of an environment.

In this current role there are some potential deliverables that I feel apply in an investment management situation, regardless of whether it's one man or another one who is providing services to insurance companies. One potential deliverable is all aspects of a pure investment function. Typically, when a company outsources all or part of its investment management function, then you are expected to be able to handle all elements of the investment operation. That investment income is very important to all of your clients. Whether they're internal clients, such as the case with GE, or a situation in which they have outside clients as Raghu does, investment companies are always very important. In my current environment most of the compensation is based upon how you deliver on net investment income. That's a very important deliverable for me in my current role.

Interest rate pricing and renewal assumptions are potential deliverables. In both situations you're providing those kinds of assumptions to folks. Because of today's environment and the fact that you're doing projections of interest rates, it's very important to provide, for pricing purposes, a relatively robust analysis.

Last week we were working with Mark Tenney, who's got an economic scenario generator that I'm sure all of you are familiar with. One of our people internally did an initial analysis and created 100 scenarios that had a key assumption of reversion

to mean historical rates. They looked at that and they asked, "How do we handle the fact that there is a real, but small, potential that we could really be looking at a Japan deflation scenario?" The suggestion that the chief actuary had, which didn't sit well with me initially, was that instead of reverting to the mean historical rate, you should tweak the model to revert to the current spot curve. Having been a programmer in prior roles, you know you could probably do anything. We talked to Mark Tenney, we did it and we got different scenarios with a different, more conservative result. I called Mark and said, "Mark, obviously you can do anything you want with your program. Does it make sense for what we're doing? Is this running counter to this scenario spacing you've been living in for the last 10 or more years?"

His response was interesting. He said, "You know there's not a lot of literature right now. This is not an exact science."

I asked, "Is this reasonable?"

He said, "You know, it's as reasonable as the mean-reverting assumption." I might not have said that a few months ago, but given where we are now I think it's a very valid way to take a look at what your potential interest-rate paths could be." He basically supported it. The actuary ended up delivering an analysis to a client an interest-rate pricing assumption that had that alternative, more conservative, assumption in it. It was a very interesting recent exercise.

Performance versus benchmark is another deliverable. All investment managers have to deliver performance versus benchmark. Typically that's because benchmarks are total return focused. You have to deliver your performance versus total return numbers. For most insurance companies, if you're on a continuum of total returns versus yield, yield is much more important. Total return is more important to endowments and pension plans, where you really don't have tax considerations. But you have to show as a check that your total return performance versus total return benchmarks is not way out of line. If it is, then there's something wrong. A company, endowment or pension plan that is focused on total return can outperform, by maybe 100 basis points, a Lehman aggregate benchmark. You would not expect that kind of outperformance from an insurance company with all the constraints from accounting, regulatory and capital gains. You want to make sure that you're close to that benchmark. You want to be slightly above it, but certainly not below it. If you're 80 basis points below it, you're probably doing something really wrong. You are maybe doing a very bad job on credit, where there's much more downside risk if you have a bad credit department. That may be an indicator that something is seriously wrong. You've loaded up on World Com, Qwest, or Enron, and you've been really nailed on that. That becomes very important to insurance companies.

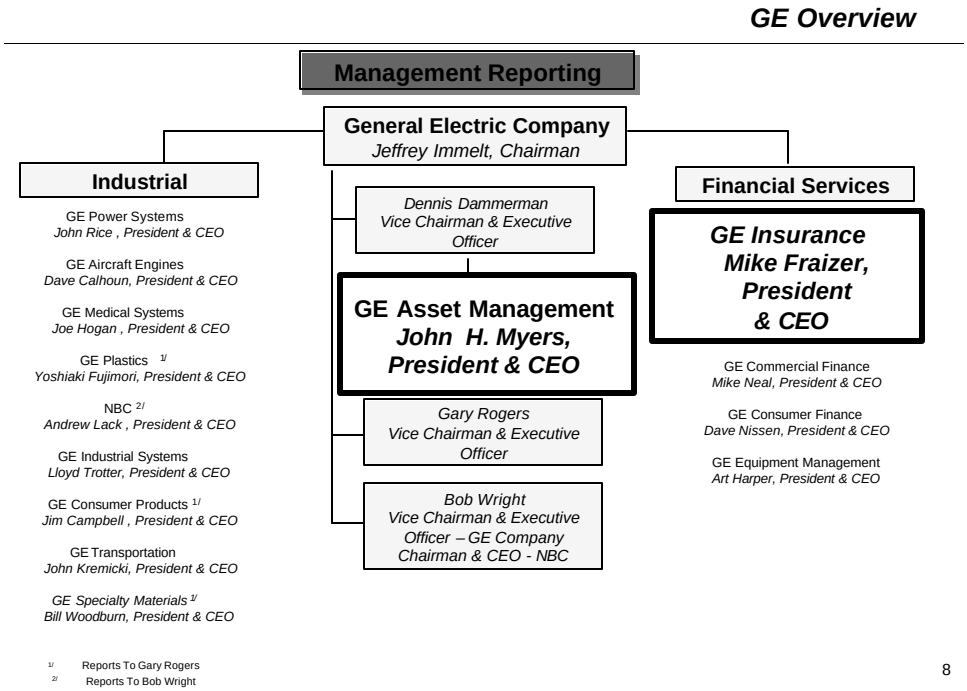
In my current role, hedging activity is a potential deliverable. There's hedging done within GE's enterprises. There are also complementary exposures across lines of

business. To me this is a very interesting part of my job. I also have the opportunity, given the people I work with and a very heavy focus within GE on risk management, for a good bit of work in my current role in this area. That helps me get up in the morning. It gets me very excited about what I'm doing.

Now I'm going to discuss some modeling tools. Portfolio optimization is the first, which is more of an asset-focused modeling tool. Under portfolio optimization is CMS BondEdge, which is one of the most user-friendly insurance company asset management systems. It's used by a lot of companies, and GE does make some use of it. One potential improvement is in the dynamic cash flow analysis. To my knowledge, you can only import static liabilities. You don't have the ability to have dynamics on the liability side. Yield Book also falls under portfolio optimization. It is more of an investment-focused, portfolio-optimization/asset-optimization tool. I think that the challenge you have is where are the systems for profit optimization. I think it's nice that TAS and MoSes are together. I would like to talk to Tillinghast a little bit about what their plans are. Prophet, MG-ALFA and PTS are also profit optimization systems. Within GE's universal companies I don't think we have Prophet, but we have everything else. We've got TAS, we've got MoSes, we've got MG-ALFA and we've got PTS. That presents a challenge, because these platforms don't speak to each other very well at all.

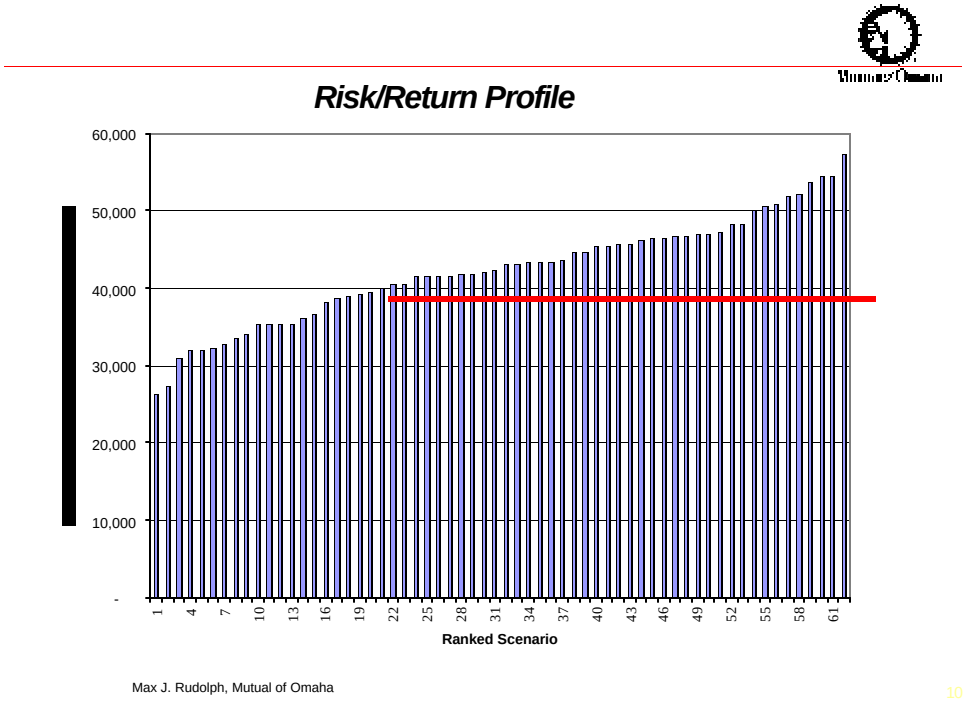
Figure 17 provides an overview of GE's organizational structure. The company is usually focused on profit, and on the left you have all the industrial sections such as GE power, medical systems and NBC. In the middle is GE Asset Management. It's directly under Chairman Jeffrey Immelt. What has happened in financial services is that they're getting much more of a focus. It's got commercial finance, consumer financing and equipment, but it's also got GE Insurance, which is a different internal structure that allows direct reporting to the chair. This is a lot of visibility. He knows that this is an area that can grow. He's combining the insurance companies and getting a direct look at the businesses. There's a lot of visibility. So right away you have senior management focus on profit measures, such as ROE and present value of future profits. Within the group we have GE Financial, Employer's Reinsurance, Financial Guaranty Insurance and Mortgage Insurance. I won't focus on that very much except to say that there is a direct reporting relationship to the chairman.

Figure 17



I stole Figure 18 from Max. I've used a chart like this before in my prior asset management life and it's very effective. The key is the $38 or $39 million present value of future profits. There's some volatility there, but when you're talking about $23 million present value of future profits, live with some volatility and deal with the tail risk.

Figure 18



This kind of chart is very effective if you can pull your systems together, which is the challenge I'm looking at and working hard on. GE has a delivery system in which they're very much focused on doing pitches, as they call them. They're not presentations, they are pitches for a specific format. Sometimes they have four of these charts on each part of the page, and management is very focused on receiving the material in this kind of format because they can make some very quick decisions. You spend a lot of time, I found in my six weeks, getting these charts ready to put in front of senior management because they're primed and ready to receive it in this graphical or chart format. In certain cultures it's very useful.

In closing, if you're in a profit-focused organization, which hopefully we all are these days, with a multi-disciplined culture, how do you arrive there and create a nice environment to work in? If you also have an ALM/risk-management mentality that runs deep, then it's a very favorable situation for the type of communication and analysis that I think we're all very much interested in. Another factor is if there's an entrepreneurial element. It's important to take a look at an economic scenario generator and say, "We won't take it as is, but how can we look at this and maybe change this so it fits today's environment?" If there's room to move and try some different things, then that's a really good environment to be in.

GE always has take-aways on their charts, and you want to walk away with one thing that's fixed in your mind. I would ask you to take away this. You have to know your own context, what you personally are interested in, where your skill set is and where you really get excited about your work. Then you very much know

your work context, and you don't head off in the wrong direction and put together 20 pages of wonderful risk-management charts. Because you've blown it if you haven't assessed the mentality of senior management, missing your opportunities to present that information. Know your context, whatever it is. Whether it's really wide or limited, know what it is so that you can really deliver it successfully.

MR. RUDOLPH: One comment we didn't include, but is embedded in all of our presentations, is that we're talking about being the risk manager and not the risk eliminator. Within your company you don't want to become known as the person who always says, "No you can't do that, because it's too risky." If it's too risky today, then explain to someone how you think someone could manage that risk or could minimize the bad scenarios so that it is a risk that you'd be comfortable with.

MR. MARK NEWTON: My question is for Raghu. In Figure 15, where you are decomposing spreads, it seems to me that in the process of coming up with these numbers it's highly dependent on the internal process for how you measure the other parts. I wonder if the credit spreads are roughly the same between the A corporate and BBB corporate from the chart? Also, can you give us a sense of the process for measuring some of the other components that eventually allow you to get to the excess spreads?

MR. RAMACHANDRAN: To answer the first question, it is based on their ratings. So that after A is BBB. BBB is the lowest investment grade. BBB is NAIC-2. A and above is NAIC-1. So anything to the left of A is NAIC-1 and BBB is NAIC-2.

The liquidity is basically a measure off of the bid/ask spreads; you look at what people are offering versus what people are asking. That lets you get a measure of liquidity. Prepayment is based on interest rate models and what you think the probability of prepayment is. There is a bit of work you have to do on looking at pools, because it's similar to histories. There's a path dependency, so if you have a mortgage pool that's gone through one interest rate cycle, there's not a chance for it to go through the cycle again. The people who are going to refinance have already refinanced. But, other than that, it's basically a question of interest rate movements. The ratings change, which you look at, is both the probability of a ratings change or default, and the cost associated with it. You want to look at the probability that a credit will move from one rating to another, with the critical question being, what's the probability that the BBB goes to junk. What is the cost associated with that? Moving from AAA to AA has some cost, but it's not the same as moving from a single A to a BBB, and certainly not comparable to going from BBB to BB. And, how much return do you have to get over your return horizon in order to compensate you for that fall? You also have the reverse probability. That's fed into the matrix, but it's not something that happens very often. It's more likely that a rating will drop than will go back up. A BBB that moves to a single A is not as good as something that is single A, or a AA that goes to a single A, because it was already started from a weak position, so the preface is that it will go down again.

MR. JACKSON: Mark, you asked about the difference between A and BBB. Some people we've talked to about BBB rates as spreads over the Treasury, look at an average BBB spread over Treasury, and come back and say, "Wait a minute, instead of 100 basis points over Treasuries, why are you quoting me something 60 or 70 over?" Especially recently, there have been some real gradations within BBBs. There are very high quality BBBs and much lower quality BBBs. There is a very wide range recently within the BBB investment grade category.

MR. NEWTON: That was the essence of my first question, because, in my opinion, there's a huge range in what BBB means, depending on how you label it and the spreads. Average spreads are not necessarily indicative of what's really available in the market. I just wanted to understand that better.

MR. RAMACHANDRAN: Look at Figure 16. You don't look at it at a sector level, you look at it as an each individual security level.

MR. RUDOLPH: One of the things that we should be thinking about as we get ready to do cash flow testing is exactly what Mark, Rick and Raghu were just talking about. Especially the BBB-1 versus BBB-3. If you've modeled your credit defaults as an average BBB, that might not be good enough and it might be challenged this year.

MR. NEWTON: I think most management would like to be able to communicate and have a desire to understand the risk management problem. What has been your experience after you start the dialogue to try to find a common language? What is the success and not only their gratitude in terms of understanding it, but their grappling with the issues, and the challenges in terms of now managing the risk management of the firm to, basically, increase the value of the firm.

MR. JACKSON: Again, it's dependent on the context. In my last insurance company role, there was obviously a good cash flow platform in place across the board. There was some initial work done in which we looked at the risk that was out there across all lines. That was enough. We were done and never looked at it again. It wasn't a dynamic process that was put in place. You would like to see it be a dynamic process, because things change on the liability side or on the asset side. I was a little disappointed that they thought there was time to do that just once.

In a recent role with smaller insurance companies, we typically managed the assets for companies worth two billion or less. They don't have the experience, knowledge, appreciation or cross discipline to go into the kind of depth that some of the larger companies can do. In my current role there's a lot of cross discipline focus at GE. You hear some of the top people, who aren't actuaries or investment people, talking risk. You've got Mark Griffin heading up a risk management operation, and he's all over everything. He's right there and the language, the focus and the commitment are there. The process is huge in GE. That makes it difficult to get to the answers, get them heard and get them through in a timely fashion. From my perspective, it's

really a function of the culture you're in. I heard Max say he's trying to introduce and get management comfortable with a certain risk management tool, but you have to realize that you have to have a champion. If you have one, two or three champions in an organization that's exciting. If you don't have one, then you're really challenged. It can be very frustrating. It's very much a function of the individual company context.

MR. RAMACHANDRAN: I generally agree with that. It depends on who's asking the question and what his or her background is. A lot of times we see one champion who's pushing it because he doesn't want to look at it in an overall enterprise level, but not necessarily buy-in from all the different areas. It's a question of who's asking and how vehemently they want the answers.

MR. RUDOLPH: It has helped our process a lot that our champion is our CEO. Any time someone questions what the value is of my area, doing ALM or risk management, he jumps all over them and he says, "You know, he's managing risk, we're looking at things that other people aren't. This gives us a competitive advantage." He always finishes by saying, ...and the rating agencies love him." There's value in that. I really encourage anybody who has this type of a role to try to get time with the rating agencies, because I think it's very positive. We get positive comments in our rating agency write-ups for the things that we're doing.

MS. BARB HILLIGOSS: I'm curious about Figure 16. What ate up all the excess return? Is that the ratings? Is it the possibility of it being downgraded? Perhaps at later maturities?

MR. RAMACHANDRAN: This figure is probably about six months to one year old, so it probably doesn't apply anymore. But there's a variety of things that are going on. Is there a flight to quality? Is there a flight to people worried about long-term interest rate movements? There is a lot of pressure at the high end because, assuming we don't go into a Japan situation, there's only one way for interest rates to go. Nobody wants to take the long duration things, which is one reason you get less excess return at the top end or the long end.

I also think there's a view that the ratings are somewhat fixed once you get set in. If you look at the Lehman aggregate, which is the bond equivalent to the S&P 500 above investment grade index, about five years ago 7 to 10 percent of that was BBB. Now about 30 percent of the Lehman aggregate is BBB. If you have a prohibition against BBBs because they are NAIC-2, then you've cut out a third of your market. The S&P 500 is not the S&P 500 anymore—you're only involved in the S&P 200, but you're judged against the 500. That has changed substantially in the last couple of years.