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Session 55PD
Financial Engineering Versus Actuarial Science

Track: Actuary of the Future

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Summary: The rapidly changing financial services environment creates enormous challenges to and opportunities for corporate success. The use of financial engineering is becoming more widespread. Actuaries are playing a significant role in this evolving field, but have some competition. This session explores where financial engineering is applied, who is "leading the charge," and what are the current and future roles of actuaries.

MR. ROBERT M. MUSEN: It was difficult to find speakers for this topic, because I don't think there's a standard definition for financial engineering. I seem to recall that it has only been about five or ten years since we developed a standard definition for actuarial science, which is a profession that has been around a long time. I think the Society actually described it in a monograph not that long ago. The approach we're going to take is to sort of surround the topic. People who think they're working on financial engineering or think they know what it is are going to define it from their perspective.

Eric has worked with clients around the globe in life, pension, reinsurance, and property/casualty organizations. He has experience in asset and liability management analysis using stochastic modeling, the development of proprietary security, and portfolio analysis systems. Eric is the primary author of Swiss Re's firm asset model for dynamic financial analysis and led the development of Towers Perrin's global CAP:link system. His latest project is a neural network-based artificial intelligence system for using credit analysis that is deemed or labeled Credit AI (Artificial Intelligence).

Eric has published articles on capital market simulation and security pricing, in addition to articles on modeling for nuclear physics and molecular biology. He speaks frequently on topics of asset/liability management and integrated risk management.

MR. A. ERIC THORLACIUS: Basically, I'm a quant. Most of my career has been in the investment-related areas, whether it was in a life insurance setting, working with pension plans, or now with a reinsurance organization. I have the actuarial training and background. The operations research program at Princeton University is now labeled Financial Engineering, so I believe that qualifies me for this particular topic.

For this presentation, there are two basic things that I want to accomplish. I want to look at some basic mathematical concepts, or at least what I think they are in actuarial calculations as opposed to what I would consider financial engineering to be. I hope that basic premise might be something that you'd all be able to take away. I'd also like to just spend a little bit of time talking about risk analysis, because that's an area that the actuarial profession is well suited to take on. I think it's also an area that nobody, even those deemed to be financial engineers, have really tackled with a great deal of success. I think there's a lot of opportunity in that area as a direction for the actuarial community to target on.

Before we get to that topic, I'll begin by talking about some differences between actuaries and financial engineers. In my view, an actuary is a professional. He or she is an individual that is supported by a fairly extensive set of standards and formalized education. There are plenty of actuarial associations to back up what you're getting and there are, certainly, a lot of standards of practice and professional codes of conduct. With an actuary you're getting a very well-known commodity. You're getting something that you can rely on.

On the other hand, I would not consider financial engineering to be a standardized profession. As Bob discussed, defining a financial engineer is somewhat difficult. You get a variety of answers. I believe a financial engineer is basically a quantitative person. It is someone who's comfortable with a particular area of mathematics and is able to apply that to pricing types of problems in the capital markets. I see it from a very mathematical perspective. From a legal perspective, we can understand what the various international securities laws are and how we can use various kinds of special purpose vehicles. Then we can turn different structures into something that creates value from a legal perspective. I'm not personally involved in this area at my organization, but there are many people who do specialize in that area. I think you can quite legitimately say that's a financial engineer. That was sort of an eye opener to me.

In general, financial engineering is not a clear-cut profession. I would characterize it more as sort of an emergent skill set. This is a field where people have taken particular mathematical capabilities and found ways to make money. That has drawn attention to them. I'd say it's really the application of mathematics to money. I think that's what's going on in the actuarial profession and I think that's, to a large extent, what's going on in the financial engineering presentation or field.

The first level is sort of the idea of trial and error. You build something to see if it works. If it doesn't seem to quite work, you try something else and you play with it

until it does work. An analogy would be trying to build a raft to get off of a deserted island. You put some logs together, and if it seems to float, great. If you start putting your stuff on it and it seems to sink, you add some more logs. Once it works, you go with it.

Another approach or the second level, as John would consider it, is that you overbuild it. You look at constructing materials that you can be incredibly confident are going to meet the stresses or strains in the particular task. I can't say I know a lot about ship building, but if we go with a similar analogy, we might think about how we want to make sure that our boat stays afloat under just about any kind of circumstances. You're going to use a double hull and you're going to use the best quality steel that you can get. You have a sense of the various kinds of forces that you're going to have to deal with. Basically, you build it so strong that it's not really conceivable that something can go wrong with it.

The third level or the third approach would be, essentially, to build a model of it. You try to construct the structure based on that model, which is, to some extent, a perfect fit to the trade-off between the stresses and strains. As an example, consider that you are building a sailboat for use in the Americas Cup, or another sailboat race. You're trying to maximize the degree of efficiency. You want it to be as fast, as light, and as powerful as possible and still stay afloat.

So those are three different levels to engineering. I was trained as an actuary, so I realize that you are using risk premiums as a way to gain security. You're using a low enough discount rate that you can be confident that you all achieve it. Many property and casualty actuaries would use zero as their discount rate.

You're going to construct a valuation that's based on conservative judgment. I would categorize that as level two, where we overbuild the situation, so that we can have confidence. As actuaries, we're providing a degree of confidence. We can offer that surety that what you're getting is going to deliver that promise.

So now we're going to start to get into the math. Don't worry. This is going to be very basic mathematics. Equation 1 is a basic actuarial equation. It's just a discounted present value. The C is indicating the cash flow that you're expecting. The V is just giving you a discount rate. And P is indicating the probability. There are various forms of this, but most actuarial valuations (at least on the life side) are based on this basic premise.

Equation 1

$$Value = \sum_t c_t v^{-t} p$$

c_t – cash flow

v – discount rate

p – contingent probability

We can expand on this in Equation 2. Now that you have two dimensions, in addition to summing over to future time periods, you're summing over various

contingencies as well. X is just a variable to indicate those contingencies. So if you're looking at various life valuations, X might just be the contingencies where you live, and the contingencies where you die, and the contingencies where you get sick. The probability is extended to reflect that variable as well. It's the same basic equation but slightly generalized.

Equation 2

$$Value = \sum_{t,x} C_t(x) v^{-t} p_t(x)$$

c_t – cash flow

v – discount rate

p – probability

Financial engineering is, basically, about pricing. Let's discuss the various structures in Equation 3.

Equation 3

$$NS(mv_1, mv_2, mv_3, \ldots)$$
$$MS_1(mv_1, mv_2, mv_3, \ldots)$$
$$MS_2(mv_1, mv_2, mv_3, \ldots)$$
$$MS_3(mv_1, mv_2, mv_3, \ldots)$$
$$\ldots$$
$$NS(MS_1, MS_2, MS_3, \ldots)$$

NS is the new structure, and MS is supposed to represent a series of other market structures that are out there. Each of them is connected to various market variables. So the MVs are indicating market variables. They're things like interest rates, credit, equity market considerations, or what have you. You have this new security that involves these things. Maybe it's an option. You have these other things that are, basically, being driven by the same underlying forces, but there is certainly a difference. You want to come up with a function that tells you the price of this new security is a function of these other known priced securities that you can get from the market.

To do that you construct a model. You could do this with the Actuarial Model, but the difficulty there is it's very sensitive to the discount assumptions, in particular. One of the breakthrough ideas in the 1970s is the whole idea of arbitrage pricing. What was discovered was that if you go back to that equation, you'll discover that there's a way to determine whether your model has any arbitrage. Arbitrage just means that there's a way that you can get a riskless profit. Assuming that you have no arbitrage, there is a probability transformation under which there are no risk premiums and every security has the same expected return.
So instead of the old P without a little accent mark on it, there is now one with an accent mark on it. There's a new probability measure under which everything has

the same expected return. That doesn't happen in the real world. Equities, generally, perform better than cash. Longer term bonds, generally, have a higher expected return than cash. If you're investing in higher yield credit, you have a higher return than cash.

There's actually a way that you can transform that probability measure. There's this alternative risk-neutral space where everything has the same expected return, which is really very nice. Equation 4 shows the formula for risk-neutral pricing. If everything has the same expected return, it has the same expected return as cash. If it has the same expected return as cash, then its price has to be the expected discounted value where the discounted rate that you're using is just the cash rate. Now you don't have to deal with the issue of risk premium. You don't have to figure out how much higher a return you should expect on equity versus cash or longer term bonds relative to shorter or intermediate term bonds. It just simplifies the whole structure.

Equation 4

$$\text{Price} = \sum_{t,x} c_t(x) r_t(x)^{-t} p'_t(x)$$

c_t – cash flow

r – cash discount rate

p – probability

This is not to say that what you should do as an actuary is use cash rates as your discount, though. That's a very different thing. You can simplify that equation, so that under this new probability measure, just by changing that last term, you're able to get a simplified equation. So instead of it being a general discount rate, it's now going to be discounted at the cash rate that you're going to have.

That is the basic idea behind 95% of financial engineering. There are many variations, but it's all about how you can make this transformation and now you can figure out the price of some new security as a function of the market prices of some other securities. You calibrate these risk-neutral probability measures to the known market security prices. That's how you figure out what this alternative probability measure is. You're going to calibrate it so it gives you the price of the things that you know. What you have is a price for this new security. You also have something that tells you how you could replicate the security, sort of a dynamic hedging strategy for this new entity as a combination of these existing market securities that you can publicly trade.

This was wonderfully successful, because if you're trading and you're able to extract a difference between this price and the price other people are charging, you can make a lot of money. It also gives you a way of pricing some securities that are not publicly available, but are driven by the same market variables.

One of the key things that you have to remember with this idea is that everything is based on the same driving market value variables. So as you go to actuarial

practice, and if you're starting to have contingencies for things like mortality, or policyholder behavior, or other things that you can't get a security in the marketplace for, then you're weakening this concept, and it becomes more difficult to apply it. If you have these non-publicly traded contingencies involved, you're really knocking out some of the underpinning ideas in this risk-neutral pricing approach. It begins to limit that ability.

One thing that has been around for the last half dozen years or so is the idea of trying to securitize some of these actuarial risks. If you do that and you begin to create a public market for it, then that might be a way that you're overcoming these issues. In general, if you don't have the contingencies available in market securities, this is not a method that's going to work particularly well. This idea is all about relative price. It's not a way to figure out the price of a new risk or a new contingency. It's just a way of being able to translate the risks that are being publicly traded. There are prices that are being determined by the public markets and we're trying to translate that into a new structure that's being driven by the same types of contingencies.

I work with portfolio managers. They're not looking at these kinds of ideas. They're looking at whether this particular stock seems like it's a good or poor value. It's underlying judgment that's driving those market prices. I think you have to have that. That's not something that's coming from this financial engineering approach. What's coming from there is just a way to connect related securities. You can't price an equity option without knowing the price of the underlying stock or at least knowing some related options. You might not be in on the stock, but you have to know some other options.

If you look at the various journals that publish this sort of material, you'll see a lot of fairly involved mathematics and, particularly, stochastic calculus. These are just tools for doing basically the same thing, but expanding it to an infinite range of contingencies and expanding it to a continuous timeframe as opposed to a discreet thing. It's the same idea. I wouldn't call it smoke and mirrors, but there is that same underlying core idea.

So that's what I would consider to be this core idea between financial engineering and actuarial mathematics. It's the same idea of discounting cash flows, except you have this trick that simplifies the hardest or one of the harder assessments to make. That's the relative return expectation assumption. The other thing to remember is it's a way of connecting known things. It's not a way of being able to consider the value of some new contingency.

Now I want to talk a little bit about risk management. Risk-neutral pricing is a very powerful technique, and it has been used to a great effect, but it really doesn't do a lot for you in terms of risk management. It doesn't tell you what the real-world probabilities are. You can't turn it around. It's not about risk management. It's about the price as it's connected to other priced securities.
Actuaries provide risk management by using a systematic set of conservative or maybe not-so-conservative valuations. That is a way of providing a measure of

confidence. There are a number of different things that have been attempted in risk management. It still requires a judgment call, whereas pricing has almost become a sort of standardized technique. I think risk management is more of an art than it is a science at this point.

What is available is the simple idea of hedging, where, essentially, you're passing the risk, or at least a good part of it, to somebody else. There's the whole field of utility theory that was developed around the late 1950s, which gives you a way of trying to determine preferences and how much uncertainty you'd be willing to accept. Some very interesting work has been done in the last few years by a group of people called Coherent Risk Theory, which is giving some new underpinnings. You've had the value-at-risk (VAR) concept. You have this dynamic financial analysis that has been developed extensively in the property and casualty area. In the 1980s, there was the portfolio insurance concept, in which you'd reduce the amount of your riskier securities as things started to go against you.

All of these ideas are what I consider micro risk theory. How can I protect my risk? What can I do to protect my situation? One of the things I think about with risk is that, at least in the short-term, it's similar to the Nortel situation. Somebody had to own all the stock last Friday. You could sell it to somebody else, but somebody had to hold it in the short-term. All of these ideas are about individual risk management as opposed to the micro and macro economics. How is risk being managed by the financial community as a whole? I think that might be an area that needs to be looked at.

Even with something like VAR, if people start reducing their exposure when things start to go against them, or because volatility estimates start going up, their VAR for the same essential holding has risen, so they back off a little bit. You start to see a cycle. I think that was part of what was going on in 1998 with the liquidity crisis. In 1987, I think a lot of people pointed to portfolio insurance as a concept that was driving some of that instability. Trying to think about macro risk theory is an area in which I think there's some opportunity. It might be a valuable thing for the actuarial community to be leading.

In summary, there's a very strong connection between what's going on in the basic actuarial connection and what's going on in financial engineering. There are some powerful techniques that are being developed in financial engineering. I think we're beginning to apply those in actuarial practices. I think we also have to understand that they're not godly ideas that are immutable. They are based on some assumptions, and they have weaknesses, where you're not dealing with publicly traded contingencies. That's what you do need for doing risk-neutral pricing.

I think the opportunity for the actuarial community lies in looking at the risk management area. I think that would be a good area to focus on as opposed to trying to claim the area that has already been taken by some of the financial engineering ideas.

MR. MUSEN: Thanks, Eric. Jack Gibson is going to be our next speaker. While Jack

is setting up, I'm going to spend a couple of minutes on what Tom Gallagher might have talked about. He wasn't able to make it here today. He is not a member of the Society; he is a lawyer who has done a lot of very innovative structuring of insurance companies. I won't be able to speak to the topic because I'm not a lawyer like Tom.

Tom was going to take a more macro view of financial engineering recharacterization of cash flows. Eric looked at individual cash flows, valuing the cash flows, and risk-neutral types of things. Tom was going to talk about moving cash flows from one jurisdiction to another. They looked like capital gains when they go out and then come back as ordinary income. Take property and casualty structures that replicate life. Also, look at the cash flows of the life product. Forget about the fact that it's a life insurance product. It has a series of cash flows that occur in a certain fashion. What if I can construct a property and casualty product that has the exact same cash flows, but is regulated as a property and casualty product? For example, with corporate-owned life insurance (COLI), you have certain rules. You cannot deposit three out of seven premiums. If it's a property and casualty product, you don't have to do that.

Tom has been involved in the above mentioned kinds of structures. He structured an insurance program to offer insurance policies that eliminate financial statement volatility caused by Financial Accounting Standard (FAS) 133. He developed an insurance derivative and payment triggers linked to the clients in the Standard and Poor's (S&P) 500 and the FTSE 100 Deferred Acquisition Costs (DACs). He worked to structure and execute a number of earthquake-linked derivatives, and he has worked with insurance companies to underwrite insurance policies that protect against the losses arising out of a failure to receive contingent income and business and profit-sharing arrangements. He has worked with Berkshire Hathaway to underwrite insurance policies that protect against losses arising out of the unavailability of grain. He has also structured and underwritten policies that protect against losses arising out of specified shortfalls and earnings per share. Finally, he has underwritten insurance policies that protect against losses arising out of unfunded, nonqualified executive compensation benefits. You can see he comes at things from a very different angle. It would have been interesting to have him talk to a group of actuaries who I think take more of the approach that Eric was talking about. He is looking at the details like an engineer with a screwdriver and a T-square. He was at a different level, looking at it from 40,000 feet.

Jack Gibson's biography is a lot shorter. Being as young as he is, it is only a paragraph long. Jack is the Americas' leader for life actuarial consulting in the Actuarial and Insurance Management Solutions Group for PricewaterhouseCoopers. Jack is a leading expert in the field of mutual life insurance demutalizations and conversions as well as life insurance company rehabilitations. He has significant experience in East Asia, and he just recently told me that he has been making a lot of trips to Japan in helping companies develop U.S. GAAP financial statements, explore possible demutualizations and other related projects. He has also worked with U.S. and non-U.S. companies regarding mergers and acquisitions, strategic planning, asset/liability management, actuarial appraisals, and product

development. Jack was recently named chairperson of the Joint Task Force on Financial Engineering and is the former chairperson of the Committee on Banks and Financial Institutions.

He has worked at PricewaterhouseCoopers and its predecessor firm Coopers & Lybrand since 1990. Prior to that time, he worked at three different major mutual life insurance companies, working extensively in the life insurance product development and financial reporting areas.

I would add that Jack and I worked very closely when I was at MetLife. Jack's firm was responsible for the third party actuarial consulting on the MetLife demutalization. I was involved very heavily from the MetLife side and got to know Jack pretty well and respect his skills. I'm very pleased to have him on this panel.

MR. JACK L. GIBSON: I have recently been named to be the chairperson on a joint task force that combines members of the Society of Actuaries and financial engineers. This joint task force is already in existence. It was created in 1998 as part of the Big Tent initiative. The primary goal was to explore how we, as a society, might attract financial engineers to the actuarial profession. Now there are variations on that theme, and I'll be touching on that more as we go along. This joint task force hasn't been very active in the recent past. Pete Hepokoski was the former and probably original chairperson. With the change in Society leadership, Pete met with some people in the new leadership structure and determined that there is a renewed commitment to the importance of this task force. As part of entering into this new phase, I've been named as the chairperson of that task force. I have recently stepped down as the chairman of the Committee on Banks and Financial Institutions.

I want to give a little bit of background on the Big Tent initiative. I've extracted some information from a survey that was taken. There was a Summary Report of the Society of Actuaries on the 1999 Big Tent Survey. You can get the full summary report off of the Society's Web site. This was done by Philip Kuehl, Ph.D. The survey was designed to solicit members' views and, also, the Society of Actuaries leadership's views on four objectives. There was a series of questions, and I've just pulled a few that I found most interesting for the discussion I'm doing today. In each question there was a range of one to six, where one was "definitely no" and six was "definitely yes". The numbers in between were to indicate yes or no, but with less extreme views.

Now the first question I chose to pull is, "Do you believe that actuaries should become the leading professionals to perform risk management functions in noninsurance institutions like banks?" There was an overwhelming majority of yes responses. The interesting question that comes to my mind is: what if we asked non-actuaries the same question? Some of these questions are telling in a couple different ways. It's not so much whether we believe that actuaries should become the leading risk professionals in banks; it's more a matter of whether we have thought about how that's going to happen.

I think we all have to be very concerned about that. I'll speak, in part, to what I see as the reduction in the degree of influence that actuaries have in their companies that is already taking place. What's more important is I think we have to look to how we believe actuaries are going to influence the future world five years out, ten years out, and so forth. We all can see that things are becoming more and more global. There is more and more consolidation across the financial services industry.

I consult with many insurance companies. I'm sure many people in the room work for insurance companies. You may be seeing what I'm seeing, which is at least a somewhat reduced, if not more so, level of influence of actuaries on their insurance companies. When you look at broader financial institutions, they don't have the same history of understanding what actuaries do and what they bring to the table. I'm going to get into that more as I move along, but it's that burning question in my mind that has drawn me, first, to my role as the Chairperson on the Committee on Banks and Financial Institutions and now to this role. I think that if we don't step up to the plate and start becoming the ones who can put the finger on what needs to be changed or on what needs to happen to ensure that actuaries have that kind of influence, things are going to take care of themselves. We may find that they might not take care of themselves in the way that we'd like.

The next question that I pulled reads, "One big tactic is to provide alternate entry points for qualification in the actuarial profession for the best educated students and to demonstrate to potential employers the enhanced value of the profession. Do you support this tactic?" I do want to comment, by the way, due to size restrictions and my lack of technological wizardry, I did edit out a couple of words. I don't remember exactly what they were, so my apologies to the source. There was an overwhelming "yes" answer to this question.

Eight was a two-part question. The questions, again, started with the statement, "A second Big Tent tactic is to create opportunities for a limited number of highly skilled practitioners currently performing risk management functions in noninsurance financial institutions to join the actuarial profession." The first part was: "Do you support this tactic as long as these 'new actuaries' are not granted FSA?" The second question was: "Do you support this tactic if these 'new actuaries' are granted FSA?" The majority answered the first part "yes," although it was not nearly as overwhelming a majority as I've shown you in some other questions. The second part of the question was a clear minority of "yes" answers. As a matter of fact, the ones who said "definitely no" made up practically 50% of the responses.

By the way, I just thought of one other poetic license, if you will, that I took in summarizing this survey. The survey actually shows you that they polled members and Society leadership. They showed the results of each group separately. The results were fairly comparable, whether you looked at it from the membership standpoint or from the leadership standpoint.

In trying to frame the results and look for synergies, part of the Society of Actuaries vision is for actuaries to be recognized as the leading professionals in the

modeling and management of financial risk and contingent events. I definitely echo that vision, and I agree that's a tremendous vision to have. I think that probably everybody in this room appreciates the depth of training that we have as actuaries and the depth of understanding that we have. We probably all equally recognize the challenge that we face daily as actuaries in trying to get others to appreciate the fact that we do have this depth of expertise and why that's important.

Who is influential in the future for these financial services companies, whether they are insurance companies or financial services conglomerates? Who is going to own the mind of understanding risk and what to do about risk in terms of pricing, or valuation, or whatever? I think one challenge we have is to realize that it may well be the group that can speak clearly and succinctly enough to make its points clearly understood. Actuaries have always faced this as a challenge. Because we have this depth of understanding, we open up our mouths and tremendous complexity comes out. Then we get the glassy-eyed look from the senior management, the people who haven't been actuarially trained. In turn, they're going to articulate, in a less complicated way, what they're looking for. We sometimes have trouble understanding the questions. Even if we do understand exactly what's at the heart of the question, we might have trouble repeating it back or determining how we're going to respond to that in a way that gives people a good feeling. While that has always been an issue with insurance companies, I think it's going to be a greater and greater issue here.

Some of the ways in which we have gained influence and credibility is through the existence of our profession and the Society of Actuaries, our exams, and our accreditation status. We have also gained status through the interlinking of these areas with many regulations. There are a number of requirements and you need to have actuaries involved in them. You need to have an accredited actuary who meets continuing education requirements and can sign opinions. Even these opinions have recourse to the extent that you could be perceived as shirking your duty or doing your duty inappropriately.

What I'd like this task force to struggle with collectively is how, obviously, there isn't the same level of accreditation standards across the rest of the financial services industry. In most cases, there are none. There's not the same kind of regulatory structure that asks: who is it that's reigning in on the risk analysis? Are things done appropriately and disclosed appropriately?

So one of the things that I've been grappling with—and I intend to make it an active part of the discussions of the task force—is should we consider pushing for the creation of a broader accreditation? Maybe it's not exactly what an actuary is today. As a matter of fact, I'm sure it's not. Maybe it's not even as rigorous as the process of becoming an actuary and it may well be something that would be called something else. But if we could combine the development of those kinds of accreditation standards with the creation of regulations that put some rigor and requirements behind what's required, this might be a way of providing a mechanism to build off of our current foundation of expertise.
Now there are three primary issues that have been identified as far as looking at

these synergies: the educational system, the organizational structure, and the issue of attracting financial engineers to jointly work together in this process.

There is a common educational core and a common basic educational system that certainly seems to be appropriate. From a college standpoint, in many cases, there can be similar training, but then that diverges after college. The broad area of actuarial education is already definitely something that the Society is focusing on and it's a separate group from this task force. It will not be the primary focus of the task force. To the extent we get any detailed views on things we want to explore, we'll coordinate with the other Society committee.

The current organizational structure is, clearly, not directly conducive. The only way that people who are acting as financial engineers can become members in the Society is to go through the same exam process that we go through now. It's impractical to think that more than just a very small handful of financial engineers would be interested in going down that path.

There is a Society committee that is focusing quite a bit on this, and it will not be the primary focus that leads to the third area, which will be the number one focus of this joint task force. We definitely take on the perspective that we can't wait, and we view this as a sequential thing. We're going to wait for the educational and organizational issues to be resolved and then we act. The time is now. I think we're at a very critical stage, and I think that the window is slowly closing. It's going to take a while, but we're definitely moving in the direction needed to create a viable plan of action.

We definitely need to explore the possibility of forming a new and separate organization. The organization might have some of the same ingredients that you have in the Society, but it would be a separate organization. I think we can explore other possibilities as well, but this is one that I think does need to have some consideration.

To the extent there was a new organization, it does seem that the folks in the organization should be global. I've listed some areas of focus that would include some of the education and organizational structure. While these areas wouldn't be the primary focus, they, clearly have to be considered. I do comment on credentialing and regulatory recognition, which I've talked about before on prior slides or public opinions as well.

There are some financial engineers that are already on this task force, but I think we need to target more and try to focus on influential, higher profile people, whether they are in the academic area or whether they are regulators. I think it would be great to get regulators directly involved. We might be able to reach out to people that are in banks now or in what we still refer to as nontraditional actuarial roles. But I think the term nontraditional is going to become more and more traditional or there's going to be less traditional actuarial roles.

There are a couple of potential advantages of a new organization or points of

focus. Right now there's absolutely a lack of a standard regarding how risk is viewed within financial services companies. There's some advantage to things like the value-at-risk models in the banks; however, these things lack the depth, if not used appropriately, of the financial analyses that we tend to do as actuaries. Our profession could help, especially if there was some kind of a joint organization. I think we're going to have trouble influencing change if we come in saying, "We're a bunch of actuaries. We're going to tell you what you're not doing quite effectively enough." If we can come at it as a broader group of people, including actuaries, I think that's one way we could become more influential. I talked about the regulatory issue already.

The biggest reason why I agreed to speak is because of my recent appointment as the chairperson of this group. I am looking to get new thoughts, new ideas, and new membership added to the group. I strongly encourage you to consider whether it would make sense for you to join the task force or to provide input.

MR. MUSEN: You were talking about how the role of actuaries is changing, and I would agree with that. I was trying to think of models of other things that at one time were very vastly popular or were the standard and have gone by the wayside. I came up with four different examples.

I was thinking back to when VCRs first came out about 15 years ago. There were two standards—Betamax and VHS. Nobody uses Betamax anymore. The reason is that there was no standard at the time. One standard won. In actuarial science, we have a standard. There's no standard for financial engineering. The question is, will there be a standard and is ours the right standard? Will everybody move to that standard? So that's one model.

Then I thought about black and white TVs, which are rarely sold anymore. Why is that? It's because there's a better technology that produces everything that black and white TV does, but it's in color. It doesn't cost any more, which is different from AM radio. There's still AM radio, even though FM has a higher quality sound for music, but they found a niche. Radio itself has found a niche. It has not been eliminated by TV, because it serves a niche. It still adds value when you're driving in your car, and you can't be distracted. I don't know if that's where actuaries are going.

The last thing I thought of that was at one time very popular which has gone by the wayside is drive-in movie theaters. There are actually Web sites that show how few there are left. There are none left in New Jersey. The last one closed about two years ago and it was the first drive-in theater. At one time, there were over 1,000 drive-ins in New Jersey. They have outlived their usefulness. The demographics have changed. The people who go to movie theaters and the reasons why they go have changed. It's not even just a matter of technology. Real estate and other things play into it. Again, are the demographics changing such that actuaries just don't fit in?

I see all these forces in all different directions that are closing in on us. Jack, you

mentioned attracting financial engineers into the actuarial profession. Maybe people have already opted out of the actuarial profession if they are financial engineers. The people in the profession may not want to be financial engineers. I don't know the answers to any of those questions.

MR. GIBSON: I think actuaries have tremendous things to add not only to insurance companies, but also to the financial services community. I believe that deeply, but I certainly see challenges. Of the four examples you gave, the one that I like is the Betamax/VHS analogy. I remember people saying that the Betamax technology was better. It was actually better and higher quality, but it never caught on for various reasons. I'm not sure how many people actually understood that it was better, but it ended up being that it didn't matter. That's the challenge that we have to have. Knowing that we're better at certain things and have a deeper understanding is not going to be enough. I think that's something that we have to look to. I think it will take some adapting on our part. If we do go down this route of thinking about an organization that tries to create some credentialing that's quite rigorous, even if it is not exactly what's done with actuaries, I think that's really something that has to be explored.

There is another group that I wanted to at least mention to people. It is the Global Association of Risk Professionals (GARP). I became a member of GARP by logging onto its Web site.

MR. GIBSON: We invited one of the leaders of GARP to speak to the Committee on Banks and Financial Institutions. He made a very nice presentation, and it included some nice slides that talked about what GARP was. Both of the words *global* and *risk* are in the name. We have neither of these words in *Society of Actuaries*, so we have to rely on people understanding what the word *actuary* means.

Now he talked about his global organization and the membership. He had the numbers on the members, and he showed the members by country and by type of company and all these other parameters. We asked him how to become a member, and he told us about a Web site.

I went to the Web site and clicked on a couple links, which brought me to a questionnaire. I filled out this questionnaire that mostly asked for my name and address. It had a question about my employer. I think there might have been one paragraph that had to be filled out regarding what you do with regard to risk and what your background is. Within 48 hours, I got an e-mail saying, "Congratulations, you're a member of GARP."

The guy from the Global Association of Risk Professionals had a pretty impressive presentation, and the organization sounded pretty impressive. I'm sure they are in many ways, and I don't mean to denigrate this group that I don't fully understand. What I do know is that they're just now talking about accreditation through an exam. As a matter of fact, I think they actually have the exam, but not too many people have taken advantage of it so far. There's no credentialing like you see for

the Society, and you don't see the regulations. Trying to get everybody to become an actuary is unrealistic, so let's think of what the alternatives are.

FROM THE FLOOR: Is there any organization such as the Society of Financial Engineers? If it does exist, is it inclusive of the Society of Actuaries as compared to Casualty Actuarial Society so that we could collaborate with each other?

MR. GIBSON: No, I don't believe so. There's not a Society of Financial Engineers. I think there are organizations, but nothing that's at all analogous to what the Society of Actuaries is.

MR. THORLACIUS: There are a number of organizations that are in the same vein as GARP. There's something called the Bachelier Finance Society. Louis Bachelier was a Fellow in Paris around the turn of the century who actually came up with one of the first option pricing models based on an early form of stochastic mathematics. So it's a very extreme quant level group that is very mathematically intensive. There's another group that actually has financial engineering in the title. I can't remember the acronym for it. It has been meeting for probably about six to eight years now fairly regularly. They're all sort of loose associations as opposed to any kind of accredited organization. There are more coming from just different types of groups. The Bachelier Finance Society has more of an academic perspective. The GARP came from some of the accounting and bank organizations, but they don't have the kind of accreditation. I mean they may use professional standards, and these people might be professionals, but it's not because they're in these organizations.

MR. SAMUEL H. COX: There is a group called the International Association of Financial Engineers. I think that's what you were referring to.

MR. THORLACIUS: That's the one.

MR. COX: I joined because they give a deep discount on the fee to academics. They are pretty well organized. They have a good journal, and they have meetings where there's a mix of academic and practicing financial engineers. They have a committee on credentialing. They don't offer credentials, now, but, evidentially, they're at least considering it.

FROM THE FLOOR:. As I was listening to Jack speak, I started to think about customer relationship management, where the first question you asked is, what does the customer want? What sort of interest is there on the part of financial engineers in joining us?

MR. GIBSON: I think that's a fair question, and I don't have the answer to that. We have to be able to answer that question. Depending on what is suggested, obviously, can affect the answer. But the challenge is to create something where both sides gain.