RECORD OF SOCIETY OF ACTUARIES
1994 VOL. 20 NO. 1

APPROPRIATE STANDARDS FOR PROFIT MARGINS

Moderator: OAKLEY E. VAN SLYKE
Panelists: STEPHEN P. D'ARCY
CHARLES L. MCCLENAHAN
Recorder: OAKLEY E. VAN SLYKE

The panel will debate the diversity of professional practice about how companies and regulators can and should measure profit and set standards for profit margins.

MR. OAKLEY E. VAN SLYKE: This session, as you know, is on appropriate profit margins, particularly in property/casualty insurance, but I think there will be something for our life brethren as well. This talk really fits logically into some of the sessions that I previously attended so let me kind of put it in a framework a little bit. Bob Clarkson spoke on his paper, "The Coming Revolution in the Theory of Finance." He pointed out that one attribute of what he thinks the coming revolution is will be an increased focus on downside risk. Beasley and Sedlak, in their paper "Risk Tolerance in Insurance Companies," and Peter Albrecht in his paper "Shortfall Returns and Shortfall Risk," also focus on downside risk. So we see perhaps some consensus there that something other than a variance measure would be appropriate, and we may be able to get into some of that as we go along here.

Chuck McClenahan will speak of the traditional actuarial perspective. Stephen D'Arcy will represent the modern theory of finance. Chuck is an Associate of the Society of Actuaries, as well as a Fellow of the Casualty Actuarial Society. He's a principal at Mercer, based outside of Chicago, and has more than 25 years of experience, including a great deal of it advising senior management about profit strategies and marketing strategies. He's going to share his perspectives.

MR. CHARLES L. MCCLENAHAN: I'm the curmudgeon of this group. I'm the stick in the mud, the old fuddy-duddy, the guy who won't change with the times. I'm willing to accept any or all of these characterizations, but I prefer to think of myself as one of the last of the advocates of reason. Profit, like beauty, is in the eye of the beholder. The connotation of the word *profit* is highly dependent upon who is assessing profitability. To the investor, it has a golden ring; to customers, it comes out as markup; and as far as regulators, it is good if they're concerned about solvency and bad if they are regulating rates. The IRS seeks to inflate it, and consumer groups seek to minimize it. In this talk, I will avoid taking any qualitative position on profitability. As a good consultant, whatever my client thinks, I think so, too. I will, however, talk a bit about some of the quantitative aspects of profit, dealing specifically with the determination of appropriate profit margins for property/casualty insurance in the rate/regulatory context.

First, I intend to discuss the difference between profit and rate of return, a simple beginning but one that is critical to an understanding of the issues at hand. Next, I will deal with some aspects of the problem that were once generally accepted as basics but are showing signs of being modernized out of existence. Third, I will discuss my personal position regarding the reflection of profit in the property/casualty rate-making context. Fourth, I will discuss what I believe to be the appropriate basis

for setting an appropriate rate of return in rate regulation. And finally, I will discuss what constitutes that appropriate rate of return.

It is important that we distinguish between profit, the excess of revenues over expenditures, and rate of return, the ratio of profit to equity, assets, sales, or some other base. Profit is a monetary value that has an absolute meaning. A $1,000 profit may be attractive to one investor and a waste of time to another, but the two have no disagreement on the value. Rate of return, on the other hand, is a measure of efficiency that has meaning only in the context of alternative real or assumed rates of return. Because rate of return, however expressed, begins with profit in the numerator, it seems appropriate to begin with a discussion of the measurement of property/casualty insurance company profits. But before we do that, let's look at those endangered basics.

Let's start with an easy one: what is the value of $1 one year hence? Now there are days on which I question the existence of present values. If I ask my eight-year-old daughter whether she would prefer one piece of candy today or two tomorrow, that's a 73,000% annual rate of return; she will invariably take the one piece today. And if you think that she simply doesn't understand the concept of value, try asking her whether she'd rather have one piece today or two pieces today.

Eight-year-old wisdom notwithstanding, let's start out by assuming that there is such a thing as a present value of a certain amount at a certain future date at a certain interest rate. Some of the new kids on the block are asking questions about utility. They ask whether the present value of $100 one year hence is the same for an 18-year-old college student as it is for a 60-year-old millionaire. The answer is, of course. The fact that my eight-year-old daughter would rather have one piece of candy today than two tomorrow speaks volumes about the utility of candy to an eight-year-old, but says nothing about the value of two pieces of candy tomorrow. Utility theory says that the rich man should play the lottery, the marginal utility of the cost of a lottery ticket being effectively zero, but his expected winnings are no different than those of a poor man.

But what about investment alternatives? Suppose I have the opportunity to invest at 8%, and you can get only 6%. Isn't $100 one year hence worth more to you than to me? Balderdash! Investment opportunity does not affect present values. A present value exists in the context of an assumed discount rate. Alternative investments or even the availability of investable funds do not impact the present value. And what about riskiness? Isn't the present value of a risky investment smaller than that of a risk-free one? No. The expected value of the risky investment may be lower than that of a risk-free investment. Its variance will certainly be greater, and this is what gives rise to the requirement of a risk premium for the risky investment versus the risk-free one, but I don't remember any probabilities in my present-value formulas.

We in the property/casualty business still talk about underwriting profit much as we nostalgically speak of Studebakers and doctors who make house calls, which disappeared about the same time. But any rational view of the economics of property/casualty insurance includes investment income in the measurement of profit. Rate

regulation, however, has forced us to distinguish between investment income generated by policyholder-supplied funds and that generated by investor-supplied funds. When an insured purchases a policy of insurance and pays for it up front, he or she suffers an opportunity cost by virtue of paying out the premium funds in advance of the losses and expenses actually being paid. In theory, the policyholder could have invested the funds in some alternative until they were actually needed by the insurer. Where insurance rates are regulated for excessiveness, it is appropriate that this opportunity cost be recognized. The calculation of the opportunity cost should not assume that all cash flows go into invested assets. The buildings and desks and computer software that were originally purchased with other policyholders' funds are now dedicated to providing service to current insureds and should be viewed as having been purchased at the beginning of the term and sold at the end. The opportunity cost should be calculated at a risk-free rate of return. The insured has not purchased shares in a mutual fund, and has no claim on any part of any risk premium earned by the insurer any more than the insurer has a right to collect additional funds to cover investment losses.

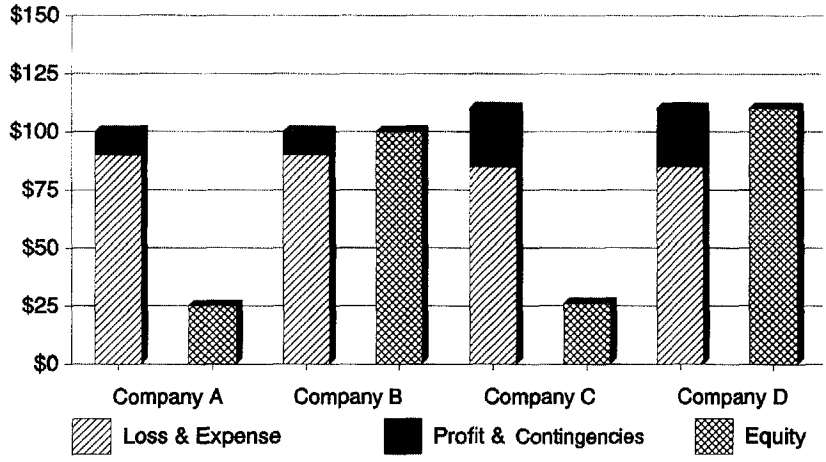
Finally, investment income on surplus should be excluded from the ratemaking process. Policyholder surplus, despite the name, does not belong to the policyholders. Instead it represents equity placed at risk by investors in hopes of reaping financial rewards. If investment income on surplus were to be included in the ratemaking process, we would create a paradox in which the more highly capitalized and therefore more secure company would be forced to charge lower rates than an otherwise equivalent insurer with less surplus. The highest rates would be allowed to the minimally capitalized insurer, a clear case of higher price for lower value.

Let's turn now to rates of return. It is imperative that we understand that U.S. insurance regulators are charged with rate regulation and not rate-of-return regulation. I am unaware of any rating law that states that rates of return must not be excessive, inadequate, or unfairly discriminatory. If there were such a law, we might have some interesting hearings wherein insurers would charge that rates of return had been inadequate. Nevertheless, rate of return is an important concept in rate regulation to the extent that it is involved in the determination of the appropriate profit provisions in the rate. There are two common candidates for the denominator of the rate of return: sales and equity. Assets might be an appropriate denominator from the standpoint of measuring economic efficiency, but equity is clearly the favorite of those seeking to measure the relative value of investments, and sales is preferred by those who view profit provisions in the context of the rates themselves. There is little doubt that equity is an appropriate basis for measuring companywide financial performance of a property and casualty insurer.

As I see it, there are two basic problems with return on equity as a basis for rate regulation. The first problem with return on equity is that it forces the regulator to forego rate equity for rate-of-return equity. Consider this example. Chart 1 shows four companies, each writing the same coverage in the same market, providing the same level of service with an expected pure premium of $95. Companies A and B propose rates of $100 and contingencies of $5, and companies C and D request rates of $110, reflecting a $15 profit load. Companies A and C are leveraged at a writings-to-surplus ratio of four to one, the equity being $25 on the line with that

$100 of premium, and Companies B and D are at one to one. The concept of rate equity would seem to require that companies A and B be treated identically as would C and D. But if we attempt to use rate of return as a benchmark, this becomes a problem. Assume that the regulator has determined that 15% is the appropriate benchmark for return on equity. Under this approach, we are forced to conclude that one $100 rate, that of Company A which is expected to return 20% on equity, is excessive, and the $100 rate of Company B is reasonable. Similarly, Company C's $110 rate is excessive, and Company D's $110 rate is reasonable. Clearly we have subordinated rate equity to rate-of-return equity.

CHART 1
APPROPRIATE PROFIT MARGINS IN PROPERTY/CASUALTY INSURANCE



The second problem with return on equity and rate regulation is that it requires that equity be allocated to line of business and jurisdiction. And no matter how much the return-on-equity advocate might wish to ignore the fact, there is no such thing as North Dakota private-passenger automobile surplus unless we're dealing with a company writing North Dakota private-passenger automobile insurance exclusively. The fact is that the entire surplus stands behind each and every risk and supports all of the reserves related to all of the claims and policies issued by the company. Any artificial allocation of surplus in no way limits the liability of the company to honor its financial commitments. By requiring the allocation of surplus to line and jurisdiction, the return-on-equity basis ignores the value inherent in unallocated surplus. In essence, the method treats a multiline national company with $100 million of surplus, $1 million of which is allocated to North Dakota private-passenger automobile insurance, identically with a North Dakota automobile insurer capitalized at $1 million. The protection afforded by the additional $99 million of unallocated surplus is viewed as having no value.

There is also the problem of an equitable allocation basis. Just how should surplus be allocated to jurisdiction and line? How should the investment portfolio be assigned to

track incremental gains and losses in allocated surplus? What happens in the event of allocated surplus exhaustion? Can any return be excessive when measured against an equity deficit? These are difficult questions that must be addressed by those who seek to allocate surplus.

When faced with these questions, some regulators have proposed using average or target ratios of premiums to surplus as benchmark or normative ratios. Let's say return on equity is assumed to be 12.5%. This corresponds to a return on sales of 25% in which writings are half of surplus, and 2.5% where the risk ratio is five to one.

But what happens if we decide to use a benchmark risk ratio of three to one to allocate surplus to this particular line in this particular jurisdiction? If we happen to be writing at three to one, we find a 12.5% return on equity and a 4.17% return on sales just as we're supposed to, but what about another risk ratio? Let's get rid of the target returns and focus upon our regulatory world. The return on sales is now a constant 4.17%, regardless of actual leverage. The use of the normative writings-to-surplus ratio has eliminated the problems associated with surplus allocation, but the result is return-on-sales regulation, not return on equity, and it's an excruciatingly complex way to get there.

Return on sales relates the profit provision in the premium to the premium itself. For anyone who is familiar with the concept of markup, it is a natural way to view the profit component. If you tell someone that 5% of the price of a loaf of bread represents profit to the grocer, that is helpful in assessing the value of the bread. If, on the other hand, you tell that same someone that the price of bread contains a 12.5% provision for return on equity to the grocer, the information is next to useless. Return-on-sales-based rate regulation is simply the establishment of benchmarks for what constitutes excessive or inadequate profit provisions as percentages of premium. It is straightforward, simple, and results in the regulation of rates, not rates of return.

So what is the appropriate return on sales for rate regulation? It depends on what kind of market the regulator wants. In any given market, the size and composition of the residual market, the number of insurers in the voluntary market, and the degree of product diversity and innovation are all related to the insurance industry perception of the opportunity to earn a reasonable return from the risk transfer. Given the relationship between rate adequacy and market conditions, the proper benchmark for excessiveness is that which will produce the desired market characteristics. And any regulator who believes that this relationship is less powerful than a well-crafted econometric argument for a given, maximum, profit provision is destined to learn a lesson about the distinction between theory and practice. It has been alleged that actuaries have made a profession out of taking something simple and making it complex. Well, I certainly do not agree with that allegation. William of Occam pointed out in the 14th century that simplicity is to be preferred over complexity. There are simple ways and there are very complex ways to measure profit. Similarly, there are complex ways to assess rate of return by jurisdiction and line of business and there are simple ways. Let us not assume that the complex ways are preferable solely because they are not simple.

FROM THE FLOOR: What's your definition of rate equity?

MR. MCCLENAHAN: I don't know that I have a definition of rate equity. My concept of rate equity is that if you have identical products written by more or less identical companies, offering identical service, and those are offered at identical rates, that is premium rates, from a rate/regulatory standpoint those rates should be treated equivalently. It's treating insurers providing a product and a level of service on an equivalent basis, based upon the rate that they're charging, not the rate of return or anything else.

FROM THE FLOOR: But presumably within that context.

FROM THE FLOOR: No, but presumably within that set of equivalencies would be the equivalent rating let's say of the insurance company, so that they're equally solvent.

MR. MCCLENAHAN: That goes in the equivalent product and service. If I'm offered a reinsurance contract from a top line reinsurer or an equivalently priced reinsurance contract from Lloyd's of Lubbock, those are not the same product. There's a lot more security provided by the former than the latter.

FROM THE FLOOR: I just want to make sure that you have within your definition the fact that the companies are equally solvent, and, therefore, doesn't it follow that the rates of return will be equal?

MR. MCCLENAHAN: It goes in the other direction under most rate-of-return regulation. If I'm highly capitalized relative to premium and I'm being regulated based upon rate of return, I'm allowed to earn less as a percentage of sales than the undercapitalized insurer.

FROM THE FLOOR: Well, I hope you wouldn't be rated the same.

MR. MCCLENAHAN: Well, I would hope so, too, but that's not the way it works under return on equity.

MR. VAN SLYKE: Let me just be clear about that. The point is that the Lloyd's of Lubbock, with its low level of capital would be given a more modest profit provision, not a bigger profit provision under internal rate of return calculations. So you'd have less security than you otherwise would have with Lloyd's of Lubbock.

MR. MCCLENAHAN: You have less security and you have a lower product with Lloyd's of Lubbock, which relative to premium is highly leveraged. So by the time the return-on-equity advocates have built a uniform return on sales into the profit provision, the return on equity allowed to Lloyd's of Lubbock is substantially greater than the return on equity allowed to the well-capitalized company.

MR. VAN SLYKE: Our next speaker is Stephen D'Arcy, who's a Fellow of the Casualty Actuarial Society and a Ph.D. Steve is associate professor of finance at the University of Illinois at Urbana Champaign. He has significant insurance company

experience with Aetna and with CUMIS. He's the author of two chapters in the book *The Foundations of Casualty Actuarial Science* published by the Casualty Actuarial Society. He's the coauthor of *Financial Pricing Models for Property Liability Insurers,* and his other research includes the aging phenomena and catastrophe futures.

MR. STEPHEN P. D'ARCY: Chuck and I are working on a book that is going to be published by the Casualty Actuarial Society, proposing the different views of coming up with profit margins for property/casualty insurance companies. We are also going to have other commentators included in this material. So as we're developing that, we'd certainly like people to provide us with input, perhaps even provide additional information on that.

I don't disagree that much with Chuck except on one major point. It's inappropriate to come up with a calculation for what the profit should be based simply on a sales margin. You can't do it; it is not going to be correct. The reason that we're proposing doing that, is because of regulatory restrictions. My main argument would be that we should argue against the regulatory restrictions that force us to use an inappropriate measure. There is little justification for rate regulation of the property/casualty insurance business. Few lines of business are not competitive, where there are not enough market players to establish a competitive rate. That's not true with the lines where most insurance departments spend most of their time regulating rates: private-passenger automobile, workers' compensation, and the like. In those lines, we should be arguing that there shouldn't be regulation. Competition will establish appropriate rates. We've obviously lost a major battle in California, but other battles are on the ground, and we can also continue pushing that in other areas. Rate regulation does serve a useful purpose for us as individual actuaries, because it creates tremendous consulting opportunities and work in companies, but it really cannot be done properly. The rates that should be established should be established in the market, not by regulatory fiat.

In the financial economics area, we are working to come up with a model that will be useful for explaining what rates insurance companies should charge or the underwriting profit margins they should have. Those models are going to be simplified versions of reality, simplified so we can deal with them. Reality is too complex to be able to consider all variables so we'll focus on ones that, at the moment, are key and use those. But circumstances change in financial markets and so do the conditions that we're facing. When something changes that we have ignored because it was not especially important and it becomes important, our model isn't usable. If we are constrained based on a model that has ignored factors, and all of the financial economic models ignore some factors, and all of the rates based on sales ignore certain factors, we then have the wrong prices. The markets will react to that, but the regulatory lag would force the market prices to be inappropriate for a while. So we're exploring coming up with a model that is useful for companies to decide what prices they should be charging. Right now, in many cases, they'll throw out a price —State Farm plus 5%—and see what happens. If they start going out of business because capital is being withdrawn from their company, they say, "We guess we've got to change our rates." Or if they see investors flock to them, they will say, "Our price is good, maybe we can lower it a little bit and pick up some more business." That's not the way I would like to see insurance companies being run. I'd like

insurance companies to be able to say, "This is the price we should be charging. It provides a fair return on the equity the stockholders provide us, or policyholders in the case of a mutual company. This is the return that we need to be earning." This should reflect all reasonable approaches at the time, all factors that are causing effect at the time. As circumstances change and the model is not useful any more, then they'll find that the capital isn't flowing as they would expect. But it would allow insurance companies to react more quickly to pricing downturns than they do now, when they're simply looking to see what's happening in the capital markets. Is capital coming in or is capital pulling out? That's too late. The time it takes to publish financial statements, send them out, and let the investing public decide whether to put more or less money into your industry is far too long. I think we can turn the cycle around faster if we can come up with a valid model.

Regarding the aspects of a valid pricing model, you're definitely going to combine investment and underwriting income together, not just focus on underwriting income; it will include investment income. It's going to reflect true economic value, not the statutory values we put in our annual report. It's going to represent the true values of both our assets and our liabilities from market value at anytime. Some we know; we just don't disclose them (the value of our bond portfolio, for example, on publicly traded bonds). Others are much harder to come up with—the value of our loss reserve run-out—but they could come up with numbers for those. And it also reflects current market conditions, not interest rates that were earned five or ten years ago, but interest rates that are available in the market today. The investor looking at putting money into the insurance industry or taking money out of the insurance industry is facing alternative investments at today's interest rates.

The side that I've been asked to propose, they didn't have to twist my arm too much to do this, is the discounted cash-flow analysis. Discounted cash-flow analysis is the foundation of many models in finance in general. It converts cash flows from different time periods to a common point in time. It recognizes the time value of money and the value of risk. If you get money a year from now or two years from now, then you just convert them to a common time. We're not looking at what any one individual would do; we're looking at what the market is valuing, sort of the trade-off between the equilibrium points of the investors that have different risk aversion, different utility functions, and the like. And the two applications that you do in coming up with this kind of cash-flow analysis that have been useful in the insurance area have been the net present-value rule and the internal rate of return calculation.

Now, I've termed the two discounted cash-flow models that have been used in regulatory environments so far the Meyers-Cohn approach, which has been used in Massachusetts in pricing automobile and workers' compensation insurance, and the National Council on Compensation Insurance (NCCI) model, which has been adopted for workers' compensation rates in different jurisdictions. The Meyers-Cohn rule is based on a net present-value calculation, whereas the NCCI comes up with an internal rate-of-return calculation. If you're interested in this, you probably should see the March 1990 article by David Cummins in the *Journal of Risk and Insurance*. It goes through a detailed, step-by-step comparison of the Meyers-Cohn approach and the NCCI approach.

The Meyers-Cohn approach equates the premium as the net present value of all of the outflows relating to the policy that's written, which includes the expenses, the losses, loss-adjustment expense, the taxes on investment income, and the taxes on underwriting income. All of those are covered together. The NCCI method allocates surplus to an individual policy, enough surplus to take care of the fact that you'll probably be paying out more in losses and expenses than you'll be getting in premiums. It takes the investment income net of taxes, so a net tax calculation of invested income is done, it looks at underwriting profit you'll be earning, and then looks at the surplus as it's released. It looks at the cash flow of those particular ins and outs of the insurance company's books and discounts at a rate that sets the net present value equal to zero, and that's the internal rate-of-return. So it ends up calculating an internal rate-of-return, comparing it to see whether that internal rate of return is attractive to an insurance company.

The net present-value decision that is used commonly in corporate financial decisions is a calculation that simply takes the summation of all of the cash flows associated with a project, or an insurance policy in the cases in which we're using it, and discounts it back at a rate of return that reflects the riskiness of that and the time that the money has been allocated. The cash flows can be positive (money coming into you that you made an investment in and you get dividends and capital gains on), or it can be outflows (paying losses, initial investments that you make). The outflows will be negative, the inflows will be positive values. You come up with a net present value on that. The decision rule on the net present-value calculation is, if it is positive, it's an appropriate project. If it's not positive, then you should not make that particular investment. If you have an investment opportunity with a negative net-present value, then you simply would not make that investment. It's going to reduce the value of your portfolio, your company's, value and the like, by making that particular investment.

A typical corporate-finance-type example would be at period zero; you make a $10,000 investment, shown by −$10,000, and in periods one, two, three, four, and five, you have various cash inflows ranging from $1,000 to $5,000 by year. If the appropriate risk-adjusted discount rate is 15%, then this has a net present value of $1,530; in other words, you would make that particular investment. An insurance company might be looking at a series of cash flows like this but with exactly the opposite signs. Initially, you have a $10,000 inflow of premium, and then you have subsequent cash outflows: −$4,000, −$5,000, −$4,000, and so forth as you pay the losses on the policy you have written. In that case, the net present-value would be −$1,530, and the net present-value rule would say an insurance company should not write this policy at $10,000 if the appropriate risk-adjusted discount rate is 15%. The internal rate-of-return calculation sets the net present value equal to zero, and then calculates the internal rate of return, what interest rate would actually be solved for if the equation equalled zero. In this particular case, the internal rate of return is 22.63%.

What would the internal rate of return be if I flipped all of the signs and had $10,000 coming in initially and all of the other values were negative? It's the same. Because you're setting it equal to zero, it's going to be solved the same way, but the problem is the decision that you'd make is exactly opposite. If you look at this particular

decision and look at the internal rate of return in the case that I gave, a $10,000 investment is a lot of money coming in, and the internal rate of return is 22.63%. That's fairly good. You would probably make that investment because you have a 22.63% return. What happens if you reverse all those numbers and come up with 22.63%? It means that basically you're paying 22.63%. You're borrowing at 22.63%, and that's not very good unless the only alternative for you to borrow on is your credit card, and then maybe it would be a good rate. But the internal rate of return interpretation depends upon whether you're borrowing money or investing money, and in insurance-industry calculations, you are often actually borrowing money rather than investing it. In that case, if the internal rate of return is very high, it's not attractive. A simple point, but it's the subject of misuse in the internal rate of return calculation.

We have tremendous problems in applying discounted cash-flow analyses to insurance companies, because insurance companies are so complex. So the models that are used are also extremely complex. I'm going to propose a very simple situation and not go into all the complications related to that. Lee's already provided us with a dozen examples for which we have to develop different pricing, so this will be developed, but I'm not going to try to do that.

Let's take a situation in which you have $100 million. Michael Eisner might have that much spare cash hanging around nowadays so we'll use that kind of model. You have $100 million and you're trying to decide what to do with it. You can put it in treasury bills, you can put it in stocks, you can put it in the bond market, or you can go with cattle futures. What would that be if you had a 100% return on $100 million? You would have a great deal of money if you did that, and that's the alternative you face.

Now we're going to have a very simple insurance example. You can write twice that amount in premiums written, a two-to-one premiums-to-surplus ratio. Why? Well, that's the amount of risk that you're willing to take; that's the amount of risk the regulators will allow you to write; that's what your policyholders require you to maintain as far as surplus to charge the price that you want or whatever. You can write $200 million in premiums to that $100 million surplus level. You're writing annual policies all becoming effective the same day. January 1 is when every policy is renewed. In Massachusetts, you wouldn't have rates until June or July, because of its regulatory hearings, but at least all policies would be effective the same day. You pay the losses at the end of the year so it's a short-tailed property type of line of business; it's all paid at the end of the policy, 25% expense ratio, 75% loss ratio. You've immediately calculated a combined ratio and underwriting profit margin, I'm sure. In addition to that, because we're using unrealistic assumptions—no investment risk, no underwriting risk initially—you know exactly what's going to happen. The risk-free rate of interest is 7%. (You would be able to get 7% if you invested in something else that was risk-free, such as treasury bills.)

Applying the net present-value rule and looking at the associated cash flows shows that at time zero, you're investing the surplus of $100 million. Then during the year, the surplus plus the net premium (premium net of expenses) is invested. There's no investment risk; all you can do is invest in the 7% risk-free interest rate. That's

discounted based on the fact that you don't get it for a year, so that's discounted by 1 plus .07 or 1.07. At the end of the year, you have the premiums minus the losses and expenses plus the surplus. You'll get that back but, again, because it's a delayed receipt, it must be discounted back. In this particular case, because we've ignored underwriting and investment risk and we use that 7% interest rate on everything, the net present value was $9.81 million.

Would you make this investment? Would you do that? Yes, you're increasing the value of your investment portfolio the day you make that $100 million investment in this idealized insurance by $9.81 million, based on discounted cash-flow analysis.

You can also use this calculation to figure out what the break-even underwriting profit margin would be. At what point would the underwriting profit margin have to be at before the net present value would not be greater than zero? By setting the net present value to zero and solving for the underwriting profit margin, it works out in this particular case to be a −5.25% underwriting profit margin. At that point, you would walk away from the investment because you would be indifferent about that investment and investing in some other area. So it is not an attractive investment for you unless the net present value exceeds zero. The underwriting profit margin from this would have to be higher than −5.25% to induce money to be invested in the insurance business.

We know that this is unrealistic for many reasons, but one that's most disturbing would be the fact that there is no risk. We need to know how we can make an adjustment for risk, and in this particular case, I'll assume that the appropriate adjustment for underwriting risk is 12%. Now we're looking at the present value of a payment of $100, or $100 million paid one year from now at 12%. This is stepping away from that particular model, and it works out to be $89.29 million. You can do that whether you're doing it in pence, shillings, pounds, or dollars, just by dividing by 1.12. But this creates a problem that all of the models that we've been using for this kind of cash flow in the insurance industry have at the current time. They're discounting for both risk and time simultaneously. The Meyers-Cohn and the NCCI models make one adjustment for risk, and that adjustment reflects both the time value of money and the risk associated with that. Actually, two separate adjustments are going on, and you can handle that by a method that's called the certainty-equivalent calculation. What is that $100, that uncertain payment of $100, worth to you one year from now? What would you take to reduce the uncertainty associated with that? Well, if there was no uncertainty with what you'd be getting paid, then you discount an amount back at 7% because that's the risk-free rate. But because there's uncertainty, what would be the adjustment that we're making for the risk associated with that? And that obviously has to be 1.12 divided by 1.07. Or make an adjustment for risk of 1.0467 that you're dividing 100 by. That comes up to be $95.54. In other words, you would be willing to trade your uncertain $100 payment a year from now for a certain $95.54 one year from now, but you have to discount that by the risk-free rate because there's no uncertainty associated with that. We've now made adjustments for both risk and time. When you adjust it back together, you end up with the same value you came up with before, but you've separated the risk adjustment and the time-value adjustment.

Let's incorporate the risk back into this simplified insurance investment example. You're going to invest in the insurance company that's going to write $200 million in premium and pay back all the losses at the end of the year. The certainty equivalent of the investment risk is exactly the same as the risk-free rate. Why? Well, that's what the market tells you. Whether the expected return is 12%, 15%, or 6.5%, if it's a nonrisky investment, you'd actually be able to equate that with that investment at the risk-free rate. That's what the market's telling you. The market equivalent of a risky investment returning whatever the expected return is the same as getting a risk-free rate. So we can just ignore that second term in my equation. It doesn't change when you're dealing with certainty equivalents. But this third term does change. Now you have the premiums minus the expenses minus the certainty equivalent of the losses. What would you as an insurance company be willing to pay to avoid having any riskiness associated with this? Now that certainty equivalent is going to be greater than the value of expected losses. It's not going to be less than the value of expected losses. If you were an insurance company that had to pay out expected losses of $100 million, and somebody came up and asked if you would pay the person $90 million and walk away from it, you'd say, "Sure," immediately. So it's going to be some value over $100 million.

Suppose you went to a reinsurance company and said you had this loss distribution with an expected value of $100 million, and you asked how much it would take for the company to buy it from you. It is going to charge you more than the expected value of the losses because that's the certainty equivalent of that. So although we can't look the certainty equivalent value up in the financial market listings, we can certainly come up with that value based on what the market is charging you.

Let's assume that the certainty equivalent of losses (if all these other numbers stay exactly the same), is $160.50. Rather than being $150, 75% of the $200 premium we wrote, it's $160.50. If it's that value and you go through to solve this, then the present value of this investment is zero. You are not going to put any money into writing this line of business because it's not producing a positive net present value for you as invested. Well, there are some complications. Taxes are a complication. You're going to have to determine what taxes are and allocate for those. Include the surplus and figure out how you measure it and allocate it. It's not your aggregate policyholders' equity. You have to allocate it to individual lines. But when you allocate it to an individual line, as Chuck pointed out, you allocate more than a pro rata share of that surplus to back the premiums you write because of a contingent claim on it. In fact, if you lose enough, it goes through not only the surplus you've allocated to one line of business but to other lines as well. So, in essence, you're probably allocating more than 100% of the company surplus if you're allocating it properly on a statistical basis. Determining what the certainty equivalent values are for the losses is going to be a problem. You have to look at individual loss portfolios to see what they would be worth on a certainty basis. And you would look at multiyear payouts, considering the fact that you don't have all the losses settled in an individual year. They go for additional years, and there's money flowing back and forth and so on.

So these issues have led the insurance industry to not have an accepted, usable, financial economic pricing model at this point. Some approaches are somewhat

useful and further adjustments to them will make them even more useful in deciding whether an insurance company should write a lot of business in a given area. These are not regulatory pricing models. The regulators that use these and come up with the rate are wrong. These are models that would allow an insurance company to determine whether, with that present value, writing a line of business in a given state is correct. And if the companies are doing that, then that's what will drive the competition, and that's what will drive the prices in a particular area. The regulators should not decide the appropriate profit margins associated with it, but what the insurance companies are willing to write it; at what point are they willing to extend their capital investment to be able to get the positive net-present value invested?

MR. MCCLENAHAN: I have a couple of comments on what Steve has just gone through. First, as an academician, Steve has the facility for assuming the real world out of existence. If we assume rate regulation out of existence, then we can focus on the key questions facing most insurers. How much are we willing to write in this line at this given rate? I agree with Steve that discounted cash flows are the appropriate way of either internally or externally measuring insurance company profitability, but I believe it's preferable to calculate them based on a risk-free discount rate. Individual risk aversions and hurdle rates can then be superimposed over those risk-free rates of return in the investment decision. If we follow through with Steve's formulas, two individual investors will attribute different net present values to identical cash flows, and that will reflect the different certainty equivalents of the two investors. And again, I think that's making the problem more complicated than it needs to be.

MR. WILLIAM C. CUTLIP: I have two questions about your certainty equivalent. First, what kinds of judgments do you use in determining what the value of the certainty equivalent should be?

MR. D'ARCY: One value would be what it would cost you to transfer that risk to someone else in the market, whether it's a reinsurance operation or some other kind of financing tool that would take that risk away from you.

MR. CUTLIP: Second, wouldn't the certainty-equivalent theory equally apply to expenses?

MR. D'ARCY: Yes, if expenses are not known with certainty. Also, there's the fact that some expenses are paid prior to being able to write a line of business. So, yes, expenses are multiyear and expenses could be adjusted on the certainty equivalent basis as well. And taxes would definitely be adjusted on a certainty equivalent basis because you don't know what your taxes are going to be; you'll pay them only if income is positive.

FROM THE FLOOR: But expenses do have a certainty, though. You are certain they will never be on budget. They'll either be high or low.

MR. BRADFORD S. GILE: If you build up some sort of a model for your own pricing purposes, it strikes me that there probably ought to be something in that model that

takes into account the regulatory, real world and what the regulator is going to be imposing on you.

MR. D'ARCY: Yes. The way you'd use the net present-value model as an insurance company is to see what the net present value of writing a given line of business will be and continue to write a given line of business if it has a positive, net present value. If it does, you continue to make the investment. If it doesn't, you step out. Unfortunately, for many insurance companies, there are abandonment restrictions or abandonment costs. You have to pay into insolvency funds if you pull out of a state, or you might not be allowed to leave. But that's the decision that needs to be made internally by insurance companies. And the rate that you're allowed to charge, whether it's high because of lack of competition in a given area and you are able to get a very high net present value, or negative because of regulatory restrictions about the rate you can charge, is something that should go into the company's decision process so the market will respond faster to inadequate rate situations than it currently does. We tend to charge what the regulator will allow us and then see if capital flees the industry.

MR. MCCLENAHAN: In addition to insolvency funds and residual market costs, to do this right (we use some very simplified examples), you need to follow a piece of new business through successive renewals. That's especially important in private-passenger automobile, which has a significant amount of seasoning. If you haven't read Steve's paper on the subject, I recommend it to you.

MR. VAN SLYKE: I think we would probably all agree that management in an insurance company needs to be aware of the overall strategic plan. That will produce an adequate rate of return to sustain the capital and, if appropriate, to sustain new investment. What if one is achieving a higher rate of return, if one has, for example, a progressive underwriting philosophy and is able to sell as much business as the surplus will allow at a rate of return twice as great as the competitors, I would question whether it would be appropriate to lower your price to match some target rate of return. It would seem to me that you would still sell as much as you could at that higher rate. Your net present-value formula would suggest that management ought to lower the rate when it's limited in its underwriting.

MR. D'ARCY: No, the net present value indicates whether you should make the investment. You don't target to lower the price to have a lower net present value. You'd be looking at the market situation you face, either under your existing rate structure or the rate structure that would be allowed if you're in an area with either regulatory or competitive constraints to determine whether there's a positive, net present value. If there is a positive net present value, then you would write that line of business. If it's not a positive net present value, then you wouldn't.

MR. VAN SLYKE: So as a practical matter then, it doesn't set any kind of a threshold at the upper end. It only sets a threshold at the lower end and says not to write this unless it contributes.

I asked Dr. Steven Ross, a previous guest speaker, what profit margins he believed ought to be put into property/casualty products. He said, unequivocally, that the

profit margin is a function of the risk of the policy or the product, that is to say a line in a state or whatever. I asked him specifically if he meant that the capital structure of the insurer was irrelevant, and he said, "Yes, that's exactly what I mean." So I think he was, in a fundamental sense, much more in line with Chuck's philosophy about how rate regulators ought to behave than with either of our speaker's philosophy about how management ought to behave. Derek mentioned earlier that as you get more surplus for a given amount of money, you become a more secure company and you offer a better product. As long as we're talking about the same product, Ross would have had the same profit margin, regardless of the insurance company that was selling it.

MR. MICHAEL KAVANAGH: I think the comment was made that, in a mutual company, the unallocated surplus does not belong to policyholders. And if it doesn't, how can one look for an appropriate rate of return on the surplus investment in new policies, because that money doesn't belong to anybody?

MR. MCCLENAHAN: You have a very difficult situation in a mutual company. You have policyholders who are current insureds, and you have policyholders as investors who may have been policyholders for a number of years. I was speaking generically that policyholder surplus (which is what it's called for stock companies as well as for mutuals) does not belong to currently insured policyholders. Obviously, in a mutual company, the policyholder surplus does belong to policyholders as owners, to the extent of their ownership equity. As you know, in cases of demutualization, determining the extent of their ownership equity is not a simple process. But certainly the equivalent of shareholders' equity in a mutual company belongs to the policyholders as owners, but not as policyholders as current insureds.

MR. D'ARCY: The existence of mutual insurance companies and their major presence in property/casualty business really complicates the decision for appropriate pricing for the stockholder-owned companies. They're competing with companies that have other interests in mind, especially when you tie it in with such things as guaranty funds and writing lines of business, such as medical malpractice, under which it might be in their best interest for the owner policyholder to underpay premiums, let the company go insolvent, and have the competitors pay the losses when they come due. So many complications are associated with the insurance industry that make it very difficult for us to come up with what the actual, appropriate profit margin would be. Therefore, you need to focus on an individual company making decisions on whether it should participate in a given line of business at a given time.

MR. VAN SLYKE: I would disagree with that, Steve. It seems to me that the existence of mutual companies creates a lot of stickiness in the movement of capital into and out of the insurance industry as a whole. State Farm, for example, has a great deal of capital and a great deal of incentive in not having that move out, even if regulators deem that that's in some sense unnecessary to support its premium volume. But just because there is an excess or shortfall of capital in various segments within the industry, it doesn't seem to have much to do with the fact that everybody has a profit margin of a few percentage points on their auto premiums. It seems to me that the profit margins in the automobile premiums are really set by the market clearing costs of moving the risks and distributing those risks to reinsurers and

underwriting the risks and doing things like that clear that market. Thinking back to Adam Smith and the way markets really work, it seems to me that a market for auto insurance or any other insurance will exist when there are sellers of insurance who believe they have the risk-bearing ability to underwrite a policy at a certain premium and buyers of insurance who believe they have such a limited risk-bearing capacity that they're willing to pay that premium. In other words, the buy price for the policyholder becomes greater than the sell price for the insurance company because of their different perceptions of risk. Company management has to focus on the sell price. I find the idea that's in the Meyers-Cohn model, that we're going to look at the perspective of the policyholder to come up with rate regulation, quite intimidating, because (it seems to me) the buy price that a buyer might offer is quite irrelevant to what company management needs as profit.

MR. GREG TAYLOR*: I just thought I'd pick up that last point about buy price and sell price. You can show a correspondence between the Meyers-Cohn technique and the internal rate-of-return technique. It all depends, of course, on choosing the right discount rates. But if you do that, you can show that those two approaches are equivalent. They produce the same price. That's as it should be, of course, because if you have fair rates of return going through all of the calculations, they should lead to the same buy price and sell price.

I thought I'd pick up another point from some of Steve's comments. He may be disappointed that I picked this one up because it may be that it was intended as a throw-away line. But he said, at the start, that there was no purpose in regulation for many lines of business, and he named some of them. Well, I thought perhaps that it placed too great a value on the free market. Whether that's true or not, it seems to me to be a question of the depth of the cycles that will be produced by allowing the free market to operate itself. If cycles are deep, then it leads to a social question as to whether that's something society wants. There's nothing God-given about the free market, and society can overrule it if it wants to. He suggested that rational pricing techniques would tend to flatten out cycles. I think that was the suggestion. But on the other hand, there is work around, and I refer specifically to the work of Ralph Winter at Yale University and Sholom Feldblum. They suggest that cycles are inevitable as a result of the tension between competition between insurers, on the one hand, and the solvency requirements on the other; no amount of rational pricing models will change that. So if you take that into account, you might well find that deep cycles are an inherent feature of a free market in insurance, and then you may decide that that is socially undesirable, in which case there is a point to regulation.

MR. D'ARCY: The comment I made about insurance regulation not having a role in certain lines of business related strictly to pricing, not to regulating for solvency. The regulators do need to assure society that their industry is solvent or that individual companies play according to rules that at least minimize the risk of insolvency. The industry gets the premium money up front, and if it expends that unwisely or unfairly,

---

*Mr. Taylor, not a member of the sponsoring organizations, is an Actuary at Coopers & Lybrand in Sydney, Australia.

then it would end up being bankrupt and that would cause a loss to the policyholders. It's in the entire insurance industry's best interest for the product to be viewed by society as being stable. Look at life insurance right now and the problems in making long-term life sales after major industry giants have gone into receivership or insolvency. So it's in the best interest that the insurance industry be regulated for solvency, but price regulation should not be applied in such lines in which there is enough competition. The lines I mentioned were auto and workers' compensation, but it included homeowners and any lines in which there are enough companies to create a market.

Now the cycles are going to occur and be deepened by the stickiness that Lee mentioned earlier. The fact that mutual companies aren't going to go somewhere else with their capital, even though they get an inadequate rate of return, is sort of captive there. The cycles would be lessened if the insurance industry had workable financial models to tell it when it should stop making investments in given lines of business. The way that it does it now is basically: what is a fair rate of return? It's a rate of return that ensures an adequate supply of capital. How do you find that out? You publish your financial statements, and you see whether the investors put more money in or take money out of the industry. That's too long a lag, especially when you're dealing with lines of business in which there are long tails and you hide reserve inadequacies for five or ten or twenty years before the public finds out that you were inadequately capitalized during that time and you did not provide an adequate rate of return.

So given those particular, informational release problems, letting the marketplace make this determination, it will do it correctly but it will do it a long time afterward. I think that would deepen the cycle. If we could bring these models forward so they're management's planning tools, decisions would be made well before the capital starts flowing in and out of the business. You'll still have cycles for the reasons that you mentioned, but they should be much less deep than the ones that we're experiencing right now, letting the market tell us when we're charging too little and too much.

MR. MATTHEW S. EASLEY: I'm a life actuary so I'm coming at this without the property/casualty perspective. But the way we view surplus on the life side is to view surplus as being one of the costs of doing business. In other words, you must have desks, you must have phones, you must have people, and you must have surplus to write a particular block of business. The comment about all surplus standing behind all the businesses is true from a legal standpoint, but there's no guarantee that any vitality surplus, the excess over whatever your required level would be, is going to be available. It could be dividended out; it could be sent downstream into a new subsidiary and made unavailable; effectively, it could be used to write additional business. I guess I'm maybe perhaps confused at the treatment surplus and some of the formulas in a sense, that it's not being factored in. There's the tying up of surplus for possibly 20 years if you have a long-tail line of business. It doesn't seem to be getting into the equation in determining the costs or the appropriate present values.

MR. VAN SLYKE: Let me add to Matt's remarks. It has become the custom on the life side to do very much the kinds of present-value calculations that Steve D'Arcy is

talking about rather than the percentage-of-premiums calculations Chuck McClenahan is talking about. In that context, let me ask Steve to state any particular issues about long-term policies or life policies that would address Matt's concern.

MR. D'ARCY: One major problem that we have in the casualty business is our focus on premium-to-surplus ratios, and I perpetuated it simply because it's a convention that we use. Surplus shouldn't be allocated to premiums. Surplus should be allocated to losses, to uncertainty related to losses (or uncertainty related to expenses as Bill's comment was earlier). And if you write business that is a one-year policy but has a tail that's going to go for 20 years, your surplus should be tied up in casualty business. We pull it back out again and reallocate it the next year in a ratemaking formula to another line of business and assume that the tail is just going to take care of itself. So when you're measuring surplus, you have to determine how to allocate it out and when to release it. It really should come back as uncertainty is resolved for the insurance company, perhaps proportionately with losses being paid but perhaps proportionately more heavily on losses that are paid 20 and 30 years later rather than up front, because that's where the greatest uncertainty is. But we haven't resolved that yet.

MR. VAN SLYKE: I'd like to ask these two gentlemen some very specific questions about the timing of the resolution of risk. But before I do that, I'm going to illustrate a couple of actuarial equations.

Again, this is in the context of setting the stage for questions about the timing of the resolution of risk. If I refer to the expected value of a cash flow as the mean of cash flow X, $m(X)$, then the present-value formula discounts that by a risk-free rate of return. Or if there's an element of risk, the present value looks something like the mean times some discount rate (Vt). This is assuming the cash flow emerges at some point in time in the future. That is to say, it assumes that there is a period of time here, a cash flow out at the beginning and a cash flow back in at some time T later, and it has an expected value of $m(X)$. It has a probability distribution of $p(X)$. That's basically the present-value formula in the presence of risk.

If we have yet another actuarial equation, we're going to consider the value of a certain cash flow to be the integral over all possible cash flows, of the probability of the cash flows at time T times the utility of those cash flows at time T over all possible cash flows. If we take that second actuarial equation (and I'll treat the first as an actuarial equation, too, because it has certainly been in the actuarial literature a long time), that is to say, if we want to be averse to risk, we want to reflect all the possible cash flows that can emerge at time T; then you can use the first formula as a special case whenever the risk over time (whatever measure of risk you're using in the utility function, whether it's a variance load or whatever) increases from nothing at the outset to some fixed level after some period of time. You get out that classic formula in finance, okay? So we actuaries certainly would say all of this makes sense. I would think most of us would say that.

You get a problem when these cash flows are reversed. You stay with the second equation, the one leaving the probabilities and utilities; you don't get the first one out. You get a radically different formula. It doesn't look at all like the first equation.

When the cash flows are reversed, you still need to make all the risk charges, because you're saying you're a person who makes risk charges. And so you don't get this idea that Steve D'Arcy mentioned, that all you do is change the signs and you still get the same 22% return. You don't get any. If the risk-free rate of return was 7% and this was 15% in this particular set of cash flows, for the risk part of the return, you wouldn't get anything like a risk-adjusted return of 15% if you had the cash flows reversed. It would be a totally different thing if you used this second equation. But I'm going to suggest that, as actuaries, we need to be aware of this: the classic model of finance is simply a special case of actuarial science, and when that special case isn't appropriate, because the cash flows are reversed, there's a significant problem. And it can be highlighted by some questions about timing, so I'm going to now ask each of these gentlemen how they would come up with a price for a policy that's only expected to have cash flows lasting, say, a day or a week, where they're doing some kind of internal rate of return or profit-margin calculation for that short a period of time.

MR. D'ARCY: That's why you need the certainty equivalent. The Meyers-Cohn, the NCCI approach or other discounted cash-flow approaches that discount for time and uncertainty at the same time can't handle that. But if you are looking at the certainty equivalent value you can. I had one example that showed that the certainty equivalent of $100 was $95.54. That doesn't make any difference whether it happens a year from now, a month from now, or a second from now. It's still worth $95.54. Then you discount that for the time value of money. If it happens tonight, then that discount rate is very low, but you have made the adjustment for risk right there.

MR. VAN SLYKE: So your answer is you explicitly make a distinction between the risk charge or the risk adjustment and the present value at the risk-free rate of return. Is that what you're saying?

MR. D'ARCY: Yes.

MR. VAN SLYKE: That's consistent with the thoughts of the Society of Actuaries C-3 Committee on Risk. Its study was completed five or six years ago and it was just recently published in *The Record* of the Society of Actuaries. So that is on sound footing. What's your answer, Chuck?

MR. MCCLENAHAN: I take the expected cash flow and discount it at a risk-free rate of return in which everybody's dealing with a level playing field. Now each individual investor will have his or her own degree of risk aversion and his own set of alternative investments available. In a risky situation, those who have few alternatives and less risk aversion will probably view that as a positive investment. Those who are more risk averse or have more available alternatives will not view that particular transaction as being attractive. Steve and I agree on what the elements are here. Steve would try to reflect individual hurdle rates and risk aversion in the equation, and I would keep them out. Let the arithmetic drive it, and let individual investment decisions be driven by individual considerations. We don't have a dime's worth of disagreement on what the elements are.

MR. VAN SLYKE: Okay, but I want to make clear that what you two are agreeing on is that there ought to be a careful distinction between the way risk is handled and the way the time value of money is handled, time until resolution is handled.

MR. MCCLENAHAN: We can have two sets of expected value or *m(X)* in your first equation with equivalent expectations, but they will present entirely different risk-and-reward scenarios to different investors. And by trying to formulate the risk-adjusted rate of return as though it is equivalent across some kind of a hypothetical market, we're ignoring those differences and we're trying to treat the market as though it comprises of homogeneous investors when it's not.

MR. MATTHEW S. EASLEY: There was a comment earlier that the certainty equivalent would be an objective fact; in other words, there would be a certainty equivalent that would be the right answer, if you will, apart from the tastes or the preferences of the company investor. Now I'm hearing that, instead, there would be a reflection of the preferences and the risk tolerances of the individual investors. Those two statements seem to be in conflict with each other.

MR. D'ARCY: No, the second statement is correct. The first statement is not. You do not go and look up a certainty equivalent in a table and say you'll plug this in. All companies are going to have their own certainty equivalent. Let's look at it in this particular way. I decide that this particular, risky investment option is available. I ask what your certainty equivalent would be of getting involved in that. And people with very high certainty equivalents would say they're above the price that clears the market (to have enough people participating in this risky investment endeavor). They pass. The people who have a certainty equivalent that's low enough to say, "That's of value to me; I have a positive net present value by being engaged in that particular risk event," would be involved in that. So each company would have its own certainty equivalent associated with it. For large, homogeneous companies, it's probably going to be generally the same, if they had used the same assumptions going into calculating it. But the companies with a certainty equivalent that leads to a positive net present value will write the business. The ones with a certainty equivalent that is too high will refrain from writing it. The market will balance at the equilibrium point between supply and demand.

MR. MCCLENAHAN: But in practice, I would contend it will not be uniform for a large company. It will depend on a number of things, such as how many agents have I built up over the years in this market, and what kind of an investment do I have in them? How do I sell my product? If you look at the difference between how Warren Buffet can treat the property and casualty industry as opposed to State Farm, I think you'll see the inherent differences in how you might view certainty equivalent.

MR. VAN SLYKE: One important thing about the certainty equivalent or the idea of a risk charge at all was addressed by Gary Ventor in a paper in the *ASTIN Bulletin* in 1990. He applied the principal concepts of arbitrage pricing theory (APT) to the reinsurance market. He was able to demonstrate that (assuming a consistent philosophy of adjusting for risk and making a risk charge was employed), and in the absence of transaction costs (God help economists if we ever have to consider transaction costs), then the market would clear such that everybody would have the

same degree of risk aversion. In other words, if you were small and had a small ability to bear risk, you would just lay off more reinsurance. And if you were big and had a big ability to bear risk, you'd retain more yourself, but everybody would have a sense of the same mark-up in some fundamental sense in his or her policy. Small companies would not have big mark-ups and big companies would not have small ones.

MR. KAVANAGH: I wonder if I could return to the problem of a mutual company. How does a policyholder as owner get the benefit of a high rate of return?

MR. D'ARCY: In a mutual company, policyholders don't. In a reciprocal company, they would. But I think a mutual is different, because if you simply decide to not renew your policy, you've lost all your ownership rights with it.

FROM THE FLOOR: How many would pay dividends in a U.S. environment?

MR. MCCLENAHAN: You may get dividends. But even absent dividends, if you choose to renew your policy (and I can't see that the mutual concept makes any sense, absent an assumption of renewal), you benefit by the rate of return in terms of the additional protection afforded by that incremental surplus.

MR. D'ARCY: But a new policyholder has exactly the same advantage that you have built up over a period of years. A new customer walks in, gets insurance, and has the same security built up. So I don't see it as being something of value.

MR. MCCLENAHAN: Well, that's not true on average. The average existing policyholders have unpaid losses, which must be paid sometime in the future.

MR. HUGH HEDLEY SCURFIELD*: You spoke earlier about a deregulated market and what might happen and how much the cycle might shorten and deepen. Over the last four years in the U.K., where we have a deregulated market, we have seen a very deep cycle and one that's moved very quickly for a number of reasons. The claim frequency went off (theft increased), while at the same time (and this was interesting), some new direct writers were coming into the market writing direct, mostly by telephone, and were what's called cherry picking, picking good risks, leaving the traditional insurers thinking they were continuing with the same exposure. They were quietly losing the cherries, and therefore, they were seeing their experience growing worse quite quickly. Meanwhile, the cherry pickers were writing and writing profitably, demonstrably more profitably, with a lower claims ratio and now a much lower expense ratio. So the market does move and does move quite quickly in a deregulated sector.

FROM THE FLOOR: Another example of that might be Massachusetts. Most companies that are mired in the automobile insurance business there are suffering atrocious losses. However, an ex-insurance commissioner was able to start a new

*Mr. Scurfield, not a member of the sponsoring organizations, is President of the Institute of Actuaries in London, England.

company, cherry pick, and be profitable as a result of that. So knowledge of the market can give an extremely strong competitive edge.

MR. VAN SLYKE: Let me conclude with a couple of remarks about how this all fits together. I think we benefit greatly when we go back to the roots. Books such as Adam Smith's remind us to actually watch how markets work and think about why markets of buyers and sellers function successfully. Earlier, Stephen Ross referred to those roots. He also focused on the cutting-edge changes in the theory of finance that arose from one, the idea that we could learn something by considering markets at equilibrium even though they're never really in it. That simplifying assumption made by Marcowitz and others really provided a way to cut into new insights. And then later there was the APT insight. We can assume that in an equilibrium market there are no arbitrage possibilities. But Clarkson raised the idea in his paper, the first paper in the Proceedings of the AFIR Conference, that there is a coming revolution. There may or may not be. Certain well-dressed people are very skeptical about revolutions that advertise themselves. But part of that revolution (if it is coming) Clarkson says, is a focus on downside risk.

One important thing that the second actuarial formula points out is that even if the risks are deemed to be symmetrical, even if one's looking at a variance measure or something like that, if one focuses on the utility of a gain or loss, in particular with a strong disutility for loss, then one gets an asymmetrical measure back out. And I think it's very important to note that variance loads don't imply that one is neutral about gains and losses. If one is neutral about gains and losses, one gets no load at all. Variance loads arise exactly from the fact that we are averse to risk. If all of our probability distributions were normal and we were all exponential utility people—and those are obviously not accurate statements—then all of us would be variance loaders at all times. So nothing about using variance loads means we're not focusing on downside risk.

However, a lot of work is being done by John Cozzolino and others on the timing of the resolution of risk. We had some questions about that. These two gentlemen here concur that you need to find out the time at which the risk is going to resolve, and then discount back at a risk-free rate of return from there, and that is quite different from standard financial lore. So we've got some innovation right here in our stodgy people.

The C-3 Committee of the Society of Actuaries is saying that financial people need to focus on cash flows, not measures of return on the income statements and balance sheets, and that is pretty radical. We heard people here talk about cash flows.

I think all of this suggests that probability is fundamentally different from utility, which is fundamentally different from the time value of money. We might discount an inward cash flow by 10% because it is deferred for a while, or we might discount it by 10% because there's only a 90% chance we'll get it, or we might discount it by 10% because there's some chance we'll get two times it or half of it or whatever and we're risk averse. Those are three fundamentally different things. If there is to be a revolution in finance, it's going to be because people start watching all three of those things separately instead of putting them into one big equation, such as adding

some excess rate of return to the risk-free rate of return. That's just plain fuzzy thinking compared with watching these three things separately.

Finally, as all of our speakers have pointed out, underwriting a risk, taking a risk with somebody else's money, is fundamentally different from making an investment. Whether you're setting up an AMWAY distributorship and going out and selling $2,000 worth of goods with a $50 kit, or whether you're setting up an insurance company and getting $50 million from the investment community and then underwriting $100 million worth of premiums and putting all that money in one big pot to pay losses, underwriting is fundamentally different from investment. Just because an equation like the time value of money appears in an investment situation does not necessarily mean it's going to be appropriate for an underwriting situation. Indeed, percentage loads such as Chuck was talking about may be theoretically sound under some underwriting assumptions.