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## **Session 95TS**

### **Profit Measures In Pricing: Their Use And Interpretation**

**Track:** Product Development

**Instructors:** MR. NOEL J. ABKEMEIER  
MR. VRATISLAV VODRAZKA

*Summary: There are many measures of profitability in the life insurance and annuity product development process, but which are the most appropriate, and what are they telling you? Participants gain an understanding of the most reasonable measures and how they can be interpreted in various environments through an interactive discussion format.*

**MR. NOEL J. ABKEMEIER:** I'm a consultant with the Chicago office of Milliman USA, although I operate out of Williamsburg, VA. I work in the product development area on annuities.

As we continue, you will see my bias toward annuities while Vrad will give you a bias toward the life insurance side.

**MR. VRATISLAV VODRAZKA:** I'm with Transamerica Reinsurance. I've been working with AEGON for the past seven years. For five of those years I worked out of Louisville developing term, universal life (UL), whole life and some annuity products for large independent marketing companies. At Transamerica Reinsurance, I develop term and UL programs for other insurance companies.

**MR. ABKEMEIER:** The topic we're going to talk about, interpreting profit measures, is of interest to both product development actuaries and financial reporting actuaries too, because they become a link in the chain afterward.

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

How many of you come from the product development side of the house? (Approximately 75 percent of the audience.) And how about the financial reporting? (Approximately 25 percent of the audience.) Out of the life versus the annuities side, how many of you are annuity oriented? How many of you are life oriented? So the life side wins by about three to one.

In the course of our discussion, we want to look at the definition of various profit measures, and discuss a little bit what some appropriate levels are. We will also discuss how you arrive at levels and address, respectively, life insurance and annuity measures that are commonly used by companies. We will also be addressing statutory versus GAAP and a little discussion of deterministic versus stochastic approaches.

As we go through this, we'd like you to come up with any questions right in the midst of the discussion. It is listed as a teaching session, so if you ask questions in midstream it will probably help us in the teaching aspects.

We are going to go through a long list of profit measures, starting off with probably the king of profit measures, the internal rate of return (IRR), which is also referred to as return on investment (ROI). From there we'll go to its first cousin, the return on equity (ROE), which sometimes is used in pricing, but more often is used as a subsequent measure. We will also talk about profit margin, which is perhaps derived from some of these others. Profit margin perhaps is more life insurance related. Then we'll get into return on assets (ROA).

Some other measures which aren't quite profitability measures but they're looked at in the process, are namely the break even year and surplus strain. Then we will discuss some other issues, which are new on the scene, the embedded value, which for some companies, is part of their pricing considerations. Finally we will have a little discussion about risk margin percentiles, which is really pricing or profit measures on products that are stochastically priced.

The first measure, which I consider the foundation of all measures is the IRR. In it we're looking at solving for the discount rate that will give a present value of all distributable earnings equal to zero. So we're solving for the present value that is zero.

In the process, most commonly you'll start off with a negative in the first year; you will have expended money on commissions. It may be in excess of reserve allowances, and since we're generally talking about distributable earnings, you'll have made a contribution to your target surplus, which is a negative flow. Then you'll typically have positive flows after that, such that when you discount it all back, it does have a nice clean closed solution.

But there are circumstances where you will have negative flows that occur later on because perhaps as reserves are strengthening or as surrender charges disappear,

they gave you a negative flow. You may have some bullet compensation in later years, which gives you a negative flow. When we come into those situations, where there are sign changes and solutions are not as easy to find, you may have to go into some kind of alternate solution to handle these reverse flows.

One of them is so called Beckerizing of the ROI. David Becker had come up with something a number of years ago, which is, if the present value of all your future flows is negative, that portion should be discounted at the cost of funds, or your borrowing rate, as opposed to making it part of your discounting solution. Now, there are other approaches that can be used that you can find in textbooks.

In looking at the IRR, what is good about it? What is bad about it? One of the best things is it does allow you to compare various investments. As you're pricing a product, it enables you to value the cost of different changes. If you change your commission, how much does it change your IRR? If you have a target IRR, it gives you a frame of reference to figure out how much you could change your commission.

One of the key uses is that it helps insure an adequate return from your shareholder perspective. The overall picture of the IRR is guaranteeing you have the profit in the product so you can feed it ultimately into the ROE that your shareholder is looking for in the valuing of the shares of the company.

It's a fairly easily understood measure. The concept is easy to calculate. The idea that this is what kind of return you would be getting, I think, is intuitively clear to people, so in that respect it is a good measure. There are some other measures that we'll talk about later that are maybe a little easier for some people, perhaps the marketing people, to grasp and use. But in itself, IRR is fairly easy to understand.

It is close to the ROE, to the extent that your company is looking for a certain ROE. It generally works out that your ROE is going to be within 0.5 percent to one percent of your IRR. So, if you are achieving and pricing for a certain IRR goal, your financial people who are hoping for a certain ROE, can have a reasonable degree of comfort that you're on track to glide into that ROE.

Also, it can be targeted for the risk reward. That is, a company has to determine what IRR it wants. It's a very common thing for companies to calibrate their IRR goal against some kind of a risk-free return, like a ten-year Treasury plus 500 or 600 basis points. That way, if you've measured in some fashion what you feel the risk is in the business you're doing and add that risk to a risk-free rate, it gives you a target to aim for. This really pulls together the risk you're facing and the charges you're going to make for it.

On the other side of the coin, it doesn't tell you everything. It's a single number. You look at a product, it has a 12 percent IRR, you really don't know how things are

unfolding over the years. You have to look to other measures or wait to see that.

In itself, it is not a risk-adjusted number, it is a measure of what comes out. Now, the underlying target surplus can be a type of risk adjustment. But in itself, the IRR is simply an algebraic answer of what you're going to get out of your product. It is sensitive to the assumptions in any adjustment method. If you do have to do Beckerization or, as I mentioned before, if you choose some other method to handle negative flows, later on this can give you slightly different answers. Actually, the sensitivity is not very strong, but there is some sensitivity there.

Finally, and very significantly with some products, if you have very low surplus usage, you may find that you have fantastically high IRRs. It's under those circumstances that you really have to step back and ask if the IRR is telling you what you want to know or should you look at something else.

Actually, if you have a product with very little initial cost, let's say with level compensation, it doesn't have much of a strain or any strain from an operational viewpoint. Perhaps it has very, very low risk-based capital, such as a variable annuity might. Again, you see that your IRR can be astronomical and there's no money in your cigar box at the end of the day. In the most extreme cases, if you don't have any investment, you'll have an infinite IRR, which doesn't tell you anything.

**MR. VODRASZKA:** Return on equity is primarily a GAAP measure. I don't want to say it's only a GAAP measure, because I think there are some papers out there that argue that return on equity can be used for statutory and IRR can be used for GAAP. But the way we're talking about it here, it's based on GAAP. It's a pretty simple formula, GAAP income divided by GAAP equity. The ROE is a measure over a certain accounting period, so you typically would have over a year or over a period of years what your return on equity is.

Because it is done over an accounting period, you want to take an average of your beginning of period and end of period equity for your denominator. This is typically an accounting period measure, so you need some sort of a way to figure out how your ROE is going to progress throughout time. It's very difficult to just say, okay my profits on a GAAP basis were this over ten years and my equity started out this and ended at this. You can't take some sort of a simple division and say this is my return on equity, because you need to somehow discount for the present value of money. Figure out some sort of a lifetime average or production-weighted average to make those measures a little bit more meaningful.

There are some pros to using return on equity on GAAP. Using return on equity for GAAP is required by the SEC for stock companies. When stockholders look at how the company is performing, what do they look at? They look at what your return on equity is on GAAP. It tells people basically how effectively this company is utilizing their available capital.

It's a highly understood measure within the general financial community. It is probably not used as much within the insurance community, because I don't think return on equity is highly utilized by product development actuaries when pricing products.

There are also some cons of return on equity. It is more interesting for an overall portfolio view rather than product by product. I guess the way I look at this is when investors look at return on equity, they don't care whether the return on equity on your term portfolio is eight percent and your whole life portfolio is producing 30 percent. They want to know what your overall return on equity is.

It's also dependent upon the target surplus and deferred acquisition cost (DAC) amortization period. Different companies have different target surplus and typically, you use target surplus as a part of your denominator, so that's going to impact what kind of return on equity you're producing. Another issue is with the DAC amortization period. The quicker you amortize your DAC, the lower early-on ROEs might materialize.

Profit margin is a measure that is used quite heavily within life insurance. It is used when pricing new products. For profit margin, you take the present value of all future profits and divide it by the present value of your premiums.

There is some question out there as to what is the appropriate interest rate that you use to discount your profits and your premiums. Maybe we can get into that a little bit later on when we talk about the different profit measures. We can get different opinions from different people as to what they feel might be an appropriate discount rate for profit margin.

Profits can be after tax or before tax, but realistically most people are interested in after tax. But I have been in situations where we've looked at pre-tax numbers. Primarily a lot of companies won't look at distributable earnings, what basically is available to pay out to the stockholders or the policyholders when we're talking about mutual companies.

What are some of the advantages of the profit margin? It is very easy to calculate dollar profits from model projections. Noel indicated earlier, you might have certain products that have very little surplus strain. On those you're going to have some very substantial IRR. But realistically you're not making a whole lot at the end of the day.

So, what profit margin does is it says, well my profit margin might be five percent of premium. If I know what my present value of future premiums is going to be, then I should have a pretty good idea of what my dollar profit present value will be.

It's a common profit measure, which means that a lot of people understand it, a lot of people use it, and therefore, they can compare very easily from product to

product, what kind of profit measures they're materializing.

There are some disadvantages. It does not reflect the timing of profits. I know what my present value of future profits divided by present value of future premiums is, but most of my losses could be in the first five years. Then maybe more losses 20 years plus, with all of the positive profits being in between there. But this type of profit measure won't tell me that. As a result, I guess you could run into some problems down the road when all of a sudden the products are developing negative strain.

Typically, I think when you want to price, you don't want to make yourself look great by having all the profits come out early. Then when you expect to retire, all the negative values come out. So I think it's very important to look at the incidence of profits.

Surplus strain is not a profit measure, although it is recognized. Surplus strain is an important issue when you're looking at return or IRR. It doesn't matter what kind of surplus strain you have, you just need to make sure your internal rate of return is sufficient for that surplus strain.

But there are other measures we need to take a look at for surplus strain, especially for companies that might be a little bit strapped on capital. You need to look at what your surplus strain is. Look at it by product or by program and then look at which one of those might give you the best bang for the buck so that you can make proper evaluation of which programs to pursue.

Profit margin varies considerably by product. I know for life insurance I've seen targets between three to five percent of premium, which is typically an after-tax measure and based on distributable earnings. For annuities, I think it's probably a lower amount than that.

**MR. ABKEMEIER:** Vlad was commenting on profit margin, which is more commonly used on life insurance. Now I'm going to comment on ROA, which is more commonly used on annuities. Actually the profit margin perhaps is used on life insurance more because there are not necessarily a lot of assets to measure against. On annuities, it's an asset-based product and the ROA just makes a heck of a lot of sense.

In parallel to the profit margin, the discount rate is commonly the pre-tax net earnings rate that the company is realizing on the business. Again, the profits could be pre-tax or after tax. The great majority of the time it is after tax because that is what ultimately is going to show up in the bottom line. That's where the company's interest is.

Sometimes, and this is perhaps a 50/50 thing, companies may do it on a distributable earnings basis, namely bringing into the picture the contribution to

target surplus and then the release of target surplus. The denominator in the calculation is a matter of company choice.

Do you divide the profits of the year by the assets at the end of the year, discounting both of those back, or do you try to have average assets? Let's consider the beginning of the year assets, plus the end of the year, divided by two. You can do what you want, just be consistent and stick to your rules as you are applying it over time and over various products.

Again the pros are that it is easy to calculate the dollar profits from the model projections. It's an easy calculation to do to divide that by the present value of your assets. It's a very common profit measure and maybe this is a point to actually talk a little bit about why these secondary measures, profit margin and ROA, are used and that will apply to both life insurance and annuities.

On the life insurance side, how many of you use profit margin as your primary measure? How many use IRR as your primary measure? That is a little bit of a surprise, that the audience has a heavy majority on the IRR side.

**MR. VODRAZKA:** Just out of interest, how many of those that did not respond for the life side, how many of you have used something other than IRR or profit margin as your primary profit measure? We'll have to get into that later.

**FROM THE FLOOR:** I think you need to look at ROAs instead of profit margin because those are primarily investment products like you said. Profit margin is kind of meaningless. I'd rather talk about the projection period.

**MR. ABKEMEIER:** I was going to ask, on the annuity side, is the profit margin a funny number? Profit margin on life insurance is somewhat common and apparently not a primary profit measure, but the ROA on annuities is a common profit measure.

Why are these common measures? Our feeling is that they're kind of easy for people to get their hands around. It may not be the most direct measure, but it is understandable. It's the language that's used in, say, the banking industry.

If you're in an organization that includes much more than life insurance or annuities, it is good to have something that is a common measure. The profit margin fits in the same way, if you're in, say, a non-financial industry. The profit margins make sense.

Is it really logical for spread-based products? As you're pricing an annuity, your measure, your method of developing your profitability is to retain a spread off of your net investment earnings rate. The return on assets is effectively a sub-set of that. It makes a lot of sense to be measuring your profit in terms of a sub-set or a portion of what you have retained for your own financial purposes.

On the other hand, there are some things that it doesn't tell you. It does not reflect the timing of profits. Again, it's a present value of two streams, it gives you a ratio, but it doesn't tell you when the profits are coming in.

Surplus strain isn't measured in itself, although it is recognized. The surplus usage is part of your distributable earnings, so it's in there, but you really don't know how deep your use of surplus is in the first year when you're looking at this measure, which then says maybe you need some other measure to give you some insight into that.

ROA can vary a lot by product. In the annuity area, you'll see a great difference between the return on assets on a variable annuity, a market value adjusted annuity or a traditional fixed annuity. So you really have to know what you're applying it to. One size doesn't fit all.

It loses its value on low asset products. That means it's good for annuities, with their asset accumulation. It isn't good at all for term insurance. It will give you very wild and meaningless numbers. Therefore, you don't use it in that situation.

**MR. VODRAZKA:** That brings us to break-even year, which is probably the third most utilized profit measure within life insurance. This audience showed that IRR is by far the leading profit indicator and followed by profit margin. I'm guessing for break-even years, most companies do look at it, although I'll kind of go into what its there for.

What is break-even year? It's the first year when the asset share is greater than or equal to zero and the assets remain positive thereafter. You could look at it two ways. You can look at it with and without releasing reserves. The reason you would do that is if you were to be interested in what's going to happen to your surplus if all of a sudden all of your policyholders lapsed their policy. When all the policyholders lapsed their policy, you can release your reserves.

In that case, you would want to look at what your break-even year would be with releasing the reserves. Then you can also look at it with keeping the reserves, which is just kind of an idea as to, if all policies are persisting, when are you going to recover your surplus.

It's not a really true profit measure, but an indicator of surplus availability.

**MR. ABKEMEIER:** Just to comment on some of the other measures, we said they didn't give you an indication of the incidence of profitability. This is a broad-brush attempt to give you some feeling for whether you have tail-ended profits or whether they are occurring at a reasonable pattern early on in the game.

**MR. VODRAZKA:** Right, I think I already stated that it's in your interest to know how quickly the investment is being recovered from different plans. I think it's

going along the lines of what Noel was just saying, that it's an indicator of pricing errors. If you get some really odd numbers, you need to look at your incidence of profits to figure out what's causing that. It could be a pricing error or some sort of a blip in the type of product design that you have. But it provides that sort of potential red flag.

Some of the negatives are that it provides only limited value. It's a number typically for life insurance products such as whole life insurance products or term products. It could possibly range from 8 to 10 years. What does that number really mean to you? It's a good number to have in the background. If it gets out of what the expected norms are, then it gives you an indication that maybe you should take a look at your profits a little bit more closely. It should be used in conjunction with other measures for the reasons that we just stated. It's very limited and other measures tell a lot better story, like IRR and profit margin.

Next, when thinking about surplus strain, as Noel mentioned, not a lot of these profit measures really talk about surplus usage. The surplus strain is a ratio of the first year loss to premium, if single premium, or to the amount of insurance. It includes in the measure the target surplus, and again like the break-even, it's really not a true profit measure, but an indicator of surplus usage.

What are some of the advantages of looking at the surplus strain? Again, you know some companies have limited surplus to go around. You need to evaluate the different programs that the company is looking at. Surplus strain is a good way of doing that. It helps in determining the capacity for writing business. It provides sensitivity to different reserving methodologies, like regulation XXX. I know companies are using different reserving methodologies to see how to mitigate some of the impact. This would be a good way to see what the impact on your surplus might be. It also helps quantify target surplus goals.

Again, surplus, like break-even, is of limited value and should be used in conjunction with other measures. But I think it's still a valuable measure for companies to look at.

**MR. ABKEMEIER:** Something that's appearing on the scene is the embedded value. It hasn't been around much, it is not an absolute pricing measure, but I have seen clients gaining more interest in it. It may be posed in terms of, how much value this new business is bringing to us? They would like to have a large enough number to assure that the business they're getting into is worth the effort they're putting into it.

The embedded value is the discounted value of future cash flows. The key thing is your discount rate. There is a certain leveraging factor in the IRR that you're earning on the business versus the rate that you're discounting it at. You should be discounting your embedded value at the cost of capital.

If you're operating on pure shareholder returns and you're not leveraging anything, it may be that you should be discounting at the same rate as your IRR. Which says you haven't added any special value with the business you've put on. Although the business you have put on will be earning its IRR over the years, it'll be paying its keep but it won't give you any special bang for the buck or any windfall.

However, if you have a leveraged structure, perhaps you're borrowing some of your capital. If some of your cost of capital is eight percent or so and another part is pure shareholder return, your weighted average is less than the IRR you're shooting for. Therefore, when you look at the discounting of the business you put on, you can quantify it and say you have added so much embedded value to the company. You could also say you would add so much embedded value to the company, by putting on business with this pricing structure and this capital structure.

This is something which again, may not drive your pricing per se. But it begins the dialogue with your CFO as to what the new business is going to do as they look at the embedded value of the total corporate operation as the years go on.

Now I said this hasn't been real common, but embedded value has gained great popularity in Europe. To the extent that a lot of European entities have companies in the United States, that is bringing embedded value more and more on this side of the ocean. I think even companies that do not have European parents are going to be relying more and more on embedded value.

Within a company the most common usage is actually looking at the whole portfolio in force. How much more is our embedded value this year than it was last year? You'll find, by the way, that if you're looking at the marching forward of a company's business year after year, the discount rate is probably not as important as it is on new business. As you're watching business march forward, if this year's discount rate was consistent with last year's discount rate, you'll get a reasonable measure of the increase in embedded value. But when you're looking at adding a chunk of new business, there the discount rate means a lot more because you don't have this continuity issue to measure it against from the previous year.

So the advantage, again, is that it tells you what is being brought to the value of the company with a new product. It is a good macro tool, if you're looking at product alternatives, where you want to emphasize the sales or the higher growth of the couple new products you're offering. This can help you choose where to channel your energies in the process.

Just like any other pricing measure, it can tell you where there are issues that need to be addressed. If you're not adding value or somehow you're showing negative value, you know you have something to work with.

Within companies, the reason why it has some growing interest is when developing

management bonuses. They've always had management bonuses. But more and more are being based on the embedded value structure. To that extent, it becomes something of great interest to the top management. Maybe the cash register starts running in their mind as they see what embedded value this is bringing, because it ultimately comes to their benefit. It's a good incentive.

On the other hand again, the choice of the hurdle rate is very important. If you get that wrong, your answers can be very screwy. So a lot of homework has to be done on getting a proper hurdle rate, getting people to understand it and buy into it, and then you can roll forward.

Again, it is more of an annual value measure. But again, looking at it on new business is an appropriate stepping stone to flow into the annual measurement. Right now, it's not widely used by pricing actuaries. It is usually used if the CFO is behind you and looking over your shoulder and saying, "We want to know what the embedded value is." It's a secondary or an afterthought calculation. It's a valuable calculation, but it's not a profit driver in itself. It's not a profit margin developer. It's really an indicator of where the margins are.

The products we've talked about, in general, are products that are deterministically priced. You can come out with nice profit flows on them or you're pricing them to achieve a certain IRR or a certain profit margin. There are other products for which that process doesn't work real well. If you're looking at the guaranteed benefits on variable annuities, they must be stochastically priced. They are based on put option concepts.

There's a distribution from very bad news to very good. You cannot afford to price them on a mean profit basis, but rather you're running a large number of scenarios and targeting profit at a certain point.

A common situation is to look at the profitability by scenario and target your profitability at the risk tolerance level that you have. For example, the 85<sup>th</sup> percentile might be where we want to charge enough premium, such that if our experience is at the 85<sup>th</sup> percentile of bad news, that we will be breaking even on the product. If it's lower than the 85<sup>th</sup> percentile, the good news is, obviously, your profit is good. If it's beyond the 85<sup>th</sup> percentile, you're going to be taking some injury on it, but at least you'll be reasonably priced for it.

In setting the target for the pricing on these kinds of products, you do have to keep an eye on how bad the curve is at the very high percentiles. The more severe the curve into the bad cases, the higher up you're probably going to set your pricing target.

**MR. VODRAZKA:** Noel quickly discussed some of the issues as to why this is a good measure for annuities. But for life insurance, most life insurance pricing isn't done with the stochastic process. At least most companies at this time do not. We'll

get a little bit more into that later in the presentation.

There is definitely some potential for using this measure within life insurance. If you have highly lapse-supported products, a slight movement in your lapse assumptions could have a pretty drastic impact on your profits.

If you cross-subsidize, which some companies decide to do, then you have the same thing. Again, I'll point back to term insurance where it's probably most prevalent. When you look at term insurance everybody wants to make their age 45, male super preferred look the best, which means that they're typically not making very much money, if any money on that at all.

What happens if your distribution by age or by sex or whatever distribution doesn't turn out to be what you expected? That could be a pretty substantial impact on your profits. This measure might be useful in trying to put some sort of a distribution around some of these assumptions.

**MR. ABKEMEIER:** As we look at it, we really commented on the pros where you need it and for what kind of products. On the other hand, just an observation, it's not in the traditional sense a pricing measure that tells you how much you're going to make. It is a pricing measure, it's not a profit measure. It won't tell you how much you make, but it will give you a picture of what the odds are of making good profitability. It gives you the tool to establish your pricing at a point to get the odds in your favor and that over the long run, you will be getting enough revenues in to cover the distribution and mean amount of losses that you would experience.

Actually, there are cases where you do know what the profitability is. If you take a risk that is priced in this fashion, and you have determined what your premium is by setting it at a certain percentile, then are fortunate enough to set up reinsurance for it, you can take the difference between the premium you're charging and what the reinsurer is charging you. There you will have locked in what your profit is.

But that's a case where you have passed on your risk to somebody else, and you can observe what your retention is. Actually what is interesting in a number of cases, companies will price a product at a certain percentile, and come up with a premium. They reinsure it at a cost which is greater than what they're taking in. So, it's really not unusual to see a touch of loss locked in with reinsurance for some of the derivative benefits on variable products.

In doing anything with stochastic distributions, the assumptions are very, very important. For equity-based risks, what is your mean return? What is the volatility? Those items can make all the difference in the world. A lot of your homework has to go in at that point so that you don't have the garbage in, garbage out problem.

**MR. VODRAZKA:** I just want to quickly again stress the value of this by giving just a quick example. Let's say you have a product line that has a 90 percent chance

that you're going to gain \$5 million worth of profits and a 10 percent chance that you might gain only \$100,000 of profits.

All in all, that might be a pretty good program to undertake. Let's take program B where my chances are 95 percent that I'm going to get \$50 million of profits, but a five percent chance that I'm going to get \$500 million of losses. Well management might look at that a little bit more closely and say, "Maybe this is just a little bit beyond our risk tolerance." They may decide not to pursue that program, even though the expected gain is still higher.

So far we've been talking about all different kinds of measures and what drives a company, in general, and about profit as what kind of return does Wall Street want? Maybe Wall Street wants a 15 percent ROE. From there we take a step down to the IRR saying, we need an appropriate IRR to achieve the ROE that is the goal.

**MR. ABKEMEIER:** It might be that your ROE goal is 15 percent, and you might be borrowing some of your capital and therefore leveraging the returns. It might be that you conclude that a 12 percent IRR in conjunction with the leverage capital will get the ROE we're looking for. We then go down one more step to where we get to the profit margin and ROA. Why have those measures? Again, these are really aids in communication to other audiences within the company.

In talking with the marketing department, it's a lot easier to say we have priced the product with this kind of profit margin. When they say they want to match somebody else's premiums, it's a very easy thing to say we have a five percent profit margin, but if you want to match them, we're going to have to give up three percent, or we'll give up 60 percent of our profit margin. That is something that they understand, more so than if we would say we would have to take the IRR from 12 percent down to eight percent. I don't think that soaks in real well. If you've converted it into profit margin terminology, it is more understandable.

The same thing is true on the annuity side. A return on assets is something that is more understandable and it is linear. If you say that the ROA was 40 basis points and if you want to credit an extra 10 basis points, that will cost you seven basis points. After tax, you've taken your ROA from 40 basis points down to 33 basis points, that is understandable. You can see how much profit has disappeared. So I think it's an easy thing.

The main message is that some of these other measures, profit margins and ROAs, are really surrogates for the IRR and ROE aspects.

**MR. VODRAZKA:** I just wanted to say quickly that you shouldn't always assume just because you may be getting let's say a 15 percent IRR that you're going to be getting a 15 percent, or somewhere around there, for your ROE. Sometimes it really is important to look at the incidence of profits and also what your equity looks like by duration. You may start out with a 20 percent ROE in the first year and

by the end of the 15<sup>th</sup> year, you might be looking at a 10 percent ROE. Some of those considerations and how to manage that scenario need to be looked at more closely.

**MR. ABKEMEIER:** Actually, the stockholder consideration drives the whole flow. It goes from corporate ROE goals down to these other profit measures. But the appropriate level is something that you're going to have to figure out internally. What does your top management feel is necessary to meet the stockholder demands? Is it a 15 percent ROE or is there something that they feel that they can get by with on a lower basis? Competitive considerations will cause you to change things. You may have your objectives that you want to get a certain IRR. You may unfortunately find that if you're trying to get into a new market or even sometimes maintain market share, you may find yourself shaving something from your target out of expediency. You'll pay in the long run, but you may have to do it.

**MR. VODRAZKA:** Let's say there is heavy competition in the term market and a company, which wants to be somewhat competitive in the term market, has annual premium of \$50 million on their universal life, but only \$5 million on term. They may go ahead and ratchet down their IRR target for the term side knowing that it's going to take very little to get that back on the universal life side.

**MR. ABKEMEIER:** In setting up your level, you have to have one eye on solvency. You do have to know what your surplus positions are. It may be based on your evaluation of how strong your surplus is, whether you have room to give on some of the returns that you are looking for.

Another thing you need to keep an eye on is the shareholder risk. Shareholders will like predictable and good levels of return. You have to look at what degree of risk you're taking on. If you have some of the living benefits, or guaranteed benefits on variable products, you'll really want to be shooting for higher profits because there's higher volatility in your returns coming out. If there is going to be volatility, you're going to want to get higher returns to pay for that volatility.

**MR. VODRAZKA:** Again, the risk considerations are very important. I've worked with companies that have the same profit targets for different product lines. Let's say they have different term products or different universal life products, no matter what the features are, they're going to go ahead and price for let's say 15 percent ROI. But that's not always appropriate because some products are highly lapse supported. There are a lot of different moving parts that could change, and as a result, your results will ultimately vary quite substantially from what you expected.

I'll use a term product again as an example. If I go ahead and price all my ages at 14 percent ROI, and I come up with a total IRR of 14 percent, that's not bad. What if I'm aiming for 14 percent again, but some of my profits are negative, some of them are 30 percent IRR? Realistically, if I have multiple term products I shouldn't be aiming for the same target. There are different risks involved and somehow

those risks need to be quantified and implemented into your profit targets.

**MR. ABKEMEIER:** Now, not all profit goals are created equal. You really have to understand the territory that you're in. It's very common for reinsurance to be favorably priced. You should be aware of how different profitability may be on your basic product without reinsurance and with reinsurance.

Due to that difference, you probably should be bringing reinsurance into the picture, particularly on life insurance where it is more common. Bring it into the picture, right off the bat and understand what the total financial impact on the company is.

You may then want to step back as a matter of curiosity, to see where you are without reinsurance. In which case, you may find that your profit is in fact a lot lower if you are not reinsuring it.

**MR. VODRAZKA:** There are some companies out there that have always been pricing, let's say, for a five percent profit margin and that's with keeping all the risks. All of a sudden the direct insurer comes along and says that they want you to take 90 percent of the risk. Let's say it's because they want the reinsurer to deal with some of their reserve strain that they're working with, as a result of regulation XXX. They say they still want a five percent profit margin on total gross premium. Can you imagine what that's going to do to the competitiveness of that product?

People need to understand how reinsurance interplays and what kind of risk you're taking. Your profit targets really need to be consistent with the type of risk that you're taking. If you're reinsuring 90 percent of the risk, you need to make sure that your profit target is going to reflect that.

**MR. ABKEMEIER:** Another aspect in setting profit goals is what kind of leverage you have. It's not uncommon for companies to borrow 30 percent of their capital. You should understand fully where you are. The CFO and the pricing actuary should have a good understanding of what you need in the way of IRR to ultimately deliver the ROE that the CFO is looking for. That's where leverage comes into the picture.

As you're looking at the returns, what are some drivers that affect your target surplus level? Companies are commonly setting target surplus at 200-250 percent of the NAIC company action level risk based capital. If your company changes its target surplus requirements or its overall objectives, that should come into the discussion of what it's going to do go your pricing. This should be part of the dialogue with the other players in the company.

In pricing, what expenses are you bringing into the picture? Make sure you fully understand what portion of expenses is reflected. If you're using only marginal expenses rather than fully allocated expenses, the returns you're getting on an IRR basis may not fully materialize over the years as the fully allocated expenses come

into the picture. Unless you are fortunate to have grown your business enough to more efficiently utilize the expenses with the volume that you're selling.

**MR. VODRAZKA:** It probably doesn't make sense to always price on a completely marginal basis, but let's say you're trying to compete with somebody. If we're bidding somebody's business, and we know somebody else is providing very competitive bids, we might go ahead and price on a purely marginal basis. It becomes an either we get the deal or we don't get the deal type thing. If we don't get the deal, we're not going to contribute anything to our overhead. If we do get the deal, we're not going to contribute anything to our overhead either, but at least we're getting some sort of profits out of the arrangement.

**MR. ABKEMEIER:** In general, we've been talking about perhaps the total profit measures for a given product, which is a distribution of ages, maybe a distribution of underwriting classes. It is important to really look behind the picture and look at how your profitability does come out for different subsets. You need to make sure that you don't have too much subsidy from one area to another.

So, the point is, aggregate profitability is important, but looking at the parts within it is also important. Perhaps you can understand better where you want to have your distribution emphasis and what you want to protect against as far as any kind of maldistribution among categories.

**MR. VODRAZKA:** The level of cross-subsidization that you can afford all depends on what kind of risk management group that you have. You're valuing your profits year by year. If you have a pretty good plan set out in terms of here's what I'm going to be monitoring—the distribution and how mortality plays out—you should also have a certain plan of action as to what you're going to do, how you can potentially remedy or at least mitigate some of these results. Then maybe you can afford a little bit more cross-subsidization than a company that doesn't take a look at the profit in any kind of detail down the road.

**MR. ABKEMEIER:** Whatever you do, you do want to look at sensitivities. Understand the sensitive dimensions of your product and get a good feel for what happens if persistency changes by a certain amount, for example. So, again, your basic measure isn't the whole story. Learn how much you're at risk of missing what you have set up as an expectation on profitability.

**MR. VODRAZKA:** I'll just try to recap the life insurance measures that I presented. The profit margin is often primary; that's primarily for what I've seen from the companies that I've worked with through reinsurance. But maybe that was an anomaly, because from what we've seen here, based on a show of hands, IRR seems to be, by far the most popular measure.

Profit margin and IRR are probably the two main measures within term insurance and ROE is something that more companies should focus on. I think it's slowly

coming around and companies are beginning to look at that. From my experience on the reinsurance side, where we do a lot of business with offshore reinsurance, the type of accounting methodologies used offshore are very similar, even on a statutory basis, to GAAP.

Return on equity is a very important measure. However, ROE can vary. Even though your IRR might be 15 percent, your ROE may vary by duration quite a bit. It is an important measure that companies should look at a little bit more. They should especially look at it because it is what the stockholders are looking at. You want to know how companies are going to favor or disfavor your company down the road.

I think IRR really is a primary measure for universal life. Profit margin is also very important. ROE is again probably not used as much as it should be, but slowly companies are beginning to realize that it does play an important role in the company and how it is viewed externally. Those companies are beginning to incorporate that into their profit measures.

Return on assets might be considered for plans that are primarily front weighted in terms of premium. You may have a lot of single premium or a lot of first year premium-type policies where the guideline single premium might be put into a policy, so return on assets might be very useful in that type of product.

For non-participating whole life, profit margin, IRR and ROE are the primary measures. For participating whole life insurance, profit margin is the primary measure and IRR is a secondary measure.

**MR. ABKEMEIER:** For annuities, there are different products with different risk levels. I have a question for you concerning a comparison of three products. One of them is a traditional single premium, deferred annuity. The insurance company is facing a disintermediation risk. If interest rates spike, customers might take their money and run. The insurer can face some market value loss. The second product is a market value adjusted annuity, which would apply a market value adjustment in the event of people taking their money out midstream. It would try to eliminate disintermediation risk. The third product is a variable annuity where the entire investment risk is somebody else's problem. So the insurance company has washed its hands of the investment risk, and it's the customer's problem.

Now, the question is, among those three, what is the least risky product for the insurance company? Is the fixed annuity the least risk product? Does anybody feel the fixed annuity is? (No one in the audience.) Who feels that the market value adjusted annuity is the least risky of the three products? (A few audience members.) Who thinks the variable annuity is the least risky for the insurance company? (A moderate number of audience members.)

I think I disagree with the results of the vote. A strange phenomenon is that a lot of

people feel the variable annuity has reduced the insurer's risk because the investments are all in the lap of the customer and the insurer doesn't have to worry about it. But the real risk the insurer has is covering his expenses. He's paid commissions upfront. He's going to finance those out of the M&E charges that come out of the product over the years.

If the market doesn't do what you hope it does, all at once the insurer is left holding the bag, which is what we saw over the last two years. I think companies have learned that the variable annuity is perhaps maybe even the most risky. It is certainly not the least risky. The market value adjusted annuity I think would fit in the category in my judgment as being the least risky of the products. This comparison suggests some of the measures that we look at and the quantification of them.

On traditional single premium deferred annuities, typically, the insurers will have the IRR as the primary measure. The product has significant amounts of target capital. It has a moderate amount of front-end surplus need to cover commissions and so forth. There's a good foundation for an IRR development and consequently that tends to be the primary measure.

ROA is the secondary measure. It's a derivative measure. If you look at it from the pricing actuary's viewpoint, then if you get this IRR for a product with these characteristics, the ROAs should be at a certain level. So you can really translate the IRR into an appropriate ROA and then maybe use that as a language that is discussed with many audiences.

When you go to a market value adjusted annuity, it's a special kind of fixed annuity. It has the same characteristics. It has less target surplus requirement and therefore, there's less capital investment. As a result, you are going to find out when you translate into an ROA requirement, it's going to be a lower requirement than for the traditional fixed annuity, but with the same IRR.

On an equity-indexed annuity, that's a fixed annuity with a nontraditional method of crediting, the considerations about it are virtually identical to those for a single premium deferred annuity.

The variable annuity has flipped things a little bit. As insurers look at their products, it's not uncommon for an insurer to want a 12 percent IRR on the fixed and market value adjusted (MVA) products. When they got to a variable annuity, not too much is said about the IRR. Among the annuity product developers, how many of you use the ROA as a primary profit measure? (Very few audience members.) How many use the IRR as your primary profit measure? (A moderate number of audience members.) I'm surprised, not that I'm right and you're wrong or anything like that, but I'm surprised.

What I generally see is that on variable annuities, there's very little capital

allocation to it. There's a small foundation for an IRR calculation and if you do get a 12 percent IRR, there's not a whole lot of return. Make that as a secondary question then, if the IRR is your profit measure, across the board for any kind of annuity, how many of you set the IRR target for the variable annuity at the same percentage as the IRR target for other annuities? (A few audience members.)

How many of you see the target for the variable annuity at some level that's significantly higher than for the other products? (A moderate number of audience members.) Okay, there the linkage comes together. I guess what I've seen is that many companies will actually use the ROA as their variable annuity goal. They keep in the back of their minds that the ROA target is linked to an IRR, which is much higher than what you're getting on other products. That is a reflection of the fact that there is volatility in returns to the company on variable annuity and therefore, you should be getting a higher return. It has a riskier profit return profile.

If you have derivative-based benefits like guaranteed minimum death benefit, guaranteed minimum income benefit and so forth, companies aren't measuring the profitability, per se. You go to a company and if you were to ask "What is the IRR on your GMIB?" I suspect that, in general, the answer would be that they don't know and don't care. We've priced it in a fashion that we were setting the premiums at a level that we felt gave us an adequate risk margin and that's where it shall be. Wherever the return comes out, we'll let that play out. Actually, if you dug down deeply in recognizing capital requirements as they exist today, I think you probably have fairly high mean IRRs on these riders, but then you have the risk that you could have very bad situations, versus the majority of good situations.

**MR. VODRASZKA:** Statutory versus GAAP has been touched upon throughout our presentation. How do ROI and ROE relate to statutory and GAAP? It depends on the types of products that you're trying to price. But it's something that you do need to look at. How does certain IRR translate to the ROE over time, let's say, for your term product line or your universal life product line? Some of those things need to be looked at to determine what the appropriate primary profit measure should be, especially since most actuaries are looking at IRR as that measure. It would be a good idea to know what that IRR translates to in terms of ROE.

Timing of profits is important. As I discussed earlier, you know ROE is a measure over a certain accounting period, typically one-year. One ROE is not going to tell you what your incidence of profits is over a period of time. The ROE needs to be looked at over several different periods, maybe going out as far as 20 years or longer, to see what real impact it's going to have over time.

ROI is important on a statutory basis to know what kind of return you're getting. Statutory is important obviously because that determines your company's solvency and your surplus usage. So definitely look at statutory measures as important issues.

Looking at ROE is an important issue, as I discussed earlier, because that's what the company is being judged on by their investors. If the company wants easy access to capital, it has to be in very good favor with the investors by producing appropriate ROEs compared to the rest of the market out there.

**MR. ABKEMEIER:** Finally, most pricing has been performed over the years by companies on a deterministic basis, except for the derivative based benefits that have come onto the scene recently. But generally, companies have not rushed into stochastic pricing. But I think as better stochastic tools are developed and companies are getting more comfortable, there's more and more room to use stochastic evaluation on anything that you're pricing.

This leads to a question, as you're pricing a fixed annuity or life insurance product which is not derivative based, how many of you do use stochastic analysis of the profitability as part of your pricing practice? (About a half a dozen of the audience members.) How many of you are using that based on some sort of home-grown software you've developed? How many are using something like TAS or ALFA or some of the other pricing systems?

I think companies will find it of value once you get comfortable with the tools, to get more into some stochastic analysis, rather than just having a profit goal of 12 percent IRR. You can get into more complex structures. It's not that much more complex. But some companies may want to set the price so the probability of achieving the IRR goal is a certain amount. You'll be able to go across a spectrum, pick your point and that is where you want to be.

Once you do take such an approach, that gives more comfort to your CFO and other top management. It gives them a better feel for what is the risk that you're going to miss targets down the road.

It requires intensive calculations, but they get easier by the day and the year. What we do see right now is blending of things where perhaps you have a base product, which is priced on a deterministic basis, and a rider, which is based on a stochastic basis. Perhaps you're going to be moving more pricing the entire combined product on a stochastic basis because that's where the real results or the real world is.

**MR. VODRAZKA:** The interesting thing with stochastic modeling is that you have to develop different distribution assumptions for the various base assumptions of your plan. You can have potential errors within the distribution that you assume. When you bring everything together, you could multiply that error out. The value of your results may be a lot less than what you expected, so a lot of care has to be taken in terms of analyzing how your key assumptions are distributed and properly factor that into your stochastic models.

**MR. ABKEMEIER:** But before you get into full stochasticism, always do your sensitivity testing thoroughly to get some feel for how things might deviate from

the mean experience that you have in your traditional pricing.

**MR. VODRAZKA:** Depending on which assumption is tested, understand how big an impact that has. The bigger the impact, the greater the need for some sort of a plan as to how you're going to deal with such development of assumptions.

**MR. JOHN MURDZEK:** For the multi-period type of GAAP ROE measures, what would your equation look like for the present valued version of that? Would that be like your ROA?

**MR. VODRAZKA:** I have no particular theory that I subscribe to, but I'm not going to say exactly how it is that my company does it. There are different theorems out there in different interesting papers. I think there is a paper called, "Bridging the Gap Between ROE and ROI." I don't remember who the author was. It gives different theorems about how you equate ROE and IRR. I think one of the theorems had the present value of your profits when you use the IRR equal to the present value for the ROE.

So for the first year, you use your first ROE. In your denominator for your second year, you would use the first and second year denominator, and multiply those out to discount your values. So that's one of the theorems proposed, but I encourage you to look at that paper.

**MR. MURDZEK:** Okay, the reason I ask is that there are systems out there where they have a canned lifetime GAAP ROE where they simply just use a non-present valued sum of income over equity, which I don't think is of much value.

**MR. VODRAZKA:** I have seen that and I do question the value of that.

**MR. ABKEMEIER:** There is one approach that you just use the sum of the Rs over the sum of the Es. The value in that is, in a sense, it gives you a picture of the snapshot that shows up in your financials later on, if you don't have growing business. The first year, this year's business is going to show up at the same time as the second of the previous years and the third year of the previous.

So what does show up is the sum of Rs over the sum of Es in a very simple world. I've seen more than a few companies use that, although more commonly it'll be the discounted Rs over the discounted Es, as you say much analogous to the ROE.

**MR. MURDZEK:** Now, I see where you're coming from.

**FROM THE FLOOR:** In your experience, do most companies base their hurdle rate on interest rates? It seems to me in the low interest rate environment, you should have a lower hurdle rate or a lower target rate for IRR.

**MR. VODRAZKA:** That makes theoretical sense, and I would tend to agree that you

should have that. But I think a lot of people typically have hurdle rates that are usually pretty consistent throughout time, regardless of what interest rates are doing.

**MR. ABKEMEIER:** I have a little difference of opinion. I look back half a dozen years ago, I heard companies saying we want a 15 percent IRR. A couple of years ago, the most common IRR goal that I saw was about 12 percent, and I see 11 percent now. One way of getting there and one that I have seen is one that I mentioned before, like a 10-year Treasury, plus 500-600 basis points, which is a risk adjusted measure. So, as interest rates go down, that pulls this down.

**MR. VODRAZKA:** I've seen that too—the drop in IRR. In some of the cases where I have seen that, it was more of an issue of just the increased competition. As competition increases, people tend to try to lower the IRR targets so that they can become more competitive within the market. That brought a lot of decision making on the IRR that I've experienced myself, but it was not based on some sort of a formula. It was based more just off of how competition was driving the IRR.

**MR. ABKEMEIER:** What does happen when you adjust your IRR down to current conditions? That gets locked in, so you sell business this year at a 12 percent IRR. Then a couple of years from now there's an interest rate spike or interest rates are up and you're shooting for a 16 percent IRR. The business that you put on your books this year has a certain spread built into it. I think you end up living with what was in the product that you sold.

So there is a delayed response or your overall returns are going to be a reflection of the history of what the IRR goals were at the time you put business on the books.

**FROM THE FLOOR:** I'd also like to add a comment about some extra measures that we look at for market value adjusted annuities. I've heard that you can do option adjusted pricing, which is what is done in the bond world. For variable annuities, we look at the percentage of DAC outstanding at the end of the surrender charge period, as well as the DAC amortization rate as a percentage of gross profit margins.

**MR. PAUL MARGUS:** One other thing about the IRR responding to current interest rates. If portfolio rates were very high, say nine percent, then a nine percent IRR would correspond to a zero percent profit margin. Likewise, if portfolio rates were much lower, let's say six percent, then a six percent IRR would correspond to a zero percent profit margin.

When a product is profitable, it corresponds to the IRR doing better than just ordinary invested assets. There's that link. The other thing about IRR is that if you have a whole stream of book profits, you reverse the signs, and you're going to get the same IRR. The pitfall of it is that a high IRR does not prove that you're making money. It may be that the rest of the world is making 15 percent off of you.

It gets even dicier when the book profits change their signs several times because then you can get more than one possible answer.

**MR. ABKEMEIER:** Absolutely true, you have to be careful observing what the pattern is.

**MR. VODRAZKA:** The pattern of profits is very important. With the different sign changes, when you get unusual answers, it's what we discussed in the Becker ROI approach, which is a way to try to get around that. I've heard of other approaches as well that try to get around the multiple sign changes of your profit.

**MR. TODD L. LASZEWSKI:** On that question earlier of which is the least risky, let's give the people the benefit of the doubt that when they chose variable annuities. They're actually packaging those M&E charges and selling that off and reducing their risk that way.

I think it's probably worth saying that the break-even year is being used quite a bit for things like self-support testing under the illustration regulation.