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PRODUCT DEVELOPMENT IN THE AGE OF RISK-BASED CAPITAL

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Recorder: GREGORY D. JACOBS

- Traditional capital measures
- Emerging trends
- NAIC changes and how to price using them

MR. JOHN D. DAWSON: *I am going to talk about a regulatory development that may be beneficial to pricing actuaries.*

The NAIC adopted the official risk-based capital (RBC) formula at its December 1992 meeting, along with RBC reporting requirements and a model act providing insurance regulators new authority to take specific action on troubled companies. The reporting requirements become effective this year. All U.S. life insurance companies will be required to calculate and file RBC along with their statutory annual statements. The model act, which gives RBC its teeth, needs ratification by state legislatures before it becomes law. The model act has been introduced in several states, but I am not aware of any states that have actually passed the act at this time.

I am going to address some of the possible implications of RBC on pricing. I will address the basics of RBC and then offer a simplified approach for incorporating RBC into your pricing exercises. I will also offer some viewpoints on the implications of RBC on your company's growth objectives. Finally, I will have some observations on how certain product features may impact the traditional surplus strain, RBC, and something that I call a required capital infusion.

The RBC formula is a function of four risk components, commonly referred to as C-1, C-2, C-3, and C-4.

C-1 is the asset risk. It is calculated by multiplying various C-1 factors by the invested assets.

C-2 is the pricing risk. It is essentially calculated by multiplying C-2 factors by a measure of the insurance risk. For mortality products, this would be the net amount of risk. For morbidity products, like health insurance, net amount of risk is replaced by the earned premiums for active lives and claim reserves for disabled lives.

The C-3 component is the interest rate risk. Annuities do not have a C-2 component, but they do have a fairly substantial C-3 component. The C-3 component is calculated by multiplying C-3 factors by the reserve. Health products do not have a C-3 risk component in the RBC formula.

Finally, the C-4 component is the business risk. The risk is different for every company, but it is the easiest component to calculate. It is the premium revenue subject to premium taxes times 2% for life insurance or 0.5% for health insurance.

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The C-1 asset risk and the C-3 interest risk are said to be perfectly correlated. This gives us a fairly complicated formula of C-1 plus C-3 quantity squared plus C-2 squared. Take the square root of that and then add the C-4 component. This is generally going to produce an amount that will be greater than or equal to the sum of the components. If it is an annuity product, it will be equal. This is important, as I will soon bring out.

The NAIC model law also defines an amount called total adjusted capital. RBC is a threshold amount. It is the amount of surplus the regulators say that you need to have. Total adjusted capital (TAC) is the amount of surplus that you do have according to the model. It is presently calculated as the sum of total capital and surplus, plus the asset valuation reserve (AVR), plus voluntary investment reserves, plus a dividend liability, if any.

AVR is a surplus allocation that used to be part of the mandatory securities valuation reserve (MSVR). The MSVR was split into two pieces last year: AVR and the investment maintenance reserve (IMR). The IMR is not included in total adjusted capital. When you talk to your investment department, you will need to discuss asset portfolio management and its potential impact on how large IMR is expected to get. You will need to factor that into your surplus requirement assumptions.

I have assumed that we are going to follow a buy-and-hold strategy, and IMR never develops. The regulators will use RBC under the model act to identify weakly capitalized companies. I am going to use an analogy of a commercial aircraft to illustrate how this works. As pricing actuaries, we are all part of the critical flight crew of the insurance companies we serve. It is the job of the flight crew to keep that plane flying high. It is our job to participate in making sure our companies have and continue to develop adequate levels of surplus. Under the model act, regulators do not need to wait until surplus is gone before taking action. The model act makes us wave our arms a little, but essentially the act sets up four threshold levels. As long as we maintain TAC in excess of the RBC that we calculated, and the ratio of TAC to RBC is not decreasing, the model act does not call for action.

But, if TAC falls below 100% of RBC, or is less than 125%, and the trend is decreasing, your company is required to submit a comprehensive financial plan to your friendly regulator. The plan basically identifies the problem, tells what is going on, why, and what you are going to do about it. It also needs to include financial projections demonstrating that the plan will actually work.

In our airplane analogy, this is like the guy in the control tower saying, "Hey, you are getting a little close to the ground out there! What are you going to do about it?" If TAC dips a little further, we enter the regulatory action level. At this point, the guy in the control tower becomes a little bit more concerned. He says, "I am going to come out and do some analysis. When I am done, I am going to tell you what is wrong and what to do about it." The regulatory action level begins when TAC is at 75% of RBC.

If TAC falls below 50% of RBC, the situation is getting serious. At this point, the regulator can come in and take over your company. This might put a damper on all

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of the product development fun you have been having up to this point. The regulator is not required to take over at this level, but he or she can if it is deemed appropriate.

When TAC falls below 35% of RBC, this will definitely have an impact. The regulator is required to place your company under regulatory control. It is hoped that the situation can be corrected before we reach this point. That is the purpose of the model act. If this fails, your company fails, and, obviously, we want to avoid this. As a pricing actuary and a member of your company's critical flight team, what can you do to keep your company flying high? For starters, you can incorporate RBC into your pricing decisions if you already have not. Communicate your findings to the rest of the flight crew – to the rest of management. This may or may not change any of your pricing decisions, but you must know what impact your pricing philosophies and tendencies have on your ability to continue business as usual.

Factoring in RBC may take a variety of forms. It may involve the RBC formula directly, a multiple of that formula, or a more onerous target surplus formula. The most effective way to incorporate RBC into your pricing analysis and to utilize contemporary actuarial science is to use a model office that includes both assets and liabilities. How many of you got involved in cash-flow testing this last year? Quite a few. Sophisticated cash-flow modeling is fairly new for many actuaries. Several people have told me that it is going to be some time before they will feel comfortable using the cash-flow model as a decision tool. Therefore, I am going to offer a simplified approach to factoring RBC into the pricing equation.

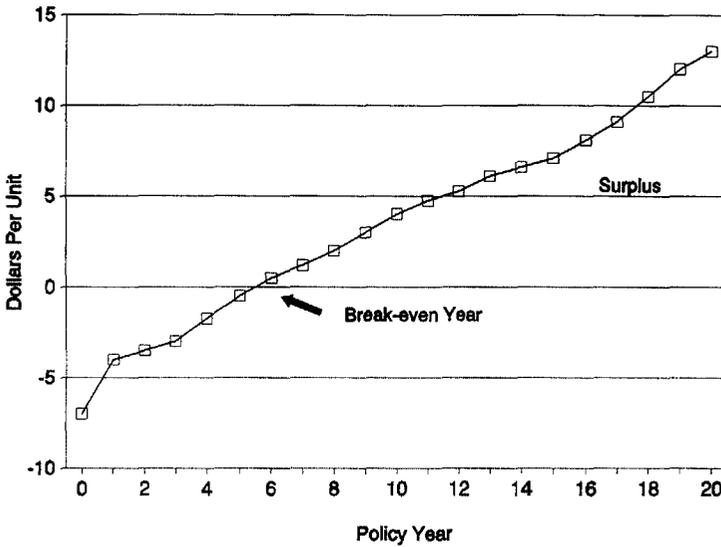
Before I do, I have a question for you. In the process of finalizing and adopting the RBC formula, it was observed that insurance companies have been restructuring their investment portfolios because of pressure being exerted by the surplus formulas that the rating agencies use. How many of you have been changing your pricing methods or philosophies in an effort to keep the rating agencies happy? Is this something that people are doing? It really does not look like it. What I am going to share may be useful to you.

I am going to show you how to incorporate RBC into the pricing of a simple universal life policy. The policy is issued to a male nonsmoker, aged 35. The death benefit is \$100 thousand. The premium is \$650, and there is no policy fee. The agent gets 90% commission in the first year and only nominal renewal commissions. This policy has a significant surplus strain, but it is probably a typical surplus strain for many life insurance policies.

I have constructed a profit test by using basic asset shared calculations. Chart 1 shows that we have a surplus strain of about \$7 immediately after issue. The policy breaks even by about year 6 and continues to be profitable thereafter. This particular pricing run has an internal rate of return of about 17%. The present value of profits over present value of premiums is about 6.7%. Is this product going to allow us to meet our required surplus? It is hard to tell without doing some more analysis.

To address this question, we first need to calculate RBC for the product. Now, what do we need for this calculation? As we saw earlier, we need to know the level of assets.

CHART 1
 Universal Life Example
 Traditional Surplus Development



We need the net amount at risk, reserves, premium revenue, and the appropriate factors. We can get the factors from the NAIC's formula. It is a fairly long formula, but the factors are there. We can get net amount of risk, reserves, and premiums from our basic asset-share runs.

We need to talk about assets a little bit more. Assets are the sum of the capital, or the cash flow from the operation, plus any capital infusion that we need to meet our surplus requirements.

If RBC were the simple sum of the four C factors, we would have a simple formula – like the one that is shown here.

$$\begin{aligned}
 \text{Capital Infusion} &= [(\text{Assets Generated}) \times (\text{C-1 Factor}) \\
 &+ (\text{Net Amount at Risk}) \times (\text{C-2 Factor}) \\
 &+ (\text{Reserve}) \times (\text{C-3 Factor}) \\
 &+ (\text{Premium Revenue}) \times (\text{C-4 Factor}) - \text{Product} \\
 &\quad \text{Surplus}] / (1 - \text{C-1 Factor})
 \end{aligned}$$

I have pulled some numbers out of my asset-share run to show you how this formula works.

$$\begin{aligned}
 \text{Capital Infusion} &= [(-1.19 \times 0.52\%) + ((1,000 - 5.92) \times 0.15\%) \\
 &\quad + (5.92 \times 0.75\%) + (6.50 \times 2\%) - (-7.00)] / (1 - 0.52\%) \\
 &= \$8.70
 \end{aligned}$$

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Immediately after issue I had a negative cash flow of \$1.19. Now, for a fairly conservative investment portfolio, I have a C-1 factor of 0.52%. Next, we calculate our net amount of risk by subtracting reserves from the units. My 0.15% is an appropriate C-2 factor for a small- to medium-sized company. The C-3 factor is equal to the reserve times 0.75%. This could be reduced to 0.5% if the valuation actuary did cash-flow testing. The C-4 factor is \$6.50 times our 2%, and then I am going to subtract off the negative surplus and divide that whole quantity by 1 minus 0.52, and I will get \$8.70. Now this formula overstates the amount of capital infusion that we actually need. It is a simple formula, but it is not completely accurate.

I have a derivation of what this formula would be if we used the official NAIC formula. Look at the RBC formula. It shows C-4 plus the square root of C-1, plus C-3 quantity squared, plus C-2 squared. I have defined all the terms. We make the observation that the assets needed for the C-1 component are really the sum of cash flow and the capital infusion.

$$RBC = P \times c_4 + \sqrt{(A \times c_1 + V \times c_3)^2 + (R \times c_2)^2}$$

where RBC = risk-based capital,
 P = premium revenue for the year,
 c_4 = the C-4 RBC component factor,
 A = invested assets,
 c_1 = the C-1 RBC component factor,
 V = the policy reserve,
 c_3 = the C-3 RBC component factor,
 R = the net amount at risk for life insurance, or earned premiums for health insurance; and
 c_2 = the C-2 RBC component factor.

I am assuming that we want our total surplus to be equal to our RBC in this case. We see that the capital infusion is really required surplus minus the surplus from the operation. So by putting these things into the formula, we get a kind of messy formula, with the capital infusion on the left and the capital infusion inside a square term and inside of a squared root term on the right. Hand this to an actuarial student, and you should get a formula back that looks like the bottom one. It is quite a bit more complicated, but it is more accurate. This formula with this data would produce a capital infusion of \$8.62. There is not much difference, but it is up to you to decide if the extra complexity is really worth the trouble. With computers, it probably is not that big of a deal to program something like this.

Assuming we want to maintain total surplus equal to risk-based capital at all times, we can determine the amount of capital infusion (CI) required as the difference between risk-based capital (RBC) and the surplus (S) generated from the insurance operation:

$$CI = RBC - S$$

where S = surplus generated from the insurance operation.

Substituting CF + CI for A, and S + CI for RBC, we obtain the following equation:

$$S+CI = P \times c_4 + \sqrt{((CF+CI) \times c_1 + V \times c_3)^2 + (R \times c_2)^2}$$

To solve for the capital infusion (CI), subtract $P \times c_4$ from both sides, square, and regroup to form a quadratic equation for the values of CI. Then the capital infusion may be determined using the well known quadratic formula:

$$CI = \frac{-b + \sqrt{b^2 - 4 \times a \times c}}{2 \times a}$$

where

$$a = 1 - c_1^2$$

$$b = 2 \times (S - P \times c_4 - CF \times c_1^2 - c_1 \times V \times c_3)$$

$$c = S^2 - 2 \times S \times P \times c_4 + P^2 \times c_4^2 - CF^2 \times c_1^2 - 2 \times CF \times C_1 \times V \times c_3 - V^2 \times c_3^2 - R^2 \times c_2^2$$

For the rest of my talk, I will use the result of this formula: the \$8.62. In this slide I have superimposed the RBC that develops (Chart 2) over the surplus that develops. You will notice a few things right away: (1) the initial surplus strain is large as compared with the initial RBC and (2) RBC decreases over time. This is the result of persistency, or lack of persistency. We also have a new break-even year. Before, our surplus poked through the zero point at around year 6. Now, we have to wait another year before it pokes through the RBC. We cannot distribute any profits from this product until the surplus is greater than RBC.

Looking at it a little differently (Chart 3), there is a line for surplus, and a line for surplus minus RBC. This last line shows what surplus would be if we held RBC simply as an additional reserve. RBC is not shown as the threshold amount that it really is, but you will get an idea of how you can incorporate it into your pricing.

We can look at the development of surplus and distributable surplus on a year-by-year basis on Chart 4. We see the larger capital infusion under RBC in the first year, and then you can see that the distributable profits are slightly more than the traditional statutory profits in renewal years. This profit stream develops a 12% return on investment, as compared with the 17% return on investment for just the traditional profits.

The most direct way to factor RBC in your pricing is to just add a new profit measure, taking into account RBC as an additional reserve.

In summary, more capital needs to be allocated to the line of business. By doing so, in our example, return on investment dropped by 500 basis points. If the additional capital was going to be sitting around collecting interest, RBC would not be a terrific concern.

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CHART 2
 Universal Life Example
 Surplus Development and Risk-Based Capital

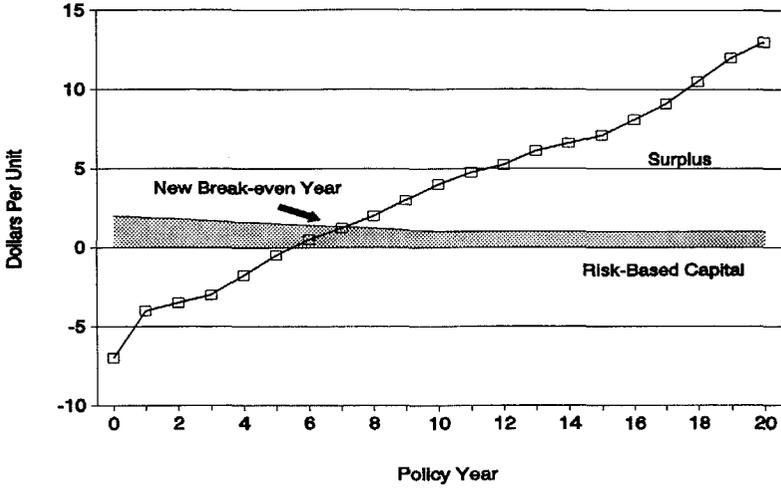


CHART 3
 Universal Life Example
 Surplus Development, Traditional and Distributable

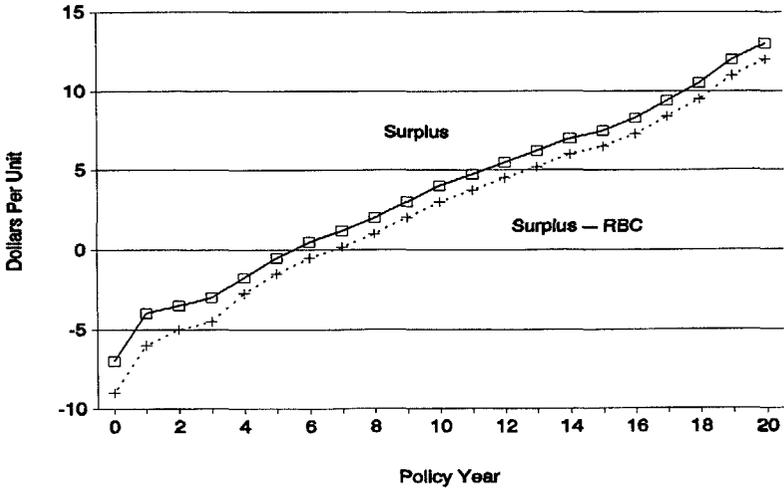
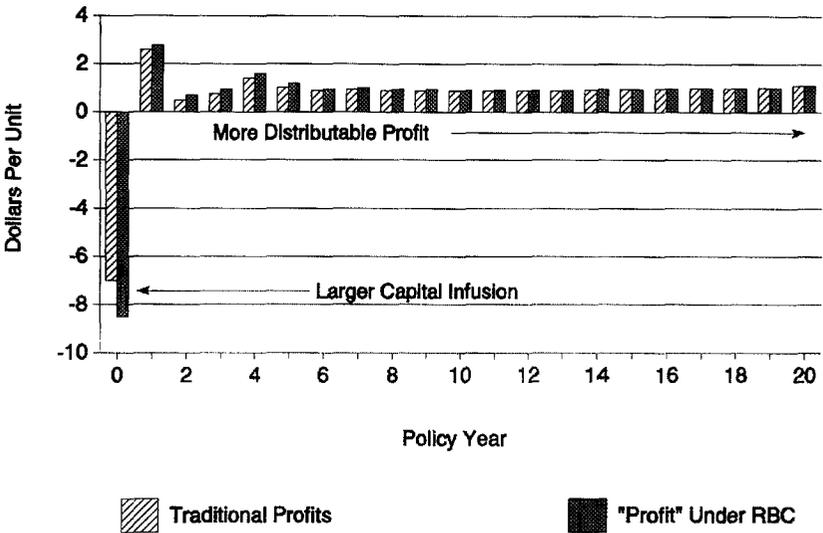


CHART 4
 Universal Life Example
 Emergence of Distributable Profit



The money is still going to be sitting around collecting interest; it just will not be excess capacity. If the capital has been earmarked for another purpose, however, RBC may have a significant impact. You are asking management to pull money out of another project so that you can provide lower returns than you did last year. This could be a tough sell.

The way that I like to approach RBC, at least until we get management thinking in terms of what this really means, is to offer some new pricing statistics to look at. Presumably, we have all been profitable in the past, so the pricing decisions that we have been making are probably appropriate. We have some new things to think about under RBC. At least this year, you might want to show these things. Maybe next year you will be using these things to make decisions. Or if you are a little further ahead, you can be using these things to make decisions this year. As we saw, we have a new break-even year: seven years instead of six years. I am defining break-even here when surplus is greater than RBC.

We have a new internal rate-of-return measure – the internal rate of return on distributable profits. You may want to look at the present value of distributable profits divided by present value of premiums. That is going to be a little bit less than the present value of statutory profits, but it probably will not be much different. You may want to look at the ratio of surplus to RBC in various years. It will be tough to really base decisions on that measure until you build some benchmark and some experience on what that means. You may want to use a model office to complement your pricing, so that you can look at return on equity under RBC. Here you can

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look at returns with and without RBC, and you can look at returns when you have RBC in the denominator – when you are paying out surplus as it emerges.

Next, I would like to talk a little bit about the implications that RBC may have on your sales objectives. One of the first things that may happen is that the old discussions of resource allocations may start all over. Everybody is going to be asking for more capital. On a company-wide basis, these discussions may lead to the conclusion that you cannot do everything that you wanted to do, or even everything that you thought that you could afford. It may have impacts on your line of business's ability to meet your sales goals. Possibly, if you are lucky, you will get the extra investment that you need. Things like return on equity and return on investment are going to become important as the company thinks about how to allocate its surplus.

To demonstrate how this works, assume that you have been given a million dollars to fund surplus this year. How much production can you afford? This is basic mathematics. You have a surplus strain of \$7 per thousand, so you divide your million dollars by seven. You find that you can afford to sell almost 143,000 units. In terms of dollars, that is \$6.50 per unit. You can almost afford to sell a million dollars worth of premium for every million dollars of assumed surplus strain capacity. But when you take RBC into account, you have to cover an extra \$1.62. When you divide your million dollars by your surplus need of \$8.62, you find that you can only afford to sell 116,000 units. So now you are only able to collect about \$750,000. Your ability to sell new business has been decreased by almost a quarter.

Your friends in the annuity area are also going to be realizing some strain, depending on whether they have surrender charges and whether they have market-value adjustments. The RBC formula is a little bit more generous, depending on the riskiness of your annuity products. Other lines of business are also going to be affected. Term products are probably going to be the most severely affected, because the C-2 risk component is relatively more severe for term products than it is for other products, as term very often does not have the great surplus strain that universal life might have.

Credit life is going to have some pain. The impact on disability income is probably going to be similar to universal life, although the makeup of a disability income RBC is really quite different.

Now, it is probably a little unrealistic to think of production in terms of "I have a million dollars to spend this year." Instead, you want to look at surplus development and production over a period of years. I have assumed that you have a million dollars to fund production – and that is all you are going to get from now on. I played around with the numbers a little bit, and decided that you could afford to sell 34,000 units this year and grow at a rate of about 17% a year and not run out of capital. As you sell more, your RBC grows. You have profits that are allowing the continued growth of your business. Obviously, I would not recommend having a sales goal that is going to bring your surplus down to the RBC level. If your projections are off just a little bit, you will be welcoming your friendly regulator in to help run your business.

Finally, I would like to talk about some product features and the impact these may have on RBC in your surplus requirements. Before I do, we need to talk about the surplus strain and what it all means.

First, let's look at RBC for our universal life example. The C-2 component really dominated the equation, accounting for over 90% of the total RBC. The other three components are small in comparison, so impacting them probably will not have a great deal of impact. It is also important to note that RBC made up less than 20% of the total capital requirement. You may want to consider implications for traditional components of surplus strain as well.

I will highlight a number of product features including graded death benefit, levelized commissions, premiums higher/lower, group product, high initial premium, and minimum cash values. The one that will probably have the greatest impact on RBC is the one that has the greatest impact on the C-2 risk. That, in my opinion, would be the graded death-benefit product. By bringing the death benefit down, you are going to be driving the C-2 risk component down, and your RBC will be decreased.

What if we increase premiums? RBC will generally be less sensitive than the surplus strain will be to premium adjustments. Increasing premiums will increase the C-4 risk component, but it will probably decrease the surplus strain by more. A high initial premium, such as a roll over, a dump in premium, or a deposit term-type product, may help reduce the C-2 component by reducing the net amount of risk. It could alleviate surplus strain, depending on how much commission is paid on that extra premium, but the C-4 component will probably increase, and there will be other implications as well. The C-1 and the C-3 components will increase, so it is tough to tell really what is going to happen with that type of product until you look at it more.

All other things equal, levelized commissions will only have a marginal impact on RBC, but they will help minimize a surplus strain. If you can get your product classified as group insurance, a few things happen. Some of the RBC factors are smaller for group insurance. And if you can get the IRS to believe that it is a group product, you can get a break on the deferred acquisition cost (DAC) tax as well. That will help keep your surplus strain low. If it is truly a group product, your surplus strain will probably be quite a bit different than it would be for an individual product.

Finally, with a minimum cash-value universal life plan, you will generally have lower premiums, so you will have a smaller C-4 component and lower reserves impacting the C-3 component in a positive way, but increasing the C-2 component. Again, you will have to look at the implications on surplus strain to get a total picture.

Reinsurance has always been a source of surplus funding. Here it can help alleviate the traditional surplus strain as well as reduce the RBC at the same time. Of course, with surplus you have to share the profits, so that requires some analysis as well.

RBC is a new tool for the regulators for identifying financially troubled companies. It was not developed for, and may not be appropriate for, use by healthy companies. Even so, it may be the first target surplus formula that many have ever really had to deal with. Now, if your company is at or near surplus capacity, you probably should consider the implications of RBC on your pricing decisions. You might think about the

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simplified approach that I offered for incorporating RBC into your pricing process. I also shared some perspectives on affordability issues under RBC, relating to your expected sales volumes.

RBC will tend to increase the amount of capital needed to support your current production levels and may cause you to rethink some of your sales goals. Finally, we examined some implications of product features relating to universal life as sort of a tickler to get you thinking about how to maximize production affordability with a limited amount of capital resource.

MR. GREGORY D. JACOBS: I do not know if everybody has had a chance to look at their company's RBC calculation. They normally look at it on the valuation side. It is complicated, and it is subject to a little bit of manipulation. I think it is absolutely imperative that the pricing actuaries start paying more attention to it. If you played with target surplus formulas in your pricing, you have had some hands-on experience. When you leave, and with what John laid the groundwork for, you will be able to price a little bit better, given what we are going to be dealing with. I can assure you, my friends, that RBC is not going to go away soon. It is going to be there, and it is going to get stronger.

I want to set the stage. Back in September, a client asked, "How should we be pricing our products, given that we are now going to be measured with RBC, specifically in dealing with rating agencies?"

We went into some industry statistics from NAIC databases. This is using year-end 1991 data; keep in mind this was in September 1992. They asked what the target level of RBC is if they were to be rated Aaa by Moody's? Moody's has not endorsed any of this. This is just factual evidence.

The top line on Table 1 is an Aaa rating. Eight companies had that as of September 1991. The average asset size was \$34.9 billion. The average RBC ratio was 137%. This is using the old way of looking at RBC: the total adjusted capital, plus MSVR, or AVR, plus half of the dividend liability, divided by the RBC calculation. I might add the RBC calculations were approximate because we did it based on NAIC data. We did not have the opportunity to go into each one of these eight companies and look at the concentration factors and all that. There were five companies in the A3 category. One was a garbage company. It was trouble. The rest were above the 100% ratio, but one really brought it down.

If you anticipate going out and becoming a Aaa Moody's company, you have to earmark your surplus. Your RBC level should be 137%. As we go through this, I will try to draw some conclusions. I will leave it to you to draw our own conclusions.

The same issue, with a bigger database, is the S&P's rating (Table 2). Again, RBC is calculating from NAIC statistics. If you look at the RBC level of the top three ratings, the lower the rating, the higher the RBC level. But I put another column up there, called average asset side. I am 98% convinced that how big you are is more important than your level of RBC. (That is just an editorial comment.)

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TABLE 1
RBC and Moody's Rating

Rating	Number of Companies	Average Assets (Billions)	Average RBC Ratio
Aaa	8	\$34.9	137%
Aa1	11	26.0	140
Aa2	18	13.5	160
Aa3	7	10.1	112
A1	15	4.7	150
A2	6	10.8	150
A3	5	14.9	67

Year-end 1991 data.

The moral of the story is: get big. Regarding S&P ratings, 51 companies are AAA-rated, the average asset size is \$12.7 billion with a 139% RBC ratio. This is close to 137%; coincidence more than anything. As you go from AAA down to A-, or AA-, RBC ratios gradually go up. Average asset size goes down. Again, size is really important. Given these statistics, what we concluded when talking with our client is, when you are pricing with a target surplus level, you may consider using something that is about 1.5 or 2 times RBC level. If you price in that arena, the rating people cannot complain about your capital level. It will be about other things.

TABLE 2
RBC and S&P's Rating

Rating	Number of Companies	Average Assets (Billions)	Average RBC Ratio
AAA	51	\$12.7	139%
AA +	38	4.2	176
AA	34	2.3	143
AA-	39	4.1	165
A +	21	6.2	100
A	8	3.9	129
A-	3	1.1	131

Year-end 1991 data.

I also noted and passed on to my client that it was very obvious there are many companies with RBC ratios of 500%, 600%, and 800%. Again, keep in mind that this data is from December 1991. RBC was still evolutionary; it was not quite where it is today.

My client and I anticipate that those companies with high RBC levels may go out and start pricing at below-RBC levels; kind of marginal RBC pricing. It is kind of like marginal expense pricing. If they are already at 400% or 500%, and the rating agencies are telling us that 1.5 or 2 times RBC is the goal, I would not be the least bit surprised if they are undercutting their pricing. I do not know if this is prudent. I am just making observations right now. Because they are pricing at below their

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target RBC levels, they can bring their 500 ratio down to where it needs to be. This is just an observation.

John did a very good job with the details. I have done enough pricing work and enough looking at RBC levels, both from the financial side, in which we help companies figure out what can be done to better RBC ratios, and also from the pricing side. When you use RBC in pricing, do not get bogged down in the formulas. Look at the big picture, get away from all the gruddy details. Look at the valuation actuary's RBC calculation as of last year-end. Come up with some big-picture averages and use those.

The bond-size factor is one of the funky things that is in the RBC formula. The theory being, if you have many bonds, presumably you have a big dispersion risk so you can bring your factor down. You ought to take your C-1 risk and multiply it by about 1.25 if you are a medium-sized company. Medium is probably anything up to about \$3 or \$4 billion. Anything over that and the size of the bond holding comes way down. You do not need to have any more fat in your RBC factor.

I am aware of a company that is in the manipulation game of RBC. The theory here is, the more bonds you have, the more dispersion risk you have. Therefore, the chance that enough of them will default to cause harm is remote. So it ranks down. Here is what it did. It had many \$100,000 bonds. This is a fairly typical bond holding for a medium-sized company. But it broke it into 100 \$1,000 bonds. Now, all of a sudden, its bond holdings went from 500 to 5,000 bonds. Do not use that in pricing. That is not cool.

The concentration factor is another funky thing that is in the C-1 component. It can just drive you crazy because of the detail. The theory is, if you are highly concentrated in a particular asset holding, you have to double that factor. Well, based on my experience (and it is nothing more than my experience), that generally means you are going to increase your C-1 factors by about 1.1-1.2. So, I guess in parting wisdom to the pricing actuaries, you ought to look at your C-1 components and multiply them by 1.1 or 1.2 to handle the concentration risk on a simple basis.

Adding the C-1/C-2/C-3 components produces a margin. John talked about it. You have seen that awful covariance formula. The marketing people whom you are going to show your pricing material to are not interested in that. They just do not want to hear it. So I have found that typically the sum of C-1 through C-4 is about 15% higher than this covariance gizmo.

You can do one of two things. You can price your product by putting C-1/C-2/C-3/C-4 in your pricing algorithm and just add them up. Why would you want to do that? Because you have some inherent margins, and pricing people like margins. Now, if they really press you, what do you do? You take the covariance, and you look like a hero. You just reduced your capital requirements by 15% by doing this covariance gizmo.

Table 3 shows some pricing results for four typical products: a single-premium deferred annuity (SPDA), universal life (UL), par whole life, and term. Some of my comments are similar to what John has already said – our observations are almost

identical. Suffice it to say, there are assumptions. I am not going to go through all that. These are reasonably competitive products. They are not the best products on the street, but they clearly can be sold by an effective marketing group.

TABLE 3
Company Impact

Products	Baseline	1 X RBC	2 X RBC
SPDA	15.7%	12.0%	10.3%
UL	15.1%	13.6%	12.5%
Par Whole Life	15.9%	14.3%	13.1%
Term	\$ 2.29	\$ 2.17	\$ 2.05

SPDA, UL, and Par whole life: ROI

Term: Present value of profits

The after-tax profit goal is a 15% return on investment (ROI) without target surplus. These guys were not quite there yet. They were just dealing with baseline profits after tax. The term product was kind of funky with the yield requirements. Because the yield rate did not make any sense, it is \$2 per thousand present value.

By introducing RBC levels into your pricing, you will see how it is going to impact the company, the consumer, the agent, and production. Table 3 shows company impact. The top three are the SPDA, UL, and par whole life, and it shows the ROI levels. The baseline is around 15% (maybe a little bit more). If you put in an RBC formula approximating one times the RBC formula in pricing, you can see that all of the ROIs drop. Not surprisingly, it drops more for the SPDA than it does for the other lines of business.

When you put in 2 times RBC, it drops even more. In John's earlier example, the 17% ROI went down to 12%. In my example, my UL 15.1 baseline yield went down to 12.5%. It is not as dramatic.

It really did not have that much of an impact on the present-value profits on the term insurance. It will on surplus strain, but the cost of setting up RBC for term insurance is not that profound in what I have seen.

Let's go back to John's question, which I thought was appropriate for his presentation. I challenge the same thing. Go to management with a goal of 15%. RBC is coming along, and you want to be AAA-rated by Standard & Poor's. You are going to have to have capital in the nature of 1.5-2 times RBC. Unless you price for that, you will have yield rates that are 200, 300, or 400 basis points less than your hurdle rate. Now, is that acceptable because interest rates have come down? I don't know; that is a discussion for another day. But clearly, somebody is going to be upset if you do not recognize this RBC issue.

Let us look at the consumer impact on the SPDA and UL products (Table 4). My consumer impact was the most visible thing: a decrease in the credited interest rate. It happened to be linear, which actually is not that surprising. If you get into the real, it is almost like partial derivatives of these little formulas that actually do turn out to be somewhat linear.

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TABLE 4
Consumer Impact

Products	1 X RBC	2 X RBC
SPDA	- 30 basis points	- 60 basis points
UL	- 40 basis points	- 80 basis points
Par Whole Life	+ \$0.45/K (1.8%)	+ \$0.95/K (3.8%)
Term	+ \$0.04/K (1.5%)	+ \$0.08/K (2.9%)

SPDA and UL: Decrease in credited rate

Par whole life and term: Increase in premium

In this example, I have a one-time RBC formula, and I am going to have to drop my credited rate to the consumer by 30 basis points. If it is 2 times, I have to drop it by 60 basis points. That is a big number. That is even recognizing the fact that I am making my spread in my studies. If you are not making your spread, it gets even worse.

We have mortality margins and other sorts of things in UL. It turns out that because of the C-2 component inside UL, I am going to have to take more out of the interest margin. Alternatively, I could have taken some out of the cost of insurance (COI) rate or increase the credited rate. In this example, I just played with the credited rate. I have to drop that 40 basis points for 1 time or 80 basis points for 2 times.

For the par and the term products, rather than trying to tear apart the dividend schedule, I just looked at a premium increase. I tried to make it simple. One times RBC for the par whole life added 45 cents per thousand. It turned out to be an increase in premium of 1.8%. For two times RBC, it is 3.8%. Those are, in my opinion, not insignificant. For term insurance, you get an increase of 1.5% for 1 times RBC and an increase of almost 3% for 2 times RBC.

I do not want to say these are reasonably palatable, but these are discussions that can take place. I do not want to say they are easy, but you can deal with these more easily. Tables 5 and 6 show that when you are sitting across the table with the marketing director, it is now really going to come home to roost.

TABLE 5
Agent Impact

Products	1 X RBC	2 X RBC
SPDA	1.3%	2.5%
UL	5.3	10.5
Par Whole Life	6.6	13.2
Term	6.4	12.8

Reduction in first-year commission rate

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TABLE 6
Production Impact

Products	Baseline	1 X RBC	2 X RBC
SPDA	2.6%	6.0%	9.3%
UL	23.6	30.1	36.6
Par Whole Life	15.2	20.1	25.0
Term	27.4	55.2	82.9

Surplus strain as a percentage of premium

For agent impact, to get the baseline profitability, I asked what number of percentage points we were going to have to drop the first-year commission to make our goal. We are going to take the entire cost of capital in the setting up of RBC out of the agents' side. This SPDA product was a 10% commission, a little bit on the heavy side. Surrender charges were ten graded down. If we go up to 2 times RBC, we are going to have to reduce the compensation 2.5%. Chances of that are slim.

For UL, we are going to have to reduce the commission 10.5% in the first year. Again, that is not trivial. Par and term are consistent. This company sells business in New York and has New York limitations on compensation, so agent compensation is capped at 50 or 55. There are some allowances and other things that are on top of it. These are not trivial impacts in my opinion. You try to get this by your agent group.

Last, impact of RBC gets into some things that John was talking about near the end of his presentation. I am showing surplus strain as a percentage of premium. The higher the strain, the less you can write if you have finite limited resources called capital. It triples for SPDA; 2.6% surplus strain, just no capital requirements. When you go to 2 times RBC, you are at 9.3%. Think about that. It is a little bit more than 3 times. If you are used to writing \$100 million of SPDA premium a month, you are going to have to cut that by a third to support your capital if you are trying to target a two-times RBC level. That is profound.

UL increases, but it is not as profound. It is not in the magnitude of 1 and 2 times. It is in the magnitude of about a 50% increase. Baseline is 23.6%, moving up to 36.6% for 2 times RBC. Par whole life is very similar. Term insurance has a tremendous dramatic impact on surplus levels – at least the strain. It goes from a 27% surplus strain all the way up to 82%. It is almost as severe as the SPDA products. For those writing a lot of term business who think that RBC is not going to hit you – it is going to hit you, believe me!

Now for my observations before we close down and try to have some conversation. Pricing with RBC has a nontrivial impact. I do not know how many times I have said that. If you are not pricing with some level of RBC in there, I guarantee your products are not performing as well as they should be. That is from a financial perspective. They are probably performing well from a marketing perspective. The problem is, RBC is going to be extremely important during the next five to ten years. It is absolutely critical that you manage your RBC as well as you can.

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Second, companies now pricing with target surplus are either marginally pricing, as I described earlier (which I hope all you are doing), or they are missing the boat. They are just flat out missing the boat.

Finally, going back to my original observation, to be at the rating level that you would like to be at (which is in the top tier of the Moody's and S&P's), it appears there is a safe harbor of sorts in the arena of 1.5-2 times RBC. I am not endorsing this by any stretch. I am just simply reporting to you what I have observed.

FROM THE FLOOR: I have a comment about the apparent anomaly of increasing the risk-based capital requirements by implying that low ROIs are acceptable and how to explain that.

If you are in a mutual company and you are looking at your ROIs as growth restraints, that also goes for stock companies in which RBC is a real restraint, it is not really an anomaly. But if you are in a stock company and you are looking at return on equity (ROE), introducing RBC obscures the relationship between ROI and ROE. Even though it would drive back ROI target, it would not necessarily drive back ROE target.

MR. DAWSON: Anytime you are required to add more assets to back your product, you have to compare your return on those assets to the return you were going to get on your product. If return on your assets is less than the return on your product, adding more assets is going to reduce your ROI or your ROE. If adding more assets is going to do otherwise, you probably should not be selling that product. You can do better by just investing the money.

MR. JACOBS: I guess I have always looked at it from a stock company point of view. I agree with your comments wholeheartedly on the mutual company side. That is just a limit on growth. You have finite resources. RBC is going to consume those resources quicker than what you are used to.

On the stock side, unless you plan to fund your businesses at appropriate RBC levels (1.5-2 times or some other higher level), what that tells me is, you are becoming a junk company. You are at the AAA level, or your target is a AAA level, and you are then able to afford AAA-type yields. Let's say 15% is the right yield for a AAA company. If you do not fund your business at the proper RBC levels, S&P's is going to say you are not doing the right job. It slides you down the curve. Now you are down in the BAAs, or whatever you want to call it. What that is going to do to your business plan is make the cost of capital go up, because now you are considered a junk company. Your rate of return is not 15% anymore. It has to be 20%.

If you look at your ROE, I think the anomaly is, you slide down the junk curve. Your cost of capital goes up. You ought to price for it appropriately in the first place at the front end. Does that make any sense?

FROM THE FLOOR: Yes. That sounds reasonable.

MR. JACOBS: Trust me. It is reasonable.

The problem is, it is tough to get 15% in the first place, much less 15% on top of these RBC formulas.

MR. PAUL H. LEFEVRE: I wanted to make a few comments from the standpoint of an annuity company. While you were going through your presentation, Greg, many things came to mind. My company is an annuity company. It has been looking at the correlation between ratings and RBC for annuity companies. It has also been looking at 1992 figures, not 1991 figures. There has been a noticeable change in the world between 1991 capital figures and the 1992 figures.

MR. JACOBS: I presume that 1992 capital figures are more well capitalized than the 1991 figures.

MR. LEFEVRE: My observation is that companies in the annuities business with a AA rating are coming in at about 250. When you look at more traditional measures of capital like a S&P leverage ratio or a straight-capital-to-assets-or-liability ratio, you find that they are low compared with companies that are in other businesses. You might find leverage ratios of companies that are under 200 and are in a broad variety of businesses, and then around 13 or 14 for an annuity company with a 200. For example, our company has an RBC ratio of 200, and yet a leverage ratio of almost 19. So the annuity companies actually have no C-2 factors. Therefore, for them you do not use the 115 for them; you use one for the covariance.

MR. JACOBS: Exactly.

MR. LEFEVRE: Another thing is the effective variable business. With a very small exception, which has to do with seed money in variable annuity funds, a variable annuity company has absolutely no respect for RBC. I believe that is going to change sometime in the near future. We were looking at one company that had almost entirely variable products with an RBC ratio of 5,200.

MR. JACOBS: Right. That is not surprising.

MR. LEFEVRE: It probably does not have an AAA plus rating. Also on pricing, and this is a good comment from the annuities side, the RBC formula, as you saw, is really not affected by asset/liability management. Whether you do or you do not. The implication is that your cash-flow testing would point out any problems, and your surplus would be reduced by extra reserves if you have it set up. I think that only happens way out on the margin. I do not think slightness measures would cause that. I think rating agents are looking at that much more. If you are pricing on an option-pricing-type basis, it is a little more difficult to take into account.

MR. JACOBS: Regarding your point about variable, I guess I should echo the same sentiments. For risk, as it currently stands, you have to have money other than the seed money, which is small relative to the big pie of assets under account. You need zero RBC to be in the variable business. For those companies that have the distribution sources and outlets to be in variable, it would seem to me that the cost of doing that business has gone down significantly with the introduction of RBC.

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Heaven knows why more companies have not migrated that way. Now, Paul's point is, if you are going to migrate that way, migrate quick and get market share. Paul's point, and I tend to agree with it, is that the NAIC is probably going to force some capital requirements on variable companies if they see a mass evacuation out of the guarantee contracts over into the variable contracts. That is still three to five years away. So for three to five years, you can move into variable nice and quietly and eliminate some of your capital requirements. It is just kind of an expensive business to do. If there are any RBC working group people here, I would be interested to hear what your thoughts.

MR. LEFEVRE: If you go too far, you do not make any money on it.

MR. JACOBS: Well, tell me. This is not to be a discussion about whether you make money in variables versus not variable. I bet that if I asked my pricing actuarial friends here, "Get real honest with yourself. Are you making the spreads that you think you are making over on your fixed-account products versus your guarantee of spread over on the variable products? Where would you rather be?" I guarantee that many would migrate to variable annuities.

FROM THE FLOOR: You mentioned that the new formula was susceptible to manipulation. Do you think companies will reorganize to reduce their RBC?

MR. JACOBS: I have been involved in at least four client projects in which the *exact* motives were to reorganize to make RBC better for the organization. This gets into an issue that is not risk based or does not even involve product development in the age or RBC; it is more like dealing with RBC. The way affiliates are handled is kind of funky. I wish I could describe it clearly, but you do not get the full benefit of having highly capitalized affiliates underneath the primary company. If you collapse them all down, not only the expense savings, assuming you can avoid New York problems, but you collapse them all down and bring them into one organization, your RBC would change just with that one little piece of paperwork. There are many lawyers' fees and all kinds of other things involved. But the fact is, I am seeing a lot of crunching down of parent/sister companies simply for RBC purposes. Personally, I expect to see more of that.

MR. DAWSON: I believe that companies will do that. I think that you probably should do that if it makes sense, but remember, the RBC formula itself is not static. As the committee moves forward, it is going to look at what happens in the industry, and it will modify the formula appropriately. If the RBC formula is hurting you, you should certainly make some changes, but you will not be able to avoid problems without keeping on top of what RBC really is doing.

MR. ROBERT C. MITCHELL: I noticed in both of your examples that you talked about the capital requirements for individual products, but you did not address the managing of the portfolio risk across product lines and how a pricing actuary would reflect the co-variance of the off-setting risk between an asset-dominated product and a C-2-dominated product. I guess from our standpoint, we try to manage on a total company basis, and the regulators are managing on total company. And I guess the sum of the pieces is much greater than what the total needs to be.

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MR. JACOBS: That is an interesting observation. I guess for the bigger companies such as yours, we have always gone in and looked at the marginal RBC effect of that particular product line. To be perfectly blunt, we could care less what the disability insurance people think. Maybe that is not appropriate. That is probably why big companies like that have corporate actuaries that try to get the guys talking, but I have never been in that situation. I would be interested in your observation that all the pricing work I have seen or been involved in has clearly been marginally focused on that line of business. It does not look at the risk attributes, or where you can get savings over on the other lines of business that maybe produces some margins. That way, the subtotal of all those produces a bit more capital than what you need, which is generally positive unless you have some serious market pressures. That is an interesting observation. I am not seeing any good decent response to that.

MR. DAWSON: I guess at the pricing actuary level, if you are responsible for one product line, it is pretty hard for you to deal with those covariances. At the corporate level, you probably can look at some of these covariances and then dictate back down to the product line a target surplus formula that may be different than RBC. For the whole corporation, each line of business will be able to produce the kind of capital that is needed so that your total adjusted capital for the company meets RBC targets.

MR. ALAN LEE STURM: My question addresses the apparent anomaly with the increasing RBC requirements. That seems to correspond to lower Moody's or Standard & Poor's ratings levels, but obviously, that would seem to indicate a problem in the formula. As you said, one of your suggestions was to just get bigger. It is possible that the eventual RBC formula will take size into account more often. Or do you think that possibly when you set target RBC levels, you should, maybe for a smaller company, target higher RBC?

MR. JACOBS: There clearly are some size gradations inside the RBC. Now, are they big enough? Well, if you think that Moody's and Standard & Poor's are doing a perfect job, the gradations clearly are not big enough. But Moody's and S&P's, as somebody brought up, do not look at formulas. NAIC people look at formulas. Those are easy to look at. Rating agencies look at management. They look at asset/liability issues. They look at market segments. They look at so many other things that the big \$34 billion companies that are top rated by Moody's are in. The group A&H, the pension business, and the direct A&H simultaneously cannot go bad, so the sum of all the risks is not needed per the RBC formula.

Now, are the RBC people going to acknowledge that somewhere down the road? I do not have a clue. It depends on how much the big companies that start getting downgraded complain, to be perfectly blunt. Equitable of New York is doing that right now about the RBC formula. Because it is complaining a lot, it may cause a change in it.

The S&P's and Moody's people that I have talked to believe what they bring to the table in their rating is quite profound, very professional, and very well done. I cannot argue with any of that. What the NAIC and this little group of actuaries has tried to do is basically circumvent their really intense detailed process by these little formulas that are at the back of the annual statement. Well, clearly it cannot be done. They

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appreciate that people are looking at RBC and capital levels, but they clearly do not appreciate the fact that guys like me are standing up here and saying, "Hey, look what they are doing. Their RBC is going down, but the rating is going up." I am sure they do not appreciate that.

MR. DAWSON: Well, there is more risk generally for a smaller company than there is for a larger company. During the process of developing the RBC formula, the formula was developed first by larger companies, and then smaller companies became involved and helped to make the formula more equitable. Still, the smaller companies tend to need to have more capital under the formula than the larger companies.

What this really points to is that smaller companies need to stay involved in managing this formula for the regulators. Get on committees and task forces that review the formula. Make sure it is appropriate for your company and for companies that are your size.

There is a tendency for larger companies to have the capacity to send actuaries to these task forces. It is more difficult for the smaller companies, but I think it is very important that they participate, too.

MR. LEFEVRE: I think some companies ought to send some nonactuaries, too.

MR. JACOBS: Yes. That is a good point.

MR. LEFEVRE: I think both the RBC formula and the IMR/AVR were very much influenced. I am not saying actuaries are bad. I used to be one.

I like the term you used earlier – managing the formula. That might not be what you meant. You mentioned Equitable as an example. If you read Equitable's annual statement, you will see it has a section on RBC and what it is going to do to improve the ratio.

MR. JACOBS: Is it management action or is it formula driven?

MR. LEFEVRE: It talks about changing the structures of its subsidiaries. It talks about using real estate investment trust (REITs) on some of its mortgage holdings.

I think all of us have done it. I know we have looked. We have seen that if we look at our top ten bonds, and if we see that some of them are slightly lower rated, we could sell off a tiny little bit of them. What influenced a big one for us was the way that seed money is treated as I mentioned earlier. If you seed it out of the general account, it hits you at 30%. If you seed it out of the separate account, it hits you at 10%. Those types of things are not manipulative.

MR. JACOBS: Yes. They are just playing within the system given to you.

MR. LEFEVRE: I do not know. I tend to believe that you can go too far the other way. I am not suggesting that the work you are inventing has done that, but if you become focused just on the RBC formula, and if you were a proxy for target surplus,

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you are going to miss something. I think many companies that were doing pricing with target surplus are finding that they are okay.

MR. JACOBS: Right. I will reecho Paul's comment. These are simply observations that a client asked. Where are the RBC levels of those highly rated companies? This is factual. It is not intended to be any more than that. But when you get many actuaries together in a room, what do they do when they leave? The next thing you know, 6,000 products will be out there in the marketplace priced at 1.75 times RBC. Do not do that. Think about it. If that turns out to be the right answer -- great! There is some statistical evidence showing that is where S&P's and Moody's are going.

Paul also said that if you look at the 1992 data, capital ratios are higher. If you look at your market segment, if you are in disability insurance (DI), if you are in annuities, if you are purely universal life, or if you are in direct response, it is all going to be a little bit different. If you focus on a big macro sort of picture like this, you may price yourself out of your own market, but you may be really well capitalized and not be able to sell the first thing.

When you are pricing products, I am about as conservative as any actuary you run into, but it does not make any sense to set up conservative reserves. One of the arguing points in the RBC at the early stages is, if a company that has been in the traditional life business since 1904 and they continue to reserve its business at the American Experience 2% Table, its reserves are awfully conservative. Does it get any break relative to a company, which prices and reserves at the edge, considering every single select factors, the highest valuation rate, the cheapest mortality rate. Do the two companies have a different RBC level? No.

The illogical conclusion, but nonetheless a conclusion of this whole thing, is to not price with conservative reserves. That is exactly not what the NAIC wanted. But, that is exactly the result. You do not get a bang for your buck by setting up conservative reserves, so if you are really trying to find those margins and pricing, do not set up conservative reserves. But do price with some sort of target surplus level.