RECORD, Volume 23, No. 3[*]

Washington Annual Meeting
October 26–29, 1997

Session 9PD
Managing Risk-Based Capital (RBC)

Track: Investment/Financial Reporting/Product Development
Key words: Financial Reporting, Reinsurance

Moderator: PERRY L. WISEBLATT
Panelists: JOSEPHINE ELIZABETH MARKS
              BRADLEY M. SMITH

Summary: RBC has become an important driver for insurance companies. In this session, the panel discusses RBC issues, including:
- *methods insurance companies can use to improve RBC ratios, including:*
    - *asset allocation strategies*
    - *risk sharing through reinsurance*
    - *product strategies*
- *adjusting asset composition to recognize RBC considerations, and*
- *future RBC developments.*

Mr. Perry L. Wiseblatt: It's important for companies to have discussions with the rating agencies they've identified as important to them and understand how the rating agencies view RBC. A company also has to understand how its shareholders view the company's capital standards. Policyholders would like companies to have as strong a capital position as possible, but they generally don't have the expertise to evaluate that, so they look to the rating agencies for guidance. Company management needs to manage the company's capital in accordance with management's business objectives, taking into account the natural tension between, on the one hand, maintaining enough capital in order to achieve its desired ratings, and also using capital in order to grow its business, achieve economies of scale, and to maximize return to shareholders. The company needs to understand which audiences are important to it and manage its capital position accordingly and in conjunction with its assets/liabilities.

At this point I'd like to ask Brad Smith, a consulting actuary with Milliman & Robertson's Dallas office, to speak on managing RBC through product management.

Mr. Bradley M. Smith: Last night's World Series, game seven, was a close game with both teams trying very hard to win, and both managers attempting to identify and exploit a competitive advantage. Last week we picked up the paper and read about the latest software wars—Microsoft packaging Windows 95 with Internet Explorer. It's obviously a critical competitive advantage if Microsoft can package them together. The government's saying, wait a minute, we don't think you can. Obviously, Microsoft's competitors don't want Microsoft to be able to do that, because it gives Microsoft a tremendous competitive advantage and it hurts the competitors.

What does this have to do with managing RBC through product portfolio management? Our industry's facing tremendous consolidation.

One of the keys to success, if you define success as continuing as a standalone operation, is working and trying to manage the limited resources that are facing the industry today. Two resources that I think are limited and critical and that are causing companies to fail are lack of capital and a lack of profitable marketing opportunities. In this presentation, I'll try to tie those together along with capital management through product portfolio management and extract some incremental profit or impute some additional competitiveness to your premiums.

Much of the work that I'm going to present was presented by Anthony Zeppatella in the June 1993 *Financial Reporter*. He wrote an excellent article that is the underpinnings of this presentation. I recommend the article highly. But, first, let's cover some basics.

$$RBC = \sqrt{(C\text{-}1 + C\text{-}3)^2 + C\text{-}2^2 + C\text{-}4 + C\text{-}0}$$

This is the RBC formula used by the NAIC. It's also the RBC formula used by A.M. Best, though the assumptions in determining C-1, C-2, C-3, and C-4 are different. C-0 in this might look strange. C-0 now is the RBC of any subsidiaries that are subject to RBC standards. The RBC of the subsidiaries that are subject to RBC used to flow into C-1, now it's a separately identified part of the formula. C-1 is asset risk; essentially, asset default risk. C-3 is interest rate risk. C-2 is pricing risk, and C-4 is general business risk. You can see that this formula creates what is commonly referred to in the industry as a co-variance between the C-1, C-2, and C-3 components.

In Mr. Zeppatella's article, he defines a factor called *R* as the ratio of the C-2 risk or the pricing risk to the sum of C-1 plus C-3 risks, R= C-2/(C-1 + C-3). The purpose of this is to identify what's insurance-related risk versus asset-related risk. This factor, essentially, when multiplied by the incremental RBC factor will give you the incremental RBC that is generated from an incremental unit of business. This is the weight associated with assets, one divided by the square root of one plus *R* squared.

$$W_A = 1/\sqrt{1+R^2})$$

Likewise, the insurance weight rating is a ratio of *R* divided by the square root of one plus *R* squared.

$$W_I = R/\sqrt{1+R^2})$$

Let's look at different companies and Company A, in this case, has an *R* factor of 0.5, that is C-2 divided by, C-1 plus C-3 is 0.5. Its weighting for insurance risk is:

$$W_I = .50/(\sqrt{1+.50^2}) = .4472$$

For the C-2 factor I've assumed that the net amount at risk is excess of $5 billion. It's incremental net amount at risk is in excess of $5 billion, so its factor is $1 per thousand. This is the company actual level factor. So if it wants to hold 225% of RBC for an incremental unit of business, the amount of RBC it would use is:

```
225% RBC factor = 2.25 x .4472 x $1.00 = $1.00
```

The basic assumption of my presentation is that people, for the most part, are going to price to be profitable; that is, they're going to attempt to identify profitable marketing opportunities and given that capital's a limited resource, they're willing to use return on investment as a pricing objective. By return on investment I mean that they're going to look at their total investment which is, essentially, after tax book profits plus change in RBC. They may or may not use the NAIC RBC formula, and that would have implications for the conclusions that draw from this presentation. But right now I want to look at the NAIC RBC formula. So, again, we're going to issue profitable business and we're going to define profitability as a return on total investment.

On the other hand, Company B's *R* factor is more asset related. It's 0.35. Its insurance weighting is:

$$W_I = .35/(\sqrt{1+.35^2}) = .3304$$

Again, I'm using a C-2 factor of $1 per thousand with a net amount at risk above $5 billion. So that a unit of $1,000 of additional coverage, essentially, if Company B is going to hold 225% RBC factor is 2.25 x .3304 x $1.00 = $.74. I'm not recommending 2.25; I'm only using that as somewhat indicative of what I've seen around the industry for pricing. I've seen 1.75, I've seen 2.5. Everybody has their own constraints.

Likewise, Company C is very asset oriented, and its incremental RBC for a unit of face amount is only 44 cents. You say, well, so what, where does this lead us? Let's take a term pricing example. The term market is probably the hottest market in the industry today. Companies are entering it because companies that entered it seven years ago made a lot of money. They've possibly been sold. It's clear that mortality has improved substantially. It's a mortality-driven market. The reinsurers are supporting this market, but many companies have hesitated to get in. And this example is going to point out a competitive advantage that a company that is very asset weighted in its RBC has over other companies. If you're an asset-weighted company, you want to consider these other markets where you're going to have a competitive advantage over the leaders in the industry. I've defined the leaders in the industry as those that issue a lot of this business and, therefore, they're going to be more insurance weighted.

Let's assume in our example that a hurdle rate, which is the minimum acceptable return on investments, is 12%. Our after-tax investment rate is 4.5%, essentially, 65% of 7. Let's take the cost of capital for an incremental unit of business from Company A versus Company C as shown in the following equations:

Company A: (.12−.045) x $1.00 = $0.075
Company C: (.12−.045) x $.44 = $0.033

Obviously, companies have different hurdle rates and different opportunity investment rates, but I'm trying to keep the variables constant to identify the differences caused by the RBC constraints. The difference between 7.5 cents and 3.3 cents is 4.2 cents. That's 4.2 cents every single year. With premiums of 50–60 cents per thousand, a 4.2 cent difference is huge. Company C is more asset oriented; it isn't issuing that much term. It has a huge competitive advantage, 4 cents per thousand.

I did say I've identified a problem. There's a potential market for a number of companies. You actually go through the database of companies. Everybody has these databases. In fact, determine R factors, determine C-1, C-2, C-3, and C-4 for each of the companies determined R factors. You'll find that the industry is overwhelmingly asset, but RBC is overwhelmingly determined on an asset-oriented basis.

There are a tremendous number of companies that have this opportunity. So from the database I searched for those with net amount at risk greater than $500 million. I wanted them at least incrementally in the life insurance business with life premium income over $100 million more than accident and health (A&H) premium. Incidentally, I'm picking on the asset-oriented companies or identifying a market for asset-oriented companies. Health insurance companies and other companies that are weighted tremendously toward insurance risk have huge opportunities. Just like we were identifying in the term market for an asset-oriented company, they have huge opportunities in asset accumulation markets, because they have a competitive advantage. It goes both ways.

If I deal with these criteria, what's the distribution of companies? Interestingly, of 131 companies there are no companies with an R factor of 1. That's because I've eliminated virtually all of the A&H companies. An R factor greater than 0.5, which is not much asset orientation, was found in only 16 companies. Between 0.35 and 0.5 are about 18 companies. I would consider that 0.35 is about the area where you're appropriately weighted between asset and insurance risks. There, in fact, you don't generate a tremendous competitive advantage by skewing your future production more to one or to the other. People think of First Colony as a term writer and you'd think it was tremendously insurance-oriented. But, in fact, it issues a tremendous amount of structured settlements, and is a very balanced company from an RBC standpoint. So about 0.35 or so is very good.

It is interesting to note the companies with an R factor of between 0.1 and 0.2. These are big companies. They have a huge competitive advantage in the issuing of term or insurance-oriented products from the RBC Formula. Then there are 30 companies with an R factor of less than 0.1 and these are also big companies. In offering term insurance, and assuming equivalent pricing objectives, they would reap somewhere in the neighborhood of 5–7 cents per thousand. That's huge.

We talked a little bit about product development and I haven't done the same example for insurance-oriented companies that could offer accumulation products, but, believe me, they're there. There's also another approach to managing RBC and you'll see many companies out there. This is the hot market. One hot market that we've talked about is the term market. The other thing that's huge right now in the

insurance industry is consolidation. Many of you would probably say, well, term insurance, the prices are too low. Well, those companies are making a lot of money. Likewise, you look at these consolidations and I think there's a session on this. I don't know if they're right or wrong. There's certainly a discontinuity in the prices that have been paid over the last 18 months from what was being paid before. Prices are very high. But let me tell you, there are many companies, and many examples.

GE Capital is a good example of this. It had a huge competitive advantage when it bought Amex Life Insurance Company. I happen to know this, because I worked on the other side of the transaction. I couldn't figure out what they were doing. I thought, well, everybody knows what the price is, knows what the values are, how can they be so much higher than us? Well, in fact, I talked to them afterwards. They essentially had a very asset-oriented company at that point in time, G&A, an annuity company. Long-term care is also asset oriented, but it's very insurance dominated. By combining those two factors, GE Capital was able to use very little incremental RBC because of the covariance of the factors working together.

Many transactions that don't seem to make economic sense really do make tremendous sense, due to this phenomenon. They're attempting to weight the RBC. Additionally, there's an opportunity through reinsurance and through acquisitions of blocks of business to utilize something that is a tremendous anomaly in all of the RBC formulas—Best's, Standard & Poor's (S&P), and the NAIC formula—and that is the use of statutory goodwill. For example, assume you purchased a block of business for $200 million. Let's say that your statutory capital and surplus is $300 million. I don't know whether those are the correct weightings. Essentially, you acquired this block of business. It didn't have any statutory capital, but you're able to establish statutory goodwill for the purchase price of the block, $200 million. That becomes not admitted to the extent that it exceeds 10% of your existing capital and surplus.

So in my example, you bought a block for $200 million. Your statutory capital and surplus is $300 million. You can put up $30 million of statutory goodwill. That $30 million gets amortized over ten years, but what actually gets amortized over ten years is the $200 million purchase price. To the extent that a piece of the original $30 million of statutory goodwill that you put up would get this amortized, it gets it replaced, but as a nonadmitted asset. You keep pumping it in, so that the $30 million stays up for, essentially, the entire ten-year period. Well, that is free capital and is counted in your adjusted capital when they're calculating the RBC for all three of those formulas.

So if you're sitting there with a company that has no statutory goodwill on its books, you are not maximizing the use of your capital. You need to go out and identify— and I'm not telling you to go and overpay for a block of business or go out into the term insurance business and underprice everybody or do something that's fundamentally not sound—those key competitive advantages that you have currently if you're going to succeed, if you're going to thrive, if you're going to overcome the limited resources that eventually catch up with all companies; that is, limited profitable marketing opportunities and limited capital and surplus.

Mr. Wiseblatt: Our next speaker is Josephine Marks. Josephine is the vice president in the Investment Department of Sun Life of Canada. She will give us a Canadian perspective of RBC and will speak on managing RBC through asset allocation.

Ms. Josephine Elisabeth Marks: As Perry said, I'm going to give you a Canadian perspective of the topic, which means I'll be talking about something called Minimum Continuing Capital and Surplus Requirements (MCCSR), which is the Canadian equivalent of RBC.

I'll discuss the similarities or differences of MCCSR to the RBC formula. I will be looking at this from the perspective of the impact on investment policy.

MCCSR is a basis that has been set by the Office of the Superintendent of Financial Institutions (OSFI) which is the Canadian regulator of all financial institutions in Canada, including all life insurance companies in Canada. OSFI has determined that the threshold level of MCCSR for every insurance company should be at least equal to 120%, so that the capital available to the company should come in at 120% of the amount determined by formula. In fact, from a practical point of view, most insurance companies are operating with capital levels significantly higher than 120%. For instance, we've had indications from one of the rating agencies that to maintain a AAA credit rating, which is what we currently enjoy, it would be expecting us to maintain our capital at a minimum of 200% of the MCCSR level. It's not a black-or-white rule. It's one of many factors rating agencies would look at. One of the issues facing the industry is that the amount of capital required varies significantly from company to company. If your capital falls below the 120% level, the premise is that the regulator would be making many visits and "helping you out" with your operation.

The MCCSR is very much formula driven. There are a series of factors that apply to different facets of your balance sheet to come up with a total dollar requirement of capital. There are four main components to the MCCSR. The first component is the asset risk or what you would refer to in actuarial terms as the C-1 risk. This broadly

represents the asset default risk or the volatility of returns. This is the one that I'll be focusing on.

The other three pieces are the mortality-morbidity risk, which is within the pricing component of the risk, or the C-2 risk. A repricing risk refers to either reinvestment risk or inappropriate pricing on renewal, so it falls somewhere between C-2 and C-3 with maybe even a little bit of C-1 in there. Last, the interest rate risk component or the mismatch risk is equivalent to the C-3 risk.

For our company the asset risk component is the bulk of the formula. It comes in at about 60% of the total MCCSR; the other factors contribute between 10% and 15% each. So within our operations, and we're very much an asset-driven organization, the control of the MCCSR through the asset risk is the key determinant for most of our life insurance business in terms of our MCCSR adjusted return.

The asset factors for MCCSR follow a geometric pattern, if you go down through the credit gradient. The factors on the left below are the factors that are applied to the book value of the different asset classes to come up with the total asset component of the MCCSR requirement. You'll see there's a 0% factor that applies to the federal bonds (Canada bonds), provincial bonds, National Housing Authority (NHA) mortgages, mortgages that are backed by the federal government and, of course, Treasury bills. Any asset that has the full backing of any government, federal or provincial, within Canada has a 0% factor and the same 0% factor would apply to other foreign government issues as well.

<div align="center">MCCSR ASSET FACTORS</div>

0%	Canada bonds, provincial bonds, NHA mortgages, T-Bills
0.25%	"AAA" Bonds
0.50%	"AA" Bonds
1.00%	"A" Bonds
2.00%	"BBB" Bonds, Residential Mortgages
4.00%	"BB" Bonds, Commercial Mortgages
7.00%	Real Estate
15.00%	Common Stock

Going down through the list, the AAA bonds are at 0.25% and then it goes geometrically through to the BBB bonds at 2%. Residential mortgages come in at the 2% factor. The BB bonds and commercial mortgages are at 4%, so the commercial mortgages are deemed to be equivalent to BB bonds. They're noninvestment grade. Further down we see real estate at 7%. I simplified the factors here. The 7% factor is for income-producing real estate. There are a few other pieces to it, but we ignore them for the purpose of this discussion. Common

stock has a factor of 15%. We'll see later on what this does to your asset mix and your investment considerations.

When you're looking at MCCSR from the investment perspective a few points come to light. First of all, because it's factor driven and the factors apply to the book value of all the assets, there's no allowance or credit given for having a diversified portfolio. Every asset has the factor applied to it on a standalone basis. The general concept whereby you create an efficient portfolio doesn't pick up any credit through the formula. So no allowance or credit is given for being well diversified or having an efficient portfolio.

There's no differentiation within the different quality bands. So what that means is that the expression, "You may as well be hung for sheep as for lamb" applies. If you're going to be in a BBB investment, you may as well be in a BBB minus, minus, minus. If all your commercial mortgages are going to be assigned a factor of 4%, you may as well pick up the most rotten, horrible commercial mortgages available, because the formula is going to assume they have a factor of 4%. Put another way, an A plus is equivalent to an A minus. There's no differentiation within the band.

There's no differentiation by term. The investment markets generally recognize that credit risk increases as the term of an asset increases, and that a 30-year asset will have higher credit risk spread than a 5-year asset. But within the formula, again, there's no differentiation. So a 5-year single A has the exact same factor as a 30-year single A.

My last point is that any issue that is backed by the government is favored over a corporate-type issue. The NHA mortgages are favored over the conventional. The provincial bonds are favored over the corporate bonds. So anything with a government guarantee, even though it may not be really as strong a credit in the world of the investment community, will come up favorably under the MCCSR formula.

What happens when you apply the MCCSR to your fixed income portfolio? There are two main things I'm looking at. For fixed income portfolio we're looking at spread. Table 1 tells us the differential in spread requirements for different asset classes. Table 2 describes this in more detail.

Let's say that you are targeting a return on capital employed of between 12–15%, which is probably the kind of range that most companies would expect to use. You have defined the capital employed to be that which falls out of your MCCSR formula. If your after tax return is 12% or 15%, you can easily gross that up to a pretax return. Table 1 uses a tax rate of 43%, which happens to correspond to the

corporate income tax rate in Canada, but you can certainly gross it up using whatever factors are relevant. In Table 1 we see our pretax return will have to range between 21–26%. For the sake of argument, we're assuming the risk-free rate of 6%, which is the amount that can be earned on the assets themselves. This leaves us with a differential of between 15–20% to be made up by the profit on the business.

TABLE 1
MCCSR—IMPACT ON SPREAD

Target ROCE:	12%	15%
Pre-Tax Return:	21	26
Risk-Free Rate:	6	6
Differential:	15%	20%

Table 2 shows that if we have an asset of a $100 and various blocks of capital set aside of $1 each or 1%, the target return on the capital is $0.26. The risk-free return is $0.06, and the spread requirement is $0.20. So on the $100 of the original asset we need 20 basis points of spread for every 1% of capital that's associated with that asset.

TABLE 2
MCCSR—IMPACT ON SPREAD
TARGET PRE-TAX RETURN=26%

Asset	Capital	Target Return	Risk-Free Return	Spread
$100	$ 1	26¢	6¢	20¢
$100	$ 2	52¢	12¢	40¢
$100	$ 3	78¢	18¢	60¢

When we look at our fixed income choices, as shown in Table 3, we're looking at provincial bonds, corporate single As, private bonds or private placements, (in this case we used BBBs), the NHA mortgages, and the conventional mortgages. The second column shows the gross spread currently available in the market. The third column shows the margins, which represents margins for investment expenses and default risk. Bear in mind that default risk still has to be taken off. The capital requirement is in addition to the margins you require to cover your default risk, which gives us the net spread shown in the fourth column.

I've highlighted the privates at 75 and the conventional mortgages at 100. So before the world of MCCSR, the business lines would have encouraged their

investment division to invest as heavily as possible in the private bonds and the conventional mortgages, subject to the usual requirements about being well diversified and sufficiently liquid and not assuming too much credit risk, but those would have been the investments of choice.

TABLE 3
SPREAD COMPARISONS

Asset Class	Gross Spread	Margins	Net Spread	MCCSR-Adjusted Spread
Provincials	25	10	15	15
Corporate "A"	50	15	35	15
Privates "BBB"	100	25	75	35
NHA Mortgages	50	25	25	25
Conv. Mortgages	150	50	100	20

After we adjust for MCCSR, recall that we have to subtract 20 basis points for every 1% of capital requirement. The corporate single As had a capital requirement of 1%, so we've taken 20 basis points off the net spread and have a MCCSR-adjusted spread now of 15. We've taken 40 basis points of spread off the BBB privates to cover cost of capital. For the conventional mortgages we've had to deduct a whopping 80 basis points to cover their cost of capital. If you recall, their capital was at the 4% level. So now the picture has shifted. Instead of the emphasis being on privates and conventional, the business unit that is being driven by an MCCSR or capital requirement will now be expecting private and NHA mortgages as part of its portfolio.

Interestingly, Table 3's numbers caused somewhat of a reality check for our management. An interesting discussion ensued, because the original premise was that we would manage our portfolio to be MCCSR efficient. Once you start looking at some of these numbers and realize how much spread you're leaving on the table, it makes you rethink the extent to which you're going to be driven by the capital requirement. But for a company that does have limitations on its capital, this would very much be the trend that you would see in terms of the asset mix.

We then said, well, maybe there's some other things we can do in our investment strategies to better work within the confines of the MCCSR requirements. Here's an example in Table 4. If you invest in conventional mortgages, recall we said the net spread was 100 basis points after allowing for default and expenses, and the cost of capital would be 80 basis points for an MCCSR-adjusted spread of 20. An alternative would be to invest in it as a private placement through a mortgage bond. You might end up giving up a little on this net spread. Here we're showing 90 basis

points net spread instead of the 100, so you have ten basis points left on the table, but your cost of capital is now—assuming you can get this rated as a BBB bond, which in our case it would have to be to allow the transaction—reduced to 40 basis points, and your MCCSR-adjusted spread has improved from 20 to 50 basis points.

TABLE 4
ALTERNATE INVESTMENT STRATEGIES

	Mortgages vs.	**Mortgage Bonds**
Net Spread	100 b.p.	90 b.p.
Cost of capital	80 b.p.	40 b.p.
MCCSR-Adjusted Spread	20 b.p.	50 b.p.
Features:	assumed to be "BB" secured by property mortgage commitment risk prepayment privileges	assigned a rating secured by property and borrower obligations spot market pricing limited optionality

What are the characteristics of these two investments? The mortgage is assumed to be a BB, regardless of the quality of the mortgage or how well it's underwritten. Whereas the mortgage bond, if the property is good and the loan is good, can be assigned a specific rating that reflects the specific nature of that mortgage. And here, as I said, we've assumed that it could be assigned a rating of BBB. Perhaps it might be assigned an even better rating. The mortgage is secured typically by property, but the mortgage bond may be secured not only by property, but also by more specific obligations of the borrower and more specific covenants on the asset. So it is, in fact, a better secured investment.

The mortgage would typically be subject to mortgage commitment risks, whereas the mortgage bond, being a private placement, might be more typically subject to spot market pricing at the time that the funds were actually committed and dispersed. And the mortgages will have more prepayment privileges, whereas the mortgage bond may have limited optionality.

A second example is the equity side (Table 5). If you recall, the equity common stock portfolio had a 15% MCCSR requirement, which translates into a 300-basis-point cost of capital. If you invest directly in equity, your return would be an indexed return, plus whatever gains you can pick up from your clever equity manager. Your cost of capital is 300 basis points. Your MCCSR-adjusted return is your index less the 300 basis points. If you go the route of equity derivatives in a

Canadian market you will give up some spread. (I think the U.S. market may be more efficient). So here we've said that perhaps your return is reduced to the index less 40 basis points. Your cost of capital, however, may be very low. For the future it would be zero and for the swaps it can be as low as ten basis points. So your MCCSR-adjusted return is, in fact, considerably improved when it's at the index less 50 basis points.

TABLE 5
ALTERNATE INVESTMENT STRATEGIES

	Direct Equity vs.	Equity Derivatives (swaps, futures)
Return	Index Plus Trading Gains	Index less 40 b.p.
Cost of Capital	300 b.p.	0–10 b.p.
MCCSR-Adjusted Return	Index less 300 b.p.	Index less 50 b.p.
Features	benefits from active management	Index performance (gains on underlying money market)

This is an interesting dilemma. In many ways it really is just exploiting the MCCSR formula, which really doesn't work all that well with derivatives. Bear in mind, the formula was first set up several years ago and derivatives have been evolving ever since. All you're really doing here is using an equity substitution strategy that really has the same risks to it as the direct equity exposure. So it's really just an exploitation of a bit of shortfall in the formula. But there are other strategies you might use that would be justified more easily as having different risk characteristics.

Here we're looking at direct equity versus an option that I've called "downside" notes or bonds with call options. There are a number of features associated with these strategies. In Canada, at least, the equity is subject to deferred accounting. The dividends flow through the income statement, but any company's gains are deferred through an amortization formula. Whereas using a bond with an option, the bond income will flow right through to the income statement.

Again, in Canada, the equity is subject to mark-to-market tax, which our government imposed on us, in which all for the realized or unrealized capital gains on your equity are subject to full income tax. Whereas, with bonds with call options, the bond income would be taxable and only the options would be mark-to-market. Although the equity will give you volatile returns, the bonds with the options will, in fact, give you downside protection. Cost of capital on the equity is 300 basis points, whereas for the bonds with the call options the capital requirement has now been reduced to something less than 20 basis points. So by

using a strategy with some limited protection inherent in it, you can significantly reduce the cost of capital associated with this type of investment.

I'd like to share with you some work we did in our organization to look at managing efficient portfolios within an MCCSR environment. We were looking at standard portfolio efficient frontiers and, for the sake of argument, we used the following, expected total returns for bonds, real estate, and stock—bonds-8%, real estate-9%, and common stock-10%. These returns were chosen because they seemed to be generally acceptable and accepted by some of our senior investment people as being reasonable numbers.

We used historical volatilities and correlations, and the first efficient frontier shows you what happens when you plot the data using these data (Chart 1). The return assumptions are shown at the top, and if you'll recall the concept of the efficient frontiers, we're plotting risk versus return, where risk is defined here as the standard deviation or volatility of results. The plot is very much as you'd expect. At the right is a portfolio of 100% stocks. It's the portfolio that gives you your highest return and your highest risk. If you're a more conservative investor and want to choose a better diversified portfolio, you might move over to one of the portfolios shown on the left. So, for instance, you might pick a portfolio of 30% bonds, 35% real estate, and 35% stocks as being a well-diversified, prudent portfolio that lies on that efficient frontier.

CHART 1
EFFICIENT FRONTIER—BONDS, REAL ESTATE, AND STOCKS
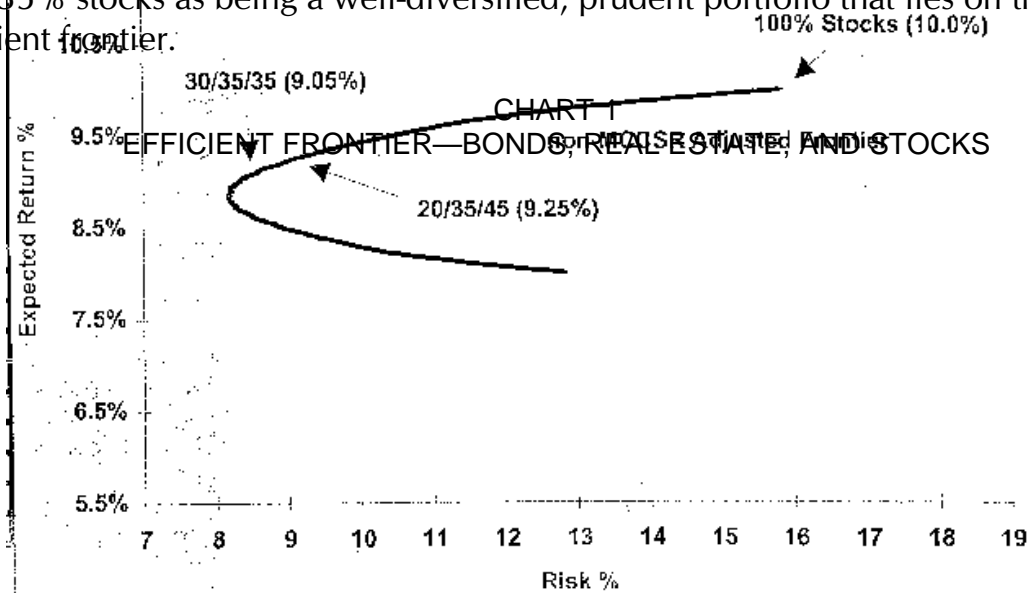
What happens when we factor in the cost of capital to the exercise? Well, two things happen as shown in Chart 2. First, the efficient frontier has shifted down. All of the returns are reduced, because the cost of capital has to be subtracted from the returns. But more interestingly, the whole graph flips over. Whereas in Chart 1 the top-right most point was the 100% stock portfolio, now that we've adjusted for MCCSR, and the highest return portfolio is 100% bonds. If you look at our well-diversified efficient portfolio that we picked over to the left, we see that we've now picked a portfolio with 50% bonds, 30% real estate, and 20% stocks. So the real estate has been reduced slightly. The equities have been reduced quite a bit, and the offset, of course, is in bonds.

CHART 2
BONDS, REAL ESTATE, AND STOCKS
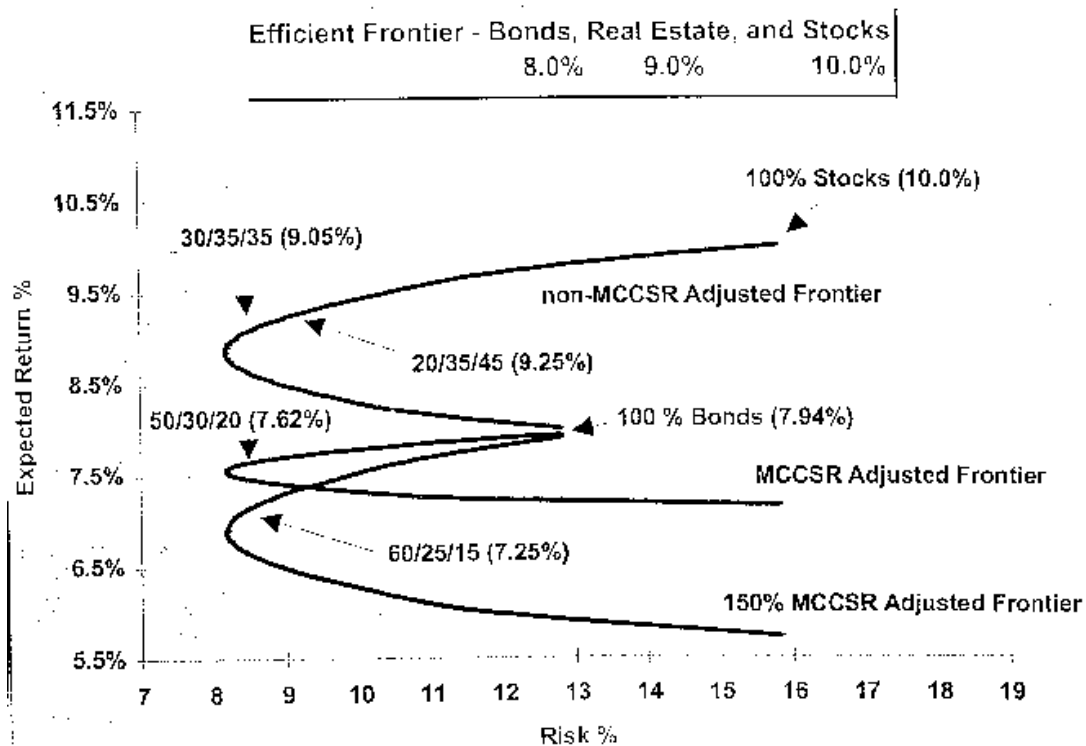
We then took this one step further, because we recalled that many insurance companies would be managing their portfolios to more than just the bare minimum of the MCCSR formula. We asked, what if you were, for instance, managing to maintain your capital to at least the 150% level of the MCCSR? As shown in Chart 2, the returns have shifted even further down, particularly for the real estate and stocks, and our efficient portfolio has been further shifted into bonds and out of the real estate and stocks.

To summarize, in Table 6, you can see the portfolio shifting. It starts out with the roughly one-third split among the three different asset classes and ends up with a

heavy emphasis on the bonds and far lesser emphasis on the equity-style investments.

TABLE 6
EFFICIENT ASSET MIX

|	**Before MCCSR**	**100% MCCSR**	**150% MCCSR**
Bonds	30%	50%	60%
Real Estate	35	30	25
Common Stock	35	20	15

Internally, we were looking at some of these numbers and the feedback from our investment people was they would never invest 30–35% in real estate. The wisdom of the investment community is that an appropriate mix for real estate is 15%. Could we work our numbers again to get 15% real estate?

To come out with the correct results, we used some slightly different return assumptions. Based on some discussions we'd had with some people about expectations, we assume 8% for bonds, 9% for real estate, and 11.5% for common stock, in this case. We still used the historical correlations, but we adjusted the volatilities for real estate to force the real estate to come out to 15% of the portfolio. Now I think there's an interesting observation here: When an investment manager chooses to put 15% and no more into real estate, he or she is implicitly assuming that the volatility for real estate is quite a bit higher than what falls out of the historical data. Considering how the market values are set for real estate, that may well be true. The underlying true volatility for real estate may well be higher than what falls out of the traditional index theories.

The other piece to this puzzle, because to make it work there had to be an offset, is that we also adjusted the volatility of the bonds, because you can't change one number without changing the other to make it all work. We said that the implied bond volatility was, in fact, considerably lower than what we were using from the index series. Again, I guess my own take is that there might be a certain wisdom to that. Historically, investment managers view bonds as being very stable and secure investments. We have a graph on the wall of our bond room that shows the actual volatility of bond markets. In the 1960s and 1970s that may well have been true; the bond markets were not very volatile. But if you look at them now, they're easily just about as volatile as the equity market. So we were using higher volatilities for real estate to force the real estate down to 15% and that forced our volatility for bonds down from the actual historical volatilities.

What we got was the following results as shown in Chart 3. The efficient portfolios are the two on the upper right. So one efficient portfolio you might select from this would be 25% bonds, 15% real estate, and 60% equity. Another slightly more conservative mix, with a lower return, would be 45% bonds, 15% real estate, and 40% equity.

CHART 3
EFFICIENT FRONTIER—BONDS, REAL ESTATE, AND EQUITY
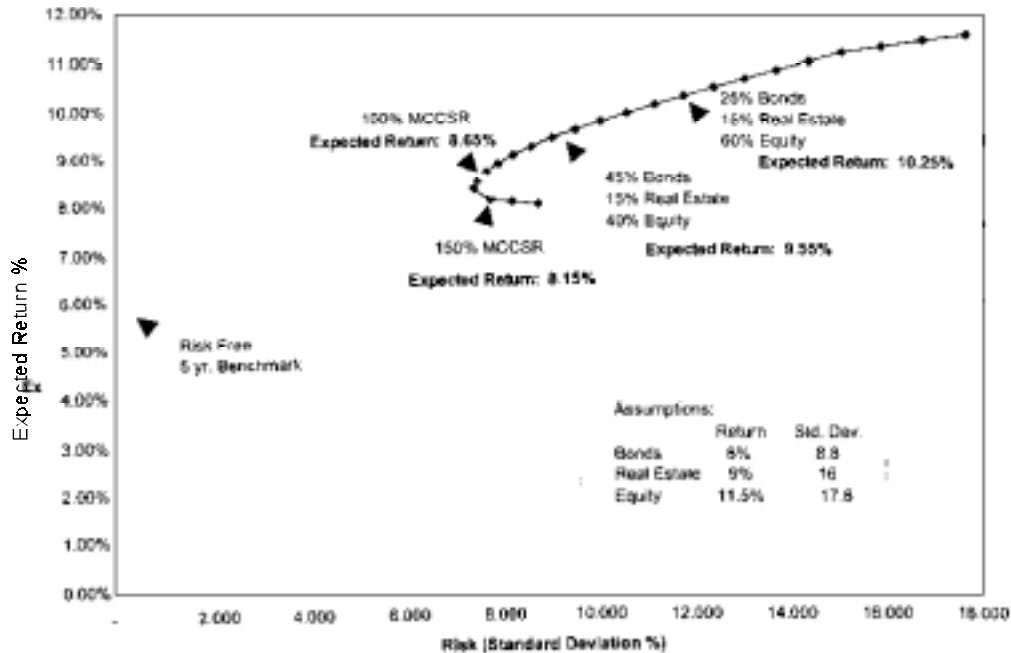
Then we said what happens if we plot our MCCSR efficient portfolios on this same chart? If you look at the squares, those are the squares off to the left. If we shift our portfolio to be the portfolio that's fully efficient under a 100% MCCSR requirement, you can see that's come right down towards the cusp of your efficient frontier. It hasn't gone too far yet, but it's certainly a far more conservative portfolio than what you might otherwise have chosen. If you go one step further and take your 150% efficient portfolio, this one has gone right around the bend. It's virtually on the most inefficient part of your frontier in a true investment context.

Table 7 shows us what happened to our asset mix as we allowed the MCCSR factor to influence our investment asset mix decision. Portfolio B might be a typical portfolio that someone might choose. Forty-five percent bonds, 15% in real estate, and 40% in stock. As we allowed the MCCSR to impact our investment decision, the bonds started to increase in the portfolio. The stocks decreased considerably

and eventually worked their way right down to zero. The real estate, interestingly, actually initially increases. Although we have the dreaded 30% real estate that our investment people would want to see, it eventually comes back down to 15% once we push the MCCSR up to 150%.

TABLE 7
EFFICIENT ASSET MIX

	Portfolio "A"	Portfolio "B"	100% MCCSR "C"	150% MCCSR "D"
Bonds	25%	45%	60%	85%
Real Estate	15	15	30	15
Common Stock	60	40	10	-

Mr. Wiseblatt: I'd like to talk to you about managing RBC through reinsurance. When we talk about managing RBC what we really mean is that we want to manage the capital level of the company relative to an RBC standard. To do that we can either manage the numerator, which is the capital level or the adjusted capital level, or we can manage the denominator, which is the RBC standard.

First, I'd like to talk about a few ways to manage RBC through the numerator, through the capital level. A company can reinsure a line of business to a reinsurer and get a ceding commission, which would be compensation for future profits. A company can also raise equity, which by definition raises the capital level. A company can purchase contingent equity. This is done more on the property and casualty side, but it works just as well for life companies, where a company would get a commitment for a future infusion of capital upon some adverse contingency. Although that doesn't raise equity today and it wouldn't raise the NAIC RBC ratio today, it does manage future results and, therefore, could possibly affect ratings positively. A company could also issue surplus notes or capital notes. Those are treated as capital. Another option a company has is to reduce the business that it writes or even eliminate writing new business—particularly in lines that are surplus intensive—and that would relieve capital pressures and thus increase capital relative to the alternatives.

Any of these could be appropriate in a given circumstance, but reinsurance has several advantages. One, it affects both the numerator and the denominator. By transferring risk to a reinsurer the company is able to reduce the risk to its books and, also, have a reduction in the RBC that the company needs to hold. Reinsurance can also allocate capital more efficiently. A company could cede business that has one level of return and use that in order to write new business that a company expects to earn a higher return.

Reinsurance is also targeted to a line or lines of business. So if a company has lines of business that are seen by audiences as problem lines, reinsurance can effectively manage those as opposed to other alternatives that still leave those lines vulnerable to attack. In addition, reinsurance can allow a company to maintain flexibility by working with one or two reinsurance partners. Reinsurance may make it easier to change directions in strategy than with other methods.

What is the value of reinsurance? Reinsurance can free up capital for a company to use either to manage the ratings of the company or to grow new business. Reinsurance can shift the low-return business to a reinsurer in order to get sub par return business off the books and, at the same time, increase the return on capital of the business that's left in the company's portfolio. Finally, reinsurance can provide a second opinion or a validation of the value of a block when dealing with the company's audiences.

On the surface, it may seem difficult to find situations in which reinsurance can free up capital. After all, the reinsurer has to earn a return on its capital. In order for reinsurance to work, the capital cost of the reinsurer, plus expenses, must be less than the value to the company of the freed-up capital. There are several situations where it is possible to manage a company's capital needs through the use of reinsurance. The first situation is when the reinsurer has more capital than it can use. In this case, the reinsurer might be willing to accept a lower return on that capital than its hurdle rate, since the alternative to the transaction would be that it would only earn its investment income rate on the capital. A second instance is when the reinsurer has a more optimistic view of future experience than the company. This could be due to a different assessment of mortality or morbidity, investment income, or expenses. Finally, reinsurance can be used to manage a company's capital when the reinsurer has different capital requirements than the company, and in particular, constructs an arrangement where its capital requirements are less than the company's requirements on that block. I am not implying that the reinsurer is undercapitalized; rather, that the reinsurer is pricing the block based on a lower level of required capital.

Many companies use a multiple of the NAIC RBC formula or a similar type of formula to measure their capital requirements. This is appropriate for many reasons, one of which is that the market sometimes compares companies on this basis. However, the NAIC RBC formula may not be a good theoretical measure of the risk of a given block of business. For one, the original purpose of RBC was so the NAIC could identify those companies that had a substantial risk of insolvency. For that purpose, the NAIC formula works rather well. However, the formula was not meant to compare two companies with healthy capital ratios and does not effectively do so. Whether or not the formula correctly measures the risk level of the industry on

average, it is not an accurate measure for all companies, and within a company, it is not an accurate measure of risk for all lines of business.

Companies have differences in their businesses that the formula can't account for. Companies have different blocks of business, different underwriting standards, different policy forms, different markets, and different distribution. For example, assume several companies have similar characteristics and similar rates, but one company has more conservative underwriting. That company's rates would then be more sufficient and, therefore, the line would need less capital than the others.

A company that writes more term may have different risk characteristics than a company that has more whole life. A company with term that has more possibility for antiselection might need more capital than other companies. A company that works with broker distribution may be more vulnerable to antiselection than a company with its own agents. A company that tries to get extra return my mismatching assets and liabilities would have more risk than a company that matches more appropriately. For two otherwise similar companies, a company with a higher per life retention may have higher risk. Finally, one of the strange characteristics of the RBC formula, a company that decides to strengthen its reserves theoretically should be able to reduce its level of additional capital, but instead, has higher RBC requirements.

There are ways to view capital in addition to the common formulas. As an example, I would like to give some insight into how the Zurich Centre Group looks at capital. We allocate capital based on the volatility of future cash flows of our business. We will look at the risk characteristics of each deal individually, and also give some consideration to the effect of adding each deal into a diversified portfolio. We assess the volatility of a deal's cash flows by modeling the deal, incorporating as many parameters as we feel appropriate to obtain a reasonable distribution of future outcomes, and running thousands of simulations. We then divide the necessary capital requirements into two pieces: risk capital and face capital.

We will determine the amount of capital that would be sufficient in a large majority of scenarios. This capital, the amount of capital truly needed to support the risks we assume, we call "At Risk Capital," or "ARC." The methodology to obtain this amount might be similar to a risk of ruin analysis or a "Value at Risk" methodology. This amount of capital, however, may not be the amount of capital that the market thinks we need. The "Market Perception Capital," as we call it, is usually measured by industry norms, which could mean the NAIC RBC formula or some other formula. The difference between the "Market Perception Capital" and the "At Risk Capital" we call the "Face Capital."

In calculating our cost of capital on a block, we take into account that the two pieces that make up the "Market Perception Capital" have completely different risk characteristics. The "At Risk Capital," the amount that we hold based on the risk of the block, is equivalent to equity, and so this amount should earn equity returns. On the other hand, the "Face Capital" is relatively risk-free capital, so we think of this capital as if we could borrow this capital. By treating it as debt-like capital, the cost is simply the negative spread on funds; the difference between the rate we earn and the cost of borrowing those funds, and we treat this difference as an expense. The total Cost of Capital is then simply a weighted-average return of the "At Risk Capital" and the "Face Capital."

To give an example of how this would work, I will assume that a given product line of Company X is earning annual profits of 80 on capital of 1000, for an annual return on capital, ignoring tax, of 8%. If a 90% quota share of the block is coinsured, Company X is left with capital of 100 and profits of 8. This in and of itself would be a good outcome for Company X. It has limited its capital that is earning a sub-par return, which increases the average return of the company and releases capital for better opportunities. However, we also assume here that the reinsurer offers a profit share of 12 back to Company X, which increases the return of the company's line from 8% to 20%. The line now has met and even exceeded the company's hurdle rate.

How was the reinsurer able to not only take the block straight up, but also offer a profit share? Well, let's assume that of the business that was ceded, the market expects the reinsurer to hold 900 capital, but the reinsurer believes that only 300 is truly necessary to support the block. This leaves 600 of "Face Capital." Suppose that the reinsurer's borrowing cost is 1% more than the interest rate earned on those funds. This leaves the reinsurer with profits of 72 minus an Experience Refund of 12, less a borrowing charge of 6, which is a profit of 54, or an 18% return on the reinsurer's "At Risk Capital." This is an example of a win-win situation for both the company and the reinsurer.

There are several other considerations that need to be looked at before entering into a reinsurance agreement. One is whether the reinsurance agreement needs to satisfy reinsurance accounting for a statutory statement or for GAAP. In order to get credit on the statutory statement you generally have to pass all the significant risks on the business being reinsured, whereas, to get GAAP accounting treatment, *Financial Accounting Standard 113* requires a reinsurer to have a reasonable probability of a significant loss.

You must consider your audiences (rating agencies, regulators, etc.) to understand whether their definition of risk transfer is based on the statutory definition or the

GAAP definition, and what they are expecting from the reinsurance arrangement. If a company is solely looking to improve Blue Blank capital levels, RBC ratios or IRIS ratios, a low risk deal that fails the GAAP definition might be appropriate. However, many rating agencies and investment analysts will discount, fully or partially, the financial effects attributed to a low risk reinsurance arrangement.

You have to decide whether to use coinsurance or other forms, such as modified co-insurance, or YRT, or stop loss and whether to have the funds withheld or transfer funds. In general, coinsurance with funds transferred produces a greater relief of RBC, but other forms can be just as good or almost as good in different circumstances. Also, you have to look at the consequences of the different forms. In particular, for funds withheld versus funds transferred, a company has to decide how comfortable it is or how important control of the investing function is.

One consideration is whether to reinsure new business versus in force. In general, if a company needs a boost to its RBC or its capital level today, it is difficult to do by reinsuring only new business. However, new business can be the way to go if a company just wants to manage the future changes in its RBC levels. There could be differences in risk characteristics between new business and in force. Also, the line of business has to be a consideration. What lines of business does the company want to reinsure? The question of using an authorized or an unauthorized reinsurer. There are several different aspects to this. For one, an unauthorized reinsurer has the requirement, and the cost, of posting security through a letter of credit or a trust. One interesting result of this requirement is that often an unauthorized reinsurer offers better security than an authorized reinsurer.

Mr. Blaine M. Barham: One question for Ms. Marks. Could you clarify a point on the NHA mortgages? You said it really didn't matter what quality the mortgage was because it was at the same rate. Did I understand that correctly?

Ms. Marks: I was actually referring to the conventional mortgage more than the NHA. The NHA being government insured, have a factor of zero. The conventional mortgages have a factor of 4%, regardless of the quality. There are exceptions. If the mortgage actually goes into default, then the factors would be different. But at the point of issue the mortgage is assumed to be at the 4% rating.

From the Floor: So you should be concerned about the quality of the mortgage if you end up in real estate.

Ms. Marks: Well, you would be concerned anyway. But within the range of the mortgages that might be all right. The other point I made—that you still have to

consider the default margin requirement in addition to the capital requirement—yes, obviously.

From the Floor: Obviously, margins are issued by the regulatory authorities, they appear to favor the investment in government bonds. What do you think?

Ms. Marks: I wouldn't care to comment. In our market the Canadian government is actually issuing many fewer bonds. It is running down its deficits and, in fact, running down the debt. So to expect that it has a hidden agenda to get us to buy more bonds wouldn't make sense, because it's just not issuing as many. I will not speak for the U.S. government. No doubt it is far more complex and sophisticated than our simple-minded Canadian government.

Mr. Frederick R. Brown, III: Perry, could you speak just a little bit more about the interest spread on the face capital and why that would be different? Also, maybe touch on the different components of RBC such as, for example, a C-2 risk versus a C-1 and C-3 risk, if a company was just taking a C-1 or C-3 risk, would it require the same return on capital as a C-2 type of risk?

From the Floor: Well, you had a different rate for the face capital as opposed to the risk capital.

Mr. Wiseblatt: The difference between the risk capital and the face capital is that the risk capital is the capital that's needed to support the liabilities. It is a minimum amount to satisfy the company's liabilities in most scenarios. That amount is equivalent to equity, so it needs equity returns. Whereas, the face capital doesn't have as much risk attached to it and, therefore, the capital does not need to earn as much. So in the example, I just assumed that there was a 1% spread between the amount that capital could be borrowed at as opposed to what it was invested in.

In terms of the different components of risk, if a company was weighted towards C-1 and C-3 risk versus C-2 risk, and the company was targeting the NAIC RBC formula, then it wouldn't have as much a necessity to reinsure a product that was a C-2 product, because it wouldn't make as much difference in the returns. However, that may not be the case for all lines. One product may still be producing a sub participating return even with the covariance formula of the NAIC.

From the Floor: Brad, as you investigated this leveraging of asset risk versus insurance risk, how did you factor in the S&P model and the fact that it does not have covariance in its analysis?

Mr. Smith: S&P doesn't have covariance, obviously. The formula, I think, is adjusted capital minus C-1 over C-2, C-3, C-4, so you don't have that same opportunity. Typically, companies are managing at a level of S&P risk and NAIC risk, if they're looking at them both. What we found is the S&P risk has resulted in a number that's a little bit less than what the NAIC number would be. So it would be a downside limitation on the leveraging of the risk. But you're absolutely right. If you don't have the type of formula that NAIC does, you don't have any covariance, and you don't have any opportunity there.

From the Floor: I guess you had used one standard deviation in your efficient frontier and your MCCSR, I presume, is something beyond one standard deviation. It looks as if you have 15% as one standard deviation. Maybe I'm not reading your table correctly, but would you care to comment on that? You have a common stock and it says that one standard deviation is 15%, and I'm just curious if that, in fact, is your basis for your RBC in effect?

Ms. Marks: That would have been the assumptions used, yes.

From the Floor: So is the MCCSR only at one standard deviation or am I missing something? It doesn't have any standard deviation? So you don't know how that factor was established?

Ms. Marks: The standard deviations are based on the historical volatilities of the equity. It's not to do with the MCCSR formula per se. When you apply the MCCSR, you have a value for your return and a value for your risk. We've used the historical data to determine that our expected risk as one standard deviation of the return. When we apply the MCCSR there's no impact on the standard deviations. The impact is on the return. The return is reduced by the cost of the capital. But the risk remains the same before and after.

From the Floor: I don't understand. I'll try to ask the question in a different way. When you set the MCCSR factors, presumably you were trying to achieve something like two or three standard deviations. There's no such requirement?

Ms. Marks: The MCCSR factors are external to the exercise.

From the Floor: But they didn't have an underlying standard that they were trying to achieve?

Mr. Wiseblatt: So is that what you want to know?

From the Floor: Some of it was like that, but it's been a long time. It's likely that we may open up the formula in the next couple of years and totally rethink it because the regulators have said they're not making any changes to it for another three years, so that gives them the opportunity to rethink things. But, in fact, there's no covariances in that formula. There's none of the stuff that Brad was exploiting, and I really think that you're exploiting that big square root formula. We don't do any of that. We just add up C-1, C-2, C-3.

I'd like to come back to something that Perry was saying. It depends upon what you think the formula is and what you think your requirement is. Most of what Perry and Josephine were talking about was making comparisons—where when you present alternatives and things you can do, you're really changing the risk in the company. I mean Josephine was altering the portfolios. Most of the times if you look at the alternate portfolios comparing different kinds of securities, the risks involved in these alternatives were different. When you're talking about reinsurance, you're really talking about passing on risk. That's why your requirements change. What bothers me is just trying to manage from the point of view of exploiting a formula if the formula is not necessarily a real measure of risk.

The formulas, as I think was said correctly in the beginning, are there for all kinds of regulatory purposes, and there's no guarantee that they effectively reflect the risks. I'm saying that there's some truth to the thing. It's a qualitative kind of truth, but the numbers aren't great measures of the real differences between companies—not to the extent that people who are just following the formula might believe. Now most of the time companies, in fact, have excess surplus and don't have to worry about most of these things. If you're really close to the line and trying to manage your surplus to fit the formula, I think you have a problem anyway. I mean, you have a greater problem, because you're really trying to hold on.

Mr. Smith: The reality is you have an insurance company that is using very conservatively based statutory reserves—this is the U.S. We're using an RBC formula that's been dictated to us. Not every actuary in the country can be involved in the determination of the appropriate levels of those factors. Many people, like myself, are hired by management to say, OK, here are the factors, here are the rules, let's manage our portfolio to maximize the return within the rules. Now if good actuarial judgment would dictate that we would do something different than that, you know, that would result in putting the company at undo risk. Each actuary has to address that and be aware of the underlying risks that are involved.

Obviously, I'm not supporting putting companies at undo risk. All we're trying to do is say, here are the rules on the statutory reserve; they are very conservative.

Here are the rules on minimum capital standards; they are very conservative. Let's make sure that within those rules we're doing what we can to maximize our return.

Ms. Marks: You made an interesting comment that the factors were originally setup with a particular goal in mind. In Canada the MCCSR factors were setup with the goal of identifying companies that were at or near being in financial difficulty. In fact, what's happened, and I alluded to it in my talk, is that some of the rating agencies are now using the MCCSR factors as one of the pieces they look at to come up with your credit rating as an insurance company. So, whereas, initially, you might not have cared whether your factor was 190 or 210, if a rating agency is going to say that 200 is a magic number, then it behooves you to manage closely to work within the rules. Is it exploitation or is working within the rules? I mean there are some fine lines here.

Mr. Wiseblatt: I just wanted to quickly mention that there is a theoretical justification for the covariance. Maybe not exactly the way it is, but there is a U.S. theoretical justification.

From the Floor: I think perhaps that we're kind of looking out the back window. We're looking for capital. I believe this industry's going to become capital rich, if it isn't already, but it will be shortly. Hence, perhaps future sessions will be devoted more to what do you do with all the capital rather than trying to find it, but that may be more effective in my own company and some others. I'm curious to know how many actually have a problem dealing with capital or have had a problem.

My other question to you, Brad, is you said that the reinsurer has lower RBC than the company. Why is that? I think you stated during your comments that the reinsurer would have lower RBC than the originating company, and I wondered why? On what circumstances would that be true and why it would come about?

Mr. Wiseblatt: Well, it would come about if the reinsurer isn't subject to the same requirements. For example, if it's not a U.S. reinsurer and it would be subject to other capital standards.

From the Floor: You weren't suggesting it would be within the U.S. or Canada, but it would have to be outside of the jurisdiction of one of the formulas.

Mr. Wiseblatt: That's what I was alluding to, yes.

Mr. Smith: It certainly can also happen because of the dynamic that I was discussing and that is that, in fact, because of its direct operations it was asset oriented as opposed to insurance weighted or vice versa.