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**MANAGING THE BALANCE SHEET**

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*Panelists will discuss avoiding "insolvency" under Financial Accounting Standard (FAS) 115. What is a company's FLUX score? What is a good or bad score? How is it calculated? "Window dressing" and the valuation actuary, how to manage off-balance-sheet assets, and how to manage risk-based capital (RBC) will also be covered.*

MR. NORMAN E. HILL: I will give a brief overview of the session. I will then introduce each panelist in turn. We hope to have some time left for questions and answers even though I'm told we have a great deal of material.

I'm senior vice president and chief actuary of Kanawha Insurance Company and Central Reassurance Company. We're located close to Charlotte, NC even though we're technically in Lancaster, SC.

If I were asked what is involved in managing the balance sheet, I would reply that the actuary must know his or her company's investment philosophy, such as the degree of risk that it is willing to assume and has assumed to date. This philosophy would be reflected in terms of the average investment grade of its bonds, the extent of commercial mortgages in its portfolio, the amount of real estate in its balance sheet, and whether its approach is to trade assets or hold them to maturity.

Not too many years ago, it was taken for granted that a life insurance company's approach to investments was holding until maturity, having both the ability and the intent to hold assets for the long term. In many cases, this approach has changed significantly. Many companies engage in extensive asset trading today, sometimes involving the majority of their assets. The actuary needs to know to what extent his or her company uses derivatives and other off-balance-sheet assets. The investment committee of the company undoubtedly holds meetings, minutes are taken, and memorandums are generated. In some cases, the actuary is a member of the investment committee. It behooves him or her to stay informed about what goes on at these committee meetings.

The actuary needs to know the characteristics of the invested assets in terms of effective yields and effective maturities of the assets, not just the theoretical maturities officially listed. He or she needs to have updated experience studies of assets. If the company's investment department does not prepare them, the actuary should do so. These include studies of prepayment rates, call rates, default rates and the extent of any restructures. In addition, he or she needs to know the extent of private placement bonds.

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The actuary needs to be knowledgeable about the company's collateralized mortgage obligations (CMOs); that is, bonds backed by a pool of mortgages. He or she needs to know the tranche characteristics of all CMO securities, whether they're the more conventional planned amortization class (PACs) or "sequentials" or the riskier interest-only (IO) or principal-only (PO) types of CMOs. He or she should be aware that some securities labeled as mortgage-backed are basically CMOs.

Managing the balance sheet also involves allocating assets by line of business. Some companies do an exact allocation, not only with income statements but also with balance sheets by line of business. I believe that most smaller companies and probably some medium-sized organizations do not go this far. In some cases, allocations are calculated in work papers and by computer. Exact identification asset by asset may be prepared, or alternatively, groups of assets may be allocated by percentages. In the latter case,  $x\%$  of an asset class would be allocated to one line of business, and  $1 - x\%$  would be allocated to another line. Any off-balance-sheet assets should be included in this allocation.

Some balance sheet assets may be committed to reinsurance-ceded treaties. In other words, if the treaty is structured as "funds withheld," invested assets that would otherwise be turned over to the assuming company would stay with the ceding company. The latter needs to know which invested assets or percentages of assets are assigned to the reinsurance transaction, so that they can be followed separately.

Similarly, reinsurance assumed involves assets that must be tracked on some basis. Invested assets along with reserve liabilities may have been turned over. For a funds-withheld treaty (invested assets retained by the ceding company), the assuming company will hold an "amount recoverable from reinsurers," that represents the block of interest-bearing assets. Interest generated from these assets is usually part of the treaty's results and must be understood by the actuary.

Some reinsurance recoverables are noninterest bearing. They need to be allocated to the line of business involved in the reinsurance treaty. Policy loans can be allocated exactly, with little problem. Deferred premiums and, possibly, due premiums are often considered offsets to liabilities. From an asset management viewpoint, it may be helpful to treat these as offsets to liabilities rather than separate assets.

Once assets are identified for a line of business, they must be allocated within the line to various types of liabilities. The latter include interest-bearing reserves, deposit administration contracts, guaranteed investment contracts (GICs), amounts left on deposit, reinsurance funds withheld (analogous to the reinsurance funds withheld asset held by the other party to the reinsurance treaty), an interest maintenance reserve (IMR) liability, and very likely, noninterest-bearing claim reserves. Assets allocated for each line, of course, should be appropriate for that line of business in terms of cash-flow characteristics, liquidity, risk, and so on. Usually, longer-duration assets are appropriate for the ordinary life line. Single-premium deferred annuities generally require shorter-duration assets. The actuary needs to know the average remaining durations of each line of business.

Cash-value characteristics, such as the magnitude of cash values relative to premiums and the incidence of buildup, must be understood for each line of business because this will

## MANAGING THE BALANCE SHEET

determine the type of appropriate assets (maturity, liquidity, and so on). Single-premium immediate annuities (SPIAs), health insurance, term insurance, and similar lines generally have no or very small cash values. This means that the risk of disintermediation (forced liquidation of invested assets at losses to pay cash values) is negligible for these lines. On the other hand, universal life (UL) and single-premium deferred annuities (SPDAs) usually generate high cash values relative to premiums. They carry a significant disintermediation risk, which, in turn, calls for different types of allocated invested assets.

Managing also includes keeping track of cash or equivalents and deciding where to allocate them. Some cash logically is allocable to short-term claim reserves. Certain expense and commission accruals, taxes payable, dividends payable to stockholders, or the portion of policyholder dividends likely to be used in cash must also be matched with cash or equivalents.

Another step in managing the balance sheet involves analyzing a company's riskier assets and probably allocating those to capital and surplus. Such assets include real estate resulting from defaults or restructures, noninvestment-grade bonds, and probably, non-invested assets, such as data processing equipment and various other categories.

To summarize my thoughts on managing the balance sheet, I believe that the actuary must manage commensurate with his or her authority. Some actuaries are chief investment officers. A larger number are either valuation actuaries or assistants to valuation actuaries. The actuary needs to make it his or her business to know as much as possible about the assets on the balance sheet, and to communicate his or her findings and thoughts to the investment department and to management. His or her thoughts include analysis of balance sheet effects on RBC and the extent of appropriate matching of assets and liabilities. He or she should make written recommendations for changes as appropriate. Above all, the actuary needs to have knowledge of legal requirements regarding balance sheet assets and corresponding professional guidelines from the Society and Academy.

With this overview, we'll go to the first of our three panelists. Tom Herget is executive vice president and a principal with PolySystems. He's a 1972 graduate of the University of Illinois. Previously, we worked together at an accounting firm in Chicago. Polysystems, his current firm, is a well-known software and data processing consulting firm and actuarial consulting firm to the insurance industry.

MR. R. THOMAS HERGET: I hope that the title of this talk, "Staying in Balance of *FAS 115*," won't prove to be an oxymoron. But with the way interest rates have been behaving this past year, that may be the case, and let's look into that.

Where did *FAS 115* come from? What is it? It wasn't a crusade to force life insurance companies to mark their assets to market, but it occurred as a result of the appearance of inconsistent literature among the industries. Also, not all pronouncements were being uniformly followed in the accounting world. FASB also thought that the lower of cost to market was not necessarily evenhanded. So it developed a project several years ago, and it blossomed into *FAS 115*. It applies to all financial institutions other than not-for-profit, and if you apply it, your results might indicate that you may be a not-for-profit organization. I seriously doubt that would get you an exemption. It started to be applicable last year, it is

in full force now, and it applies to everybody. The big implication is greatly increased volatility of financial results.

First, we'll talk about the rule makers. Where do we expect guidance and pronouncements to come from? The SEC, the financial policeman of equities, was founded in the 1930s. It, in turn, empowered the FASB in the early 1970s to develop accounting rules for publicly traded institutions. The Emerging Issues Task Force (EITF), a unit of the FASB, deals with hot issues that can't wait to make it through the due process, so to speak, of the FASB. Last, the AICPA is a professional body of accountants. All four of these groups have combined to give us guidance on *FAS 115*.

There are three categories of asset classifications. If you can demonstrate that you have the intent and capability to an asset to maturity, it's called held-to-maturity. It is recorded at amortized cost, and its changes flow through the income statement. If you buy an investment that you intend to trade, it's called actively traded. It is recorded on the balance sheet at fair value, and its changes flow through the balance sheet as income. Anything else is called available for sale and is recorded at fair value, but its change is split into two components. Any coupon received remains as a component of income. The change in amortized cost remains as a component of income, but the change in the fair value, the difference between the amortized cost and the fair value between successive valuation dates, is reported below the line as a direct impact on retained earnings.

Now we end up with two deferred acquisition costs. The one that you used to calculate before *FAS 115* can be called the regular deferred acquisition cost, although some people call it the historical deferred acquisition cost. For *FAS 115*, you perform the same exercise except you assume that the unrealized capital gains or losses were, in fact, realized, and you recast your amortization schedule. That's been called the alternative deferred acquisition cost (DAC), the adjusted DAC, or the shadow DAC.

So what is the difference? The difference is called either the equity DAC or the valuation allowance. We have some new terms here. People call them different things. This dual DAC calculation not only applies to the DAC, but if you hold an unearned front-end load (UFEL) or a "special benefits-type liability," you would have to recast these as well. This primarily impacts business when you unlock DAC assumptions either prospectively or retrospectively.

Two accounting rules determine income from emerging margins of actual-to-expected components. *FAS 97* applies to UL and deferred annuities, and *FAS 120* applies to participating life contracts in mutual companies. In following these pronouncements, realized capital gains are presumably included in your revenue stream already (for amortization purposes). This does have some impact on recoverability in certain situations, for *FAS 60*, or in traditional life insurance business.

Before you implement *FAS 115*, you need to allocate assets to a line of business, as Mr. Hill said. You may need to allocate it to products within the line of business, and you may have to assign it to an account or year of issue as well. So there's a related task there in assigning unrealized capital gains to a particular product line.

## MANAGING THE BALANCE SHEET

Let's go through some examples with a balance sheet and an income statement. We'll look at two lines of business, a margin or interest-sensitive product under *FAS 97* and a traditional life product under *FAS 60*. We will have three scenarios: a level, a decreasing, and an increasing interest scenario. We will presume that all interest rate activity occurred at the end of the year, which makes development of examples much easier. However, federal income tax will be kept out of this example entirely.

An opening balance sheet and an income statement are Scenario A where no market values changed during the year (Table 1). There is a \$40 deferred acquisition cost for our traditional *FAS 60* product, a \$110 deferred acquisition cost for our UL product, and \$800 of invested assets (we assume everything is available for sale). The result, of course, is total assets. On the liability side is a \$120 benefit reserve, a \$780 fund reserve under *FAS 97*, and \$50 of retained earnings. Then we move ahead one year. Nothing has changed, except that the company has grown a bit and our surplus has increased by \$5 to \$55.

TABLE 1  
SCENARIO A\*

<b>Beginning-of-Year Balance Sheet</b>			
<i>FAS 60</i> DAC	\$ 40	<i>FAS 60</i> Benefit Reserve	\$ 120
<i>FAS 97</i> DAC	110	<i>FAS 97</i> Fund	780
Invested Assets	800	Total Liabilities	900
		Retained Earnings	<u>50</u>
<b>Total Assets</b>	<b>\$ 950</b>	<b>Total</b>	<b>\$ 950</b>
<b>End-of-Year Balance Sheet—No Yield Curve of Change</b>			
<i>FAS 60</i> DAC	\$ 44	<i>FAS 60</i> Benefit Reserve	\$ 132
<i>FAS 97</i> DAC	121	<i>FAS 97</i> Fund	858
Invested Assets	880	Total Liabilities	990
		Retained Earnings	<u>55</u>
<b>Total Assets</b>	<b>\$1,045</b>	<b>Total</b>	<b>\$1,045</b>
<b>Income Statement</b>			
Premium	\$ 40	Expenses	\$ 178
COI, etc.	190	Change in <i>FAS 60</i> DAC	-4
Investment Income	200	Change in <i>FAS 97</i> DAC	-11
		Claims	120
		Increase <i>FAS 60</i> Res.	12
		Interest Credited	<u>130</u>
Revenues	<u>430</u>	Expenses	\$ 425
<b>Net Income</b>	<b>\$ 5</b>		

\*GAAP/Gross ratios on *FAS 60* = 95%; "k" factor = 70%; all assets are AFS.

The income statement for the year is fairly straightforward; increases in *FAS 60* reserves, expenses, and changes are in deferred acquisition costs. The net result is our income of \$5, which matches the change in surplus mentioned above. Footnotes are frequently used in these situations. One shows that our GAAP-to-gross-premium ratio for the *FAS 60* products is 95%. Our k factor, which is the percentage of the *FAS 97* margin necessary to amortize our acquisition cost, is 70%. All our assets are available for sale.

RECORD, VOLUME 21

Now we move to scenario B (Table 2). Interest rates drop at the end of the year. This causes our fair value of investments to increase by \$50. Our beginning balance sheet doesn't change, but it does reflect these differences by the end of the year. While year-end *FAS 60* DAC doesn't change from Scenario A, our *FAS 97* DAC does change. Along with the \$50 increase in our investments, our k factor ratio remains 70%. Therefore, we need to mitigate that increase by its impact on DAC, had we included a resulting increased amortization through our expected gross profits. As a simplifying assumption, assume that all of the change in market value applies to assets backing the *FAS 97* liabilities.

TABLE 2  
SCENARIO B\*

End-of-Year Balance Sheet—Yield Curve Drops			
<i>FAS 60</i> DAC	\$ 44	<i>FAS 60</i> Benefit Reserve	\$ 132
<i>FAS 97</i> DAC	86	<i>FAS 97</i> Fund	858
Invested Assets	<u>930</u>	Total Liabilities	990
Total Assets	\$1,060	Retained Earnings	<u>70</u>
		Total	\$1,060
Income Statement			
Premium	\$ 40	Change in <i>FAS 97</i> DAC <sup>†</sup>	\$ -11
COI, etc.	190	Change in <i>FAS 60</i> DAC	-4
Investment Income	200	Expenses	178
		Interest Credited	130
		Claims	120
Revenues	430	Increase <i>FAS 60</i> Reserves	<u>12</u>
Net Income	<u>\$ 5</u>	Total Expenses	\$ 425
Adjustment to retained earnings			
Unrealized capital gain	\$ 50		
Change in <i>FAS 97</i> DAC <sup>†</sup>	-35		
Net	15		
Total increase in retained earnings	\$ 20		

\**FAS 97* "k" factor stays the same if proceeds are reinvested in the same quality and duration.

The reported DAC is the "shadow" DAC, with its increase split into two places:

<sup>†</sup>Above the line —regular and realized capital gains/capital losses

<sup>†</sup>Below the line—impacts of unrealized capital gains/capital losses

We take 70% of the \$50 to derive \$35 impact (reduction) on the deferred acquisition cost. This gives us new invested assets and new total assets. However, this is somewhat one-sided accounting, because our benefit reserves and fund reserves did not change from the prior scenario A. Our total retained earnings are now \$70. On our income statement, \$5 emerges, along with two extra categories.

Several items run through the surplus account. We have unrealized capital gains of \$50, which are offset by the change in the *FAS-97*-deferred DAC of \$35. Our net adjustment to retained earnings is \$15. The regular earnings of \$5 and the adjustment to retained earnings of \$15 results in \$20, the increase in equity. Only \$5 came through earnings and \$15 resulted from this new approach.

## MANAGING THE BALANCE SHEET

Of course, we need footnotes. If our proceeds on these realized or unrealized capital gains or losses could have been reinvested in roughly the same maturities and the same credit quality, we wouldn't have much of an impact on our "k" factor. This is an assumption that many people are using. Also, a new term, "shadow DAC" has arisen, which is the DAC reported on the balance sheet, with its increase in two places. The change that goes through net income is a component based on regular amortization plus any realized capital gains or losses. You report "below the line" the portion of DAC change due to unrealized capital gains or losses.

Recoverability is important to consider. A moment before interest rates changed, using a 7.5% interest assumption, we needed to cover \$43, the *FAS 60* gross premium reserve. But, when interest rates fell to 7.1%, we needed \$94 gross premium reserve. In terms of net liability, we have a benefit reserve and a DAC, for a net liability of \$88. By comparing the \$88 and the \$94, we're short by \$6. But when we analyze our *FAS-97*-type DAC, the net liability, \$772, measured against the Scenario B gross premium reserve of \$740, shows that we are still recoverable. The \$32 margin offsets the \$6 shortfall. If this is measured as one line of business, we would not make any DAC adjustment. But had the *FAS 60* (traditional) DAC stood alone, we would have been forced to make an adjustment for this deficiency. When we make such changes for *FAS 60* business, we have to keep an eye on the amount originally capitalized, because any DAC reported cannot exceed what we have spent (including interest).

Let's consider Scenario C (Table 3). We will assume that the yield curve increases, which causes the asset carrying value to decrease by \$70. Our beginning balance sheet stays the same. Our *FAS 60* DAC doesn't move, but our *FAS 97* DAC does change. We take 70% of the \$70 market value write-down, \$49, and we add that to the DAC to mitigate the otherwise reported loss. In other words, the Scenario A DAC of \$121 is increased to \$170. On a net basis, retained earnings are reduced \$21 (\$70-\$49) from Scenario A down to \$34.

In the income statement, our change in *FAS 97* DAC remains \$11, despite all the different scenarios. The impact of unrealized losses is reflected in retained earnings rather than net income. In addition, we must make sure that we have not capitalized too much. We originally spent \$145, which we've been tracking since issue. The interest on that amount has been \$30, so total DAC cannot exceed \$175. Our shadow DAC is \$170, so we have avoided an over deferral problem this year.

For the life insurance industry, let's take a look at what actually happened last year. Interest rates rose approximately 250 basis points and caused some withering effects on portfolio market values. I made an unscientific study by contacting a range of companies (big, small, rich, poor), as well as the stock and mutual company variety. Carrying values all declined, with actual reductions depending on the maturity of investments, the extent of premium discounts, and exact times of security purchases. Despite the mitigating impact of the shadow DAC, this drastic drop in investment value caused perhaps an average 15–30% loss in GAAP equity in these companies' statements.

RECORD, VOLUME 21

TABLE 3  
SCENARIO C

End-of Year Balance Sheet--Yield Curve Increases			
<i>FAS 60</i> DAC	\$ 44	<i>FAS 60</i> Benefit Reserve	\$132
<i>FAS 97</i> DAC	170	<i>FAS 97</i> Fund	858
Invested Assets	810	Total Liabilities	990
Total Assets	\$1,024	Retained Earnings	<u>34</u>
		Total	\$1,024
Income Statement			
Premium	\$ 40	Change in <i>FAS 97</i> DAC	\$-11
COI, etc.	190	Change in <i>FAS 60</i> DAC	-4
Investment Income	200	Expenses	178
Revenues	<u>430</u>	Interest Credited	130
Net Income	<u>\$ 5</u>	Claims	120
Adjustment to retained Earnings		Increase <i>FAS 60</i> Reserve	<u>12</u>
Unrealized Capital Loss	\$-70	Total Expenses	\$425
Change in <i>FAS 97</i> DAC	-49		
Net	-21		
Total Increase in Retained Earnings	\$-16		

Most of these companies are recording their investments as available for sale. The industry average is about 75% in this classification. One company shows about 50% of assets as being held to maturity (HTM). However, it has significant structured settlements, and the company does not believe that its underlying assets backing reserves should be available for sale. Other companies with large traditional blocks may also classify larger portfolio percentages as HTM.

When companies have a choice in this year's asset classifications, they may tend to categorize them as HTM. Reducing volatility in reported equity may be more of an objective for 1995.

I was talking to an actuary earlier whose company adopted a new purchase accounting combination as of December 31, 1993. All its investments were marked to market as of the same date. A year later, due to *FAS 115*, it experienced a nightmare. Its GAAP equity turned negative. Even so, it received a clean audit opinion.

What's next with *FAS 115*, considering its demonstrated explosiveness and volatility? Many actuaries are trying to fine-tune their expertise in applying and projecting scenarios involving *FAS 115*. In all cases, regardless of product, DAC must eventually run down to zero in projections. Possibly, cash-flow testing, including realized gains and losses from asset sales, might have to be considered in recoverability studies.



## MANAGING THE BALANCE SHEET

I know stock analysts don't care for *FAS 115* and how to reflect its impact in evaluating company performance. Many in the industry are advocates of marking liabilities to market for the sake of consistency. Certainly, volatility would remain but at least on both sides of the balance sheet.

In conclusion, the balance sheet impact of *FAS 115* still needs study.

MR. HILL: Christopher T. Anderson is a director at Merrill Lynch in the institutional client services division. He specializes in strategy development for insurance companies. Chris has a degree from Brown University and an MBA from the University of Chicago. He is a Chartered Financial Analyst (CFA). Chris has been very active in the NAIC in recent years, working with several advisory groups such as Invested Assets. Chris is not a member of the Society, but he has worked quite a bit with actuaries, and he has been exposed to us and knows our language.

MR. CHRISTOPHER T. ANDERSON: Its a great pleasure to come and talk to you about FLUX and cash-flow variability.

As actuaries, you need to know a definition of FLUX, you need to know how to compute FLUX-related numbers, and you need to know what good and bad FLUX results are. A preliminary question is, why should you even care? Looking back a couple years, in 1991 there was regulatory concern that more large insurance insolvencies were on the horizon. Remember that this was the "junk bond era," when several companies showed sharp downturns in portfolio market values and in liquidity values. Some insurance regulators believed at that time that CMOs posed the next great threat for insurance companies following the junk bond and real estate problems.

That obviously hasn't come to pass. But in the meantime, regulators have available a new set of tools developed by the industry for their support. First, they have better disclosure of Schedule D of securities, including CMOs. As you recall, the changes to Schedule D included breaking out loan-backed bonds, structured loan-backed bonds, and even CMOs into separate categories. Now a regulator can find CMOs in annual statements. Second, regulators can get an indication of the class type of any CMO, whether it's PAC, sequential, IO, PO, inverse, or other subclassifications. These are all found in data networks now available to regulators. Third, the accounting standards are much more precise than they were. And finally, FLUX, the measure of cash-flow variability, has been developed for CMOs.

FLUX stands for the flow uncertainty index. It was developed over a period of about a year by 15–20 people who participated on an *unscheduled* basis in a round of meetings. There was significant actuarial involvement in developing this standard. It represents the relative variability in cash flows of a CMO as compared with a base case, looking at alternate interest rate scenarios. One other caveat should be made: this is adverse variability.

The precise measures of determining FLUX scores are available in the public domain. The NAIC publishes input for FLUX scores on an annual basis, and equations are a matter of public record. They're based on prepayment speeds that are developed from a survey of

broker-dealers. That survey is conducted annually by the Public Security Association, and it's available in machine-readable form to any interested person.

If you can generate cash flows for a CMO under a specified number of interest rate scenarios, you can generate your own FLUX score for this security. It can probably be done on a personal computer, if you have access to these FLUX factors. If you summarize calculations for a portfolio, you can wind up with one score that summarizes cash-flow variability over a range of scenarios.

However, a number of third-party software vendors have been involved in this process. You can find FLUX scores on computer screens. For example, they exist on the "Bloomberg Screen," named after the firm's own computation system. They exist in "CMO Passport," which is a Merrill Lynch software product that also appears on Bloomberg. Third-party vendors, such as Global Events Technology, Capital Management Sciences, and others routinely compute FLUX scores. The FLUX scores that you see are probably of several different varieties or flavors. One is the score that is submitted to the NAIC from CMO Passport on an annual basis. Regulators now have FLUX scores for about 30,000 CMO securities in their database.

Another way to compute a FLUX score is to input your own pro forma expectations. What do you expect will happen in 1995? Are you interested in a current FLUX score by using today's assumptions or assumptions that may prevail at the end of the year? A number of systems provide options of not just looking back at year-end FLUX scores, but also looking forward, setting your own assumptions, and developing FLUX scores as of a certain future point.

The next thing to address is, what is a good or bad FLUX score? One of the best explanations along those lines is from Andy Davidson of Andrew Davidson & Company. He was instrumental in helping design the FLUX analysis model and provided much theoretical work for the actual design that we implemented. Andy has compared this question with a level of difficulty. The higher the FLUX score, the more difficult the bond is to evaluate and analyze. There are bonds with FLUX scores indicating that their cash flows are no more variable over a range of interest rate scenarios than "normal" PAC CMOs. In fact, they would be less variable because the primary risk with CMOs is cash-flow variability stemming from the borrower's prepayment option, not from the credit risk.

A low FLUX score indicates that there's a relatively low degree of variability. A relatively high FLUX score indicates that the cash flows can be highly variable, given changes in interest rate levels. Therefore, my view is that the higher the score, the higher the level of analysis needed. This is what we've been explaining and emphasizing to regulators.

For portfolios with a high FLUX score, indicating more variable cash flows than conventional CMOs, regulators are demanding that companies have professional expertise available for ongoing analysis. First, in evaluating a firm's expertise, you should look at its experience, ask what it has done, and measure its internal procedures. How does it derive CMO prepayment speeds? How often does it perform analysis and of what kinds?

## MANAGING THE BALANCE SHEET

Second, systems must be available, such as those of Global Events Technology and Capital Management Sciences. Several good systems perform portfolio analysis. Any system used by a company must be able to provide documentation.

Third, for securities with relatively high FLUX scores, records should be kept for regulators. These include records of trades and CMO performance patterns during changing levels of prepayments.

Many have asked, what is a high FLUX score, or what is too high? On the Bloomberg system, specifically its FLUX Distribution Report, FDR, an array of actual FLUX scores by collateral types and CMO types is available. This gives guidance as to what is "high" or "low."

Again, there are very few absolutes with FLUX scores. All we can say about these scores is that the higher the score, the greater the potential for variability. We can't say that a bond with a FLUX score of ten is twice as variable in its cash flows as one with a five. We can say that the one with the ten score is more variable in its cash flows, or at least has the potential for greater variability.

It is very important to think of FLUX as a screening tool for regulators. It was designed exclusively for insurance regulators and not for others. We thought that the committee, after surveying the universe, believed and concluded that there was not a single measure or numeric value that indicated something essential about a CMO to be used for insurance regulatory purposes. Some systems, such as the Bloomberg Grade System, provide several variables that indicate certain elements of the CMO. One difficulty, from the point of view of the committee that designed the FLUX measure, is that it's not an open architecture system. A company cannot readily access the system and manipulate it.

The FLUX measure is available to insurance regulators in electronic form. It's one of the four improvements with respect to CMOs developed in the last couple of years. The next regulatory stage may be "son of FLUX." One reasonable request from regulators has been to indicate appropriate class types of CMOs. Now that CMOs are segregated in annual statements, how can they be analyzed further?

A group of us will be meeting tomorrow for the next round of this whole process. Our objective is to put together somewhat more specific guidance as to what a regulator should do when he or she spots portfolios with relatively high FLUX scores. Most of us in the advisory group think that looking at a CMO in isolation is probably not appropriate. Regulators appear to be asking about situations where they need to devote more time to and analysis of the actuarial memorandum.

As investors acquire CMOs with greater variability of cash flows, I think regulators and your companies will look to actuaries to understand how well the securities interact and whether scenario analysis is sufficient to evaluate future performance. In conclusion, actuaries should become generally familiar with FLUX scores and their implications.

MR. HILL: Joseph L. Dunn is a vice president and actuary for the Metropolitan Life Insurance Company, and he is an FSA. Joe has been with Metropolitan Life since 1977

when he joined as an actuarial student. He's currently responsible for its capital and risk management areas. We served together on the American Academy's Committee for Life and Health, Life RBC, and Joe is also a member of the NAIC's Technical Resources Group that deals with asset value reserve (AVR) and IMR.

MR. JOSEPH L. DUNN: My talk will focus on the process by which RBC considerations can be integrated into a company's decision-making process. Notwithstanding the description in the program, I will not discuss, at any length, specific strategies to manage RBC. I've chosen this focus because of my belief that the management of RBC cannot be readily separated from the day-to-day decision making in a company, and that the best way to influence this decision making is to modify the management reporting systems.

I've been led to consider this question for two reasons. First, in my role as a member of the AAA Committee on Life RBC, I've come to the position that the incentive effects of the RBC formula are important and have not been given sufficient weight in the deliberations that led to the current system. Second, I've been part of a reengineering initiative at Met to overhaul our capital management process, and we are currently struggling to develop a reporting system that facilitates that process.

### **BACKGROUND**

For those of you who are new to this area, let me provide a very brief tour of recent history.

RBC rules have been around for about seven years in the banking industry following the 1988 Basel Accord, but these rules were first adopted for the life insurance industry for year-end 1993. Considering the scope of the changes, they were introduced in a remarkably short period of time following a sharp rise in the number and severity of life insurance company insolvencies. These insolvencies were not confined to small companies and included two very large insolvencies: Executive Life and Mutual Benefit Life.

Although meaningful explicit capital requirements are new to the life insurance industry, the industry has long had implicit requirements through the conservative processes used to value both assets and liabilities. Statutory reserve strains and the AVR (and earlier the mandatory securities valuation reserve (MSVR)) forced companies to operate with substantial GAAP equity.

The NAIC RBC requirements were layered on top of these already existing requirements. These RBC requirements were intended by the designers to be minimum standards by which to identify weakly capitalized companies. The enabling model act contains a statement that RBC should not be used to rank companies and, in fact, it prohibits those in the industry from disseminating RBC information.

Unfortunately, because these rules do not apply to industry outsiders, a number of interested observers have compiled tables of RBC ratios. At least for the time being, many companies are targeting ratios in excess of 200% (400% on the NAIC's modified formula) in order to stay viable in this "beauty contest."

### **POSSIBLE APPROACHES**

There are a number of approaches that a company can take in the present situation:

## MANAGING THE BALANCE SHEET

1. It can ignore the RBC ratio, provided that the ratio is significantly in excess of 100% (now 200%). This is the approach intended by the designers. For most companies, such an approach would leave the company's decision-making process unchanged, and there would be no need to modify reporting systems.
2. It can assign the management of RBC to specialists and leave the bulk of the decision-making and all the financial reporting unchanged.
3. It can focus primarily on the NAIC RBC requirements in its capital management processes. This is the current state of development at the Met.
4. It can integrate NAIC RBC considerations into traditional risk/reward analyses by making appropriate changes to its management reporting systems. As you've probably guessed, this is the approach that I will be advocating. However, a number of issues must be resolved before this is a viable alternative.

I won't spend much time discussing alternative 1, as I assume you are all knowledgeable about your traditional way of management.

### **SPECIALIST APPROACH**

Those taking the specialist approach will tend to focus on certain types of transactions that have a highly leveraged effect on the RBC formula without significantly affecting the company's risk or expected return evaluated by using traditional standards. Such a transaction may be possible because of imperfections in the formula or the design of the transaction so that it only affects the tail of the risk distribution. Because the current formula is in many cases driven by the legal form of the transaction, such an approach frequently involves changing that form, either through subsidiary transactions or securitization.

This approach is predicated on the assumption that such transactions are sufficient to manage the company's RBC and therefore no change need be made in the company's day-to-day operations. Of course, if this is true, no change need be made in the company's reporting systems.

However, to the extent that RBC levels are driven by the competitive situation rather than by some absolute standard, the specialist approach is unlikely to be sufficient.

### **FOCUS ON NAIC REQUIREMENTS**

The underlying premise in this approach is that the company's capital requirements are defined by the NAIC formula rather than the "real" economics. The capital requirement for any activity or line of business is the sum of the explicit NAIC RBC requirement as well as the implicit requirements arising from the conservative valuation process.

To calculate returns on equity (ROE) for subsets of its business, the company uses this RBC to define the denominator. In doing so, the company can build in its targeted RBC ratio by appropriately scaling the RBC portion of the capital requirement.

The company can also use a similar procedure to define the capital flows arising from any activity or project. Return on investment and net present value can then be calculated from these capital flows.

By a slight modification of Anderson's method, these capital requirements can similarly be built into the pricing.

### **PROBLEMS WITH FOCUSING ON NAIC RBC**

There are a number of problems with focusing primarily on the NAIC formula.

- The most obvious problem with such a focus is that the formula was not designed with this purpose in mind. There are a number of places in the formula where it would have been done differently if its designers had thought that it would be used to rank strong companies. The rankings generated by the formula do not track ratings as determined by the rating agencies.
- The NAIC framework is based on book values for fixed-income assets. Most of the requirements are generated by the asset side of the balance sheet where it is customary to manage on a market-value basis.
- There are a number of instances where the factors seem to diverge from the "true" economics. In particular, a number of observers think that the factor for common stock is onerous relative to the other factors. In fact, the property and casualty formula which generally follows the life formula, on investment matters, has a lower factor for common stock and also treats it more generously in the combination of risks adjustment.
- This leads me to my next point: the formula makes minimal recognition of the correlation of risks between various asset categories. Portfolios concentrated in one asset category benefit from this oversight, and portfolios that are well diversified across an asset category suffer.

### **INTEGRATING NAIC RBC INTO ASSET ALLOCATION**

An approach focusing exclusively on NAIC RBC requirements is doomed to failure. It might work if RBC were driven by the liabilities but, in reality, the assets that drive the results.

Asset managers measure risks and returns in a market-value context. The best way to ensure that NAIC RBC requirements are built into the investment decision-making process is to integrate RBC considerations into the usual framework for managing assets.

Some might argue that doing so will result in a departure from a focus on the "true" economic value, but such an argument fails to consider that economics deals with the allocation of scarce resources, and for many companies NAIC RBC is incontrovertibly scarce.

### **SIMPLE MODEL**

To clarify these issues we will consider a simple model of the asset allocation process in the presence of an NAIC RBC constraint. Fortunately, the asset allocation models originally developed by Markowitz allowed for any number of linear constraints. The NAIC requirements are almost linear in the C-1-C-3 components of RBC, and thus these models are applicable.

The model is simplified in a number of respects. It assumes that assets and liabilities are acquired or assumed at the beginning of the year and then sold at the end of the year. Taxes are ignored.

## MANAGING THE BALANCE SHEET

The company attempts to maximize its expected return subject to three constraints:

1. The cash invested at time zero must equal initial capital plus the cash made available from the liabilities.
2. The volatility of the one-year returns must be less than the company's risk tolerance. This constraint is quadratic.
3. The explicit NAIC RBC requirement (scaled to the company's target ratio) plus the implicit requirement generated by the valuation process must be less than the company's available capital.

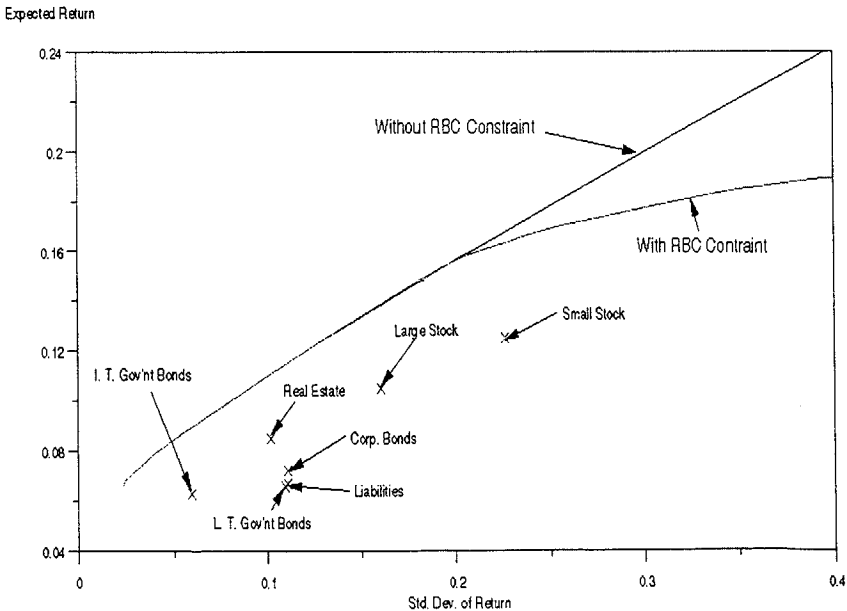
The model is also limited in the number of asset categories considered. This limitation is largely driven by the availability of data. The categories included are: real estate, large company stock, small company stock, intermediate-term government bonds, long-term government bonds, and long-term corporate bonds.

The liability part of the model is even more restricted, being limited to one liability category, namely, a long-term liability. This liability is assumed to behave quite similarly to a corporate bond.

### EFFICIENT FRONTIER

Chart 1 depicts the "efficient frontier" (the set of portfolios with the highest return for a given level of risk), which is predicted by the model. The risk is graphed along the x-axis, that is, the standard deviation of the one-year return, and the expected return is graphed along the y-axis. The risk and return of each of the asset and liability categories is plotted along the bottom of the graph.

CHART 1  
EFFICIENT FRONTIER



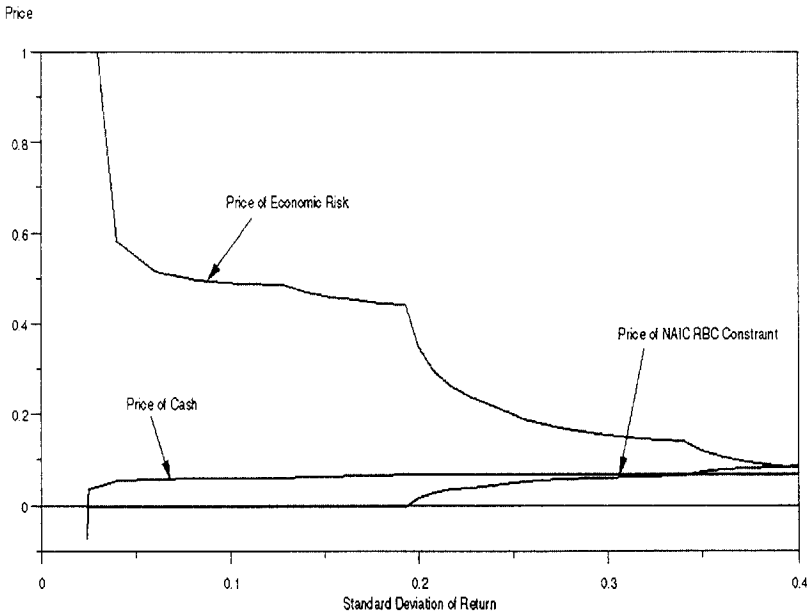
Above these individually plotted points are two lines that represent efficient frontiers. The top line is the efficient frontier in the absence of any NAIC RBC constraint, and the lower line is the efficient frontier in the presence of the RBC constraint. The two lines coincide for low levels of risk tolerance, but diverge substantially if the company has a high tolerance for risk. Both lines are above the individual asset categories because the presence of liabilities allows the company to leverage its overall return.

The asset allocation in the presence of the RBC constraint tends to be more heavily weighted toward fixed-income securities than the asset allocation in the absence of the constraint. In fact, the portfolio with the highest return in the presence of the constraint consists of a highly leveraged investment in corporate bonds.

**PRICE VERSUS RISK**

Chart 2 is of more relevance to our current discussion because it displays an attribute of the solution that persists even for more sophisticated models, that is, the existence of a price associated with each of the constraints.

CHART 2  
PRICE VERSUS RISK



Once again the risk is plotted along the x-axis, but this time the y-axis displays the price of each of the scarce commodities.

As one would expect, the price of the economic risk declines as the company's tolerance for risk increases, and the cost of cash quickly rises to a base level and then remains constant.



## MANAGING THE BALANCE SHEET

The price of NAIC capital is zero for low levels of risk, but it rises as the NAIC requirement becomes a bigger impediment to companies with high levels of risk tolerance.

### INTEGRATED APPROACH TO PERFORMANCE MEASUREMENT

Let's now shift our attention to the subject of performance measurement. When there are two constraints on capital, standard ROEs necessarily miss something. Which constraint should be used to define the denominator for RBC purposes? Possible solutions to this problem are to use equity based on NAIC RBC and adjust the return for the real risk; use equity based on the real risk and adjust for the cost of the NAIC constraint; or charge for the costs of all scarce resources and focus on aggregate adjusted profits rather than ROE.

The second solution is closest to the ROE calculations currently used and is probably the most saleable. The last solution avoids some of the strange incentives that can arise when line managers focus exclusively on ROE. When line managers attempt to maximize their individual ROEs, they are likely to choose just a few high-return projects and leave much of the company's capital lying fallow, thereby depressing the company's overall ROE.

### CHALLENGES IN THE INTEGRATED APPROACH

A number of issues must be resolved to fully implement an integrated approach:

- A process is required to determine prices for the scarce resources. In real cases, these prices will be determined by supply and demand rather than by a mathematical model. At the moment it is difficult to observe these prices directly in the outside market.
- The model discussed here has a one-year time horizon, and therefore it is not necessary to determine the prices for the scarce resources in future years. More realistic models will have a term structure to these prices.
- The inclusion of nonmarketable assets and liabilities introduces two problems. It is difficult to acquire pricing data and it necessitates a multiyear model that recognizes that nonmarketable items will not be converted to cash until maturity.
- Income taxes ought to be included.

At this point, I'm afraid that I have as many questions as answers, but I hope I've allowed you to see the dim outlines of how this problem might be addressed in the future.

MR. STEVEN P. MILLER: What should I do with surveys that ask me my RBC ratio and my average FLUX score on my CMOs? I'm not sure if I get any from the big rating agencies, but I do from quasi-rating agencies and insurance industry studies. My tendency is to ignore them, but I'd like your opinions about the people who have worked on the actual numbers.

MR. ANDERSON: I'll certainly address the issue of FLUX scores. As the person who chaired the group that designed the method for computing FLUX scores, I would like to say that the group and I are available to discuss the concept and background and how FLUX works. We have had some conversations with rating agencies, and we welcome those opportunities.

I can't help you with the politics of answering and I can't help you with your own company strategies. But I can say that if you are asked a stupid question, no reply is necessary. If

you are asked for your high FLUX scores, low FLUX scores, or medium FLUX scores, these are not useful questions. The answers to those questions don't help much in understanding a company's situation.

The group that put together the FLUX measure was asked to address a couple of questions, which are, still, I guess, technically pending. One of those is, how do you treat real estate mortgage investment conduits (REMICs)? Is it appropriate to have a FLUX score for a REMIC? And second, is it appropriate to have a score for an entire portfolio or a single score for an entire portfolio of CMOs?

On the issue of REMICs, we said that because FLUX is a basic and not an advanced measure, those scores can be misleading. We do not encourage the use of FLUX scores for REMICs. But, what we're inclined to do is make them available to regulators. We hope that we can show them that the FLUX score is less reliable here.

With respect to portfolios, theoretically, the correct way to compute a FLUX score for a portfolio would be to aggregate all the cash flows through the entire period, treat that as one bond, and compute the score for the portfolio as a whole. The committee has considered that even that measure has a potential to be misleading. Therefore, we do not endorse it. The original mandate for deriving FLUX scores was to look at them on a bond-by-bond basis, as a screening tool to see when additional portfolio analysis was needed.

FLUX is too simple in our view to be conclusive. We think that it's inappropriate for people to use it beyond the original intent, just as RBC is used only as originally intended. I can't give you any more specific guidance about answering various questionnaires except—high, low, and medium FLUX scores are not particularly useful and can be misleading when communicated in this manner.

MR. HILL: Does that answer your question?

MR. MILLER: It answers part.

MR. HILL: Joe, will you answer the other question?

MR. DUNN: On the subject of disseminating RBC numbers, there is a section in the law that prohibits anybody in the industry from disseminating those numbers. It seems to be very broadly written and, although I can't offer a legal opinion, I'd say the safest course is just never to disseminate them. If somebody wants them, they can go down to the insurance department and pull your annual statement.

MR. CHANDLER L. MCKELVEY: I'm curious as to whether you see any movement toward trying to include FLUX in RBC.

MR. DUNN: I haven't seen any such movement, and I'm not aware of any proposals on the table at the moment.

MR. ANDERSON: In a similar vein to the previous question; I think that the committee that designed FLUX would resist that and deem it inappropriate. After all, a sophisticated

## MANAGING THE BALANCE SHEET

portfolio manager could combine, for example, IOs and POs and therefore replicate an entire loan. However, the regulatory issue and question is whether investment operations are being conducted effectively and prudently, with understanding of the possible side effects and impact. I believe that it's inappropriate to penalize more sophisticated management by adding that as an RBC factor.

MR. DUNN: I hope you're right. We're always looking for ways to simplify things and come up with a single index. It strikes me that FLUX is an area that sooner or later is going to be discussed in this light.

