RECORD OF SOCIETY OF ACTUARIES
1989 VOL. 15 NO. 2

COPING WITH CASH-FLOW TESTING IN A SMALL COMPANY

Moderator: NEAL A. FARMER
Panelists: ROBERT C. GREVING
CARL M. HARRIS
RANDOLPH DAVID MILLER
Recorder: NEAL A. FARMER

- This session will focus on the smaller company's use of cash-flow testing.
  - -- Applications
    - o Certifications
    - o Pricing/repricing
    - o Investment management
  - -- Mechanics
    - o Build, buy or rent a system
    - o Build, buy or rent an operator
    - o Integration with other financial systems
  - -- Different audiences
    - o Regulators
    - o Internal management

MR. ROBERT C. GREVING: Cash-flow testing is one of the hottest topics of discussion in the actuarial profession. Why do you want to do cash-flow testing? What do you expect to gain from it? Who are you doing the testing for? What kind of commitment are you willing to devote to the effort in the form of time, staff, and money?

Many people are answering the question, "Why are we doing cash-flow testing?" with the answer, "Because it is the proper thing to do, everybody else seems to be doing it." I submit to you that this is the same mentality that the American Indian relied on when he devised the hunting technique of running a herd of buffalo off the edge of a cliff. Each buffalo believed that running with the herd in that direction was the proper thing to do because everybody else was doing it.

For whom are we performing the cash-flow testing? For many, the answer is senior management. Our executive officers are curious and concerned about how the company stacks up in a cash-flow test.

How much commitment and cost are we willing to bear to carry out cash-flow testing? Usually, the answer to this question is something like "a reasonable cost is acceptable."

These are all important questions that each of us should answer relative to our own position, experience, and company structure. This session addresses the particular problems of cash-flow testing for a small company, but does not actually define what a small company is. It would appear that the term *small* is a relative one. But, I submit to you that a small company has a relatively unique environment and special characteristics like a limited actuarial staff and a fairly significant reliance on outside consultants for data processing and actuarial projects. Normally, it would also include the use of outside investment advisors to manage the company portfolio or portions of it. I don't believe that you can define a small company by simply looking at the *Best's Reports* and assuming that the financial size category of 6 or less is small, but a category of 7 or greater is large.

Many of the challenges and decisions facing the small company relative to cash-flow testing also have to be faced by the larger companies. Larger companies simply have more resources to draw on and a different magnitude of problems in running their day-to-day operations.

Let's first consider if cash-flow analysis makes sense for small companies at all. One school of thought believes that cash-flow testing in a small company environment is essential! Its argument indicates that small companies have very little margin for error. Since the lines of business do not produce significant cash-flows, there is little room for subsidization between the lines of business. Cash-flow in general tends to be more cyclical and sporadic, not only from year to year, but also potentially from month to month in many small companies. It is generally felt that the small environment is one that can most readily adapt to the results of cash-flow testing because it is a more controlled environment without all of the bureaucratic layers that are present in a large company. It is easier to adjust the investment strategy or the interest crediting strategy for a line of business or for the company as a whole, if necessary.

A second group considering this same question considers cash-flow testing in a small company a total waste of time. Its argument is that a small company environment is much more volatile than a large company environment and that cash-flow projections extend too far into the future to be beneficial. This group points to a high portfolio turnover indicating that, even though you can feel comfortable with your cash-flow testing, three months from now the investment portfolio will have changed materially, and the cash-flow testing would need to be repeated with very limited benefit. The group also points to the fact that establishing the cash-flow testing mechanisms is far too costly in both staff and money. At the current time, testing is not required of the valuation actuary by the NAIC, nor is it dictated by the October 7, 1988, Actuarial Standards Board (ASB) standard of practice concerning cash-flow testing for Life and Health Insurance companies.

Before we pass judgment on these two divergent viewpoints, let's examine the uses for the data and models used in cash-flow analysis. Perhaps with some more information, we can begin to take our own position relative to this critical question.

The most common use for cash-flow testing is the area of asset/liability management. Cash-flow testing, by its nature, projects the combined cash-flows of both the asset portfolio and the liability portfolio of a company. Some projections are done on an annual basis, while others deal with much shorter time frames such as quarters or even months. These projections are used for actuarial certifications and regulatory requirements such as New York Rule 126, which requires testing under seven specific interest rate scenarios.

Increasingly, A.M. Best & Company is also looking for this type of analysis in establishing its annual company rating, particularly for companies with large portfolios of interest sensitive products. These projections can also be utilized to establish a viable investment strategy for a portfolio of liabilities or for the company as a whole. In like manner, the projections can be critical in establishing a crediting strategy for the portfolio of interest sensitive products.

If cash-flow testing is carried out by line of business, it can be used to establish the most efficient asset allocation relative to various liability cells. If your organization is established on the basis of profit centers, the question of asset allocation can become a very political one. Each profit center head becomes very concerned that the good assets will be given to other profit centers and he will wind up with all the long-term low-yield bonds.

Once the cash-flow model has been built, it can also be used for net present value analysis. Essentially, based upon some realistic assumptions and a given discount rate, you can establish the net present value of your in-force business very easily. The most common use of net present value analysis is in establishing a market value for the company or block of business involved with a potential sale or merger. The net present value analysis could also be presented to a reinsurance company when considering a surplus relief agreement on a block of business. By calculating the net present value of a company, on an annual basis, you can begin to establish the value added to the corporation as a result of the activities carried on by management during the year. This can be used, along with the profit for the year, in determining the total return on equity of the corporation each year. This can be an effective basis on which to build management incentive bonuses as well as to provide valuable information for shareholders.

A third area for the use of cash-flow testing models is in the area of financial forecasting and projections. These projections can be very valuable in preparing your annual and multiple-year budget projections. Most of the computer models used for cash-flow analysis have the capability of putting in new business projections, which can be used for surplus analysis and statutory

profitability reviews. One area that my company found valuable is the use of the cash-flow model for Financial Accounting Standard (FAS) 97 modeling. Some of the software companies are establishing FAS 97 reporting as a feature of their system.

Last, the actuary can use the cash-flow model for product development efforts. While some of the models are rather cumbersome for initial pricing and design work, they are very beneficial in final product analysis. The information available can also be used for source-of-earnings analysis on either new business being developed or existing business. Projections of in-force business can also point to weaknesses in your overall product portfolio, which may be adjusted by modifying the cost of insurance rate or the credited interest rate. For new products, the cash-flow projections can indicate whether the product will function well under the established investment strategy and interest rate crediting strategy designated for its line of business. Adjustments to the product or strategies can be made and retested on a timely basis.

You can see there are many applications for cash-flow projection models. Depending upon your company's structure and goals, you can get good value for the investment you make of both time and money.

Cash-flow testing should not be perceived as being simply an actuarial exercise. Both internal and external publics are interested in these applications and results. Let's take a look at some of these.

The executive officers of the company and potentially the board of directors could utilize information obtained through cash-flow testing analysis for corporate planning, budgeting, and surplus analysis. Net present value analysis can establish the company value and its value added on an annual basis along with incentive bonuses for executive officers and operational officers throughout the corporation. Information can be used to demonstrate progress in the company goals. A total return on equity is an objective measure of progress for the year.

Accounting officers are interested in cash-flow projections for budgeting purposes and most recently for use in FAS 97 reporting. The accounting officer is also interested in the ability of the actuary to provide, in a timely fashion, the valuation certifications and demonstrations necessary to complete financial reporting requirements.

The actuarial officer is the ultimate asset/liability system user. He is most interested in cash-flow projections and the impact on product lines of various investment and interest crediting strategies. The actuarial officer also focuses on source-of-earnings analysis and general product development usages of the modeling process.

Your marketing officer is not exactly interested in the overall functionality of the system, but is very concerned about the impact the results have on his ability to sell. This concern could include the impact any analysis would have on the company's interest crediting strategy, which would directly affect the marketability of his products. To the extent the cash-flow analysis has the potential to affect the A.M. Best rating of the company, the marketing officer also shows an acute interest. At this stage, it does not appear that A.M. Best is using cash-flow analysis in a material way to establish the overall company rating, but is beginning to be more critical of companies which sell interest sensitive products without any form of cash-flow testing.

The investment officer is perhaps the second biggest user of cash-flow analysis after the actuarial officer. Of particular interest is the use of cash-flow projections of the asset portfolio and the potential changes to those cash-flows, which result from a change in the mix of assets. The investment officer utilizes cash-flow projections in establishing the optimum asset allocation of the portfolio between product lines. The investment department is becoming increasingly involved in establishing an investment strategy by line of business to support the newer products. This application is becoming more apparent with the high competitive level at which interest sensitive products find themselves. It is simply not enough for the company to establish a crediting rate based upon competition and then turn to the investment officer for the yield needed to support that rate.

As you can see, there are multiple applications of cash-flow models that can provide valuable management information in a small company environment. It seems inevitable that all companies, including small companies, will be doing some form of cash-flow testing on their in-force and new business. The question becomes how extensive this testing should be for a particular company and

how much peripheral information is needed as a result of the modeling process. The ability of senior management to learn and comprehend the uses and values of the available data will to some extent, dictate the level of commitment in the process. There is an old saying, "You get what you pay for." When it comes to cash-flow modeling, perhaps the saying should be changed to "You pay for what you get."

Once it has been decided that cash-flow testing is worthwhile for an organization, there are some specific steps to consider taking towards the decision to build, buy or rent a system.

The first, and most important, is to determine the applications that are important. Establishing this basic criteria will determine how the model is structured and what type of flexibility is needed in a system. This step also considers who the users of the system are going to be as well as the users of the results and reports that are produced from the cash-flow projections. Of equal importance, is a determination of the priorities of the applications. Some systems are more equipped to satisfy some applications and less well-equipped to satisfy others. The approach to this project should consider the priorities of the applications that are important. The last portion of this step is to determine whether the applications are one-time applications or whether they will be repetitive. If they are one-time applications, perhaps the use of a consulting actuarial firm is appropriate; however, if the applications are going to be repetitive, it may be more prudent to consider controlling your own destiny in establishing the ability to perform the projections on your own.

The second step toward this decision should be to review the internal resources available. If programming resources are pretty scarce, perhaps building a system from scratch should not be considered. Actuarial resources are critical with any approach since they are the focal point for determining the assumptions, building or coding the model, running the system, or interfacing with the consultants and finally analyzing the results. The availability of computer hardware should also be considered. Is your company mainframe available for a new application? Does your company have available, or is it willing to purchase, necessary microcomputer support for this project? Most of the systems that run cash-flow projection models will run on microcomputers. Some of the microcomputers required to run these massive number crunchers require a fairly sophisticated and powerful microcomputer to obtain the results in a reasonable time frame. What is the time frame for the overall project? Is this something that senior management had to have yesterday, or is it a project that you can work on over the next three to six months? The shorter the time frame, the more we lean toward the use of consulting actuarial firms; and, the longer the time frame the more we begin to consider building a system from scratch. Finally, how much is in the budget for this particular project? All the items required for this project should be considered, including the cost of the system itself, hardware, consulting fees, training expenses, and to some extent, the soft cost of staff time.

The third major step in the overall decision process should be to review the available alternatives. Contact various vendors that have systems, which could satisfy your needs, review their systems, and determine whether their system will perform the functions that will satisfy your application needs and fit within your resource parameters. Figure 1 addresses 34 items that you should know about any system whether you build it, buy it, or rent it.

The second approach to reviewing the alternatives would be to discuss your needs with the actuarial consulting firm most frequently used and determine whether renting the system through the use of an actuarial firm is a good approach to satisfying your needs. The final alternative to buying the system from vendors or renting the system from consulting actuarial firms is to determine whether it is practical to build the system. In general, I would discourage this approach for a small company, simply because the complexity of these systems and the manpower required to develop one would be prohibitive for a small company.

Finally, with all of the information available we are now equipped to make the decision. Consider the publics and the users of the system, as well as those who will be reviewing the decision. This is a major corporate commitment and should not be taken lightly. I would also suggest that you be extremely forward looking in your approach. A large amount of time and effort will go into the project. The maintenance of the system and company position two, three or five years down the road should be considered to make certain the system will satisfy company needs, and the task will not have to be repeated in the near future. Finally, do not underestimate this project. Cash-flow testing and projections of assets and liabilities of this nature are very

complex and involve numerous internal resources, regardless of the decision to build, buy or rent a system. Examine the project thoroughly, and remember it will probably take the best people to make the project successful. This is new territory, and many questions do not have definitive answers, so it will probably take longer to complete the project than originally estimated. If there is thorough planning, all the alternatives and limitations have been considered and facts are accurate with regard to internal resources available, budget, and time frame, a valuable tool can be developed for the company.

FIGURE 1

CASH-FLOW TESTING MODELS
THINGS TO KNOW ABOUT YOUR SYSTEM

1. Hardware required to run it.
2. Software required to run it.
3. Vendor viability and credibility.
4. Quality of documentation (System and User)
5. Functionality to serve your needs.
6. Language the system is programmed in.
7. Ease of user modification or vendor support.
8. Cost of system (Price, Installation, Hardware, Software, Maintenance, Modifications).
9. Type of licence (Site Licence, Copy Licence, Multiple User Licence).
10. Maintenance Agreement cost, terms and coverage.
11. How many other users of the system?
12. Methods of input to the system (Keyboard, Interface with other systems).
13. How are results reported by the system (Printed Tables, Graphic Reports, Computer Data Base, Video Screen, Lotus Workspace)?
14. What type of liabilities will system support (Ordinary, Universal Life (UL), Single Premium Immediate Annuities (SPIAs), Annuities, GICs, Group, A&H)?
15. What type of assets will system support?
16. How many asset/liability cells can be loaded in one model?
17. Can results of multiple models be combined?
18. Is there a limit to the number of scenarios that can be processed (system limit, practical limit of time)?
19. Are the asset and liability cash flows dependent or independent of each other?
20. How does the system project interest rate scenarios (Random probability, User specified, Log-normal projection)?
21. What types of investment strategy can be used?
22. What type of crediting can be used?
23. Will the system determine the optimal strategies for me?
24. How is tax treatment reflected?
25. Can the system test projected new business?
26. What does the system do with negative cash flows?
27. Can the system handle "exotic" assets and features such as puts and calls, options, warrants, etc.?
28. What vendor support is available to prepare the initial data file?
29. How long does it take the average user to load a typical liability data file? Asset file? What would affect the time required?
30. What system debugging features are available to identify coding errors or inconsistencies?
31. Is the source code available?
32. Has a user group been organized? How often does it meet?
33. What are the future enhancements planned for the system?
34. What level of personnel is required to operate the system? (Number and skill level)

MR. CARL M. HARRIS: I have been asked to speak about asset and liability matching in a small life company. The concept of asset-liability matching is a large and encompassing topic and has received a great deal of attention recently. While I do not profess to be an expert on this subject, I have adopted some procedures for my company, which I will share with you. The comments I will make are my own and relate to my company alone, although they are not unique to the industry as a whole.

For background purposes, American Life has approximately $1.6 billion in assets. Of this figure roughly $1.3 billion is in various flexible and single premium annuities. The remaining portion is in ordinary life insurance including universal life, single premium whole life (SPWL) and traditional whole life. Most of the growth at American Life has occurred in the last four years, almost tripling in size. Approximately 12 months ago, I was faced with some of the same situations you may face. They are:

1. Am I making a profit?
2. How much of a profit am I making?
3. Can changes in the policy affect me?
4. How will they affect me?
5. Where is my profit coming from?
6. Will it continue, and if so, for how long?

At that time we couldn't answer any of these questions. This was very disturbing to us because we were in the asset range of $850 million and growing at the pace of $35 million per month in premium.

My participation in this panel discussion will deal with the areas of initial product pricing, repricing, and what tools, equipment and computer software are available. I will be discussing several specific product lines later.

One of the more critical functions that life company actuaries have is the pricing of products. This can be accomplished either internally or by a variety of consulting firms. Of the myriad of assumptions that must be "guessed at," the one that I want to deal with is the interest rate assumption.

For purposes of the following discussion, I will be concentrating on the annuity side and SPWL product of our company. However, there is obviously carry-over to other life products, like UL, especially when talking about single premium whole life.

There are three profit centers in our annuity products. These are:

1. Interest rate spread,
2. Expense savings,
3. Mortality savings.

Of these profit centers, let me first touch on the interest rate spread.

Simply put, interest rate spread is the interest rate earned on investments (net of investment expenses) over the interest rate credited to the annuity and SPWL contracts. I include SPWL here because our SPWL product, while having a guaranteed underlying cost of insurance charge, does not assess any charge to the policyholder. So for all intents and purposes, our SPWL policy is very similar to our single premium annuity products. This spread is usually expressed in basis points, i.e., 125 basis points would be the same as 1.25%.

The first question that needs to be addressed is how much spread is necessary for a product. Before this can be answered, the question arises as to why the company needs any spread in the first place. The interest spread in our annuity and SPWL products cover the following items:

1. For statutory purposes, the decrease in surrender charges from one period to the next. Our reserve liability is consistent with the Commissioners Annuity Reserve Method; therefore, reserves may exceed the policy cash surrender value.
2. Annual maintenance expenses incurred with the product are also covered by the spread. Acquisition expenses are assumed to be covered in the first-year surrender charge.
3. Death benefits under the policy are also covered in the spread. The death benefits under our policies are the difference between the full accumulation value and the cash surrender value.
4. The final item covered by the spread is the profit in the product.

As you can see, the spread covers a wide range of items. In addition, there may be a provision for adverse deviation in any of these items, which has to be funded by the spread. For our company,

and 190-200 basis points for a two-year guarantee. As I will outline later, we are just now beginning to offer a two-year interest guarantee product.

With this spread, we anticipate a profit of approximately 180-300 basis points over a 10-year period, (our normal observation period for testing) depending on whether the product is a single or a flexible premium product.

The next concept I would like to address is the one concerning the duration of both the assets and the liabilities. There has been a flurry of literature written in recent months concerning the concept of duration.

The first article to really address this subject detailed the concept of immunization and was written by a British actuary named Redington. The concept of immunization has a long history in England but was not a serious subject in the U.S. until recently. In his article, Redington used numerical equations to determine whether changes in the underlying policy or any external changes surrounding the policy would affect the outcome of the policy. If the policy was positively immunized, any changes that occurred in that policy would not cause harm to the company. In other words, the company was fully immunized from outside forces. On the other hand, if the policy was not immunized, then any change that occurred in the policy would have very real and maybe disastrous results in the company's financial results.

Perhaps, the most famous of the more recent articles is one written by Jim Tilley. The article in *TSA* XXXII includes almost 40 pages of hard-to-understand mathematical formulas requiring extensive programming. The average person or company would not be able to adopt such procedures in normal everyday practice. If you are like most people who have tried to assimilate this article, you probably gave up shortly after beginning it. Let me tell you what I feel is important regarding matching. Most of our company's investments over the past 12-15 months have been in the government mortgage backed security area.

We have estimated that the average life of these instruments is seven years. We have tried to find higher yielding corporate instruments, but the availability of such assets are few in number and those that do exist are quickly absorbed into the market. They can be found in the secondary market, but the price will have undoubtedly changed from issue and may not suit our needs any longer. Whenever we can, we purchase as many of these as we can, provided all the risk factors can be dealt with satisfactorily and the price is reasonable.

We have a variety of annuity-type products in our current portfolio. One of the keys here is trying to determine the average duration of the liability in the policy. If your annuity product has a 10-year surrender charge period, it is not inappropriate to assume that the duration of the policy will be in the neighborhood of seven years. Knowing the average duration can be very reassuring to both the pricing actuary and the investment manager in determining which type of assets to purchase. In a number of respects, it is almost a requirement for us. The duration of the annuity policy is clearly related to the length and level of the surrender charges and the level of the interest rate credited to the policy.

When dealing with the UL product, the concept of duration is more confusing. Most UL products, including ours, contain a surrender charge provision that extends for 20-25 years. There is also the concept of underwriting risk to be dealt with, subsequent to issue. What impact does underwriting have on duration? We have estimated the duration of our UL product to be in the range of eight years. Included in this estimate is a determination for lapse. We also have the ability, as I am sure all of you do, to manipulate the cost of insurance charges in the policy. At this time, we have chosen not to do this.

Duration encompasses all these parameters. As you can see, the duration of the UL policy is roughly the same as the annuity policy. However, the policies themselves are not the same. Care must be taken when purchasing or repurchasing assets to back these liabilities.

Let's spend a few minutes talking about the not-so-perfect situation, which exists where assets are either longer or shorter duration than liabilities. If you're like me you are a firm believer in Murphy's Law, which is, simply put in this context, a policyholder will either surrender or deposit more money at the wrong time, relative to the current interest rate market condition. In other words, if a policyholder knows that future interest rates are going to drop, and your contract

offers a competitive interest guarantee, he is most likely to deposit into that contract. On the reverse side, if rates are likely to increase and your current rates are not keeping pace, then he is more likely to surrender.

For this reason, it is imperative that you watch the spreads almost continually. In our company, we have an in-house investment committee meeting monthly for the purpose of determining what the new issue and renewal interest rates are for the next month. It might surprise you how much 1/32nd of 1% can really mean to your bottom line. In our company this amount is roughly $500,000. It might further surprise you to know how often the rates move more than 1/32nd of 1%.

The monthly premium flow into our annuities has been in the range of $40 million and shows every indication of continuing at this pace or rising. By the year 1992, we project our assets to rise from the current level to just under $5 billion. Applying the scenario mentioned earlier, the effect to the bottom line would approach $1.5 million a year, not an insignificant amount.

The next topic I would like to address concerns which type of asset is appropriate for investing. As you are all aware, there is a large variety of investments that can be purchased, both government and corporate. Some have call features, some may have convertibility features, and some may have other features. Care must be taken with these features, as they have the effect of shortening the duration of the asset. Without listing all the different types, let me tell you how we invest our funds.

As I indicated earlier, we have had a little difficulty finding high-yielding corporate instruments without having to go into the so-called "junk" market. It has been and still remains our goal to invest our funds in vehicles that give us the highest return while still having a risk in the range of governments or minimal risk. We do not invest in the "junk" market.

For this reason, we have found it quite acceptable to invest in the government secured mortgage backed security market. These securities are readily found in the open market on a daily basis. They are also fully admissible for NAIC purposes although you must establish a Mandatory Securities Valuation Reserve liability for the Federal Home Loan Mortgage Corporation but not the Government National Mortgage Association.

The rate of return on these instruments is in the range of 11.2-11.5%, which after investment expenses, allows us to credit an interest rate to our policyholders in the neighborhood of 9.2-9.5%.

You will need to examine your own pricing criteria and safety requirements to determine which investments you feel are most secure.

The next topic is the easiest to identify. That is which products or product line require a current rate of interest. For simplicity's sake, I have classified these as the following:

1. Annuities -- both flexible and single premium
2 Universal Life
3. Interest Sensitive Whole Life or Excess Interest Whole Life
4. Single Premium Whole Life

You may have more than these, but these represent the existing general product marketplace. I have purposely left out the variable products because of my lack of experience and also because they usually have assets directly backing the specific liabilities.

How long should the profit study be? It used to be that the norm was 20 years. It wasn't until a few years ago that actuaries and investment people began to realize that changes were occurring much more frequently than every 20 years, especially in the area of interest rates. It was for this reason that we began to modify our pricing criteria with respect to profit study duration. We now use a period of 10 years for our annuity line. We still use a 20-year model for our life line but include a deviation for changing interest rates we can earn on reinvestment.

We insist on a very rapid break-even period. For our annuities, this is usually one year for statutory purposes. We feel that if a dramatic change were to happen in the interest rate area, we want to be as safe from surrenders as possible with respect to unrecoverable losses. This issue is

slightly different for GAAP. The loss of deferred policy acquisition cost (DPAC) is offset against the surrender charges collected upon lapse.

On the life side, it is unrealistic to expect a break-even period of less than five years. If you combine this fact with the average duration of a UL policy as eight years, mentioned earlier, there is no real room for error. It also means the profit accumulation period is very small, i.e., three years. On the positive side, early surrenders carry a fairly substantial surrender penalty. On the statutory and GAAP financial statements, as with the annuities, we feel we are fairly protected.

But what of the assets? Will the surrenders be funded out of cash-flows, or through asset sales? If you are not adequately matched, you could find yourself having to dispose of assets at the wrong time. Or if your high-yielding asset is suddenly called, what will your reinvestment have to be to secure the same return and duration as the original asset instrument? Remember my belief in Murphy's Law.

How long the guarantee period should be is strictly a company decision. However, there are a few things that must be considered when determining the issue of guarantees.

First, there is a surplus strain for reserves whenever you offer an interest or any guarantee. The longer or higher the interest guarantee, the higher the strain. Most of our annuities are currently being marketed with a one-year interest guarantee. We are just now beginning to offer a product with a two-year interest guarantee, but only on a limited basis, and with a lower guarantee than the product with a one-year guarantee. We are very concerned with the amount of strain we can handle, as I am sure you are.

We have found that the surplus strain for a one-year interest guarantee in our annuities discussed previously is approximately 200 basis points or 2%. For a two-year product, this strain is approximately 350 basis points in the first policy year and 175 in the second policy year. For a block of $100 million of premium, a one-year interest guarantee will cost you $2 million, and a two-year interest guarantee will cost you $3.5-4 million in year one and $1.75-2 million in year two. There are a large number of companies promoting annuities with very long interest guarantees, and some of these also include a bailout provision. If you have tried to reserve these, you will be shocked at the amount of strain these types of guarantees produce. I have seen these strains approach 10%. On this issue, you have to be the judge as to your own limitations.

On the life side, all of our UL and SPWL products carry a one-year interest and mortality guarantee. In the case of SPWL the mortality guarantee is zero. Our reserve liability is the greater of CRVM reserves or cash surrender value plus half of the next month's cost of insurance charges, similar to an unearned premium reserve on the health side in Exhibit 9A. There is minimal strain as a result of the liability. Most of the strain in a life product is the result of the acquisition costs associated with the policy, i.e., the commission and the direct underwriting costs.

Let me spend a few minutes discussing repricing of these same products. Some of the main issues that need to be considered are as follows:

1. Duration of assets and liabilities,
2. Interest guarantees -- both length and amount,
3. Experience data on existing policies.

As you can see, the first two items are the same as under the initial pricing of the product. The same philosophies hold here. The third item needs some further explanation. Under this item, the experience data can be broken down in the following items:

1. Actual versus expected spreads
2. Actual versus expected expenses
3. Actual versus expected mortality costs

When repricing, the only item we are most often concerned with is the interest rate level. We have been able to track the results on spreads on a quarterly basis in conjunction with the financial statement. From these results, we are able to determine whether we have achieved our goals or have been shot out of the water. It is a very rare occurrence when the actual exactly mirrors the

expected in this area. Most of the time, we experience results either greater and less than the expected. Recently we have been able to show better results than projected. From this tracking, we are able to project what we will offer in the way of future interest rates.

All the preceding discussion leads us to the most important topic, namely what is available to help both price the product and match the assets with the liabilities.

There is a myriad of products on the market to help with the pricing of products. In addition, most actuaries have developed their own techniques for determining profit levels. On the subject of matching, there is less in the marketplace.

There are three methods of obtaining matching results: 1) Buy, 2) Build, or 3) Rent.

The buy option is available in several different modes. Tillinghast offers a self-contained pricing program called PROPHIT. It also offers a matching program called CALMS, which stands for Comprehensive Asset/Liability Matching System. Both of these programs are able to be run on the PC microcomputer with normal input instructions. Other consulting firms have similar systems, but I am unfamiliar with them.

The CALMS program tests various investment and policy assumption scenarios against a static policy. It is sort of like playing a "what if" game with the pricing system. What will happen if investment results are worse or better than expected and your reaction to change occurs several months later? What will happen if lapses are worse or better than expected? Several different investment strategies, including provisions for investment features similar to callability, can be input to compare results. In the rental market, Polysystems offers a time-sharing on-line system in conjunction with Shane Chalke. This system is called the PTS program. This program is similar to the Tillinghast program in both input requirements and results. Both vendors offer user support for their products. All my knowledge on these two programs is what I gained from brochures and conversations with the vendors.

The third method is the one I am most familiar with, which is the "build" method. We have a home-grown system, which we use for modeling and testing. However, I must tell you that it is not a very sophisticated system, and a lot of the bells and whistles in the other systems are not present in our system.

At the end of each quarter, we rank our investments by annual yield and coupon rate, capturing both the market and book value. We then summarize all our liabilities by interest rates required. After this has been done, we divide our liabilities into three categories, depending on the interest requirements associated with them. For example, our annuities require the most competitive interest rates while the older ordinary life products do not require as much. In addition, there are some liabilities that do not require any interest at all. For this reason we rank our liabilities according to the following:

1. Group 1 requires the most interest matching (annuities, SPWL, UL, and excess interest whole life)
2. Group 2 requires less matching (older traditional whole life)
3. Group 3 requires little or no matching (other liabilities)

Using Group 1 as an example, we are able to produce a static or snapshot interest requirement on each of our annuity and SPWL product cells for the next 12 months. We assume the interest rate currently being credited will continue for 12 months. In reality, we know it will not, but all we are trying to do is test our spread theory in a snapshot vacuum. We multiply the current full account value by the current interest rate being credited. The result tells us what our interest requirement will be. We do this for all the other liabilities in Group 1.

On the asset side, we begin with the highest yielding assets and include those assets until the book value equals the full account value for the liabilities. The assets are then multiplied by the coupon rate to determine the interest amount earned. This result is then subtracted from the liability interest requirement. When the result is divided by the book value, the result is the spread. This can then be compared to the pricing assumptions to determine whether we have been successful or not.

The same scenario is carried over to Groups 2 and 3 in a similar fashion with the remaining assets. Obviously, only interest yielding assets can be used. Therefore, assets like DPAC and goodwill, which have no coupon rate, will be of no value to this calculation.

It is not unusual for the spreads on Group 2 and 3 to be abnormally small or large or even negative. In reality, Group 1 encompasses almost 95% of our assets and liabilities.

As I indicated earlier, this is not a very sophisticated system, and, in fact, can be a very dangerous one if left alone. Since ours is a static program, the results can change very rapidly, as often as the market does. But the main comfort we take is that we are at least doing something. Since we review this system at least once per quarter or more, at least the reaction time to change is limited.

The main point here is, if you know what you are trying to accomplish, your course of action does not need to be very sophisticated. Of course, you may have a need for some sophisticated modeling, in which case some of the systems I have alluded to have real potential.

The cost of our program is the amount of time it takes to gather all the information, usually one week. The cost of the buy programs can run in the $50-60,000 range while the rent programs are usually a time charge. I am unfamiliar with the normal charges; you would have to contact the vendors if you have any questions on specific programs and the associated cost.

The decision of which program to use, if any, also requires a decision as to how sophisticated and detailed are the results required.

MR. RANDOLPH DAVID MILLER: I am going to talk from the perspective of a valuation actuary. This will narrow the perspective somewhat. While Bob and Carl have given you the overview of senior management, I will be talking more from the view of a working actuary. The valuation actuary is sort of the Dirty Harry or Dirty Harriet in the organization, the person who comes up with unpopular answers to unpopular questions. But you live through it because you are a professional. At least that is what I tell myself. My official title is Vice-President/Valuation Actuary. The story behind this tag is one of evolution, natural selection, and survival of the fittest. You are looking at one of the most complex life forms in the galaxy.

Let me begin by telling you a little about my company. Security Benefit Life markets primarily three products, universal life, annuities and reinsurance. Two of the three products are investment-driven, and my company is basically investment driven. This led us to an asset segmentation project, which I worked on. We set up six investment portfolios to help match investment strategy with product-liability structure.

You know that it took some work to set up six portfolios. It took a lot of analysis to determine what we needed. It also took programming to be able to track the portfolios. This investment orientation also led us to visit with various gurus, wizards, and celebrity investment analysts from the East. Some that come to mind are Joe Buff and Jim Tilley when they were with Morgan Stanley. You will find the investment people are a good source for learning about asset/liability matching. In fact, they sometimes know more than the actuaries.

For projecting cash-flows for new products, the investment people will be glad to give you projections under various economic scenarios. These projections may not be as severe as the ones you would use in your testing, but you can get some idea of what those flows would be like. In fact, I met one guy who I think was a salesman from Miami. He was sitting in my office with a laptop computer, a gold chain around his neck, and a bunch of jewelry on his fingers. He also had a sophisticated program that could project collateralized mortgage obligations (CMOs) out over various scenarios that I could not do on some of the models I have.

You can use that type of program, especially if you are doing the New York filing. Have someone from an investment house project out some of the weird products under static scenarios, and you can plug those in. If you must do a projection under a random scenario, the investment house programs wouldn't be able to do it, but it is a way of getting around some of the New York requirements.

Another picture of how I became a Valuation Actuary had to do with surplus. Like almost everyone in this room, we have limited surplus. The natural question is, "How limited are we?" To

find out, we commissioned a study on required surplus needs with Walt Rugland of Milliman and Robinson. Walt, as you may know, was and is spreading the Valuation Actuary concept across the country. In this case, it fell on fertile ground.

Security Benefit is accredited in New York as a reinsurer. What does this mean? Well, let's make some subtle connections -- Annuities, New York, New York Regulation 126, Cash-flow Testing, and Reserve Opinion.

For the past three years, 1986-88, I have been responsible for submitting the required Opinion and Memorandum on annuity reserves.

As a final note, we did not develop our own software for the modeling, but purchased the CALMS system from Tillinghast.

There are now official Standards of Practice on Cash-Flow Testing put out in October 1988 by the ASB. These do not mandate cash-flow testing, but they do apply whenever it is done. The chief requirements are related to procedures, a written report, and levels of documentation. That is the key: document, document, document.

The golden rule of actuarial work also applies: Leave enough of a trail so that another actuary could follow your work. The other actuary may not agree or come to the same conclusion as you did, but he or she should be able to follow what you did.

Documentation in the choice of assumptions is really our field. There are so many possible interrelationships that it is almost impossible to do the job of selecting assumptions without writing everything down. Another friend is sensitivity testing. This means that none of your work is ever wasted. Even the most botched input will produce a run that tells you something. It is a good idea to devise a labeling scheme for every run you make. You don't need to save every one, but an annotated record can always be used for sensitivity analysis. Of course, you can also do sensitivity analysis on purpose.

The NAIC has a Special Advisory Committee on the Standard Valuation Law. In December 1988, this committee presented a proposal on the valuation actuary concept. The chief features were:

1. Minimum reserves as currently defined would not change. Commissioners could require opinions on reserves in light of assets on certain policies.
2. Companies would designate a qualified actuary to make this opinion. The proposal envisioned these as being members of the Academy.
3. The type and depth of analysis supporting the opinion would be based on the extent of risk and the choice of the actuary.
4. The supporting memorandum would not be filed, but would be a confidential document available in the examination process.
5. A broader MSVR concept, covering all invested assets except real estate was outlined, but details were not fleshed out.

This proposal is somewhat kinder to the little guy than New York's Regulation 126. Regulation 126 requires an Opinion and Memorandum supporting annuity reserves. The reserves subject to the required opinion have increased under newer variations. The regulation itself is now 48 pages long, or the size of a large study note. It is an excellent guideline and checklist for what needs to be done in a thorough cash-flow analysis. It has the benefit of being tested under fire now for three years. The Department has incorporated suggestions and occasionally simplified or eliminated provisions.

This is not to say that every change has been without controversy; Regulation 126 added a section last year on substandard annuities that matched an early NAIC proposal -- a proposal that has since been modified. The New York Department has listened to the actuarial community, but it has also shown a bias to act rather than wait. This is not all bad; I have to admit I would not have been dragged into the modern era of the valuation actuary without the impetus of the Department's regulation.

Some of the major differences between New York and the NAIC model include:

1. Who can be a qualified actuary? New York bases it on Fellowship status, or by satisfying the Commissioner.
2. You can request your supporting Memorandum to be kept confidential, but it must be filed. The filing date is intended to be concurrent with your annual statement filing.
3. The type and depth of analysis is more laid out for you.
4. Specific alternatives are available, even those that require setting up additional reserves in lieu of an Opinion.

Let me close by mentioning that any type of requirement does not just enact itself. It is part of a political process, with give-and-take on all sides. There will eventually be cash-flow testing requirements everywhere -- I wish I could sit up here and tell you it could all be done without spending money, adding staff, calling in consultants, or buying additional computers. In fact, if I could do that, I wouldn't be sitting up here for free, I'd have you all pay me to tell you how to do it.

MR. WILLIAM T. BRYAN: I just wanted to tell the people here that one of the committees that reports to the ASB is the committee on life insurance financial reporting. Its members are the ones who drafted that ASB cash-flow testing report. They are in the process of drafting one that concerns more when you should do cash-flow testing. When it gets published I would encourage all of you to read it and make comments so that it can be the kind of document that is going to serve us all.

MR. GREVING: Does it appear that cash-flow testing is going to become a requirement as a result of that ASB proposal?

MR. BRYAN: At this point, the ASB hasn't seen it yet. The committee on life insurance financial reporting is drafting it, and it is not mandated at this stage. It is more on the line of guidance to the actuary, not only the valuation actuary but also the pricing actuary, actuaries doing appraisals and lots of different functions and tasks. It is geared to when you are making a professional opinion or recommendation. This is guidance as to whether you should do cash-flow testing. Now, of course, the thrust of it could change, but that's where it sits right now.

MR. GREVING: I don't know how many of you attended the session here that Joe Buff was in. He had some interesting statistics. Since this is composed mostly of small companies, he said there was a survey that he was familiar with that indicated there were about 150 companies that were subject to filing under rule 126 in New York and that approximately half of those companies were actually filing; the rest of them didn't have product lines that called for a formal opinion, or they were setting up additional reserves.

According to a survey, there were about 100 companies that have systems that do the modeling necessary for cash-flow testing, and of those 100 companies, about 80% of them used cash-flow testing to help manage their companies. I noticed there were some that were not subject to 126 and actually did the cash-flow testing. Is there anybody in the audience who is actually doing cash-flow testing to mange his company? Nobody at this point. We are really spearheading this overall effort in the industry.

Any effort toward setting up a system is a large task and requires the dedication of quite a bit of resources. The initial thrust in my effort to set this thing up was to overview the systems and select one. Once I had the system, I thought it wouldn't take very much to code up and get it running right. I didn't have a very high-level individual involved at first, and it became obvious, very quickly that an inexperienced individual, without a pretty good overview of the overall company, its function and the different political factions, could not be effective. This project demands your best people. Plan on chewing up some pretty good resources, especially in the actuarial department.

Carl's company basically manages its assets and liabilities using an interest rate committee; I heard him talk about how the company matches up its weighted cost of funds analysis to the weighted yield analysis against the portfolio of assets.

MR. HARRIS: Of those companies that do the weighted costs, are the results pretty much what were expected, or are they off the mark by a wide, wide range?

MR. ROBERT W. ESCHRICH: We are a small start-up subsidiary of a state charter savings bank in the State of Washington. I previously had been with a company, which is now United Olympic Life Insurance Company. We have been using that technique at both companies since about 1982 and I would say with pretty good success. I might mention that the investing in this case is not done by the life company but by the investment people at the savings bank.

MR. HARRIS: Do they have some feel as to what your spread requirements are?

MR. ESCHRICH: As you can imagine, our owner, being a different type of financial institution, has looked at the insurance business very carefully. I think it's fairly safe to say quite a bit of expertise, not only on the asset side but also on the liability side. The affiliation I have had with Washington Mutual has been about three years now, and over that period it has been a two-way education process. I am starting to feel very comfortable with the bank, and I think the people there are feeling comfortable with the people on the insurance side, also.

I would say, yes, the savings bank does have a pretty good appreciation for the options that are offered in the insurance products, for the structure of the liabilities, for the requirements on the asset side, and for the durational constraints that you have. So I would say, yes, the people there do have a pretty good understanding, and they have taken a long hard look at it.

MR. GREVING: I guess I'm just curious about one thing. Last year there was a large fear that the valuation actuary would have to sign off on the asset side of the ledger sheet. The question basically was how many actuaries really felt they had an influence in the investment aspects of their company to the extent they could have that influence and sign off on the investment side of the ledger sheet? Since we are predominantly small companies here, I guess theoretically, we could have more influence, but in some situations our company doesn't even do the investing -- maybe some parent company off on the east coast does the investing. But how many actuaries actually have an indirect input and work with their investment department to the extent that they could have some pretty good influence on what the investment strategies of the company are? Not as many as I would have expected with a group of small companies.