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CASH-FLOW TESTING AS A MANAGEMENT TOOL

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Recorder: DONALD F. BEHAN

- Was the year-end process useful or a necessary evil?
- How realistic were the assumptions used?
- How much was pure guesswork?
- What were the lessons learned from the exercise?

MR. DONALD F. BEHAN: We are fortunate to have Susan Kimball, a consulting actuary with Tillinghast/Towers Perrin, and Yvon Charest, the vice president and Actuary with Industrial-Alliance Compagnie d'Assurance Vie here in Quebec. I'm with Deloitte and Touche.

Both of our panelists have significant experience with cash-flow testing and have some very useful ideas on the management applications of cash-flow testing to present to you. In the United States, there is a broad cash-flow testing requirement covering all products. Most life insurance companies were required to perform cash-flow testing for all products as of December 31, 1992, and the requirement will be extended to almost all states during 1993. This requirement is actually for regulatory cash-flow testing. I am using that term because today's session will demonstrate that there are some different approaches that you will want to take in using cash-flow testing for management purposes.

In fact, we will use this outline as a point of departure rather than the core of our presentations. We will focus more on the last point, "What lessons were learned?" and perhaps more important, what lessons can we learn in the future?

Our speakers will focus on four aspects of the management use of cash-flow testing, cash-flow testing in risk management, and in profit enhancement, each of these as applied to assets and to liabilities. One of the key aspects of shifting from a regulatory point of view to a management point of view is the change in our perspective on the assumptions that are going to be used. Realistic assumptions, including assumptions about new business, and assumptions about the likelihood of interest rate scenarios, will need to be used if the results are going to be useful as a basis for management decision-making.

Susan Kay Kimball is a consulting actuary with Tillinghast/Towers Perrin in St. Louis. She started her actuarial career with Transamerica Occidental Life and has been with Tillinghast for five years. She has been involved in a variety of life insurance consulting areas, and recently has been involved in all aspects of cash-flow testing for life insurance companies. Susan will give you an overview of cash-flow testing considerations for management.

MS. SUSAN KAY KIMBALL: We finally finished cash-flow testing. I think I heard one big sigh of relief in March 1993. Was all that effort just for regulators, or can we use what we have learned in the management of our business? I would like to start

off by discussing cash-flow testing and some of the various side benefits. We will consider the implementation of a corporate strategy, and how cash-flow testing fits into this process. After touting the glories of cash-flow testing, I will also spend some time on some of its limitations.

The extensive work performed in cash-flow testing involves building the models on the practical side, and understanding the asset risks involved, and their interactions with the liabilities on the theoretical side. We can use this in analyzing and implementing a corporate strategy, the most notable areas being the management of in-force business and product development.

What are some other uses of cash-flow testing? We can perform sensitivity analysis on various investment and crediting strategies. For example, we may find, for a fund-driven product, that a higher credited rate and a lower spread might actually yield more profits for the company due to improved persistency. Investment strategies which can be tested include changes in asset quality, asset liquidity, and asset maturity. By applying the methodology employed by rating agencies to the yearly results of cash-flow projections, a company can determine future capital requirements necessary to maintain or improve their current rating. Cash-flow testing can furnish the data necessary to calculate the change in surplus due to interest rate volatility. If an insurer understands the sensitivity of surplus to interest rate changes, it can attempt to immunize its surplus from these changes. Cash-flow testing also can be used to measure the true costs of different policyholder options, such as bailouts and interest guarantees. We will discuss this last point later in the discussion.

On the plus side, cash-flow testing can be used to improve profitability of both new and in-force business. It can reduce the likelihood of surprises. We can use it to explore management's appetite for risk, and we'll discuss the asset/liability efficient frontier (ALEF) concept later also. Cash-flow testing also can be a source of competitive superiority.

On the minus side there are difficulties in determining the value added by the expertise of the investment area. It also is difficult to project active and ever-changing management strategies. And if anyone has the key to accurately forecasting policyholder behavior, I think we'd probably have to make that person the Yoda of actuarial science.

Cash-flow testing is the nucleus of the asset and liability management control cycle. It is being used to address product design, investment and crediting strategies, and valuation actuary issues. Reserve adequacy may be our initial concern, but cash-flow testing can also be valuable with respect to pricing. We can determine possible negative aspects of a particular product design before it actually hits the street. And it allows us to evaluate the impact on surplus, and any unexpected statutory effects. We can use cash-flow testing with regard to asset allocation strategy, analyzing the impact of surplus on economic changes. We can evaluate the pros and cons of crediting and portfolio rate versus the market rate. And we can achieve results which have been adjusted for various options, including bailouts, interest guarantees, book value cash-outs, and free loans.

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Let's now focus on management. A large part of the manager's leadership role in the company involves corporate strategy. Corporate strategy is often viewed as a matching of the company's resources to its opportunities. For example, a company may see opportunities in the variable market, but not have the distribution capabilities. An insurer may wish to enter the annuities market, but not have the needed capital. Or maybe a company would like to invest in the overseas market, but just isn't sure which country to start with. Often, companies incorporate this strategy via long range planning without varying from the charted course. However, research has shown that many companies do not adhere to a rigid, predetermined plan, but effectively manage their companies through adjustments over time to emerging circumstances and opportunities. The corporate strategy should answer the following questions: What are our objectives? How do we measure success, and how will our objectives be achieved? Corporate objectives will vary from industry to industry and company to company. Objectives for a life insurance company may be growth, profit, and expense control.

Let's now focus on the profit objective. How do we measure success? Financial theory says profits should be measured in terms of return versus risk. If we are given a projection of future financial results, we can easily produce a number of reasonable measurements of return. The uncertainty or risk is that the required future financial results cannot be determined with certainty. This ALEF concept evaluates various alternatives regarding product design and crediting and investment strategies and their associated risks and returns. The definition of risk and return may reflect management's philosophies. The goal is to choose the final product design and strategies packaged to form a number of efficient combinations. The selection of the optimal package depends on the company's risk and return objectives.

Chart 1 shows the ALEF concept graphically. We must determine which strategies improve our current position, and which is in the middle. Hopefully, we will go in the optimum direction of reducing risk while increasing return. There are barriers to achieving optimal results. Organizational roles may thwart optimal positioning. The product manager may be concerned with liability design and pricing. The investment manager may be focused on asset return performance, while senior management may have individual functional goals which are not integrated with overall corporate goals. In addition, the current reporting and compensation procedures may hinder overall performance. The following questions may arise: How do we evaluate alternative product niches and liability mixes? How do we select the best investment strategy? How do we measure the effect on embedded value of actual investment performance? How do we design fair and objective incentive compensation packages for the portfolio manager? We plotted our various strategies by return, which is defined as the expected total return of an asset, and risk, defined as the variability of annual returns. Those strategies on the outlying boundary of low risk, high return from the efficient frontier, which is in Chart 2, are considered superior to all other strategies. The strategy is on the efficient frontier if no other strategy has a higher return with equal risk or equal return with less risk. Here strategy A is inefficient while B and C are efficient strategies.

We are now going to look at an example incorporating our adjust-over-time strategy. Therefore, rather than strictly following the assumptions used in the product development process, we will, at various points, incorporate information that wasn't

previously available. We are going to start with a block of single-premium deferred annuities issued in 1988, priced to achieve a 14% return on investment (ROI) and ask the question "What is the effect of the current environment?" The surrender charges are: 7%, 6%, 5%, 4%, 3%, 2%, 1%, and we have a 4% guaranteed rate.

CHART 1
ALEF Allows Different Corporate Policies to be
Evaluated Based on Risk/Return Analysis

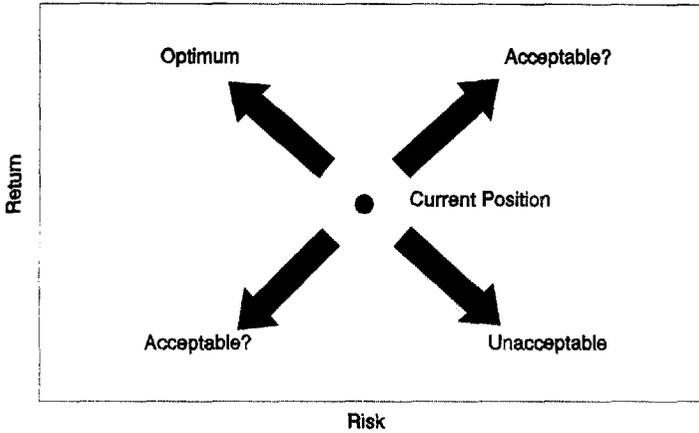
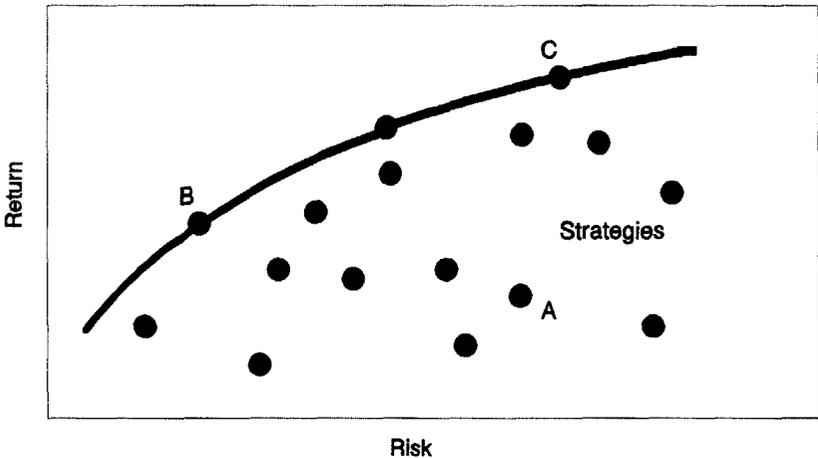


CHART 2
Strategies on the "Efficient Frontier" are Superior



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Let's go through these assumptions fairly quickly. The investment strategy under a normal curve is 40% in a five-year collateralized mortgage obligation (CMO) planned amortization class (PACs), 40% in five-year A-rated bonds, and 20% in five-year BAA-rated bonds. If the yield curve is inverted, we will invest in one-year, A-rated bonds. We will credit the asset yield minus 200 basis points, subject to the condition that our credited rate must be within 50 basis points of the competitor rate, while never exceeding the asset yield less 50 basis points. The competitor rate is defined in terms of five-year Treasury bonds.

We initially developed our assumptions in 1988, when 90-day T-Bills were at 7% and ten-year treasury bonds were at 9%. We will assume in developing our future interest rate paths that there will be a reversion of the rates to the current level. In 1993, our five-year assets supporting this block of business will be maturing. We want to revisit our investment strategy to determine if the strategy developed in 1988 is still appropriate. Our proposed strategy is to invest 80% in A-rated ten-year bonds and 20% in BAA rated ten-year bonds. So that is our proposal. We will come back to that. We are currently faced with an interest rate environment of 90-day rates at 2.75% and ten-year rates at 6%. For the time being we'll again assume mean reversion to current rates. We will address that assumption in a little bit.

Based on these assumptions, the proposed strategy yields a much higher return for a fairly modest increase in risk, and appears to justify a change in strategy (see Chart 3). Our definition of risk incorporates both the likelihood of the present value being less than zero, as well as the magnitude of the value, if it is less than zero. The problem with our initial analysis is that most people would not be comfortable assuming that, over the long-term, rates will revert to their current level, given the steep slope of the current yield curve. Therefore, we must consider what might happen if we change this assumption.

Barron's ran a survey in its December 28, 1992 issue of 13 economist's predictions for the course of interest rates over 1993. Of the 13 economists, 11 predicted that short-term rates would rise by the end of 1993. Two predicted no change in the short-term rates. As we move out the yield curve, we find less of a consensus with six of the 13 predicting an increase in the five-year treasury yield, three predicting a decrease, one predicting no change, and two having no comment, which might be the safest thing to do. For the 30-year treasury yield, eight believe it would be higher at the end of 1993 and five believe it would be lower. The consensus or the average of the group would suggest a flattening of the yield curve in 1993. The flattening prediction coupled with the prevailing feeling that rates are likely to drift up over the next few years led to these rates that we'll revert to. They're a little bit higher than the current rates: 5% and 6.75%.

In Chart 4, the dots on the left are based on our initial assumptions, so the left dots are the same as those in Chart 3 that we looked at previously. We just have a little bit different scale here. And the right dots incorporate our new mean reversion assumption. The decision to change to the proposed investment strategy is no longer a clear-cut one. Given the new reversion parameters, investing longer involves significantly more risk.

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CHART 3
1993 Management Analysis

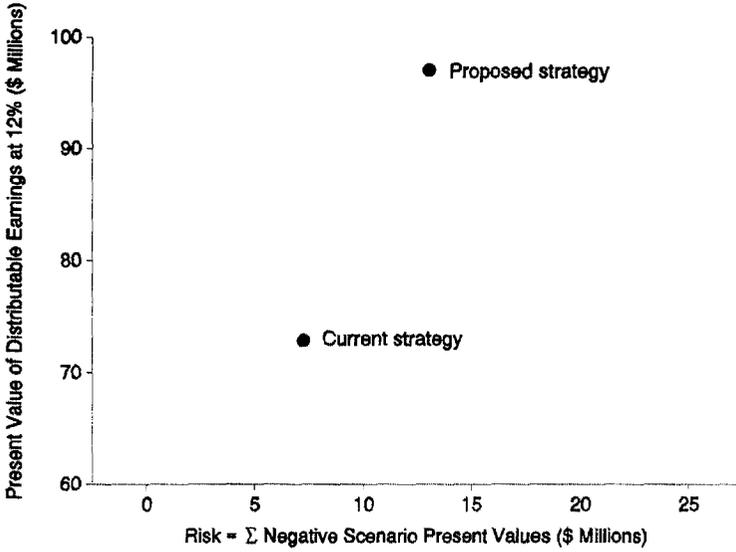


CHART 4
1993 Management Analysis



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I'd like to summarize by going over some of the cash-flow testing advantages that we have discussed. Options are valued on the basis of their impact on profitability. Having a range of results facilitates downside risk analysis. The ALEF analysis can be used to customize the definition of risk and reward. We can reflect the cost of capital, and we can incorporate discount rates that are specific to your company.

As I mentioned, I will also give some time to some of the disadvantages. The example we just went through demonstrates one limitation which is the sensitivity to certain assumptions that can't be absolutely determined. The actuary needs to understand the dynamics of the modeling process, and the dependence on these assumptions. Other disadvantages are that the distribution tails require many scenarios to be meaningful, and as I'm sure many of us found out recently, the projection output can bury you unless it's summarized in a comprehensible manner.

MR. BEHAN: Now I'd like to introduce Yvon Charest, the chief actuary of Industrial-Alliance Life Insurance Company here in Quebec. Yvon has been with Industrial-Alliance since 1979, when he received his bachelor's degree from Laval. He became an FSA in 1981. He has been active in the Canadian Institute of Actuaries. Currently, he is vice president of the Canadian Institute of Actuaries and a member of the Council. As you may know, most Canadian actuaries have had a longer involvement with cash-flow management than U.S. actuaries, so Yvon will discuss some of the issues that he has dealt with and lessons that he has learned in applying cash-flow management techniques in his company.

MR. YVON CHAREST: The objective of this session is to check to what extent cash-flow testing was a useful process or not and to discuss the things that we should learn from cash-flow testing. My objective for this session is simply to try to convince you that your single most important job in tackling the current issues in the industry, and I will discuss these issues with you, is to redesign your reserve using cash-flows using future projections. And I don't want you to wait a couple of years and then to be told that you have no choice but to do it. I would like to convince you that it's best to start working on an integrated basis for your company using cash-flow testing. I also will share with you my thoughts concerning the software issue, simply because the more jobs we have to do the more conflicts we have to deal with in terms of software.

I want everyone to understand that we have new issues that are very different than what has been discussed for a long time. The traditional issue within the industry was the conflict between growth and profitability. It is now becoming even more acute because of the risk-based capital requirements that are coming in the states. But mainly the first issue and the objective in the industry was that question of growth versus profitability.

The other issue that we are facing, at least in Canada, is the fact that the duration of our liabilities is decreasing as opposed to other deposit-taking institutions. Life insurance companies were able to invest a lot more long-term in stocks and real estate, mainly because a big proportion of their liabilities was long-term. This is less frequently the case. But new issues are coming up, and the biggest one is the new capital requirements. In Canada, since 1990, we have an industry compensation fund, and to be able to be part of that fund you have no choice but to be able to

meet the requirements in terms of capital. And those requirements are risk-based. They are very detailed, and I think that the ones that you just had to meet in the U.S. are about the same type of rules that we have here in Canada. For two years now we have also had capital rules that we have to meet, and those are regulatory authority's rules. So, given the capital issue, and having no choice for some companies but to raise capital, the main consequence is that we are talking with a lot more people from outside the industry. It could be potential investors, or it could be financial analysts.

The other point is that products are becoming more and more the same within different financial institutions, so that within the insurance industry, we see more executives coming from outside the industry. The traditional questions that we were so well prepared to answer are not the ones that people are asking anymore. We used to be asked questions about our experience by function. What is your experience with mortality? What is your experience with lapse? What is your experience with expenses? These are not the types of questions that people are asking anymore. They want to know what the profit was for this particular product in that particular calendar year. We actuaries always look at problems by splitting them by assumptions, but that is not what those people are talking about. They are talking about profitability by product. They are talking about capital needs by product, and what the return will be on that capital, and when the return on that capital will be realized.

We see that the traditional actuary's job was about pricing and reserving, and we had the issue of matching assets and liabilities, and in Canada, which I will talk about in a moment, we also have now a standard of practice about dynamic solvency testing. This is the traditional job, but the questions that our public is asking are: What about your gain and loss analysis? Why did you lose money on this product? Why did you have profit on a product? And just after you discuss with them what has happened in the last two years, the next question is quite simple, and comes very rapidly, What is your projection for the next two years? And the other question is, How much capital do you need? since we have capital requirements. What will be the return on it? Another key question also is, When do we have that return on capital? And that public is the company executive and the investors. You will have to produce actuarial or accounting reports less frequently. More often, you will have to produce what I call business reports.

Now to help you understand why my objective is to convince you that you should actively work on cash-flow projection for reserve purposes, I will give you some background about what was going on in terms of assumptions in Canada. One of the questions I think we have to answer is to what extent were assumptions realistic. If you were only starting to deal with it, you might consider that the old process was just crazy because it was too difficult to have assumptions on every single item. But let me show you where Canadians are coming from in terms of assumptions.

Back in 1979, the Credit Insurers Association (CIA) issued recommendations for financial reporting purposes, and essentially the recommendations are saying is that it is up to the judgment of the actuary to define the amount of the liabilities. So for the very first time in 1979 we had no choice but to do that asset/liability interaction. The amount of liability was supported by income that could be earned on the asset side.

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It was the same for expenses. We had no choice but to review to what extent our reserves were able to recover the actual expenses that we had in the company. So very rapidly we had that link between real expenses and expenses we must have in our liabilities. With those recommendations, for many companies it was the last year of using an implicit methodology or retrospective calculations. For example, for the par line of business in many companies the reserve is the present value of future benefits including dividends, including one scale of dividends, minus the present value of premiums. So in going to explicit assumptions for par business we had no choice but to go and check what we were expecting in terms of interest rates, what we will be expecting in terms of expenses and so on.

The second paper that has significantly modified the way actuaries are thinking about the assumptions is the CIA Provision for Adverse Deviation (PAD) paper. Now Table 1 includes the development period, not the year, that the paper was first used because during that development period actuaries had copies of those standards of practice. Some people may have decided to implement them on an early basis. But essentially that paper was to help actuaries split future assumptions between the expected ones and the margins for adverse deviation. We had no choice but to split the assumptions between the two components. A couple of years ago, when we were talking about capital projections, the expected assumptions were already there because for years people had no choice but to define them.

TABLE 1
How Could You Answer These Questions
(A Canadian View)

<i>Develop Expertise to Set Future Assumptions</i>	Development Period
<ul style="list-style-type: none"> • CIA recommendations for life insurance reporting • CIA PAD Paper (Provision for Adverse Deviation) • CIA DST Paper (Dynamic Solvency Testing) (Threats to solvency. Courses of action to mitigate them.) • CIA VTP No. 9 (Valuation Technique Paper) 	<p>1979</p> <p>1985-88</p> <p>1989-91</p> <p>1992-93?</p>
Current Situation	
<ul style="list-style-type: none"> • Assumption on each future event split between expected experience and margin for adverse deviation. • Five-year cash-flow projections using company business plan and various adverse scenarios (mandate by the CIA or chosen by the actuary). (To understand the results, you have no choice than to develop a gain and loss exhibit. You will see to what extent your PAD may absorb adverse scenarios.) • Statutory reserve for annuities under various economic scenarios. 	

Now that paper had a very narrow range. At the very beginning, we were dealing with only individual nonparticipating insurance, which is small, and after that the CIA with other standards of practice started to use the same process in other lines of business. So we can conclude that at this stage, for just about all Canadian companies, the actuary is able to split his future assumption between the expected ones and the margins for adverse deviations.

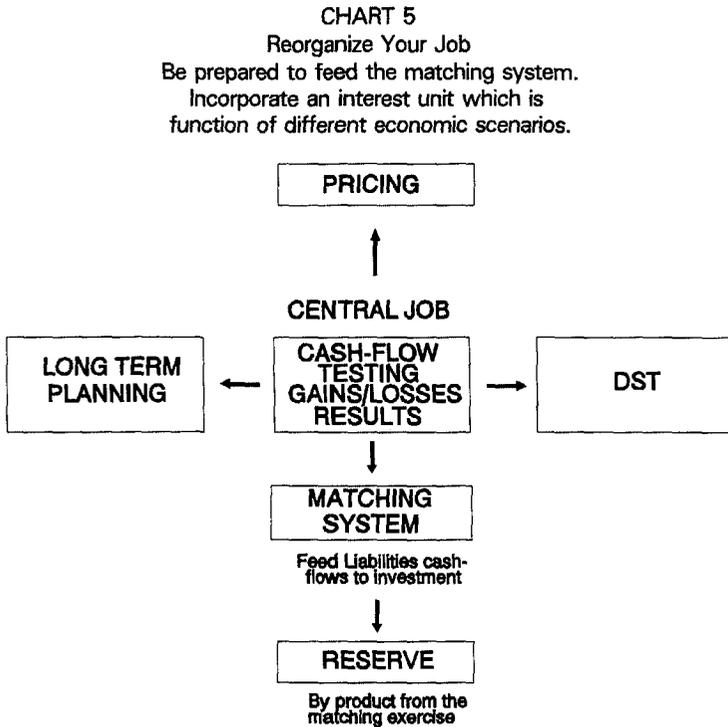
The other CIA paper that I will discuss a bit is called the Dynamic Solvency Testing (DST) Paper, another acronym. You may have already heard about dynamic solvency testing. The idea is to project the financial statement of the company for five years, including both in-force and new business. In terms of assumptions, you first use the management's corporate plans in terms of sales and investment strategy, and you add your own assumptions in term of experience for valuation purposes. So the idea of DST is to find out what the main threats are to the solvency of the company, and for the valuation actuary to suggest some course of action. Now that report is not technical at all because the standard of practice says that you have to report on an annual basis to the board. So it's not pages and pages of numbers all together. It's simply the conclusion of the valuation actuary that goes to the board, and the report essentially shows the board how costly the program of new business will be. How will that program affect capital requirements, and how will the new business affect profitability? So what was added to the previous two papers is a kind of integration of business plans for the company.

Finally, there will very shortly be another CIA paper. It will be one of a series of valuation technique papers (VTPs). VTP No. 9 will discuss the valuation for the annuity line of business, and here again it will be exactly the same process of using cash-flow projections. So with the two last CIA papers actuaries had no choice but to work actively with cash-flow projection. So what is the current situation in terms of assumptions? Each assumption can be split between the expected experience and the margin for adverse deviations. Each company has a five-year cash-flow projection using the company business plan and various adverse scenarios. We found out that it was sometimes very difficult to do that five-year cash-flow projection and to understand the results, and we concluded that the only way to understand those results was to develop within it a gain-and-loss exhibit, so with each year for each product we'll understand what the source of your profit was and what the source of your losses was in a line of business. And, finally, with that new CIA paper VTP No. 9, where the reserve will be calculated under cash-flow projection, reserves will have to be calculated under different economic scenarios, and the actuary will have to pick up a little of the liability that will cover sufficient adverse scenarios.

This background and work on assumptions has helped us to stop and think about the way you have to approach the actuary's job. Let's refer to Chart 5. Historically, you were dealing with pricing and reserves. A couple of years ago, you started working on a matching system, and in your matching system you were checking to what extent your assets/liabilities were well-matched doing cash-flow projection. If you go a step further, you may do your matching analysis using different economic scenarios, if your block of business was not well-matched. Once that exercise is done, it is very easy just to modify your cash-flow a bit; do another cash-flow projection, and the present value will simply be your reserve. So the matching system may have been seen by many people as an extra job, but I will submit to you that the matching system may simply be a better system for calculating the reserves. Last year in my company, when I decided to revise the assumptions for annuities because of VTP Number Nine, I asked my investment people, who control the cash-flows on the asset side, to modify the default rate a bit, and I asked the actuarial people to modify the projections in the mortality table for liability purposes and to do another matching run. Their answer was simply the new reserve for those annuities. Instead of working on

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both the matching system and the reserve system, you may simply think of using your matching system, and the byproduct will be your reserve.



Now let me go one step further. And the step is DST where you also need to do cash-flow projections. So now you are in the position where, for DST purposes, you need cash-flow projection, and you need cash-flow projections for your matching system. With the new standards of practice within the Institute, you will need cash-flow projections in order to calculate your reserves. So, to one extent, cash-flow testing may well become the central job for the actuary.

To understand the results of cash-flow projections you will need to do a gain-and-loss exhibit. Now, if you concentrate on those two things, let's see what will happen. In terms of DST, you will have a very good start on the job of implementing that standard of practice. Now your company is also working on long-term planning. They have to weight profitability and growth. In our company last year, in part of the three-year business plan, we used dynamic solvency testing to see what the expected results would be for our company with different levels of new business. In one line of business we decided to cut, by a fair percentage, our expectations in terms of new business, just to be able to weight profitability and growth. But, here again, to the extent that you have worked a lot with cash-flow projection, you, as actuary, are able to be very active in terms of your company planning. You may not have to wait for some questions by management simply because you've put together that report. This might lead to additional scenarios, because you will be actively involved in planning.

New executives and potential investors are not asking the same questions that you are used to answering in terms of how good you were at predicting one assumption or another; instead they will ask you to do a link between pricing and results. For that reason, in your pricing process, you may have no choice but to incorporate an interest unit that will look a lot like the way you do your cash-flow projections. So, here again, you will come to have a link between your pricing and cash-flows. So what I'm telling you is that some authorities may ask you to do cash-flow projections, but if you just stop and think for a moment about the traditional job of pricing and reserving, and if you compare it with all the requirements coming in, you might conclude that your central job should be to work on cash-flow projections.

Now, when you put all those pieces together, you may have a problem, depending on how big your company is. My company has assets of \$4 billion, and we are only active in Canada. It may be more complicated for other people, but let me suggest that you start, for example, with one line of business and try to have that integrated view. Once it is done I'm pretty sure that you will like to expand that way.

One final comment. I told you that I will discuss a software issue with you. It is kind of a challenge to put all the pieces together and have one system talk with another one. Each person may have his own view on this. What I have found out is that it is very difficult to work with more than one software program. Because communication between them is so difficult but it is important. If you buy one, then your job is to adapt others to your main or central software program. For example, you may decide to buy software for cash-flow projections, but after you have your main program, it is my experience that it is easier to add your own software later to the one you bought.

MR. BEHAN: I would like to summarize the management actions that we can take in response to cash-flow testing. There are a number of actions that you can take related to liabilities, but obviously the most significant impact is during the product design phase. This would include selection of which products to emphasize, and the process of valuing the options that are embedded in our products. Once products have been issued, the primary management opportunity on the liability side is to design strategies for dealing with nonguaranteed elements, such as crediting rates. Cash-flow testing allows us to model various strategies in relation to assumed policy-owner actions, and pick the optimum approach.

On the asset side, in addition to looking at asset maturities, we can look at the variations in behavior under the various scenarios. We can then try to control risks beyond the simple mismatch of maturities. In the past, the possible variations in that yield and maturity under different scenarios was not given enough weight. At least in hindsight it would appear that way. The issues that you have to deal with in trying to come up with more creative structures would include such issues as the expenses of creating various synthetic instruments. Also, you want to make sure that the results will actually come out as you intend. Specifically, from an accounting standpoint, there is *Financial Accounting Standards Board (FASB) Statement 80*, dealing with hedging. There are definitions of hedging in that statement, and under generally accepted accounting principles (GAAP), you are only permitted to account for a transaction as hedging if it meets those requirements. So you would definitely want to make sure, as you structure some synthetic instrument or some complex

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approach to your asset portfolio, that the financial reporting result will be what you have intended.

MR. JAMES E. FELDMAN: You talked about being the Yoda of actuarial science if you pick up the assumptions. Could you talk a little bit more about assumptions – how you communicate your choice of assumptions to management, particularly when you're dealing with wide ranges of results as you're looking at lapse assumptions on annuities, for instance?

MR. CHAREST: I think that it is not necessarily a revelation for management, because when you put together a new product we usually do the valuation assumptions at the same time, and we split those valuation assumptions between the expected value and the margin. So, at the very beginning, management will have a good knowledge about your business strain, and its meaning will be apparent to them, because in some circumstances, with some standards of practice, you have no choice. One of the examples is what we call in Canada lapse-supported products, where you could issue permanent life insurance with no minimum cash value, or even with no cash value at all. So the lapse assumption becomes critical.

For these products the CIA has stated that we shouldn't use a lapse assumption higher than 3% per calendar year on a long-term basis. So that element is quite critical in terms of business strain, for example. So when you put a lapse-supported product on the market, you will indicate to management what the valuation assumptions will be, and what the effect on the strain will be. For that reason, management will get used to the assumptions very rapidly. They may well think of going over your provision for adverse deviation (PAD), but we tell them that we need that margin for default and the interest rate, and we do need that margin for reinvestment, and so on. They get used to seeing those assumptions at the same time on a regular basis. So when you do your DST, and you project your operations for five years, they are not inclined to discuss your assumptions for a long time.

MS. KIMBALL: Also, you were talking about lapses and other dynamic assumptions. It's always best to use your own past assumptions, and really research it as much as you can. Also, you should definitely sensitivity test any type of dynamic assumption like that and show management results of increasing lapses a certain amount. It's very important that you throw sensitivity testing in there so that you can see just how sensitive your products and your results are to those dynamic assumptions.

MR. BEHAN: One issue is that actuaries are used to communicating with management about the more insurance-oriented aspects of the products, things like lapse rates, but they are not as used to communicating on the investment side. If you look at other countries, specifically the U.K., about 20% of all the actuaries there are directly involved in the investment process. If you look at the U.S., (and I think Canada falls in between the U.S. and the U.K. on this issue), there is a very small number of actuaries that currently have investment as their primary function. So communications between the actuary and the investment department, and the level of mutual respect between them, could be improved. That is demonstrated by some of the situations that have occurred, where it is clear that there were some surprising results coming out of the behavior of some of the investments, such as CMOs.

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MR. MICHAEL P. SPARROW: I have a question about the asset/liability efficient frontier. I noticed Ms. Kimball's chart showed the present value of negative scenarios as the measure of risk. Can you comment on other measures of risk?

MS. KIMBALL: When you are measuring that it depends on what your philosophies may be, but you basically want to know the variability, the standard deviation, looking not only at whether it is negative, but you also normally want to measure how large that negative value is. If it is a small negative value, it is not as important that it is negative as it is that it is small. And if it is a very large negative value, then you also want to look at the magnitude of the negative number. There are certainly other ways, but I would say it really is up to you to decide what your management philosophy will be.

MR. BEHAN: A few of the large companies are using stochastic interest rate scenarios, so to the extent that their assumptions about the statistical model of the interest rate scenarios is a good one, they get direct evidence about the level of risk as well as the amount of risk. But one of the key issues in moving from a regulatory focus to a management focus is the need to consider the likelihood of risks. You will see some companies in the industry failing, for example, an immediate pop down scenario and then saying, it is okay, because they don't really believe that scenario is likely. If you are really going to use this information for management purposes, you are going to have to face up to the fact that these seven scenarios, or 12 scenarios, whatever the number, were not selected to be equally likely, or even to represent what is expected to happen. You have to gauge your reaction to the outcome of various scenarios on the basis of how likely it is for those scenarios to occur.