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Session 43

Management Uses of Cash-Flow-Testing

Moderator: Robert T. Lumia
Panelists: Meredith A. Ratajczak
Nancy L. Bennett

Summary: Increasingly, many insurance companies are enhancing the regulatory cash-flow-testing for quantitative analysis of their operations. Enhancements include adding new business, extension of New York 7 scenarios to numerous deterministic or stochastic economic permutations, and stress testing of key business parameters in a total company context.

Panelists discuss how widespread the practice of leveraging cash-flow testing is to create a strategic, quantitative tool to support management decision making.

MR. ROBERT T. LUMIA: I'll be the moderator for the session. We have two speakers that will show us new uses of cash-flow-testing that will make it a more powerful management tool. Our first speaker is Meredith Ratajczak. Meredith is a consulting actuary with Milliman & Robertson in Hartford, Connecticut. She has been with the firm since 1987. She has worked primarily with life insurance companies on a variety of assignments. Her professional experience includes extensive work on actuarial appraisals for mergers and acquisitions, demutualizations, product development, financial analyses and projections, statutory and GAAP valuations, and asset/liability management. Meredith served on the NAIC Task Force on Actuarial Issues regarding accelerated benefits, the Planning Committee for the Valuation Actuary Symposium, and the Academy of Actuaries' Committee on Life Insurance Reporting.

Our second speaker will be Nancy Bennett. Nancy is a senior consultant with the Avon Consulting Group in the new Midwest office. She joined Avon Consulting Group in May of this year. Before joining Avon Consulting, Nancy had worked at Minnesota Mutual for 18 years. Following eight years in individual life product development and division management, she built the company's corporate actuarial department and was the company's appointed actuary. Nancy's responsibilities included cash-flow-testing, reserve adequacy analysis, strategic planning, capital budgeting and financial forecasting, coordinating investment policy and product design, and the analyzing portfolio performance on interest rate risk. She has been responsible for overseeing the integration of financial management functions among the company's divisions.

She has also maintained the integrity of the company's modeling systems and presented to various groups including the company's board of trustees and rating agencies. Without further ado, here's Meredith Ratajczak.

MS. MEREDITH A. RATAJCZAK: I'm going to talk about management uses of cash-flow-testing on the general side. Nancy is going to talk about a specific example where cash-flow-testing is used for management information from the standpoint of managing interest rate risk. I've been a member of the Valuation Actuary Symposium Planning Committee for what seems like a really long time. I guess one of the perks is you have your choice of which sessions you recruit, and you have your first choice of sessions where you'd like to serve as a presenter. Management uses of cash-flow-testing has always been a topic of interest to me because, as a consultant, I'm typically one of those people that uses cash-flow-testing to get management information.

Over the last 12 years with Milliman & Robertson, I've done merger and acquisition, demutualization, and value added work, as well as strategic planning. Frequently, the first thing I do is ask for a copy of the actuarial memorandum, if it exists, and any supporting documentation. I find that this gives me a very good foundation for the type of work that I do. We can often

minimize the work that we do by piggybacking on the work that the company does to validate its models, to validate its assumptions to kind of set up its assumptions and do experience studies. What I'd like to do is answer some general questions in a question and answer format. The first question will be, "Are companies using cash-flow-testing to provide management information?" The second is, "Who are the potential users of management information derived from cash-flow-testing models?" The third question is, "What are the benefits of using cash-flow-testing models to provide management information?" Finally, "How can cash-flow-testing models be used to provide management information and go beyond regulatory compliance?"

If you ask me, the question is, "Are companies using their cash-flow-testing models to provide management information?" I'd probably have to answer that question, "Yes and no." I am involved with four companies each year-end. I either serve as the appointed actuary, or I do the work that supports the appointed actuary. In some instances, the company does the work, the projections, the report, and the filing, and puts it all in a drawer until next year. Other companies actually use it as the basis of some of the strategic work they do. They use it as the basis of their corporate models or for other financial purposes.

When we talk about potential users, I admit that I'm certainly one of those. I rely on that information and use it to help me develop assumptions for the work that I do. Pricing actuaries are another potential user. In a recent assignment, we were doing a projection on the existing block of business for a company, and on a present-value basis, the block of business looked horrible. Even year by year, the results were negative. It didn't sound like that information got back to the pricing actuary, but if the pricing actuary knows that information and can look at something like a sources-of-profits report, it will give them some idea where they might need to look and address assumption changes to price new products or to re-price existing products.

Now, in the course of your cash-flow-testing work, how often do you talk to your underwriting department? A better question is, have you ever talked to your underwriting department? Close to a year ago, we added an underwriter to our staff. Now I really have a much better appreciation

for the value that the underwriter can bring to the product development process. In the situation that I talked about, in terms of doing a projection and really getting horrible results, by looking at the sources of profit report, it looked like there was a problem on the mortality side of this particular product. If the underwriter talks to the actuaries doing the sources of profit report, then he or she has a better understanding of what experience is coming out of the underwriting that is being done, and possibly some changes need to be made in terms of either pricing or how the underwriter is doing his or her job.

The investment department is another user, and our products have become much more complicated, and the asset side of the balance sheet has also become much more complicated. For the most part, the systems that we use for cash-flow-testing do a much better job capturing both the asset and the liability side of the balance sheet. Years ago, you'd never see an actuary working in the investment department. I think it is more realistic these days, but I still think there are situations where investment departments don't have the best understanding of the liability characteristics or they really haven't seen a projection that shows them what the liability characteristics are. In that case, they might be missing some critical information to allow them to do their job better. We build these models. We build in reinvestment and disinvestment assumptions. It's very easy to make modifications to those assumptions and to give the investment department some information in terms of what happens if they can get an additional 25-basis-point spread or invest a little longer. We can tell them what the impact is from a risk standpoint. From an earnings standpoint, we can look at this block of business that we do our cash-flow-testing on and discuss the effect on business.

The chief financial officer (CFO) is interested in the general, overall, financial health of the company.

The present value information coming out of the cash-flow-testing model or even year-by-year earnings information does indicate, based on the assumptions that are used in cash-flow-

testing, what the company looks like. If cash-flow-testing shows that there are numerous scenarios where the results are negative, it might be an indication that there's some interest rate risk that's possibly not being addressed properly in the matching of the assets and liabilities.

The senior people, like the chief executive officer (CEO) or the board, are interested in the overall health of the company. If you take your cash-flow-testing model, which has existing business in it, and layer in future issues, you can use that as a source of overall financial information for the company. It's a corporate model. In that way, you can use that as a tool to do things like short-term plans, long-term plans, and plans of operation. From the standpoint of a CEO or the board, cash-flow-testing often serves as the basis for a value-added analysis, which helps determine what the company's compensation is going to be or how they're going to be rewarded for value added from the new business that they sold.

I do a lot of M&A-related work, and I guess you could even think of it as being on the demutualization side. Typically, we start with the cash-flow-testing model as the basis for a lot of the appraisal work that we do for companies. Let's say a company has a lending or borrowing relationship with a bank or another financial institution. As part of the due diligence process, they might be very interested in what the cash-flow pattern is going to be for the company. You have this basis where you might need to layer in new business assumptions, but you have something that you can use to appraise the company, a block of business, or to see what the cash-flow implications are of the company based on the models that you set up.

Let's discuss the answer to the question, what are the benefits of using cash-flow-testing to provide management information? You're all probably thinking that it is kind of a no-brainer. We went in and talked to a company about building a corporate model, and when you sat down and talked with them and asked them, what models they were using now, there were probably six different models that were set up six different ways to do six different things on the same block of business. Part of the benefit of using the cash-flow-testing models is the models exist and are

already in place. Resources have expended a lot of time to come up with static and dynamic model validations, to do experience studies and to update assumptions accordingly. They are also possibly doing some dynamic model assumption validation. In that respect, instead of having six models with six different people or six groups of people working on them, there is a collection of individuals that are familiar with this model. You can kind of make use or capitalize on your investment because you've got to do this cash-flow-testing model anyway.

I think the models for cash-flow-testing tend to be more granular today than years ago. You capture more of the characteristics of your business because you model many more cells or many more issue years than you might do for kind of a quick-and-dirty, five-year plan or short-term plan. As I said, this is something that you update. You have to update it. You spend a lot of time doing it, so you have a validated model that is a good source of information for all of those potential users that I talked about.

Anybody who has tried to reconcile financial information from two different systems that essentially work on the same information but do two different things finds that more time is spent trying to reconcile those differences than actually analyzing the results. So the model that you're comfortable with and that you need to use for cash-flow-testing kind of provides a consistent basis for providing financial results to all of those potential users that I talked about. If you respect the fact that there are these users, and these are individuals that will benefit from the information that comes out of the system, and you regularly find some way to provide them with that information, I think it opens up better communication in all departments of the company because they all have an appreciation for what your business is and what the business looks like from a financial standpoint.

The last issue deals with how you can use these models. Give some examples of how you can use these models to provide management information and go beyond regulatory compliance. I use the

words “to go beyond regulatory compliance,” but I want to give you two examples of where cash-flow-testing is used as a management tool in regulatory compliance. I’ve done the cash-flow-testing work for a company for many, many years, and part of our assignment is to do cash-flow-testing as of the end of September and also as of the end of December. The appointed actuary uses the work that we do in September to get a sense of whether there are going to be any problems before year-end. It gives him an opportunity to react to them in time to either make adjustments, increase reserves, or to alert the appropriate people that they might have some problems at year-end.

We have also found that because a lot of companies are going through system conversions on both the asset and liability side, we use that September testing to kind of work out all the kinks in the process. We are able to turn around the December testing a lot quicker. This company believes they need to do this work in September and in December. That same company is going through and filing a new product.

There was some issue in New York regarding whether this particular product would really kind of fit into the company or whether it would disadvantage them. The person who was in charge of pricing asked if we could take our cash-flow-testing model and build in this new product, making assumptions as to certain acquisition expenses and premium levels. We actually did a 10-year projection for them showing that the earnings would be based on a particular assumption set. It’s kind of two examples of using this model for regulatory compliance. As I mentioned, companies can take this cash-flow-testing, throw in new business, and, voila, there is a corporate model that can be used for many different purposes, both short-term plans, long-term plans, and, as I mentioned, value added.

Once you build a corporate model, it gets a lot easier for you to answer the questions that the CFO and the CEO might ask, such as: “What happens if we invest \$100 million in this new

system for which we expect to, over the long haul, reduce unit expenses by x percent and, because of that, increase production by x percent?" I don't know what that investment would be, but if you have this tool, it's easy to layer in some global assumption changes and to see what the impact is down at the underlying product level. In addition, cash-flow-testing is appraising a block of business or the whole company. I think I've mentioned that a couple of times.

The cash flows that come out are streams that can be used by people that are lending you money as part of due diligence to determine whether you're a good risk or a bad risk. As I mentioned, you can also test alternative investment strategies. One of my first assignments when I started at Milliman & Robertson in New York was to do Regulation 126 testing for a small company. They had a mix of annuities, both deferred and immediate, and some life insurance business. We went through and did the testing, reflecting the assets that it had on its books at the time and how it was reinvesting. It turned out that the results that came out of the cash-flow-testing were a little counterintuitive given the type of business that was on the books. I mean the deferred annuity block made up a significant portion of the company.

After we went through the work and did our regulatory filing, we talked with the appointed actuary about this a little bit. Why do things look this way, and is there some underlying problem that we should be looking at? What we did is we used that model, and we actually went in and looked at the assets and liabilities and did some very simplistic duration calculation on both the asset and the liability cash flows. What we found was that the liabilities, primarily deferred annuities, were six years, and the assets were one-and-a-half years. With that information in mind and the company thinking that it wanted to grow in the future, we wanted to make sure that it had an investment strategy that appropriately linked up the asset and the liability characteristics.

We were able to provide the investment department and the appointed actuary with some information that allowed them to make modifications to their investment strategy. That's just one example. As I mentioned, the company will say, "What happens if we switch from 30-year bonds

to 15-year bonds with call provisions?” Many of the systems allow you to do that very easily. Another example is to manage the interest rate risk in the company. I’m going to turn the floor over to Nancy, and she’s going to talk about a specific application of using cash-flow-testing to manage the interest rate risk in a company.

MS. NANCY E. BENNETT: The Valuation Actuary Symposium is a friendly reminder to all of the valuation actuaries that another cash-flow-testing season is upon us. Many of us have been doing cash-flow-testing now for more than 15 years, and I think all of us understand what we might be able to do with cash-flow-testing. We recognize the value of asset/liability management and understand that the interest rate risk is a real risk for life insurance companies. We acknowledge that the cash-flow-testing regulations are fairly misguided in their construction, and if companies only satisfy regulatory requirements, limited information is obtained from cash-flow systems.

One thing we can all agree upon is that we would all like to leverage our investment in cash-flow-testing systems, both the hard-dollar cost of the software and the soft-dollar investment in modeling. We also recognize, especially for any of us that have worked inside insurance companies, that there are many barriers to leveraging the cash-flow-testing system. Resources are always an issue. We always have many projects to do. We have to find time to do the things we *must* do, but when it comes to doing the things we *want* to do, we often don’t have the resources. We often don’t have enough of the right kinds of people with the appropriate skill sets to figure out what’s going on inside of our cash-flow-testing models.

Despite these barriers, I think companies are gradually starting to leverage their cash-flow-testing systems by learning about the interest rate risk and how the changes in interest rates affect the value of their company and their financial strength.

I just recently joined Avon Consulting Group, but prior to that, I was the corporate actuary for Minnesota Mutual, which is a large mutual life insurance, multi-line company. There, I worked as

the corporate actuary and was responsible for many areas of financial management. As such, I often ended up spending a lot of my time adding up the results from various product line systems and reconciling the results. After I became tired of feeling like an accountant, I became more and more convinced that the real answer in leveraging the cash-flow-testing systems and doing more with asset/liability management hinged on the joint efforts of the asset product and corporate managers. In other words, the successful life insurance companies will integrate the financial management across all of the functions involved in the company. It's important that company managers understand how the value of the company, both the assets and the liabilities, changes in different interest scenarios.

Although significant time and resources were invested in cash-flow-testing and in other financial management activities when I was at Minnesota Mutual, I realized that, oftentimes, I was not in a very good position to answer many of the questions that would be posed to me by the various financial constituencies looking at the financial strength of the organization.

This symposium has probably caused you to think a lot about new regulations, and they are certainly overwhelming. However, just for a moment briefly contemplate, the kinds of questions that may come to you from rating agencies, stock analysts, your senior management, or maybe even questions that you're asking yourself to make sure that you are, in fact, executing the appropriate strategies.

Are you able to answer some of these questions? What is the value of your company? It's a very simple question, but do you really know what the value of the company is? What is the value of the company today, and what will the value of the company be if your current business plans materialize? Are your products adequately priced? Are you earning adequate margins to achieve your financial objectives? What are your company's financial objectives for earnings, capital, risk, and growth? I know you can probably survey a lot of different company managers, and they will

tell you that they'll have a financial objective for earnings. It might be a 15% GAAP return on equity before tax and a 20% growth objective. If you're involved with trying to achieve those objectives, you may realize that the objectives have not been defined properly and that they're oftentimes mutually exclusive.

Another important question, which is particularly important to this group, is your company's tolerance for interest rate risk. You'll get this question from the rating agencies, and though I'm not convinced that the rating agencies actually know what the answer is, they are going to ask it, and you have to come up with the answer. Do you know how your asset and product manager should be evaluated? As your company executes, its decision strategies, do you know how to evaluate the performance and whether or not the managers have contributed to the success of the organization? Wouldn't you like to be in a position to answer these questions for your company in a relatively quick, yet sufficiently robust fashion?

I think we would like to be able to use our cash-flow-testing systems to answer these questions. Most members of management want to know the answers to these questions. There are probably some members of management that would just as soon not have all these questions answered, but by and large, most members of management want to know the answers. I think the appointed actuary is uniquely qualified to answer these questions since the appointed actuary has developed skills in the investment, product, and corporate finance disciplines in order to do their job.

Unfortunately, most of us have reported to management's that haven't valued integrated financial management or interest rate risk assessment as much as we would like. While our bosses accept the need to do regulatory cash-flow testing, we weren't given the time to do much beyond that.

In order to leverage our cash-flow-testing systems to have better financial management information, we need systems that would actually produce actionable, meaningful information. Better financial management systems were needed where we could first evaluate the interest rate

risk. We had to come up with a measure for interest rate risk and monitor the risk and track it. We had to have a financial management system that would allow us to evaluate alternative investment and product strategies and be able to analyze the risk-and-return trade-offs of both short-term and long-term financial positions. We needed to be able to establish and then, in turn, measure the profit expectations for our company and the product lines inside the company. Finally, we needed to establish performance benchmarks and then measure the product manager's performance against that. In a phrase, we needed to strengthen the financial management infrastructure of the company by leveraging the cash-flow-testing systems.

As I worked to leverage these cash-flow-testing systems, I became more and more convinced that a major problem in leveraging the cash-flow-testing systems was that the current financial reporting techniques for allocating investment results to the product lines co-mingled the contributions of the asset, the product, and the corporate managers. Many companies employ some kind of segmented asset allocation approach to achieve their asset/liability management objectives. While this asset allocation approach usually satisfied the regulatory requirements for cash-flow-testing or the financial reporting, these methods of allocating assets and the associated investment income items made it difficult to manage the interest rate risk for the organization as a whole. It also became clear to me that if we wanted to leverage our cash-flow-testing systems, our methods for allocating investment results to the product line needs to be reconfigured to facilitate the management of the interest rate risk, and ultimately, the development of a practical asset/liability management system.

I'm going to talk about one use of cash-flow-testing, and that is an asset/liability management paradigm based on transfer pricing. This is a paradigm that will facilitate both the analysis of risk and profitability. I designed and implemented a transfer pricing approach at my former company. I'm going to review the concepts of transfer pricing, the theory, and then provide an example to help illustrate how transfer pricing would work once it's implemented. Then I'll close with some of the benefits and other applications of a transfer pricing system.

Let's start with the definition. Simply stated, transfer pricing is the intra-company reinsurance of the interest rate risk. In transfer pricing the asset and product managers cede or transfer the interest rate risk to the corporate risk manager, allowing the asset and product managers to focus on the performance of the assets or the products, respectively. The transfer pricing infrastructure was designed to meet many of the objectives of an ALM system that I mentioned before and to help answer many of the questions that I raised earlier. Within transfer pricing, we were looking for a system that would help us manage the interest rate risk. It would become a tool for evaluating alternative strategies. We needed a process for evaluating the cost of capital and for evaluating the performance of the asset and product managers. Essentially, we needed a system that would strengthen the financial management infrastructure. In strengthening the infra-structure, we would be articulating, measuring, and assessing the financial strategies for the enterprise as a whole.

To understand how transfer pricing really works, let's take a step back and think about the basic problem that faces most insurance companies. Companies issue products that contain guarantees and options. A price behavior curve in Chart 1 shows the liability risk profile of a single premium deferred annuity (SPDA) product. The basic question is: what kinds of assets should back this product liability? Most companies employ some kind of segmented asset allocation approach. Perhaps certain classes of assets or maybe portions of assets are allocated to the various product lines. A typical ALM graph for this same SPDA product shows that the assets and liabilities have different interest rate risk profiles (Chart 2). The question is, if you are using this type of asset allocation approach in your company, you need to understand what that means for interest rate risk and how you can manage it.

When looking at the ALM paradigm, you might be trying to figure out how to evaluate it. There is interest rate risk, but is this level of interest rate risk acceptable to your company's management? With this kind of a structure, it's really difficult to provide meaningful feedback to either your investment or your product actuaries if, in fact, you want to change this particular diagram. In this example, the assets are always greater than the liabilities. It doesn't appear that there's a great threat of insolvency, but there is interest rate risk. The value of the assets backing

these lines changes as interest rates change. You have to wonder if this ALM position is where you want to be. Transfer pricing provides an alternative ALM paradigm that will help you assess your level of interest rate risk and determine what you want to do.

In transfer pricing a corporate risk function is created. In the corporate risk function, the interest rate risk is transferred from the product lines to this corporate risk line. In transfer pricing, the ALM paradigm for each product segment is not based on this segmented approach. Now, the ALM paradigm is based on synthetic asset portfolios (Chart 3). The allocation of investment results to the product lines is now based on synthetic asset portfolios that have an interest rate risk profile that is identical to the liabilities they are supporting. With transfer pricing, the contribution of the assets and product corporate managers is disaggregated into separate components because the value of the assets and liabilities changes with interest rate changes. Transfer pricing shows how the value of the company changes and whether the cause was asset-related, product-related or both.

Again, we still have the same problem here. Our liability curve is the same, but now, instead of backing the liability with this segmented asset portfolio, which contained portions of all the assets that the company has owned, we're now backing it with this synthetic asset portfolio. The theory sounds good, but you're probably wondering at this point in time how this would really work in practice? If we set up these synthetic or shadow portfolios, what does that really mean for product operations? How would the accounting work? Ultimately, how would you get down to measuring the results?

I'd like to go through a case study to illustrate how these concepts can work in practice. This was a multi-line life insurance company case study. Let's start out first with some very basic accounting. At both a total company level and at a product line level, we know that the amount of assets that back the product line is equal to its liabilities, plus some amount of capital that has

been allocated to the line to support the various risks. Companies use different capital allocation techniques. Let's assume that the allocation technique is based on a percentage of the NAIC's risk-based capital formula.

As I mentioned before, in transfer pricing, we are trying to centralize the management of the interest rate risk. Therefore, what we need to do is transfer the management of the interest rate risk from the product line to the corporate line. In a transfer pricing paradigm, the first thing that we do is reallocate some capital from the lines of business to this corporate line. Essentially, the capital backing the interest rate risk, which is called the C-3 risk, has been reassigned from the product lines to this corporate line. The next step is to change the portfolio composition of the assets based on these theoretical synthetic asset portfolios. Essentially, in these first steps, we have changed the balance sheet at a line-of-business level. In the first step, we have reallocated the dollar amount of assets that back the product liabilities, and then we have changed the composition of those assets.

In transfer pricing, one of our objectives is to actually measure the amount of risk and then to measure the impact that alternative strategies will have on the income statement. Once we've changed the balance sheet, we need to change the earnings statement. We need to change the earnings statement to facilitate the measurement of alternative strategies on earnings. The first thing we need to do is to change the allocation of investment income and other associated investment items. For example, there are investment expenses, capital gains, and other items. This reallocation of investment items changes reported net income by line of business and finally, changes the calculation of a financial performance measure such as GAAP ROE by line of business.

Let's actually look at some numbers. These numbers are not actually the numbers for Minnesota Mutual, but they are representative. In this particular company, I combined things so that there are four major lines of business plus the corporate line (Table 1). We have \$3 million of capital

that has to be allocated between the corporate line and the individual lines, in the individual and pension and other lines. Under a segmented approach, the middle column represents the amount of capital that has been allocated to the lines of business. In this particular example, the capital is based on 200% of the NAIC's risk-based capital formula. The first step in transfer pricing is to remove the capital that has been assigned to the lines for the interest rate risk. We've reallocated a lot of the risk-based capital from the product lines to the corporate line.

TABLE 1
Step 1: Reallocate Capital by the Line of Business

Line of Business	Segmented AA	Transfer Pricing
Individual Life	\$ 428,000	\$ 141,000
Individual Annuity	700,000	65,000
Pension	175,000	20,000
All Other	700,000	550,000
Corporate	997,000	2,224,000
Total	\$3,000,000	\$3,000,000

The next step is to reallocate the assets by line of business (Table 2). We have \$16 billion of assets that need to be allocated between the product lines and the corporate line. As you can see, the difference between the middle column, which is the segmented asset allocation (AA), and the transfer pricing column represents the amount of target capital, that has been moved out of the product lines into the corporate line.

TABLE 2
Step 2: Reallocate Capital by the Line of Business
(000's)

Line of Business	Segmented AA	Transfer Pricing
Individual Life	\$ 4,600,000	\$ 4,313,000
Individual Annuity	6,100,000	5,465,000
Pension	2,100,000	1,945,000
All Other	2,200,000	2,050,000
Corporate	1,000,000	2,227,000
Total	\$16,000,000	\$16,000,000

The next and final step dealing with the balance sheet then is to change the portfolio composition of those assets in Step 2 by line of business. Remember, we are trying to immunize the lines of business from the interest rate risk and move the measurement and management of the interest rate risk to the corporate line.

We construct the liability price behavior curve for each segment that we want to manage. We then construct a synthetic portfolio of assets that have the same interest rate risk profile as the liabilities. The synthetic portfolio of assets is constructed by using a linear programming model that selects these synthetic assets from a universe of non-callable assets of various durations and interest rate derivatives. The linear programming model helps us construct a synthetic portfolio of assets that has the same interest rate risk profile as the underlying liabilities. Finally, we need to set up these synthetic investment portfolios in investment accounting systems in order to track the investment activities of these synthetic assets.

I'll just remind you again about what we were trying to accomplish. We are trying to construct an ALM paradigm at the line-of-business level that immunizes the manager from changes in the interest rate. With an ALM paradigm based on transfer pricing, we have been able to construct a synthetic asset portfolio in which the price behavior curve is identical to the underlying liabilities (Chart 4). The duration and convexity of the synthetic assets and liabilities are equal for all interest rate shifts.

We finished our balance sheet, and we're moving on to change our earnings statement. We have three things to accomplish. We first reallocate our investment income between the lines of business and the corporate line based on these synthetic asset portfolios. Instead of the product line getting investment income from collateralized mortgage obligation (CMOs), callable bonds, non-callable bonds, or maybe real estate, and all the various kinds of investments that the company owns, product lines are now going to get investment income based on the coupons that the synthetic asset portfolios are earning. We've reallocated the investment income, and then we reallocate the associated investment item like investment expenses, federal income taxes, and capital gains and other related items to investment income. Finally, the GAAP ROE is recalculated by line of business.

Table 3 shows the final results, and, not surprisingly, if you're presenting this to management, this is the most interesting thing for everybody. This is what they want to look at first. As you can see, the GAAP ROE for the company in total was 9.9%, but if you look at the GAAP ROE between the segmented results and the transfer pricing results, there's quite a difference. I can make a couple of observations here, but obviously it takes quite a long time to understand what's happening here. There's one thing to point out here. These numbers represent all of the company's operations. In other words, all of the assets are reflected in these numbers, both fixed-income and non-fixed-income assets, home office, policy loans, and everything that goes into the financial statement.

TABLE 3
Step 6: Recalculate GROE by Line of Business

Line of Business	Segmented AA	Transfer Pricing
Individual Life	10.7%	10.2%
Individual Annuity	11.4	24.2
Pension	8.7	12.9
All Other	12.0	15.0
Corporate	7.6	6.4
Total	9.9%	9.9 %

The transfer pricing column illustrates that many lines of business were not being allocated the most appropriate assets. I think, in total, and as we looked at prior graphs, the ALM or the interest rate risk position for the company was actually pretty good. There was a mismatch of assets and liabilities within the company. In particular, some of the shorter product lines weren't getting short enough assets, and some of the product lines that could withstand longer duration assets were not being allocated those assets.

Another thing that's happening here is that we are able to quantify the impact of non-fixed income strategies on the company's bottom line. As you can see, we were able to provide fixed-income assets to the product lines that satisfied their needs, so they could pay the benefit obligations, and the interest rate risk was removed. But the company also owned a lot of non-fixed income assets

such as stocks and real estate. By centralizing the measurement of those kinds of assets, we were able to quantify the impact of investment in non-fixed income on the company. Non-fixed-income investment explains why the corporate line return has been reduced.

Obviously, there are a lot more observations. There's a lot that goes into the analysis, but obviously, in the time allotted, we wouldn't be able to go into any more observations. I will say, and I think this proves more than anything, that transfer pricing is not only an interesting theory, but it actually can work in practice. When we started building the synthetic asset portfolios I was a little concerned that we wouldn't actually be able to find a theoretical portfolio of assets that would match the product liabilities, but we really were able to do that. I think this illustration shows you that transfer pricing really can work in practice.

I will admit that the implementation of transfer pricing is a fairly major endeavor for any company. However, I will say I think transfer pricing is worth it. This implementation took the better part of two years. There are a number of implementation issues and I'm sure these won't surprise you. The first and probably most important implementation issue for transfer pricing is to get organizational buy-in for the project. Since transfer pricing is attempting to measure the impact of interest rate risk on the entire organization and look at the impact of alternative investment and product strategy at an enterprise-wide level, it's very good to get top-level buy-in, to get CEO buy-in, or certainly to get your chief investment officer (CIO) and chief financial officer (CFO) to buy into all of this.

It's important to get agreement on who is responsible for various functions within financial management. In other words, who is primarily responsible for the management of the interest rate risk? Who is primarily responsible for the development of investment strategies? I think we all know that these are shared functions or shared responsibilities across many functions; oftentimes, because they are shared responsibilities, it's hard to point to one person who is really responsible. Transfer pricing in no way suggests that the product lines won't be involved with the management of the interest rate risk or that the corporate risk manager is entirely responsible. What transfer pricing does, though, is to facilitate these

discussions by centralizing this analysis in one line, so the analysis doesn't get diffused as it goes across various product lines.

In implementing transfer pricing, there's a lot that happens in terms of gathering data. You have to understand what has happened, and what the historical asset allocation has done to your measurements. You'll have to establish tracking systems both in the accounting and financial reporting area. Transfer pricing will impact all of your financial management functions: cash-flow-testing, financial reporting, the establishment of line-of-business objectives, and performance benchmark.

I think there are many benefits of transfer pricing. I think the biggest benefit of transfer pricing, at least at Minnesota Mutual, was that it provided a forum to clarify the accountability between the functional areas. Functional areas develop over time because certain individuals have worked on certain projects. Sometimes it gets hazy in terms of who's really accountable for managing certain elements of the financial picture. Transfer pricing provided a very good forum to clarify this accountability and to discuss responsibilities between the investment, product, and corporate managers.

Transfer pricing also provides a forum for reviewing the profit targets for both your existing and new products. It provides a basis for establishing investment strategies that directly reflect product risks and the cost of capital. It provides a basis for establishing different investment strategies for the assets that back products versus the assets that back the surplus. Transfer pricing provides a quantitative basis for measuring risk and the impact that these alternative strategies will have on your company's value and your company's earnings. More than anything, the biggest benefit of transfer pricing, is that it actually requires fewer staff resources because, in the long run, the product and the corporate areas will be able to focus on their functional responsibilities. The product lines are not going to have to spend as much time explaining why their investment income or why their investment margins aren't what they are because the investment area decided to sell a particular security.

If you're only thinking about one line of business, that might not seem like a lot of savings, but if you have several product lines explain earnings, there are many actuaries talking to the investment area to understand how their actions affected their income statement. It allows the product line actuaries to focus on their functional responsibilities and not be as concerned about what the investment managers are doing. Conversely, it allows the investment managers to focus on the development in investment strategy because they will primarily be dealing with one client, which is the corporate area, allowing for the development of the investment strategy for the company. They won't be dealing with the concerns of the product lines as to whether or not, for example, stocks are the appropriate investment for their product line. In the end, I think everybody ends up doing less reconciling between different systems.

As I've discussed before, there are many applications for transfer pricing once you have the system in place. What I've talked about today is an illustration of transfer pricing, and how transfer pricing affects the financial reporting. Once you get the infrastructure in place, there are many applications for transfer pricing. Obviously you can quantify the interest rate risk. You don't just graph it; you can actually quantify it and put a measure on it. With transfer pricing, you're directly recognizing product risk and free capital in your investment strategy, setting crediting rates and pricing products. You're actually in a position to quantify the risk and return of alternative strategies. You can evaluate how your managers contributed to the company's performance. You can use transfer pricing to set minimum benchmarks for asset performance. Finally, your earnings analysis at a line-of-business level, is much more predictable because it's based on the investment income from the synthetic asset portfolios.

As I said before, the implementation of transfer pricing took about two years, and the company is still working to implement transfer pricing and get as much out of it as it can. I'm even more convinced now that transfer pricing is a very powerful tool and that transfer pricing really is the elusive answer that the insurance industry has been seeking to manage the interest rate risk and to move well beyond regulatory cash-flow-testing.

CHART 1
Liability Interest Rate Risk Profile

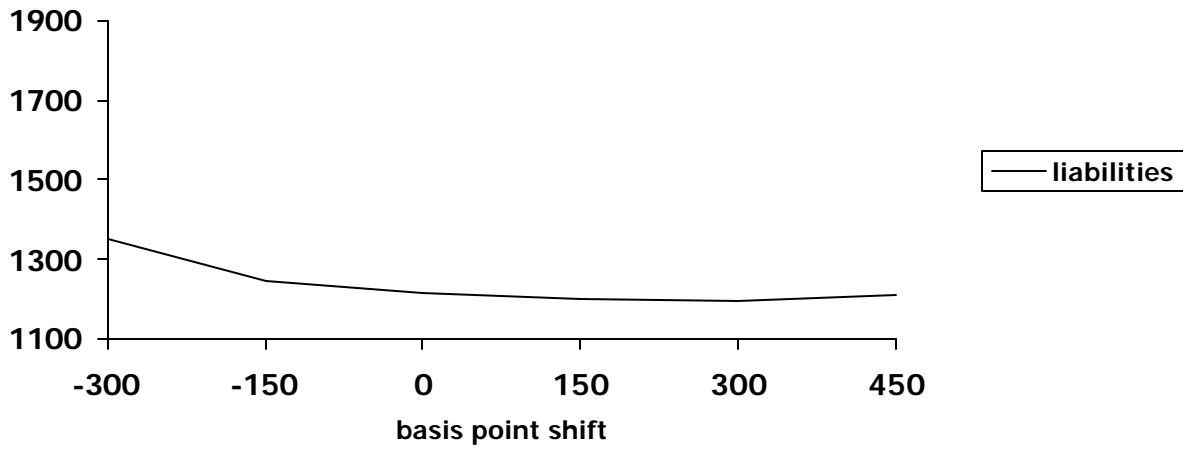


CHART 2
ALM Paradigm Using
Segmented Asset Allocation

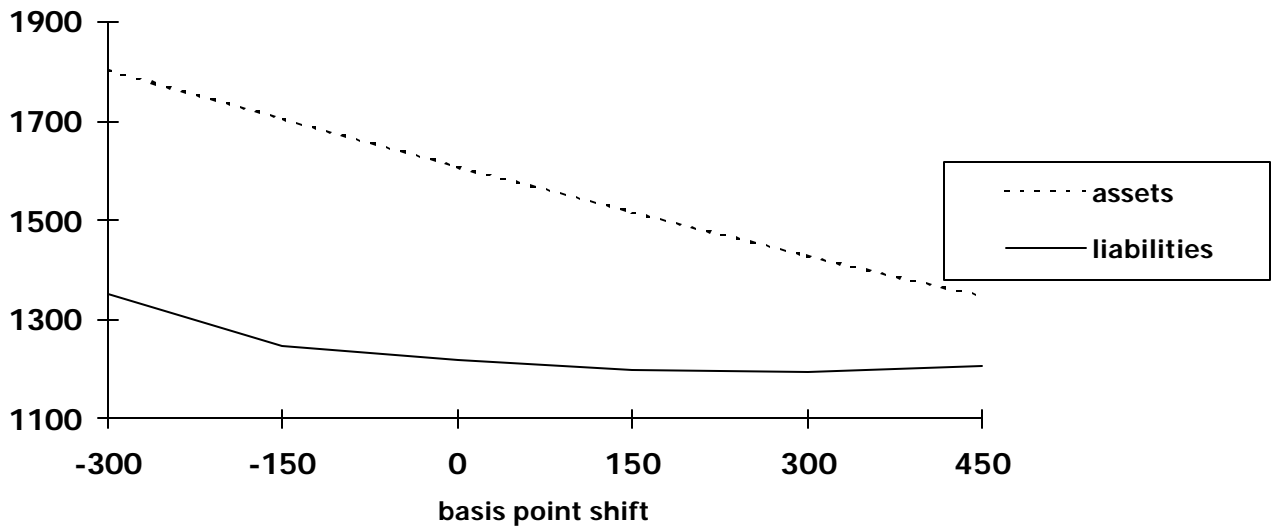


CHART 3
ALM Paradigm Using
Synthetic Asset Portfolios

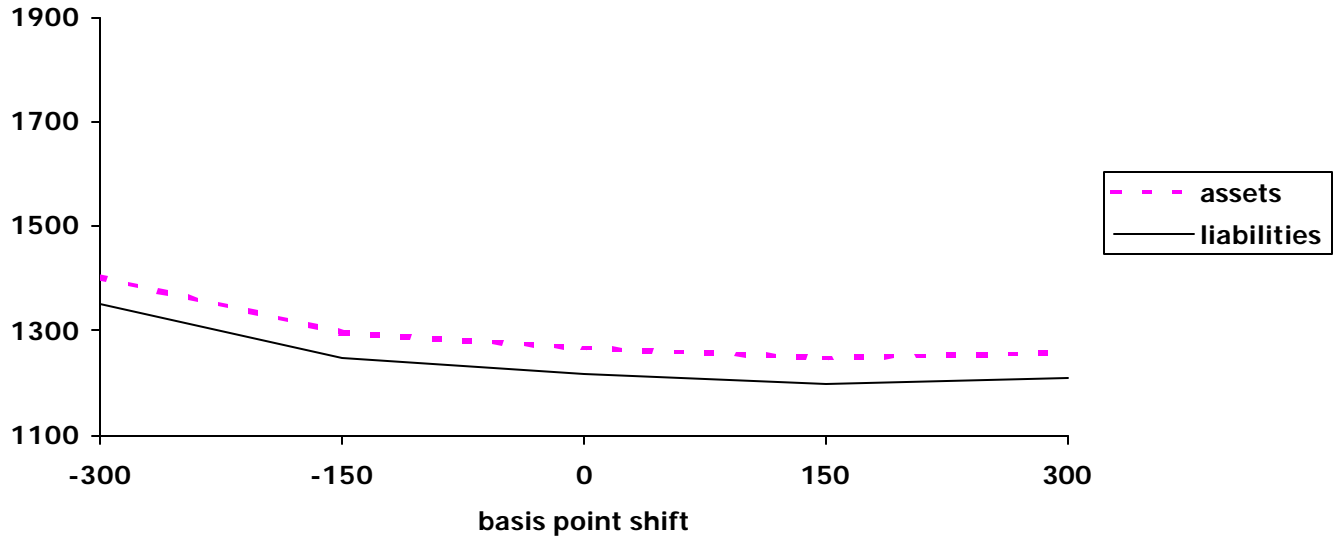


CHART 4
ALM Paradigm
Using Synthetic Asset Portfolios

