

**RECORD OF SOCIETY OF ACTUARIES
1990 VOL. 16 NO. 4A**

CASH-FLOW PROJECTION METHODS AND ASSUMPTIONS

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Recorder: TIMOTHY F. HARRIS

The panel will discuss techniques, methods, and assumptions for projecting cash flows for reserve analysis. Emphasis will be given to year-end reporting, but the panel will also address other appropriate uses for cash-flow projections including communicating results to nonactuarial members of company management.

The panel will cover the current status of:

- o Regulation 126
- o The standard of practice regarding how and when to do cash-flow testing
- o The regulatory environment regarding cash-flow testing

MR. TIMOTHY F. HARRIS: While I was talking to the other panelists prior to this meeting, we noted that it was appropriate to be so near to Epcot where many of us have gotten a glimpse of the cultural and scientific future. We will now take a look at our professional future. Those of you that have operated in New York have been subject to Regulation 126 on certain lines of business, and those of us that are members of the AAA must now adhere with the when-to-do-cash-flow-testing standard of practice. In addition, the NAIC has already seen amendments to the Standard Valuation Law and is expected to approve these amendments and will also approve, in 1991, a regulation, all of which pertain to the valuation actuary requirements. We now also have a revised how-to-do-cash-flow-testing standard of practice.

I'm Timothy Harris, a consulting actuary with Milliman & Robertson in the St. Louis office and a member of the Life Committee of the Actuarial Standards Board. I'm also a member of the task force that drafted the recent exposure draft that you may have seen on how to do cash-flow testing.

We're going to start addressing some of these issues with one of my firm's experts on Regulation 126.

Jackie Keating is with our New York office and specializes in cash-flow testing. She was a member of the committee that developed revisions to New York's Regulation 126.

MS. JACQUELINE M. KEATING: For year-end 1989, there were about 145 companies that submitted Reg 126 filings with the New York Insurance Department. For the rest

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of the companies that may be dealing with the need to develop cash-flow projections for other purposes, I think you will find some of the experience I have gained and lessons I have learned in complying with Reg 126 helpful.

First of all, I'd like to give a brief history of the evolution of Reg 126. Second, I would like to discuss the current status of the regulation and some of its requirements. My intent in discussing Reg 126 is not to give you an in-depth analysis of all of the requirements, but to give you a general flavor of some of the requirements and how the regulation has changed over the years. Third, I'd like to discuss very generally the method of developing asset and liability cash-flow projections. And finally, fourth, the area I'd like to spend the most time on is a discussion of some of the assumptions used in developing asset and liability cash flows, assumptions which may be transferrable to other purposes.

The precursor to Reg 126 was Circular Letter 33 which was adopted in 1982. Circular Letter 33 said that in order to use some of the higher valuation rates allowable under the dynamic valuation law for valuing annuity and GIC reserves, companies had to submit an actuarial opinion by a qualified actuary. Only those companies wanting to use the higher valuation rates and hold the lower reserves were required to submit an opinion. There were 30-40 companies annually that submitted opinions to the New York Department under Circular Letter 33.

The next step in the evolution of Reg 126 was the amendment of the New York valuation law which took place in 1985. The amendment required that for annuities and GIC contracts, companies had to submit an opinion by a qualified actuary stating that the assets backing the reserves made good and sufficient provision for the liabilities. The amendment also included the requirement of filing an actuarial memorandum in support of that opinion. Furthermore, the amendment authorized the Superintendent of Insurance to promulgate regulations concerning the calculations needed to support such opinions.

So then in 1986, Reg 126 was adopted and became effective for year-end 1986. The regulation prescribed certain requirements for being a qualified actuary and set out guidelines for developing an actuarial opinion and memorandum, and in essence, required cash-flow projections for annuities and GIC contracts issued in 1982 or later. Failure to file such an opinion and memorandum resulted in penalty reserves.

In 1988, Reg 126 was revised, and one of the changes at this time was a change in the scope of the regulation. The regulation now applied to single premium whole life insurance contracts, as well as annuities and GICs, for all years of issue. So, annuity business issued prior to 1982 was included as well. And then in 1989, the first amendment to Reg 126 was adopted. This amendment included some changes in the calculation of minimum reserves for substandard annuities and also included a more liberal small company/small block of business exemption. For those of you complying with Reg 126, you'll be happy to note that there are no proposed changes for year-end 1990.

So, what is the current status of Reg 126? The regulation itself is over 50 pages long, and I won't try to go into each and every requirement but I will try to give you a general

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flavor of some of the major requirements of the regulation. Reg 126 requires an actuarial opinion and memorandum for all annuities, supplementary contracts, GICs and single premium whole life insurance policies, for all years of issue, and generally requires the development of asset and liability cash-flow projections in support of those opinions. Penalty reserves are required when an actuarial opinion and memorandum are not submitted. There are certain exemptions for small companies and small blocks of business. The exemption applies to the blocks of business subject to Reg 126 which have total reserves less than \$25 million, or reserves which are less than \$50 million and also constitute less than 50% of total reserves. Even if a company falls under the small company exemption, the Superintendent of Insurance can request that cash-flow projections be performed and an actuarial opinion be submitted. The opinion must be signed by a qualified actuary appointed by the Board of Directors. And, finally, the requirements apply to all companies licensed in New York and all accredited reinsurers in New York.

So, what do you do if you need to develop cash-flow projections for Reg 126 or have other needs for the development of cash-flow projections? The basic method is to develop projections of asset and liability cash flows under various economic scenarios, reflecting changes in cash flows, and reflecting a company strategy towards crediting rates and reinvestment strategy. If you are testing reserve adequacy, you would normally start with assets equal to your statutory reserves. The projections would be done over a period deemed suitable for the block of business being tested. For example, for a block of deferred annuity business, you may do your projections over a 10-year period. For a block of structured settlements and immediate annuities, you may do your projections over a 30-year period. Typically, you would discount your projection results to the valuation date in order to get a handle on the adequacy of reserves.

One of the things you'll notice, if you begin this process of developing cash-flow projections, is that there are an awful lot of assumptions that need to be made. I recently looked at a set of projections we had done for a client and started counting the number of individual assumptions involved in the projections, and I stopped counting when I got to around 50 or 60. Suffice it to say that there are an awful lot of assumptions involved in these projections, though some of the assumptions will be much more crucial to the projection of cash flows than others. Assumptions concerning lapse rates and prepayment rates on assets can have a dramatic impact on the projection of cash flows.

I'm going to focus more heavily on asset-type assumptions, since I think these may be more foreign to actuaries who have not dealt with this requirement in the past. Also, some of the other panel members may talk more about liability-type assumptions.

One of the first things you'll need to deal with in developing cash-flow projections is the scenarios over which to develop projections. Table 1 shows the seven scenarios suggested in Reg 126. These scenarios are merely guidelines, and the regulation requires the actuary to test as many scenarios as necessary to determine an understanding of the dynamics of the asset and liability cash flows. The majority of Reg 126 opinions filed with the New York Insurance Department include these seven scenarios as well as some additional deterministic-type scenarios. According to Paul Schoener of the Insurance Department, it is not uncommon, however, to see projections based on a stochastic

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development of interest rates, where a thousand or more randomly-generated scenarios may be projected. Your choice of using a fixed set of scenario rates or a randomly-generated set of scenario rates may well depend on the block of business you're testing. For instance, for a block of long-term fixed liabilities, like structured settlements or immediate annuities, you can be pretty certain that scenarios where interest rates go down and stay down are going to be the ones that produce the worst results. However, it may not be apparent what the worst scenario would be for a block of deferred annuities, given the interplay of scenario rates, credited rates, lapse rates and reinvestment strategy.

Even if you stick to the seven scenarios shown in Table 1, there are other assumptions that need to be made. You need to determine a yield curve which represents the yields available on assets with different terms to maturity and also different quality ratings. You may also need to consider the occurrence of an inverted yield curve.

TABLE 1

Scenarios

- | | |
|----|--|
| 1. | Level |
| 2. | +5% over 10 Years |
| 3. | +5% over 5 Years; -5% over Next 5 Years |
| 4. | +3% Pop-up |
| 5. | -5% over 10 Years |
| 6. | -5% over 5 Years; +5% over Next 5 Years |
| 7. | -3% Pop-down Minimum = 4%; Maximum = 25% |

What are some of the key assumptions in developing the asset cash flows? One of the assumptions you'll be forced to deal with is an assumption concerning the level of defaults. The impact of this assumption will depend, of course, upon the quality of the portfolio. Reg 126 allows the actuary to use a default charge which is equal to 75% of the annual MSVR deduction, and in using this assumption, you would not include assets equal to the MSVR in the projections. Alternatively, you could actually model defaults in the projections, and in this case, you would include assets equal to the MSVR in the starting asset base. In this case, though, you would have to demonstrate that the MSVR assets are only going to back default risks and are not being used to cover other risks. The majority of Reg 126 filings use this 75% of the annual MSVR deduction as a default charge which is obviously a much easier method to project.

The recently-adopted changes in the calculation of the MSVR, changes in the categories of assets and the annual accumulation amounts, will impact the default charges projected for future Reg 126 filings.

Next is a discussion of asset prepayment assumptions and some examples of formulas used to project bond calls and mortgage prepayments, affecting both mortgage pass-through bonds and collateralized mortgage obligations (CMOs). For certain blocks of business, the prepayment assumption can be one of the most crucial assumptions to the projection of cash flows. Reg 126 includes some acceptable formulas to be used in calculating bond calls. One example formula looks at the coupon rate on a bond and

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compares that with the projected new money rate at a particular point in time and further reflects a bond's call premium. For bonds with no call premiums, it would be acceptable to assume that a bond would be called when new money rates are 2% below the bond's coupon rate. A trigger higher than 2% could be used in cases where a bond had a call premium. The regulation also includes some examples where you would assume a certain percentage of a bond would be called, rather than assuming that 100% of a bond would be called.

Table 2 shows a formula that we sometimes use to project bond calls, and, again, it looks at the economics of the situation asking, on the one hand, what does it cost the bond issuer to call that particular issue? On the other hand, what does it cost the bond issuer to maintain the current issue based on projected interest rates? The cost to call the issue is at the top of the table and basically is the par value times (one plus the call premium), where the call premium is expressed as a percentage of par value. In addition, there is some transaction cost involved in calling an issue, and we typically express this as a percentage of par value which may be 2% of par for investment-grade securities and 4% for noninvestment grade securities.

TABLE 2

Bond Call Options

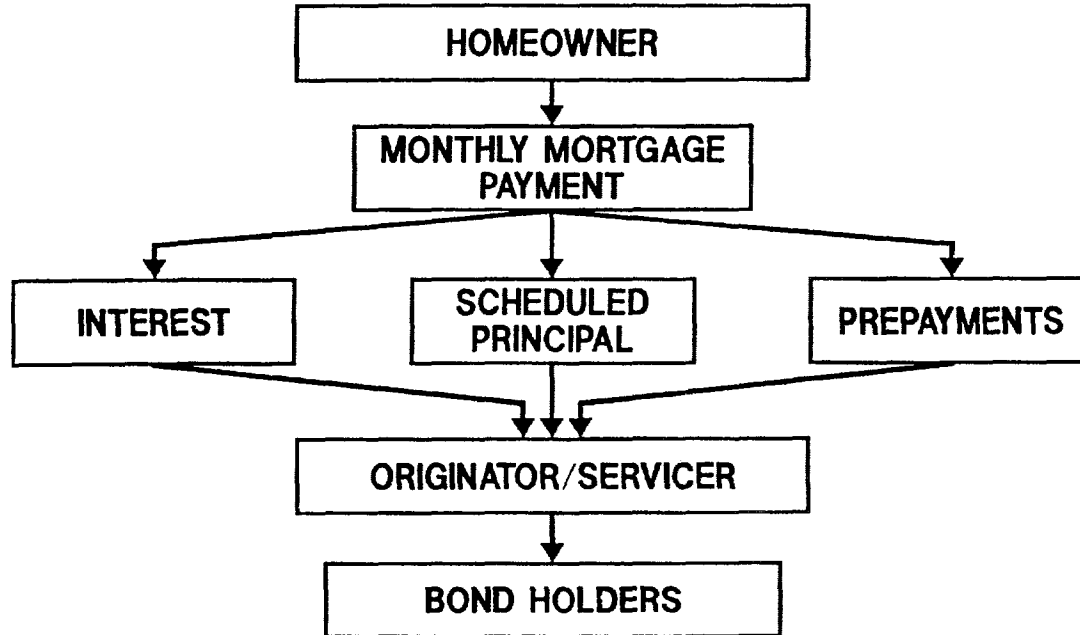
Cost to Call
Par (1+ Call Premium) + Transaction Cost
Cost to Maintain
Call Market Value
Assume Bond is Called if:
Cost to Call < Cost to Maintain

The cost to maintain the issue is merely the present value of remaining coupons and principal payments on the bond, discounted at current new money rates, similar to a market value calculation. The formula says that you would assume a bond would be called if the cost to call the bond is less than the cost to maintain it. In testing this formula against some bond experience, we notice an inertia in the marketplace, that is, you don't see an automatic increase in calls the moment this equation holds true. To reflect this fact, we include a margin in our call market value formula. Basically, we discount the remaining coupons and principal values at an interest rate which is one hundred basis points higher than current new money rates.

Obviously, there are many factors affecting whether a particular bond will be called or not, but the examples I've described try to recognize the economics of the situation. To the extent that you have additional information available on which to base your assumptions, obviously it would be in your best interest to use that information.

Prepayment assumptions affect cash flows on mortgage pass-through bonds and collateralized mortgage obligations. A mortgage pass-through bond is backed by a pool of mortgages. Chart 1 shows the typical flow of funds from a homeowner to the mortgage bondholder. The bondholder receives a pro rata share of all cash flows from a

MORTGAGE PASS-THROUGH BONDS FLOW OF FUNDS



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CHART 1

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pool of underlying mortgages, cash flows consisting of interest payments, scheduled principal payments and any prepayments.

Chart 2 shows a typical pattern of mortgage payments on a pool of 30-year, fixed rate mortgages. The black portion of each bar indicates the principal payments, and the white portion the interest payments.

Chart 3 shows the flow of funds from the same underlying collateral but assuming there's a 6% annual prepayment rate on the underlying mortgages. Obviously, the prepayment rate has a dramatic effect on the flow of funds to the bondholders.

Table 3 is an example of a formula we use to develop the prepayments on an underlying pool of mortgages, and again, the formula looks at the difference between a bond's coupon rate and current new money rates. Multipliers in this formula would be anywhere from 10-15 depending upon data we may have on the underlying pool. Different pools of mortgages will prepay at very different rates depending upon the characteristics of the mortgages in the pool, and to the extent you can reflect a particular pool's characteristics, you should do so in the formula. We would typically subject this formula to a minimum and a maximum which may be something like 4-6% as a minimum each year and 40-50% as a maximum each year.

TABLE 3

Example of Prepayment Formula

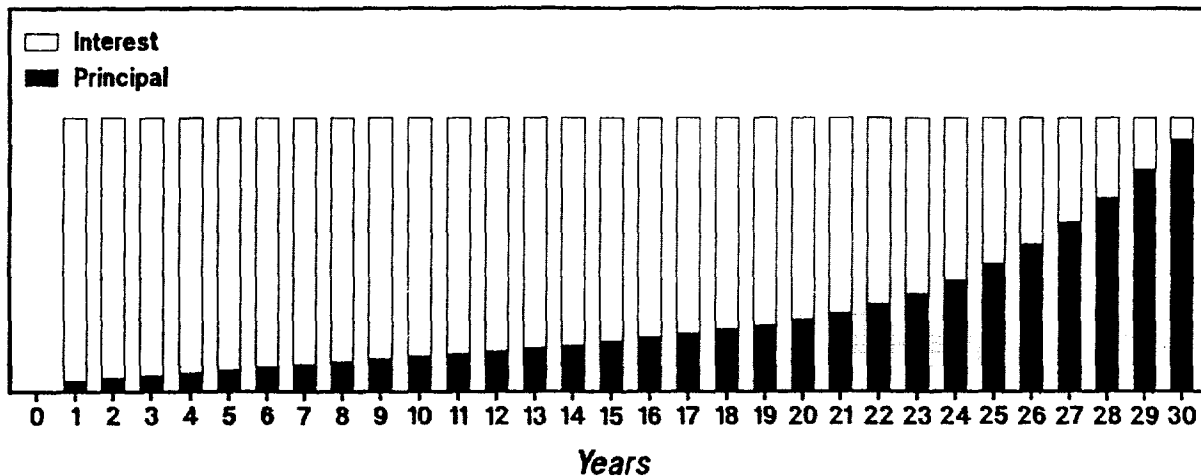
Percent of Remaining Mortgages that will Prepay in a Month:

$$1 - [1 - \text{Multiplier} \times (\text{Coupon} - \text{New Money})]^{12}$$

Subject to minimums and maximums

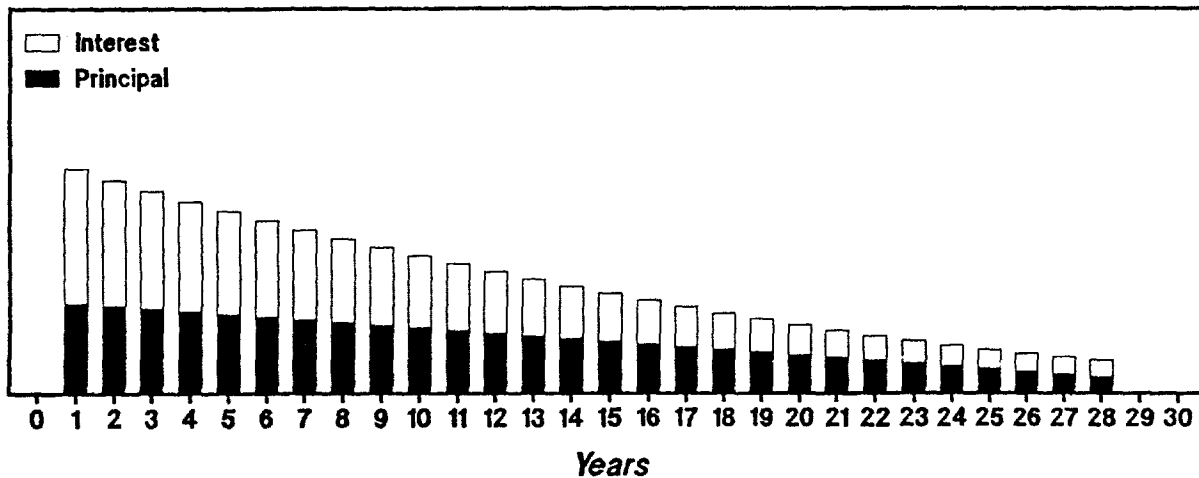
CMOs were created in the early 1980s as a means of dealing with some of the prepayment risks inherent in mortgage pass-through bonds. CMO bonds, like mortgage pass-through bonds, are backed by a pool of mortgages. However, the flow of funds to CMO bondholders is not a pro rata share of all cash flows from the pool of mortgages, like it is for a mortgage pass-through bond. Rather, CMOs impose a different structure by which the cash flows from the pool of mortgages are allocated to the bondholders. CMOs are designed to segment the prepayment risk. A CMO bond is structured as several different tranches, each tranche having its own stated bond coupon rate which, in some cases, could be a floating rate. When you purchase a CMO you purchase a particular tranche of the CMO, and the tranche structure defines how cash flows are allocated to the different bondholders. Let's take a simple example (Chart 4). Again, we're assuming that this CMO is backed by the same pool of 30-year fixed rate mortgages, and they have an underlying prepayment rate of 6%. Tranche A bondholders receive interest based on their bond coupon rate, and all principal payments from the underlying mortgages flow to pay off the principal balance on this tranche first. Chart 5 shows the cash flows to tranche B bondholders, and you'll notice that tranche B receives

MORTGAGE PASS-THROUGH BONDS CASH FLOWS ASSUMING ZERO PREPAYMENTS



MORTGAGE PASS-THROUGH BONDS

CASH FLOWS ASSUMING 6% ANNUAL PREPAYMENTS

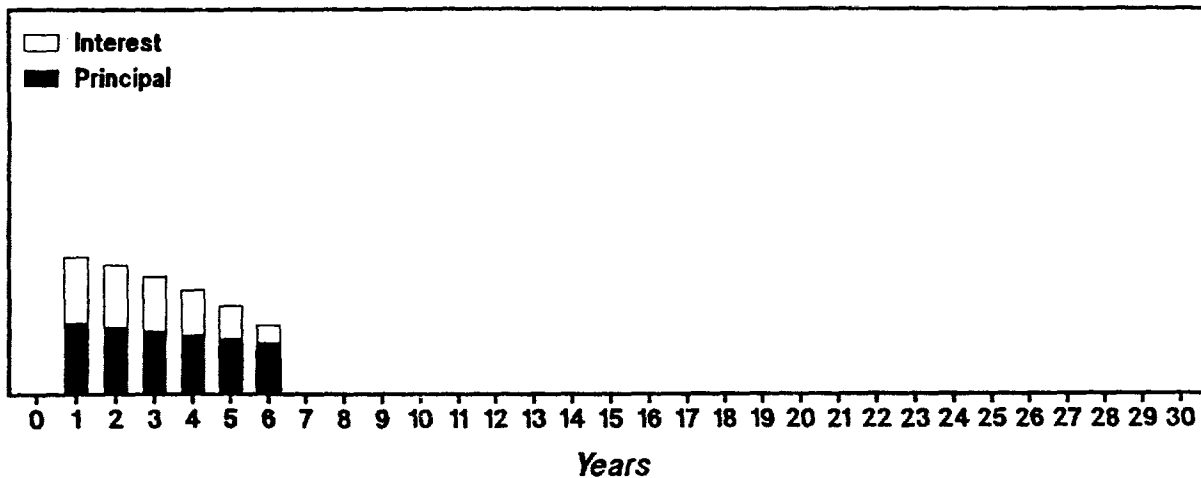


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CHART 3

CMOs

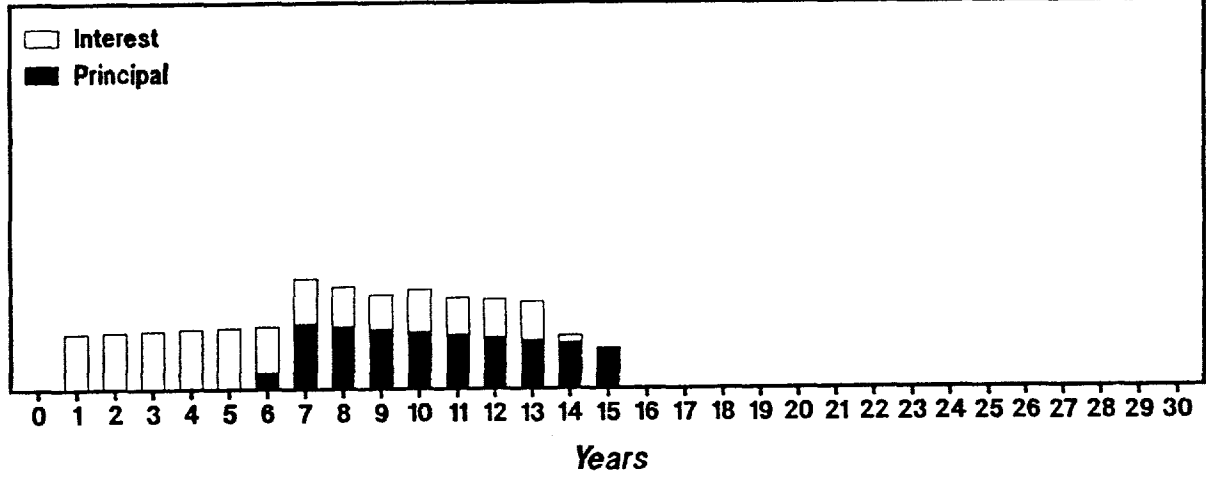
CASH FLOWS TO "A" TRANCHE



Assuming 6% annual prepayments and no 'Z' tranche.

CMOs

CASH FLOWS TO "B" TRANCHE



Assuming 6% annual prepayments and no "Z" tranche.

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interest payments only until such time as tranche A has been paid off. Then all principal payments from the underlying mortgages go to pay down the principal to tranche B bondholders. And, finally, the same pattern to tranche C (Chart 6). You see interest payments only until such time as the prior tranches, A and B, are paid off, and then the principal payments go to pay down the balance on tranche C.

Table 4 illustrates a simple numerical example to demonstrate again how the CMO structure can allocate cash flows from a pool of mortgages. Again, we're assuming a collateral of \$400,000 of 10%, 30-year fixed rate mortgages, and this CMO has four tranches, A, B, C and Z, and Z is an accrual tranche.

TABLE 4

CMOs Simplified Numerical Example

Collateral: \$400,000 of 10% mortgages		
CMO Bonds:		
Tranche	Principal	Coupon Rate
A	\$100,000	8.0%
B	100,000	8.5
C	100,000	9.0
Z	100,000	9.5

Accrual tranches are different from the other tranches in that they receive no cash flows, no interest payments and no principal payments, scheduled or prepayments, until such time as all prior tranches have been paid off. You'll note that each tranche has a specified bond coupon rate.

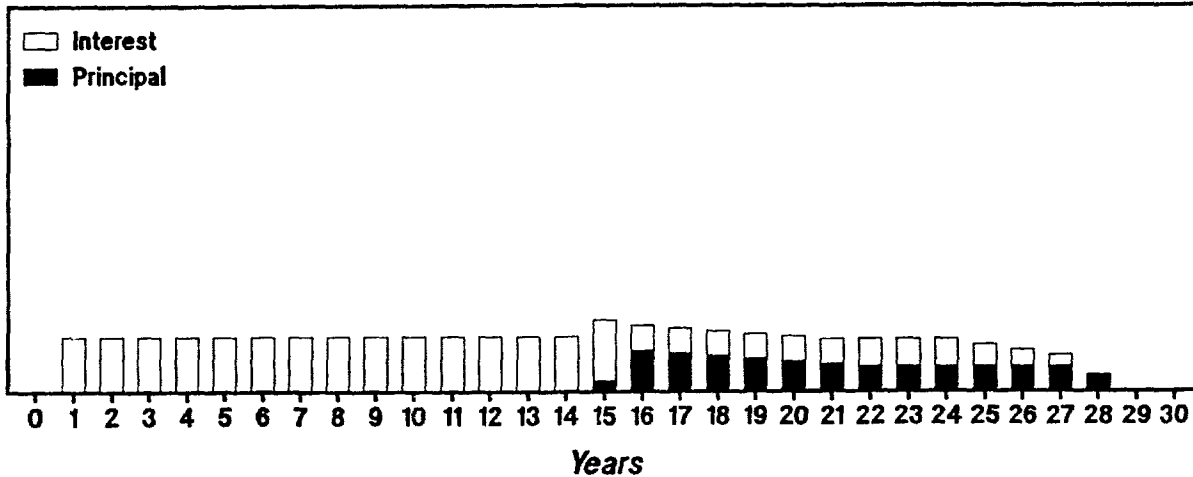
Further, let's assume that the cash flow from the underlying collateral in year one is as follows: You have interest payments. You have scheduled principal payments of \$2,224. And you have prepayments of \$20,000. Note here that the total principal payments we're assuming are \$22,224.

Table 5 shows you how that cash flow would be allocated to the different tranches. The top part of the table just reiterates the structure of the CMO, and at the bottom on the left-hand side you see that the A, B and C tranches receive interest payments based on their bond coupon rates. The Z tranche receives no interest payments until all prior tranches are paid off. If you go to the next column, you see the principal paydown all goes to tranche A, and the amount of the principal paydown is equal to the \$22,224 total principal payments stated above, in addition, the \$9,500 of interest accruing to tranche Z.

If you go to the final column, you'll notice that the principal at the end of the year for tranche A is the \$100,000 of original principal less the \$31,724 of principal paid which is \$68,276. There is no change in the principal balance for tranches B and C, and tranche Z has accrued interest to a principal balance of \$109,500.

CMOs

CASH FLOWS TO "C" TRANCHE



Assuming 6% annual prepayments and no "Z" tranche.

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TABLE 5

CMOs

First Year's Cash Flow to CMO Bonds:				
Tranche		Coupon Rate		Principal Beg. Year
A		8.0%		\$100,000
B		8.5		100,000
C		9.0		100,000
Z		9.5		100,000

Tranche	Coupon Payments	Principal Paid	Total Cash Flow	Principal End Year
A	\$8,000	\$31,724	\$39,724	\$ 68,276
B	8,500	0	8,500	100,000
C	9,000	0	9,000	100,000
Z	0	0	0	109,500

In projecting the cash flows from CMO bonds, we use the prepayment formula I showed previously to develop the prepayments on the underlying mortgages and then layer on top of that the structure of the CMO to determine how cash flows would actually be allocated. As you can imagine, this can be a very time-consuming and complicated process, particularly since most CMOs are much more complicated than the one shown here. Some of the recent CMOs we've seen have as many as 10 different tranches, and each one you look at will be slightly different from the one you've seen before. To the extent that CMOs are a small part of your portfolio, or if you own one of the earlier tranches and can get a handle on the range of maturities you can expect, you may be able to do some modeling or develop simplifying assumptions in projecting CMOs.

Table 6 illustrates a couple of examples of formulas used to develop lapse rates for a block of deferred annuity business. Formula 1 is an example formula given in Reg 126, and it has three components.

TABLE 6

Lapse Rate Formulas

Formula 1	Base Lapse Rate + A (Market Rate - Credited Rate) ^B - C (Surrender Charge)
Formula 2	$.25 \times \frac{\text{Prior Credited Rate} - \text{Current Credited Rate}}{\text{Prior Credited Rate}}$

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The first component is a base lapse rate. The second component measures the difference between the company's current rate and what the market is offering on a similar type product. And the third component reflects the dampening effect of surrender charges on lapses. Obviously, there are many variations of this type formula, and you should gear it to whatever experience is available for the particular block of business you're looking at. Formula 2 is a formula we sometimes use if a company has dropped its credited rate or is projecting that it will drop its credited rate, and basically, the formula says even if your credited rate remains competitive, you may still see an increase in lapses. This may depend on how the business was sold and contractholders' expectations.

Very often in developing cash-flow projections, you'll be asked to develop projections of items where you don't have a good feel for what the assumptions should be, and in that case, you need to do some sensitivity testing of the assumptions you've used in your projections. Also, there may be cases where you may have a good feel for what the assumption should be based on experience. However, if that assumption is crucial to the projection results, you also need to do some sensitivity testing to see just how sensitive your results are to that assumption.

MR. HARRIS: I hope that even those of you who don't do business in New York were paying attention because more and more of us are going to be doing cash-flow testing. We have the NAIC valuation actuary proposal, and we have actuarial standards of practice. So, we're going to be doing cash-flow testing not just for valuation purposes but also for other purposes.

The valuation actuary amendments to the Standard Valuation Law were initially drafted by the Tweedie Committee. This committee was given the assignment to develop the amendments to the Standard Valuation Law, along with the supporting regulations. The Life Committee of the Actuarial Standards Board has also been involved in this process since we have supported the work done by the Tweedie Committee by developing actuarial standards of practice. The Tweedie Committee and its successor organization, the Joint Committee on the Valuation Actuary, have worked with the Life and Health Actuarial Task Force of the NAIC to produce the valuation actuary amendments which were exposed in June 1990, at the NAIC meeting and are expected to be finalized at the December 1990 meeting. These amendments will require that the qualified actuary (under these amendments a qualified actuary is defined as a member in good standing of the AAA) will attest to the adequacy of reserves in light of the assets backing the reserves, the investment earnings on these assets, and any considerations anticipated to be received and retained on the policies and contracts to cover benefits under and expenses associated with these policies and contracts. That's cash-flow testing.

This opinion will also be based on standards of practice issued by the Actuarial Standards Board.

The actuary is supposed to be liable only to the state and the company. There's a provision in the amendments that states this, but I guess it'll be up to the attorneys whether or not that applies. They're trying to avoid litigation, frivolous or otherwise, against the actuary based on the opinions that he might provide.

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There's also the possibility of disciplinary action by the commissioner of the state, and this will be laid out in regulations to be drafted later.

The proposed valuation actuary regulation, which goes hand-in-hand with the amendments to the Standard Valuation Law, will require that the annual statement of opinion attest to the adequacy of the reserves in light of the assets backing these reserves. The qualified actuary under this regulation is defined a little bit differently. He or she is defined as someone who is qualified to sign the life and health statement in accordance with the AAA qualification standards. So, we not only have to be a member of the AAA, but we also have to keep up our continuing education requirements. This actuary also cannot have gotten into any trouble with the state or with any other body of law, otherwise he or she would be disqualified.

This actuary also has to be an appointed actuary. This is very similar to the New York requirement in that the actuary has to be appointed by the board of directors of the company, and if the appointed actuary is changed by the board, the board has to let the state know that the actuary was changed and why the actuary was changed.

There are, however, small company exemptions in this regulation. The regulation in its present draft, which may not be the final draft, splits up companies into four categories: companies with less than \$20 million of assets, companies with \$20-\$100 million of assets, companies with \$100-\$500 million of assets, and then companies with more than \$500 million of assets. It then applies ratios to each of these groups of companies. These ratios are as follows: (1) capital and surplus to cash and invested assets; (2) annuities and other deposits, to reserves and liabilities, less MSVR; and (3) the book value of non-investment grade assets to capital and surplus. If a company's ratios fall within certain limits, the actuary may not have to provide a cash-flow testing type opinion or may have to provide one only once every three years. The actuary will still have to provide the normal statutory opinion and will have to show what the ratios were and state that he or she did not have to provide the cash-flow testing type opinion and had not been requested by any state to provide such opinion.

These opinions are going to be very similar to the opinions that you might be signing now for the annual statement, except that when you're doing the cash-flow testing, they're going to become more elaborate. You're going to have to indicate the method of analysis that was used in analyzing the reserves and the underlying assets.

Any additional reserves that are required to be set up may be graded over three years under the present draft, and the testing that you will be doing is not going to be limited to cash-flow testing. If you refer to the actuarial standards on cash-flow testing, there are lines of business where cash-flow testing is not the most appropriate method for testing a block of business.

This regulation is going to require that a memorandum be produced to support the work that you have done. The memorandum is to include detail for the liabilities that were reviewed including product descriptions that show a risk profile of the product, the source of your in-force, the reserve method and basis, any investment reserves (the MSVR) and any reinsurance agreements. For the assets, you're going to have to

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describe the portfolio including a risk profile of the assets, your investment and divestment assumptions, and the source of your asset data, and show your asset valuation bases.

You're going to have to detail the analysis bases that were used, the methodology, the rationale for inclusion or exclusion of different blocks of business, and how pertinent risks were analyzed.

You're going to have to give the rationale for the degree of rigor that you used in analyzing different blocks of business.

You're going to have to show the criterion that you use for determining asset adequacy.

You're going to have to detail the effect of federal income tax, reinsurance and other relevant factors.

Aggregation will be allowed in these analyses, and you will be allowed to aggregate a sufficient block of business with a deficient block of business if the scenarios that are used to do the analyses are consistent and these blocks of business are subject to mutually independent risks. You're also going to have to describe the method of aggregation that you used.

The scenarios that are going to be used are the same scenarios that are used under Reg 126. So, it looks like a lot more of us are going to be subject to a regulation or a requirement similar to Reg 126.

Let's look at the actuarial standard of practice on when to do cash-flow testing for life and health insurance companies. The Tweedie Committee recommended the basis and the framework for this standard. The language in the standard was coordinated with the new, how-to-do-cash-flow-testing draft. You may note some language which may not be familiar to you, the use of the term obligations, for example, instead of liabilities. Obligations cover more than just your reserves. Obligations cover all your obligations including taxes and dividends, whatever obligations you might have. There was considerable interest in the draft of this standard from the AAA membership, and, as is normally the case, many of the comments that were made were incorporated in the final standard.

There was no small company exemption included in the standard. There was some lobbying, however, to include such an exemption, but it was felt that this was not the place to include a small company exemption. That's a political issue, and that should have been included, and will be included, in the valuation actuary amendments to the Standard Valuation Law or the regulations that go along with it.

When do we now do cash-flow testing? We may do cash-flow testing when we do pricing or product development, when we look at investment strategies, when we analyze or project dividends and nonguaranteed elements, when we do financial projections, when we perform reserve testing, and when we do appraisals.

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Now, when I say you may do cash-flow testing in these situations, it's really going to be up to the actuary. The actuary has to make a judgment call. You've got to look at what you're doing and decide whether what you're doing should be done using cash-flow testing, and if you decide that it does not require cash-flow testing, then in your report, or in some type of documentation which would, in effect, be your report, you should indicate that you considered this and that you decided that cash-flow testing was not appropriate. So, again, we're going to be doing more and more cash-flow testing and not only in connection with valuation work.

Many of you recently received the exposure draft of the actuarial standard of practice on how to do cash-flow testing, which is entitled, "Performing Cash-Flow Testing for Insurers." Doug Collins was the chairperson of the task force that put together this draft, and I was on this task force. I'm going to go over this draft a little, and Doug is going to cover it as well.

This is actually a replacement for the existing how-to-do-cash-flow-testing standard. This was developed by a joint life and casualty task force, and one of the things we dealt with was using common language, trying not to use language that was specific to one discipline or another.

What does this new standard say about the different risks that we should be projecting in cash-flow testing? We shouldn't be concentrating solely on the interest risk. We also have to look at the default risk and the operations risk. AIDS, for example, is one of the risks that should be considered as a sensitivity in the cash-flow projections.

This draft covers the default risk and the operations risk in more detail than the old standard. The old standard seemed to be an oriented-toward-interest-risk standard because that was the hot topic at that time.

Perhaps Harold Phillips will tell us what the state of California is going to be doing, if anything.

MR. W. HAROLD PHILLIPS: At the present, we have no specific requirements in effect. However, we're very, very interested in the subject. I understand that the resolution of the Baldwin United situation involved cash-flow projections. That may have been the genesis of the present concept, and as you know, one of our large domestics that's been in the press a lot has had extensive cash-flow testing done by an outside consulting firm. John Montgomery is chairman of the NAIC actuarial task force, and as mentioned, under intensive consideration is a rewrite of the Standard Valuation Law, and a key change revolves around the actuarial memorandum, reporting on the results of cash-flow testing or an asset adequacy analysis, as it's also being called, which supports the actuarial memorandum. California strongly supports this effort. We've had a long-standing interest in cash-flow testing, and the options available to us were to strike out on our own, for all life companies operating in California, through a California regulation similar to New York Reg 126, or to await the developments in the NAIC on a national scale. The second option is the way it seems to be going. Other states are also choosing this route, for example, Illinois. Nevertheless, we do have a bulletin on the shelf. It's not the position of the Department yet, my disclaimer. In fact, it may be my

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own current thinking, and I'll just very briefly cover some of the points in it. The purpose of this bulletin is to describe the guidelines and standards for actuarial memoranda supporting actuarial opinions. We define cash-flow testing and analysis. The standards are those of the AAA. The liabilities to be covered are those for annuities, GICs, structured settlements and universal life type products. There's a long description of the actuarial memorandum covering what has to be included; for example, for reserve liabilities, product descriptions including a risk profile; for assets, portfolio descriptions including a risk profile, the methodology and so on. The memorandum shall also describe, among other things, (1) how the risk of default is provided for and its relationship to MSVR; (2) any aggregation of blocks and the rationale therefor; (3) the use of the seven New York scenarios, minimum of 4%, maximum of 25%; (4) the interest crediting philosophy and the basis for the beginning interest rate for each scenario; (5) the basis and rationale therefor of substandard mortality tables used for structured settlements. Then there's a small company exemption similar to the New York Reg 126.

MR. HARRIS: Doug Collins is a Fellow of the Casualty Actuarial Society and is a consulting casualty actuary with the Hartford office of Tillinghast. Doug is a member of the Casualty Committee of the Actuarial Standards Board and is the chairman of the task force that developed the present exposure draft on how to do cash-flow testing.

MR. DOUGLAS J. COLLINS: Casualty property insurance companies generally have so much difficulty keeping their undiscounted reserves and prices at an adequate level that cash-flow testing really hasn't received the attention that it deserves on the casualty side. While it is certainly true that cash-flow testing is more well-developed among life actuaries, I think it's always useful to compare the types of work that are being done in different disciplines.

I will not go into a great deal of detail about the methods and assumptions that we use on the casualty side because I think, for the most part, they're similar to the basic techniques used by life actuaries.

I would like to explore briefly the differences between the two practices and describe the types of work that we do on the casualty side. I've come to the conclusion that there are not any basic differences between cash-flow testing as done by casualty and life actuaries, at least in terms of how cash-flow testing is performed. I came to this conclusion when the joint task force met and put together the proposed cash-flow testing draft that you recently received. The first draft of this standard of practice was developed by and for casualty actuaries, and when we presented it to the standards board, they suggested that we get together with the Life Committee and come up with a joint standard. I found it very interesting when we met as a joint committee that virtually the entire discussion related to terminology and editorial changes to the draft. The joint task force made no changes in the basic content of the original draft standard. Perhaps we'll find through the exposure process that there are some differences, but I don't think we will.

There are some key differences in the emphasis between different parts of the analysis that would be done by casualty actuaries versus life actuaries. I think the differences in emphasis are due to the differences in the nature of the liabilities, as well as the different economic effects. In both life and casualty, there are significant timing risks in

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projecting the payout of the liabilities, but on the casualty side, timing risk is usually outweighed by the risk of adverse development in the ultimate loss levels. Twice in the last 20 years, we have seen industry reserves for commercial casualty business develop by more than 25% within five years of the reserve date. This high level of uncertainty has kept casualty insurers from discounting their loss reserves, and this has resulted in less attention being paid to cash-flow testing.

In both life and casualty insurance, there are significant risks that changes in investment rates of return will reduce asset cash flows or increase asset/liability mismatch, but the effects of economic changes seem much more important on the life side. Only in life insurance do you have the disintermediation risk that can significantly reduce cash flows when interest rates are high. As a result, I think more effort by life actuaries has gone into modeling the effects of alternative economic scenarios. I think these differences will tend to fade over time. Cash-flow testing by casualty actuaries will probably become more complex if regulators continue to expand our role in solvency surveillance. Unless basic changes are made in the tort liability system, the cost of casualty insurance will probably continue to rise rapidly, and regulators will be forced to look even more closely into the issue of insurer solvency. I wouldn't be surprised if these changes eventually result in valuation actuary requirements on the casualty side.

What areas of casualty actuarial work currently require cash-flow testing? There are no valuation actuary requirements on the casualty side, but Kentucky and Pennsylvania have implemented regulations in recent years that permit insurers to discount certain casualty loss reserves if an actuarial opinion is provided supporting the discounted reserve calculations. These opinions are not too different, I don't think, than the opinions that are required in New York. These regulations in Kentucky and Pennsylvania have been a major factor in causing casualty actuaries to do more thinking about cash-flow projections, methods and assumptions. The Kentucky and Pennsylvania regulations were both proposed at about the same point in time, late 1987, early 1988, and are very similar in content. Both only apply to the longer-tailed casualty lines. The Pennsylvania law permits loss reserve discounting only for medical malpractice liabilities, while the Kentucky regulation applies initially only to malpractice and workers' compensation, although other lines may be included at the discretion of the Commissioner. Not very many companies are affected, primarily only those that write just the malpractice and workers' compensation lines and no other business.

Both laws require an opinion as to four items. The first is an opinion as to the adequacy of undiscounted or nominal reserves. This is really no different than the opinion requirements in other states. The second part of the opinion is an assessment of the appropriateness of the discount rate assumed in the present value calculations. This opinion must be based on an analysis of the invested assets underlying the liabilities, as well as a review for consistency with any interest rate assumptions used in pricing. The final two parts of the opinion relate to the reasonableness of the matching between asset and liability cash flows and the appropriateness of the cash-flow projections themselves. Neither state requires a margin for the risk of adverse deviation.

Typically the methods used to support these opinions are not that complex. First, asset and liability cash flows are projected, probably not too differently than they would be by

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life actuaries. Cash flows of future loss and loss expense payments are generally projected first by year of occurrence, and then, the payout of these liabilities is projected for future calendar periods based on the historical payment patterns. The differences between projected asset and liability cash flows are then accumulated so that an estimate of reinvestment income can be calculated. If cash flows are negative over part of the projection period, it is usually assumed that funds are borrowed to meet cash flow needs. The present value of the combined asset and reinvestment cash flows is then compared to the discounted value of loss reserves and tested under a variety of assumptions to determine a reasonable discount rate. Sensitivity testing is usually limited to a range of fixed investment rates of return. Modest margins for conservatism in the discounting assumptions are maintained through a combination of faster-than-expected payout patterns, discount rates less than expected investment income, and margins for variation in the ultimate loss level.

There are a few other areas where cash flow testing is useful to casualty actuaries. Financial reinsurance can take on many different forms, but most commonly, there's a transfer of long-tailed loss liabilities for a risk-adjusted, present value premium. There is usually an aggregate limit to the losses covered. A commutation would involve a similar transfer, but the liabilities would be reassumed by the original ceding entity. Unlike most casualty property insurance companies, financial reinsurers generally segregate their asset portfolios for each contract. Pricing of these contracts usually is based on a somewhat conservative loss payout assumption depending on the uncertainty of the payout. Profit provisions are built in as a percentage of expected losses or as a percentage of the amount of discount itself. If there was no aggregate limit, the risk margin would probably need to be so large that it would eliminate most of the discount.

Profit provisions in ratemaking, other than by financial reinsurers, were traditionally set at a constant percentage of premium, for example, 5%, regardless of the investment income on underwriting balances. This assumption isn't as inequitable as it may sound, since the lines of business that generate the most investment income also have the largest pricing risk. Still, the use of cash flow techniques to determine profit provisions based on appropriate return on net worth calculations seems to be on the increase. The Proposition 103 hearings in California were a good test of our ability to defend profit provisions that most investors would consider insufficient. Cash flow testing techniques were quite useful in this process.

Appraisals can also be thought of as a form of cash flow testing. They're usually performed by discounting income streams rather than separate projections of asset and liability cash flows. One special type of appraisal, calculating the liquidation value of an insolvent insurance company, is more relevant to this panel. In this situation, it is not uncommon for regulators to have a casualty actuary prepare a projection of asset and liability cash flows. Alternative scenarios of ultimate losses and reinsurance recoveries would be used in these projections. For insurers on the edge of insolvency, such a projection is an invaluable part of the decision making process in determining how to go forward.

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Valuations of investment strategy are another area with obvious cash-flow analysis opportunities. Numerous papers have been written in recent years by casualty actuaries on this subject, as insurers are looking more closely at the risks and rewards of mismatch.

Three topics not only warrant further research, but will undoubtedly always require some level of actuarial judgment. First, how should we determine what is an appropriate risk adjustment when selecting a discount rate? If casualty reserves are to be discounted, we clearly need to add in a margin above the expected value. Second, how should we decide if assets and liabilities are reasonably matched? At what point does a mismatch become material? Finally, how should we translate a given economic scenario into its effect on casualty insurance liabilities? The relationship between inflation and casualty loss development is not very predictable. Many casualty actuaries have studied these questions in recent years, but I'm not sure that we're very close to having generally-accepted procedures for answering them. Perhaps the life actuarial literature can provide insights that would be valuable to us.

MR. HARRIS: Tom is a past member of the Committee on Life Insurance Financial Reporting of the Academy and was on that committee when the Committee drafted the present how-to-do-cash-flow-testing standard, and Tom tells me that last year he came in second in the Society of Actuaries' contest for the most obscure mortality table. Tom is going to ask you, are you ready for cash-flow testing?

MR. R. THOMAS HERGET: We do have some very important concepts here to discuss. I'd like to talk about the question, Are you ready for cash-flow testing? As you've heard from our prior speakers, an enormous amount of energy is required to set up a total company cash-flow test. The resources you'll have to command will be impressive. I think that your company management will demand many uses from the studies you'll be doing. Consequently, I think you will need to be replacing many studies that you used to do by rule-of-thumb or by shortcuts with procedures that will comply with all the guidelines and rules we've just been talking about.

Cash-flow testing will embrace full utilization of nearly every principle in our prospectus. It will comprise a conversion of many concepts into action plans; it will embrace many evolutionary ideas currently incubating.

There will be some new terms and some old terms as you encounter cash-flow testing. There will be familiar concepts such as Anderson's method, recoverability, value added, gross premium valuations, and expected values. Now you and your staff will be dealing with and explaining convexity, stochastic determinations, option adjusted, prepayment, standard assumptions, and durations.

Now, duration is an interesting word. This is about how comfortable I felt with it. At one of the first investment committee meetings I attended, we had actuaries and investment people looking at each other using the same term, duration, but they weren't communicating. I attempted to arbitrate and had to go to a dictionary. I looked up the word duration and found what you see in Table 7.

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TABLE 7

Duration

du.ra.tion (doo ra shen, dyoo)n. ancient Scottish 1. **Macaulay (var McAuley).** The first derivative of price w.r.t. interest. 2. Average maturity, the timeweighted value of asset maturities. 3. Average cashflow or weighted average life. The time weighted values of either asset or liability cashflows. 4. **Empirical.** The measure determined by applying regression analysis to observed market fluctuations of price in relation to yield environment. 5. FisherWild. A variation of Macaulay using spot rates instead of yields to maturity. 6. Implied. Empirical without regression analysis. 7. Option adjusted. The measurement of value change due to shifts in yield curves as determined by-analysis of many random or nonrandom scenarios. 8. **Modified. Macaulay/(1+R/2), a close approximation to percent change in market value with 1% change in interest rates.** 9. t (archaic). Policy year, seldom zero relative.

I found nine definitions of duration. The first one happened to be Macaulay which we're fairly familiar with: the first derivative of price with respect to interest. Another term that's been used, average maturity, is the time-weighted value of asset maturities. Then we found the average cash flow or weighted average life which is the time-weighted value of either asset or liability cash flows. We were using the term empirical, the measure determined by applying regression analysis to observed market fluctuations. Fisher-Wild came up, the variation of Macaulay using spot rates instead of yields to maturity. We had option adjusted, the measurement of value change due to shifts in yield curves as determined by analysis of many random or nonrandom scenarios. Modified duration, which is a close approximation to the percent change in market value with a 1% change in interest rates, was eighth.

The last definition, number 9, is one that I definitely recognized, simply called policy year. I think it's an archaic term now: Policy year, seldom zero relative.

Well, this illustrates many of the communications battles you'll be encountering. We need to define our terms and make sure everybody uses them the same way and understands the implications.

To get going on your cash-flow testing, you will have to gather immense amounts of data. You'll have to be able to ask the right questions. You have to be able to interpret the answers and grasp the implications to your baseline intentions. You need to have full appreciation for the possible uses of your study and the potential audience it reaches. And you must be aware of laws and standards of practice.

Let's just walk through how we might start up some of the various aspects of the components. There are at least 50 assumptions, and that's probably being modest. For starters, you'll have to allocate assets. You'll probably embark on a dogfight with fellow

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managers of profit centers for assets. You'll need to discuss and address appropriate needs for liquidities, maturities, yields and credit risk. And the way many assets are performing today, it may be that the deferred premiums might be one of the most valuable.

You will need to consider splitting assets with another line. You will need to address the question of fulfilling cash needs. You have to ask yourselves some serious questions. The availability of capital funds is a real dilemma that will probably work its way into your cash-flow opinion. If you need cash, where are you going to get it? Do you get it from outside sources? It appears the U.S. isn't quite as appealing as it was a year ago or two years ago. There are other countries that offer as much safety now as the U.S. does.

Will you be able to get funds from other companies? Will financial reinsurance be available? If your line of business and your cash-flow testing deems funds are needed, can you go to a capital account within the company and borrow from there? There may be trepidations because the rates are probably usurious. Or could you borrow money from other profit centers? Those rates are probably more usurious. Can you go to other lines within your own profit center or perhaps to a different generation of policyholders within your own profit center?

You need to get up to date on CMOs which we've talked about. The actuarial knowledge of these assets really ranges from nothing to fairly sophisticated knowledge of how they operate. You've got new terms: IOs, POs, residuals, floaters, reverse floaters, etc. You may need to know CPR (conditional prepayment rates) to deal with these assets.

What is a typical CMO? Well, there is none. Does the actuary need to study the prospectus of each one? I think the answer is a function of the purpose of the study. We embarked on a study where there were 90 CMOs, and the investment manager did do a job, I think a good job, of aggregating them into 10 model securities. So, we got the base flavor of what would happen, but we really couldn't get very specific because of the modeling involved. And, of course, you need to understand assets that are not in your portfolio in order to model these.

To get the liabilities going -- most of you with traditional blocks have countless aging plan codes for which you need to make a good representation. You'll need to be able to reflect count, premium, reserve and face amount properly.

We all have fund products, and these all have their unique characteristics. One of the more obscure questions might be when does a policy lapse? when the fund goes below zero? Well, maybe, maybe not. Some companies will have designed a policy so the fund can stay negative for a while. Others will give it a couple chances. So, you have to be able to tell your software which time, when the fund goes negative, it expires.

You'll need to start off with a good balance of, say, your universal life reserves. Sometimes modeling and approximating those can be a challenge. If you've got policies such as an interest sensitive life, they may have two bases for a cash value, a fund and a tabular type; you'll need to be able to access both. If you're doing cash-flow testing and forecasting today, you'll need to be able to coordinate interest rates, if you're using

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random interest rates in the future, with what they will correlate to as the maximum state rate for Commissioners Annuity Reserve Valuation Method (CARVM) and Commissioners Reserve Valuation Method (CRVM). If you have a practice of guaranteeing high interest rates after issue, you'll want to reflect these as well. You also need to be able to consider riders. I think they do add an immense amount of profitability and certainly shouldn't be overlooked.

You need to make a variety of assumptions. For CMOs, these include seasonality, spreads, the type of collateral. You need to go to your investment department and get their opinion as to what they think is going to happen. You'll have bonds. You have to deal with a default risk and calls. Some bonds will just never be called, so you can't just assume that every treasurer will behave in a rational manner. Measuring your default risk will be a challenge. When you ask your investment people what they think default rates for a security may be, you may be asking the very people that recommended buying it. You may have to be able to interpret their answer. If you've got a convertible portfolio, you'll want to be able to contemplate converting that into stock if the market moves that way.

Another assumption that you'll have to deal with is expense. I found that this can really be the making or breaking of a forecast. You need to do a thorough and cautious analysis and expression of your expenses. I have found that many cash-flow tests will just die if you haven't done an adequate job in stratifying expenses. You need to break them by maintenance and acquisition.

In case you have to come back and determine what a block of business is worth, you had better have segregated out your acquisition expense from your general maintenance expense. You need to express costs as either marginal, semivariable or fixed. Marginal costs are the ones that vary directly with the size of your business. They need to be obtained from each cost center. Your semivariable costs are a little more awkward to express. They can often be expressed as a percentage of your variable cost. These costs are the ones that remain level until an event occurs which triggers their immediate change. A fixed cost would be the cost of operating in a line of business which needs to be there as long as the line is present but would vanish if the line were not there. These costs don't really vary with the size of the business. Some fixed costs might actually decline in the future. I wouldn't be afraid to anticipate a future development such as replacing an expensive or aging mainframe maintenance administrative system with a much cheaper -- perhaps PC-based-system.

Another important step is to stratify costs between line of business and corporate overhead. Corporate overhead costs are defined as those which nobody wants to be assessed, and which don't have anything to do with your line of business. These costs will exist even if the line of business is not present. They're items such as shareholder relations, public relations, board meetings, audit fees, and perhaps some of your executive compensation. These costs must be in your study, of course.

Another implication on expense analysis is, for those of you in stock life companies, FAS 97. You'll want to be able to split the capitalized and noncapitalized cost. Chances are your cash-flow test will serve as a forecast for where the company's going. You'll need

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to present a GAAP balance sheet and income statement. So, you want to do a good job in defining your acquisition cost as to what percent is deferred and what percent is not deferred. And also for your maintenance costs you might want to flag those costs which are within the definition of your gross profit stream and those that fall outside it.

This is a lot to handle right here. This is a good half-year to maybe two years' worth of work if you haven't embarked on this type of study. You may not be able to achieve these results on the first pass, but the least you can do is get a process started.

You'll have to track down your interest rate crediting practices. You'll have to be able to extract various buckets from your administrative system. Hopefully, your system will be able to provide you the categories that you need. You'll need to develop dependencies and action plans. You'll want to emulate the dynamic investment environment. And you've got to remember that your investment department won't be operating with the benefit of your software's foresight.

You'll want to verify your beginning balances. You really won't be able to achieve credibility until you've proven that your techniques and approaches work. You need to start out initially verifying your balance sheet. Do you reproduce your face amount? Do you reproduce your reserve? Then you'll also want to demonstrate that your premiums and claims grade smoothly to last year's values. And the cost of insurance that you're charging should compare smoothly with last year. How do you verify this? You could redo last year, start a year early and demonstrate that your model reproduces the proper year. This is a tremendous task. Or, you could just inspect last year's financials with the first year of your forecast and see that they grade smoothly.

You will need to maintain these data bases once you get them established. For assets, will you totally refresh each time you forecast or can you just update assets you'd already purchased? Of course, you'll always be dealing with new investment classes. For liabilities, chances are you'll be getting new systems periodically. You need to be able to feed from these. Occasionally, new data become available on systems, perhaps premium histories. You'll always have new plans, new ages, and your prior model will tend to drift. So, you need to be ready to prove they remain in balance.

Now, your cash-flow test may serve as a basis for many decisions. As a minimum you must be alert to disclose when the scope of your work cannot adequately permit the answering of other questions. You need to keep in mind what cash-flow testing means to your GAAP financials. If you're forecasting with your best assumptions, shouldn't those be used for your GAAP as well? You also have to remember the impacts of federal income tax, stockholder dividends, and borrowing from other lines. This cash-flow testing may be used to compare to your pricing assumptions. And, of course, there are a few unusual situations that you may want to look at individually. Perhaps you might have a large liability that's bundled together, and it's either a yes or no type situation. Your investment department may want some input from you as to how to invest towards that situation.

Sometimes you may want to go to stochastic measures for just certain elements such as if you've got a large term block with a big variation of sizes. You may want to use some

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Monte Carlo technique to see what your confidence limits are. And, of course, the forecasts resulting from cash-flow testing could well evolve into a basis for your company's incentive compensation program.

So, you'll have many people to answer to, not only people within your company, but also those who have promulgated standards: when to do cash-flow testing, how to do cash-flow testing, New York Regulation 126. You're going to have to learn how to live with reliance. You have to deal with GAAP recoverability. You have requirements for AIDS. Hopefully you addressed the question of "what to do about AIDS" before you started.

And we do have the proposed Standard Valuation Law amendments now. I liked what I read. One paragraph caught my eye; "Except in cases of fraud or willful misconduct, the qualified actuary shall not be liable for damages to any person (other than the insurance company and the commissioner) for any act, error, omission, decision or conduct with respect to the actuary's opinion."

This will rub actuaries in different ways. On one hand, it may appear to limit the liability of the actuary as it carefully delineates the parties that can have recourse. It defines the events that can cause professional liability. I believe that a statutory limitation of liability is appropriate, for not every policyholder, agent, employee, shareholder, analyst, etc., can realize that there is no finite number of cash-flow studies that can encompass the universe of future outcomes. Five hundred or 1,000 stochastically generated interest scenarios could easily fail to embrace the particular chain of circumstances that will emerge.

On the other hand, the fact that there is a residual liability to the company is notable. I've paraphrased parts of that prior paragraph, and this is what really caught my eye. By selecting certain words from that prior paragraph you can read, "The qualified actuary shall not be liable for damages to any person other than the company for any act or decision." Well, first of all, who is the company? Is it senior management? Is it the board of directors? Is it any and all of the shareholders? The opining actuary may be on harmonious terms with this group today. Should he or she make another assumption that the cooperative environment may cease to exist? Should the opining actuary anticipate a change in relationship and personally prepare for a worst case scenario, an adversarial environment? Should the opining actuary prepare his opinion as if his documents could be subpoenaed? The work of the valuation actuary who has changed companies might be particularly vulnerable should this prior company experience difficulties.

Let's say a company does suffer from severe financial distress. Perhaps the state guarantee fund or an aggressive speculator has taken over the business. What might happen first? A witch hunt. People might want to pursue the causes for the mishaps and identify anybody that was associated with the event. As any accounting firm or large consulting firm can attest, you don't need much basis in fact to be named in a lawsuit.

Today's working environment reflects the traditional posture that the professional work which you perform belongs to the person who paid you to do the work. After you

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perform the work and sign the opinion, the work papers are in the control of your employer. The actual memorandum and all supporting data sources remain their property. If you write the memo and sign the opinion as an employee of the company, your workpapers will likely always remain with them.

While the company actuary needs to be acutely aware of his or her company's property rights, the professional capacity in which the actuary signs the opinion and memo ought to entitle the actuary to retain personal copies of his workpapers if he deems it important. Also, does the insurance company's opining actuary need errors and omissions insurance? What if the company refuses to provide it? It's something your average individual could not afford or would have trouble getting through his expense report.

So, in conclusion, cash-flow testing requires a major human resource commitment. You must be aware of all possible uses of your report. You must be aware of all the standards of practice. You must learn how to live with reliance. You need to be able to balance the ability to be precise with the ability to deliver an end product. You must be prepared to deal with this on an annual basis. Once you succeed doing your job there, you can expect to be asked to do it quarterly, and if you do a good job quarterly, to do it monthly. So, you must be able to learn how to deal with all these concepts. It'll be a challenge to all of us, as this is where science meets art.