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MARKET VALUE ADJUSTED PRODUCTS

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o   Regulatory aspects -- state and federal
o   Administrative aspects
o   Financial reporting issues
o   Canadian products

MR. MICHAEL R. TUOHY: Our panelists are Don Sondergeld from Hartford
Life, Marc Verrier from Manufacturers Life and Joe Buff from Morgan Stanley.

Our first speaker is going to be Don Sondergeld who is Senior Vice President
and Chief Actuary of Hartford Life. He's been at Hartford Life ever since
1963, and before that he was with Connecticut General. Don is the father of
market value adjusted products in this country, and he is responsible in a
large way for the change in regulation relating to these products. The Hart-
ford is the one company that has really been pushing this product over the last
year.

My background dates back to the Abbey Life in the U.K. which is a subsidiary of
Hartford Life. Some of the ideas that are coming into Hartford Life's products
I recognize from the products that Abbey initiated in the U.K. It's interest-
ing to see how U.K. ideas get transferred into the U.S.

PANEL DISCUSSION

MR. DONALD R. SONDERGELD: I'd like to first provide some background on the need for market value adjusted products. Next, I'll describe a product that my company, Hartford Life, is selling in the United States. I will then provide information on regulations and legislation, applicable to these products in the United States. After that, I will discuss certain financial reporting aspects associated with these products.

As actuaries, we don't want to design products that contain uncontrollable risks. A large disintermediation risk can occur when interest rates rise and the market value of assets supporting policies with book value guarantees become materially less than the guaranteed surrender value. One way to eliminate, or reduce, that risk is to offer individual life and annuity products which utilize a market value adjustment formula in determining cash values. However, until 1985, book value cash surrender values were required on individual life and annuity policies in the United States.

I'm sure some of you have read the feature article in the December, 1985 Best's Review on new product profitability. It was titled, "A Tale of Two Countries," and was written by Fred Richardson, F.S.A., President of the Hartford Life Insurance Companies. That article compares the historical development of cash value products in the United States and the United Kingdom, and indicates the lessons that can be learned from our British relatives. The major ones are the need for market adjusted cash values and the use of cash flow matching.

During the early 1970s, in the United Kingdom, a number of life companies offered SPDAs with attractive interest guarantees. As interest rates rose to unexpectedly high levels, a number of companies found themselves in serious trouble in meeting their withdrawal guarantees. This crisis resulted in a number of rescues of small companies by the industry, and in one bankruptcy. This event caused great distress to policyholders and, of course, was of great concern to the industry and the regulators.

Through a company we previously owned (Abbey Life in the U.K.), the Hartford has had extensive experience with SPDAs in a period of high inflation and volatile interest rates. Abbey Life wrote an "asset linked annuity." That contract has been very popular and, by its nature, avoids the inherent risks of

the traditional SPDA by having surrender values related to market values. Abbey Life has been very successful in writing that product, and, as of year end 1983, held over $500 million of reserves on its asset linked business. As a result of this experience, Hartford Life decided to launch a similar product in the U.S.

We wanted to market a "safe single premium deferred annuity" to individuals. That is, an annuity with a guarantee of principal at a stated maturity date, an attractive interest guarantee during that period, but with a surrender value that is equitable to both the policyholder and the company. The surrender value is adjusted upward or downward, based on market conditions at the time of surrender. We began offering this product in May of 1984, using an SEC registered group annuity contract.

Our product is sold to customers of four broker dealers that are affiliated with The Hartford. It is sold to individuals who are issued certificates under four group annuity contracts issued to a Rhode Island Trust. We currently offer this product in only 42 states, as these are not legal "groups" in nine other states. Those states are Arkansas, Massachusetts, Nevada, New York, Oregon, Pennsylvania, South Carolina, Washington, and Wisconsin.

The certificate holder initially selects either a 3, 5, or 10 year guarantee period. We provide a simple interest guarantee over that period. Each year, the interest is either paid out or treated as a new single premium containing the original maturity date, but with an interest guarantee appropriate to market conditions at that time. At the end of the guaranteed period, the individual can choose a new guarantee period or take the principal.

If any certificate holder chooses to surrender during a guarantee period, he or she is given a surrender value based on a market-value adjustment formula. The formula is designed to closely approximate the market value of assets needed to back the guarantee. This modification is why the product is called a modified guaranteed annuity. Our formula includes such factors as the period remaining in the guarantee period, the aggregate rate of interest being credited on the date of surrender, and the rate currently being guaranteed by the company on contracts with the same guarantee period remaining. This formula can obviously

produce a result that is larger or smaller than book value. It is, however, fair, and removes the antiselection that the company would otherwise be subjected to when the market value of the assets was less than a book value surrender value. A rear-end load is also applied on surrender.

As you can see, a modified guaranteed annuity product is one which can provide attractive interest guarantees to the contractholder and a guarantee of principal on a maturity date. At the same time, it reduces, or eliminates, the reinvestment risk and disintermediation risk which the insurance company might otherwise assume.

We would prefer to sell an individual policy, but our product does not satisfy the individual annuity nonforfeiture law (due to its market value adjustment formula), or the variable annuity regulation (which relates to separate accounts having unit values). Therefore, in 1984, Hartford Life began working with the NAIC Actuarial Task Force and the ACLI. Our efforts resulted in an NAIC model regulation on Modified Guaranteed Annuities, which was adopted by the NAIC in June, 1985.

Let me summarize what is contained in the NAIC Model Regulation on Modified Guaranteed Annuities, which is patterned after the model regulation covering variable annuities:

(1)   Like traditional variable annuities, the assets of a modified guaranteed annuity are placed in a separate account.

(2)   A traditional variable annuity has nonforfeiture values that vary based upon the unit values of a separate account. A modified guaranteed annuity has nonforfeiture values that vary based upon a market value adjustment formula. The formula may or may not be related to the assets of the separate account.

(3)   The market value adjustment formula used in determining nonforfeiture benefits, must be stated in the contract. When the contract is filed, it must be accompanied by an actuarial statement indicating the basis for the

formula, and indicating that the formula provides reasonable equity to both the contract-holder and the insurance company.

(4)   The assets backing a modified guaranteed annuity are placed in a separate account, and are valued at market. Let me quote from the regulation:

> Reserve liabilities for Modified Guaranteed Annuities shall be established in accordance with actuarial procedures that recognize: a) that assets of the separate account are based on market values, b) the variable nature of benefits provided, and c) any mortality guarantees.
>
> As a minimum, the separate account liability will equal the surrender value based upon the market-value adjustment formula contained in the contract. If that liability is greater than the market value of the assets, a transfer of assets will be made into the separate account so that the market value of the assets at least equals that of the liabilities. Also, any additional reserve that is needed to cover future guaranteed benefits will also be set up by the valuation actuary.
>
> The market-value adjustment formula, the interest guarantees, and the degree to which projected cash flow of assets and liabilities are matched must also be considered. Each year, the valuation actuary must certify that the market value of the assets in the separate account are adequate to provide all future benefits that are guaranteed.

(5)   The loadings included in the nonforfeiture calculation are identical to those included in the variable annuity model regulation.

(6)   Separate accounts relating to modified guaranteed annuities will be subject to investment law applicable to the insurer's general asset account.

(7)   An annual report must be provided to the contract-holder showing account values and surrender values.

(8)   Agents need to be licensed to sell variable annuities in order to write modified guaranteed annuities.

Although this model regulation was adopted by the NAIC in June, 1985, it is not yet in use by any state. We do expect its adoption in California, Connecticut,

and Minnesota very soon. I would urge insurance company product development actuaries to become proactive, and help initiate adoption of this regulation in the states in which their companies are domiciled. I would further urge them to write to the ACLI to get active, rather than passive, support from the ACLI, which is acting as if this was needed only by Hartford Life, rather than by the life insurance industry.

A number of questions have been raised about the applicability of federal securities laws to the Hartford's modified guaranteed annuity product design. I thought you might be interested in our answers. Our market value adjustment formula is unaffected by the performance of the assets, so we believe that the Investment Company Act of 1940 is not applicable. In fact, the SEC has reviewed our product and has given us a letter indicating that placing the assets in a separate account is no different than placing them in a general account. They have raised no 1940 Act issues.

However, our product is subject to the Securities Acts of 1933 and 1934. Some companies' products may not be. The reason for this is that the SEC has consistently applied three tests to determine if an annuity is a security under those Acts:

Test 1   Does the insurer assume a significant mortality risk? Our product has meaningful mortality guarantees, so it is not a security according to this test.

Test 2   Is the product marketed primarily as an investment contract? Our product is marketed primarily as an investment contract, so that makes it a security.

Test 3   Does the annuity contract transfer a substantial investment risk to the policyholder? This test was academic, as we felt our product was a security as a result of test 2. It could be argued that our design does transfer a substantial risk to the policyholder. On the other hand, it might be argued that there is no risk if the policyholder does not surrender until the end of the guarantee period.

You will note that none of the questions ask whether the assets are located in a separate account or a general account.

Let me now turn to life insurance. In 1985, Hartford Life again worked with the NAIC Actuarial Task Force, and the ACLI, on a similar NAIC model regulation, which would permit use of a market value adjustment in determining cash values on individual life insurance policies. We are interested in including this "guaranteed option" within a variable universal life insurance policy. That draft has been exposed in anticipation of adoption by the NAIC at its June, 1986 meeting held in Boston. It was approved by the NAIC Actuarial Task Force so I expect it will be adopted in Boston.

An important feature of both of these NAIC model regulations is that the assets must be placed in a separate account, and valued at market. I strongly believe this discipline is essential to proper management of the assets supporting the liabilities.

Also, New York is in the process of developing regulations that will be used to implement legislation applicable to annuities, adopted in 1985, which permits utilization of a market value adjustment formula to be used in calculating cash values on individual annuity contracts. The New York annuity law gives the insurer the option of placing the assets in a separate account or in a general account. If a company operates in more than one state, it will probably hold the assets in the separate account -- rather than file a separate New York statement with assets in the general account.

A draft of similar legislation, applicable to life insurance, is also being worked on in New York. It could possibly be promulgated either this year or next.

Let me now briefly elaborate on statutory reporting, as it relates to Modified Guaranteed Annuities -- and then mention a federal income tax problem that is being addressed.

The assets for a Modified Guaranteed Annuity have to be placed in a separate account, and they have to be valued at market. In New York, you have an

option. You can put the assets in the general account, and they will be valued at amortized cost; or you can put them in a separate account, and value them at market. In either case, an actuarial opinion is required, and this actuarial opinion must be submitted each year, and it must state that the assets are adequate to provide all future guaranteed benefits. New York, at the present time, has four different task forces that are drawing up regulations that will help all of us understand the legislation enacted last year.

I'd like to now touch on a couple of problems that we've discovered in the Federal Income Tax Code. First of all, the benefits on this particular type of contract, a Modified Guaranteed Annuity, are not necessarily tied directly to the assets in the separate account. As a result, it appears that this type of contract is not a variable contract for Federal Income Tax purposes. The specific words in Section 817 of the Code are that annuity benefits must reflect investment return and the market value of the segregated assets. This is not the case here. The benefits are guaranteed and even early withdrawals, generally, have a formula, rather than any type of tie-in to the actual assets. So, the result is -- it appears this contract must be taxed as a general account product under the Reserving Section of the Internal Revenue Code.

This means that, for tax purposes, we must value liabilities on a book basis. Meanwhile, we have statutory assets and liabilities on a market basis.

There is, however, a cap on the reserves that you can use in the tax return. That is, you can't use tax reserves that are higher than your statutory reserves. The result is that fluctuations in unrealized gains and losses will change the incidence of taxes in an unfavorable manner. You can't price this unpredictability. We, therefore, need to have the tax code clarified for this kind of product.

A second, very similar, tax problem has to do with the mutual company's equity tax, or the differential earnings tax. This affects the equity base that is calculated for a mutual company. The tax code indicates that the excess of the statutory reserves over the tax reserves should be used to increase the equity base. This creates a problem when the market value adjustment is positive, and the annual statement reserves are greater than the tax reserves.

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The solution to both of these problems appears to be legislative. There is an ad hoc group in New York working on a number of problems associated with contracts that have assets valued at market and have some minimum guarantees. This will be done for the contracts that fall into that spectrum of products, and we hope this group will be able to get some type of clarification through legislation in the near future.

MR. TUOHY: Marc Verrier is Assistant Vice President of U.S. Marketing at Manufacturers Life of Toronto. Marc has been involved with product development at Manufacturers in both the U.S. and the U.K. He spent a year and a half in London at one stage in his career. He's now responsible for design, development, pricing, and promotion of U.S. annuity and single premium products.

MR. MARC G. VERRIER: All of you are aware of the dangers that a company encounters in the U.S. marketplace for single premium or investment products with guaranteed cash out options. I would like to specifically address two critical high-volume products in this market -- the Single Premium Deferred Annuity and Single Premium Whole Life products. Many of you are aware of how companies attempt to compete in this very competitive market, and the difficulty of doing so, given competition, severe legal restraints on product design, and the complexity of the regulatory situation.

Please understand that my comments apply only to the U.S. market for single premium accumulation products, either SPDA or SPWL. The critical characteristics of this market are:

o First, large premium payments, enough for a customer (or his advisor) to pay attention on an ongoing basis.

o Second, owners of these products tend to be more savvy than average consumers, because of their greater experience investing money.

o Third, producers tend to specialize in older age affluent markets or emphasize investment products in their practices, necessitating much greater knowledge of current offerings.

o   And finally, very little apparent product differentiation, allowing the
     products to be compared and sold very much like commodities.

Over the longer term, I strongly believe these markets will come to be domi-
nated by guaranteed interest products with provisions to perform unscheduled
cashouts on a market value basis.

I have drawn on experiences of the Canadian marketplace, as well as my own
interpretations of recent and current activity in the U.S. market, to reach
this conclusion. The more difficult question is how long it will take us to
get there, and how painful we should expect the transition to be. As an
industry we can see options, thanks to the efforts of the people at the Hart-
ford, that could get us there in the medium term. Unfortunately, the industry
seems to be adopting the approach: "If it don't look like it's broke, don't
fix it!"

I will suggest to you that there is a major flaw in the industry's approach to
this market which will result in some companies making a lot of money, some
companies losing a lot of money, and a good number of dissatisfied customers no
matter how you look at it.

First, the Canadian market -- it is very different from the U.S. market in that

o   Consumers are accustomed, currently and historically, to much less regu-
     lation of all sectors of the financial services industry.

o   No financial product has substantial tax advantages over any other.

o   There is much greater uniformity of pricing and investment strategies.

As a result, consumers of products at all points of the investment spectrum
have become consistently more sophisticated over the last twenty years. Since
the financial markets have been very volatile throughout this period, average
money strategies, or mismatched investment strategies, for product pricing have
become the exception rather than the norm. Clearly insurance companies in
Canada learned serious financial lessons in the mid-1970s, with investment

losses wiping out what then appeared to be trivial profit forecasts. The ensuing changes in product design as well as investment strategies proved to be very beneficial in the early 1980s; as consumers here in the U.S. became aware of and began to chase higher interest rates with serious financial consequences to issuing companies, insolvency of Canadian insurers was one problem we did not have.

Insurance companies in Canada now generally sell products allowing for unscheduled cashouts on a market value basis, and where the underlying investment and the contractual term to the customer are in step, or "synchronized." This has come about naturally, in a largely nonregulated environment, because of that environment, as well as because of the fact that insurance companies found a clear willingness among consumers to take on the investment risk prior to the maturity of an account of a particular term. In other words, the risk charge needed to support a mismatched asset and liability strategy exceeded the price a consumer was willing to pay for this "benefit." Looked at the other way, a market value adjustment was clearly acceptable, psychologically as well as financially, provided some other inducement, even if of lesser actuarial value, was given.

In addition, companies with investment strategies that mismatched the duration of the asset relative to the contractual term of the liability, or that priced off average money returns, simply got their customers picked off by other companies without the excess baggage that low yielding assets represented in a rising interest rate market.

No forecast can be attempted without recognizing the regulatory environment. Companies can move very quickly in Canada to exploit new marketing opportunities or to introduce sexy new products. Regulators impose very few administrative hassles, and very few technical hassles. As a result, laws and regulations are hardly even a technical or product design consideration, never mind being on the critical path leading to introduction of a new product.

There are too many differences when compared with the American market to simply transfer these results over the border; one thing is clear though, and

that is that sophisticated as well as unsophisticated consumers will accept market value adjustments.

There is another factor of recent experience in the U.S. marketplace that is also instructive -- all of you know how quickly our producers "repositioned" customer insurance cash value to get onto the new money, universal life band-wagon. How much better do you think producers will be at this exercise the second time around?

Similarly much fuss is now being made over stockbrokers given their ability to move large amounts of money very quickly. They are selling large amounts of SPDA and SPWL on the basis that those contracts today are providing very good return, with substantial tax advantages over CDs and other alternatives available to the conservative investor. Any mismatched investment strategy for these products assumes a relatively inefficient customer base. I can assure you that this particular customer base will get efficient very quickly if credited interest rates ever lag the market by a significant amount.

Finally, look at the economic environment -- I don't believe we will see the Dow Jones increasing in perpetuity! We have seen over the last twenty years that in times of inflation, interest rates can easily move into the teens; we've also seen incredibly high real interest rates in times of low inflation. We must plan for continued volatility in capital markets and interest rates.

The set-up is now complete:

o   Consumers will accept market value adjustments; they will also tend to chase the best long term value. In this market, best value is presumed to be represented by the best interest rate.

o   Producers, agents and stockbrokers alike will help consumers move their money around to optimize their short-term as well as long-term wealth. These producers are also quite sensitive to the competitiveness of the interest rate, in some cases to the exclusion of everything else.

o   We will see continued volatility in our financial markets, resulting in
       substantial upward and downward interest rate swings.

And the conclusion is obvious: There is only one rational way to compete in
such a market -- insurance companies will be marketing synchronized products,
where the contractual term matches the term of the underlying portfolio of
assets, with contractual provisions allowing for unscheduled cashouts to be
performed with market value adjustments.

However, the opposite is now the case. The market is currently dominated by
products offering one year rates, apparently backed by securities of much
longer duration, possibly of the high performance variety, or simply junk
bonds. Since they are one-year products, or at least marketed that way, then
the market value provision is superficially inapplicable, and in practice
always absent.

The result is a product that combines the marketability of the apparent short
term commitment of the "one year product" together with the marketability of
interest rates that come from crawling up the yield curve and skidding down
the quality ladder!

It also happens to put issuing companies in the uncomfortable position of
"borrowing short and lending long." Clearly then, whereas the customer orig-
inally bought a long investment, a rising interest rate market will increase
the number of consumers willing to exercise their "put," their option to get
their money back, or to transfer their account to another carrier, presumably
less a surrender charge at least in the early years, but at book rates. The
rate of increase in antiselection will depend on:

o   The speed at which interest rates climb.

o   The length of time before rates drop once again.

o   The availability of synchronized products in the marketplace.

o   And finally, the efficiency of the marketplace in total, specifically, the combined efficiency of well-informed producers and a mixed bag of sophisticated and nonsophisticated consumers, to move together to better their own financial positions, primarily at the expense of the original issuer.

Many hedge strategies, some very sophisticated, have been developed. To my knowledge, however, all such strategies rely on an assumed level of inefficiency in the marketplace.

I suggest that this rate of increase in "repositioning" SPDA and SPWL assets will be greater than most companies anticipate, that we will see a very significant increase in the market's efficiency.

In such an environment, companies will have to choose in many cases between paying more interest than they can afford in order to stem the flow, and staying with their then uncompetitive interest rates and be forced to meet surrender payments by liquidating assets at market prices potentially well below original cost.

What will be the end result of this frenzy of activity? Many companies would like to be in this market, but are not specifically because of the reasons I've outlined. Of the companies competing in the manner outlined, some will shorten their assets at the right time and ride out the storm quite happily. Most, however, stand to lose substantial sums of money; we should also expect to see great dissatisfaction among consumers and possibly in the financial community generally.

I cannot paint a pretty picture. Consumers are becoming more financially astute, producer loyalty continues to wane, and producer sophistication increases every day. And we have not solved the puzzle of a volatile economy.

My conclusion? Yes, this will continue to be an attractive market within which to raise substantial volumes of capital. But it will also prove to be a very risky one. Yes, we as an industry are becoming more sophisticated in matching assets to liabilities and managing our portfolios of products and our portfolios of assets.

But in the meantime, we need to do more to protect ourselves from investment antiselection by our own customers and producers. The medium term solution, enabling market value adjusted products, offered by our associates at the Hartford, is a good one. The resulting products will be marketable, and we will do our industry much good by supporting this legislation in home states and in our companies.

In the short term, I suggest you have a very close look at your markets, your distributors, and the options you are giving away in your contracts. You can bet that when the time comes, your customers will have a very close look at those options.

MR. TUOHY: It's interesting to look across to the U.K. where there is similar freedom in designing products as in Canada. Also, the actuarial profession has much greater involvement in the investment side of the balance sheet. There is much more emphasis on investments in the actuarial exams in the Institute than there has been in the Society. As a result, insurance company investment departments have always been heavily populated by actuaries and the concept of matching assets and liabilities has been high on the priority list. With this understanding of both sides of the balance sheet, the companies were faced with two choices: (1) they could have restricted their investment freedom by matching very closely to the guaranteed cash value products, or (2) they could have designed products with investment freedom as an objective. Generally, the latter approach was taken, and most balance sheets of U.K. life companies are full of equities and properties. The reason that this is feasible is that most products do not have guaranteed cash values. It's a shame that didn't happen in this country.

Our next speaker is Joe Buff who started his career at the Guardian where he held two positions; one had to do with mathematical modeling and financial forecasting, and the other, market research and strategic planning. In 1984, he moved to Morgan Stanley where he was recently promoted to Product Manager in the Fixed Income Research Group. He provides consulting services to insurance companies regarding investment strategy and asset/liability matching. I think it's fair to say that the team at Morgan Stanley, of which Joe is a big part,

is clearly on the leading edge of the work that's been done on asset/liability matching, and Joe's going to take us through a little bit of that now.

MR. JOSEPH J. BUFF: I will present a financial evaluation of a representative single premium deferred annuity, to which a market value adjustment might apply. Option pricing theory will be used. The evaluation will examine the impact on product pricing, and on investment strategies, of a fairly common type of market value adjustment provision. The assumptions used in the sample evaluation, and the statistical output from the model, are detailed on the charts used throughout this presentation.

GENERAL APPROACH

By taking apart a typical SPDA, we can look at it like a financial security. The accumulation account is very similar to a zero-coupon bond. This is because the accumulation account grows over time at a declared rate of compound interest, and coupons are not automatically paid out to the policyholder.

Suppose an initial credited rate is guaranteed when the policy is issued, to be reset to new money rates when that initial guarantee expires. Then a useful review of a market value adjustment is facilitated if we think of the zero-coupon bond as "maturing" at the end of the initial credited rate guarantee period. More precisely, the "duration" of this zero-coupon bond can be taken to be the initial rate guarantee period.

An SPDA's cash value guarantees are financially equivalent to put options. A put option on a bond is the right to sell that bond for a "strike price" given by a schedule fixed at the time the option contract is written. The strike price does not depend on the bond's market price at the time the option is exercised. Such an option grows more valuable when interest rates rise and bonds lose market value. By analogy, the insurer purchases bonds with the policyholder's single premium deposit. The insurer grants the policyholder the right to "sell" these bonds back to the insurer for a "strike price" equal to the guaranteed withdrawal value. This put option has value to the policy-holder, and it has cost to the insurer. By writing the option the insurer

creates a liability. Under statutory accounting this liability is off-the-balance-sheet.

In a like manner, the insurer's (limited) right to reset policyholder credited rates is like a call option. A call option on a bond is the right to purchase the bond for a strike price fixed in advance. Call options become more valuable as interest rates fall, and bond market values rise. In essence, by lowering the credited rate when interest rates decline the insurer has called in one zero-coupon bond and reissued one with a lower interest rate.

A market value adjustment can work to neutralize some of the value of the put option. The type of market value adjustment studied below approximately adjusts the cash withdrawal value to track the actual market value of the underlying zero-coupon bond/accumulation account. If the strike price of the put option is dynamically adjusted to track the market value of the bond, then exercising the put option has little economic value.

VALUING INTEREST-SENSITIVE CASH FLOW STREAMS

Once we decompose an SPDA into bonds, and options on bonds, we face a technical problem. The cash flows that give the liability its value depend on the future interest rate environment. One might study the product using traditional simulations along a set of interest rate scenarios. We will apply a general method for assigning a fair market value to a stream of interest-sensitive cash flows. This technique, a specialized version of simulations, is described in detail in "Price, Duration, and Convexity of a Stream of Interest-Sensitive Cash Flows," D. Jacob, G. Lord, and J. Tilley, Morgan Stanley, April 1986. My talk will apply this model, but I do not have time to discuss the method itself.

The general pricing model essentially requires the same assumptions as does a simulations model. One exception is the treatment of future interest rates. Instead of supplying interest rate scenarios, we supply an interest rate volatility assumption. This volatility assumption allows us to generate a "lattice" of future interest rate possibilities in a formalized manner. The lattice is really just a set of scenarios, but the scenarios are specially

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designed according to arbitrage pricing theory so that proper option prices will result.

The calculation of liability market values is helpful for pricing SPDAs and developing investment strategies for them. Modern option pricing theory allows us to compute market values which do not rely on interest rate forecasting. This is an ideal solution, because we do not know which future path interest rates will take.

PRODUCE PRICING

To apply the model to a particular SPDA product liability, the product's design and actuarial assumptions must be specified in sufficient detail to project cash flows along each path through the interest rate lattice. Assumptions about expenses, competitor credited rates, interest-sensitive lapses, inflation, etc., are needed just like for a traditional simulation study. In fact this option pricing based model is just a special form of cash flow simulation model. Theoretical constraints apply to obtain market values consistent with arbitrage pricing theory.

One independent variable is the interest rate to be credited to the cash value at any given time, or instead the "margin" to be subtracted from some portfolio rate or external index rate. Any given rule for setting the credited rates results in a liability market value. The product is adequately priced when the market value, including all expenses and profit targets, exactly equals the single premium deposited by the policyholder.

If equality of market values were maintained over the life of the policy, regardless of future interest rate movements, then a good solution to the pricing problem would have been found.

The next section will show that this equality of asset and liability market values can in fact be immunized against C-3 risk if the right methods are applied.

MARKET VALUE ADJUSTED PRODUCTS

DURATION AND INVESTMENT STRATEGIES

A financial variable is "immunized," at least approximately, if its value does not depend on future interest rate movements. The immunization process for SPDAs and other interest-sensitive cash flows, begins with a definition of duration:

$$D = (- 1 / P) \times \triangle P / \triangle I \qquad (1)$$

where D is duration, P is the market value, $\triangle$ I is a change to the force of interest, and $\triangle$ P is the change in market value caused by $\triangle$ I. (Here we are assuming a one-parameter model for changes in the yield curve. This assumption is not entirely realistic, but in practice it produces very useful results.) $\triangle$ P / $\triangle$ I serves as a numerical approximation to dP/dI, the first derivative of the price function with respect to interest rates. Specifically, I is a one-parameter change in the yield curve in effect on the valuation date. In practice it is difficult to explicitly evaluate this derivative for options on bonds, so we use a numerical approximation instead.

This definition of duration can be computed for any interest-sensitive cash flow, once we can price the flow. Notice that we are defining duration as a measure of how the market value changes when interest rates change. This is not the same as Macaulay duration if the cash flows do indeed vary as interest rates vary. (See the charts to find out just how different from Macaulay duration this price-sensitivity duration can be.) Immunizing strategies can be developed by first computing the relevant asset and liability durations. Then, the asset and liability portfolios should be managed so that certain relationships between these durations hold true.

Duration defined by (1) satisfies an "aggregation property." Suppose that MVa and MVb are the market values of two different cash flow streams, with durations Da and Db. Then the sum of the cash flows of these two streams is also a cash flow stream, with a market value MV and a duration D, the aggregation property states that:

$$D = (MVa \times Da + MVb \times Db) / MVa + MVb \qquad (2)$$

Simply put, the aggregation property says that the duration of the sum is the weighted average of the durations of the component streams, where the weights are the respective market values of the cash flow streams.

Suppose our target is to assure that asset and liability market values, including expenses and profit targets, are always equal. This will be approximately true if the asset and liability market values are equal at issue of the product, and if the asset and liability durations are always kept equal. Now, the liability duration tends to follow its own courses as time passes and interest rates change. The asset portfolio's duration, however, can be adjusted by the insurer. This could be done by redirecting new cash flow, by trading existing assets, or by using options or futures or interest rate swaps.

The initial equality of market values is maintained (immunized) as interest rates change by a duration matching process because, approximately:

$$MV1 = MV0 \times 1 - D \times \triangle I \qquad (3)$$

Here MV0 is the market value before a change in interest rates $\triangle$ I, MV1 is the market value right after the change in rates, and D is the duration of the cash flow stream right before the rate change. If two cash flow streams have the same starting market value MV0 and the same duration D, then a change in interest rates $\triangle$ I will lead to approximately the same MV1 for both streams.

MARKET VALUE ACCOUNTING

Market value accounting is not the same thing as statutory or GAAP accounting. However, market value accounting is very relevant to book value accounting. This is because:

o   Statutory accounting produces (temporarily) stabilized surplus values. Statutory accounting provides an unrealistic measurement of C-3 risk exposure, and provides little in the way of clues about how to control that exposure. Market value accounting does allow the measurement of risk exposure, and through duration management, it suggests ways to immunize profit targets against C-3 risk.

MARKET VALUE ADJUSTED PRODUCTS

o   Market value accounting is a leading indicator for book value accounting.
     This is because risk exposure or actual losses masked today by statutory
     accounting will eventually make themselves manifest. Market value ac-
     counting uses the present value of future book gains and losses, so it is
     a proactive approach to risk control. Book value accounting is reactive.

SUMMARY OF THE METHODOLOGY

I will summarize the approach I've taken to analyze a representative market
value adjustment product, by the following bullet points:

o   Financial analysis in an environment of volatile interest rates should
     avoid explicit or implicit dependence on interest rate forecasting.

o   The interest-sensitive components of an SPDA are equivalent to bonds,
     and options on bonds.

o   A generalized model for valuing interest-sensitive cash flow streams can
     be used to obtain the market value of an SPDA liability. Interest rate
     forecasts are not used. Instead an assumption about the degree of future
     of interest rate volatility is required.

o   Duration can be defined as an index of the sensitivity of market value to
     changes in interest rates. Duration can be computed once market values
     have been computed.

o   If asset and liability market values are set equal at issue of the prod-
     uct, and asset and liability durations are kept equal as time passes and
     interest rates change, then the asset and liability market values will
     remain approximately equal over the life of the product.

o   Given specific information about product design and assumptions, the
     credited rate can be treated as the independent variable in product
     pricing. If the liability cash flows include expenses and profit, then
     adequate pricing can be accomplished despite interest rate volatility:
     Adjust the policyholder credited rate "rule" until the total liability

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market value exactly equals the premium deposit, at date of issue. After issue, maintain asset durations equal to liability durations.

Duration matching is normally thought of as an investment strategy process, but we see that it is also appropriately viewed as part of the pricing process. This seems to make plenty of sense since long-range pricing targets can only be achieved if C-3 risk is controlled, and this can best be done by maintaining the right asset portfolio structure.

MARKET VALUE ADJUSTMENT -- SOME THEORY

We are now ready to make a couple of simple statements about the withdrawal privilege of an SPDA with no market value adjustment. Earlier I stated that this policyholder right can be thought of as a put option granted by the insurer.

o   The put option has a cost to the insurer. This has to be reflected in the pricing of the product.

o   Put options have negative duration, since they become more valuable as interest rates rise. By the aggregation property, the put option shortens the duration of the total product liability.

Market value adjustments are intended to adjust policy withdrawal values as interest rates change. The specific market value adjustment I examined here, as detailed on Chart 9, is:

$$MVa = 1 + F \times (R0 - RT) \times Y \qquad (4)$$

where R0 is the credited rate at issue, guaranteed for a specified period; RT is the corresponding credited rate for new SPDA policies issued at time T; Y is the number of years remaining until the initial rate guarantee expires; and F is a factor between 0 and 1 which determines the extent of the market value adjustment.

This market value adjustment formula can be interpreted using equation 3. The variable Y time until the initial credited rate guarantee expires is D, the duration of the zero-coupon bond/accumulation account (treated as if it matures when the initial rate guarantee period expires). RT - R0 plays the role of $\triangle$ I, the change in interest rates. If F equals 1, then this market value adjustment approximates how the market value of the zero-coupon bond/ accumulation account changes in response to a change in interest rates, by direct application of equation 3. If MVA is multiplied by the cash value to obtain the cash surrender value, then the cash surrender value approximates the market value of the zero-coupon bond.

Market value adjustments have these effects on the SPDA product liability:

o   The market value adjustment penalizes withdrawals when interest rates rise, so it discourages policyholder disintermediation.

o   By adjusting the withdrawal value to rise and fall when interest rates rise and fall, the put option is essentially neutralized. This is because the strike price of the option is being adjusted dynamically to roughly track the market value of the underlying assets upon which that option has been written. When this adjustment is made, there is no additional economic value to the policyholder if the "option" is exercised.

o   The type of market value adjustment reviewed here passes a gain to the policyholder's cash withdrawal value when interest rates fall. This is an added cost for the insurer to the extent lapses actually take place in such an interest rate environment. Thus the financial effects of a market value adjustment are not comparable to those of a surrender charge, even if a similar credited rate might be affordable and immunizable under the two alternative product designs.

A market value adjustment should therefore have a major impact on the market value and the duration of an SPDA liability, everything else being equal. Our technical analysis, documented in the charts, will show that:

PANEL DISCUSSION

o   A market value adjustment allows a substantially higher level of policy-
     holder credited rates, because it approximately neutralizes the put option
     and so eliminates its cost to the insurer.

o   A market value adjustment lengthens the initial duration of the product
     liability. This is because the put option itself tends to shorten the
     duration of the liability. When the put option is neutralized, the
     product liability duration lengthens accordingly.

THE CHARTS -- A SPECIFIC EXAMPLE

The specific example illustrated in the charts is a product with an initial
credited rate fixed for seven years. The market value adjustment applies
during this period. The specifics of product design and assumptions are given
in the charts. Expenses were assumed to be $100 first year and $25 per year
renewal. The renewal expense was assumed to inflate at an annualized rate
equal to the current new money ninety-day A-rated commercial paper rate, minus
3%.

The quantitative analysis presented in the charts supports the qualitative
analysis of market value adjustments described. Although a surrender charge
can fund the cost of withdrawal rights on a policy which has no market value
adjustment, a surrender charge reduces but does not eliminate the effect of the
put option on duration.

This completes a discussion of the general approach behind my economic eval-
uation of a market value adjusted product. The reader can now review the
charts to see the quantitative results obtained from the model.

CHART 1

An SPDA can be priced like a financial security

o   Accumulation account is a zero-coupon bond.

o   Guaranteed withdrawal right is a put option.

o   Insurer's right to reset credited rate is a call option.

CHART 2

Risk/Return Quantifiers

o   Apply a model for pricing interest-sensitive cash flows.

o   Compute market value of liability. Credited rate is "priced" correctly when market value of liability at issue of product is equal to the single premium.

o   Compute duration of liability. Ratio of surplus to liability is hedged if asset and liability durations are matched.

CHART 3

Definitions of Duration

o   Weighted average time-until-payment of the cash flows. The weights are the present values of the cash flows. This is Macaulay duration.

o   Relative sensitivity of price to interest rate changes. If P is price, $\triangle$ I is change in force of interest, and $\triangle$ P is change in price caused by $\triangle$ I, then duration D is given by:

$$D = - \left(\frac{1}{P}\right) \cdot \frac{\triangle P}{\triangle I} \quad \bullet$$

o   We will see that for interest-sensitive cash flows, Macaulay duration does not approximate the price sensitivity!

CHART 4

An Example -- The Model

o   The model prices interest-sensitive cash flows based on:

Arbitrage pricing theory
Interest rate term structure theory.

o   Quarterly cash flows are projected for twenty years.

o   Annual interest rate volatility assumed to be 15%.

PANEL DISCUSSION

CHART 5

An Example -- Product Design

o   Single premium deferred annuity.

o   Initial credited rate fixed for seven years.

o   After initial guarantee expires, credited rate is reset on each policy anniversary.

o   Moneyback guarantee.

o   Commission 5%, override 1%. Chargeback upon lapse is 100% first six months, 50% second six months.

CHART 6

An Example -- Credited Rate Reset Strategy

o   Interest rate environment uses A-rated non-callable current-coupon corporate bond rates at 3/31/86.

o   Initial five-year rate is 7.89% annual effective.

o   Renewal credited rate always equals five-year new money rate, minus a margin.

o   Margin through five-year rate is fixed as the excess of 7.89% over the initial guarantee rate.

CHART 7

An Example -- Competitive Environment

o   Competitor rate is recomputed each quarter.

o   Begin with larger of ninety-day and ten-year A-rated new money rates.

o   Subtract a margin. The margin begins as -1%, grades to +1% over two years, then remains at +1%.

o   The initial competitor rate is 9.25% annual effective.

MARKET VALUE ADJUSTED PRODUCTS

CHART 8

An Example -- Interest-Sensitive Lapses

o   Compute competitor rate minus SPDA rate.

o   Subtract 0.25% "sluggishness" threshold.

o   Subtract threshold which allows policyholder to recoup surrender charge and market value adjustment over a three-year period.

o   If net result in percent is positive, multiply by 10.

o   This is the annualized interest-sensitive lapse rate, which is capped at 30% maximum.

CHART 9

Market Value Adjustment Formula

o   Applies only in first seven years. Adjustment factor is recomputed each quarter.

o   Let Y be the number of years remaining until the seventh policy anniversary.

o   Let R0 be the initial SPDA rate (guaranteed for seven years).

o   Let D equal 8.02% (the initial seven-year A-bond rate) minus R0.

o   Let RT equal seven-year new-money A-bond rate minus D.

o   Let F be a multiplier between 0 and 1.

o   Then the market value adjustment factor (MVA) is:

$$MVA = 1 + F \cdot (R0 - RT) \cdot Y$$

CHART 10

Sensitivity Testing

o   Interest-sensitive lapses.

o   Surrender charge of 7%, 6%, 5%, 4%, 3%, 2%, 1%, for the first seven years respectively.

o   Market value adjustment (see Chart 11).

PANEL DISCUSSION

CHART 11

Sensitivity Testing

Surrender Charge	Market Value* Adjustment	Interest-Sensitive Lapses	Initial Credited Rate	Duration
No	No	No	7.09%	5.4 Years
No	No	Yes	5.75%	1.1 Years
Yes	No	Yes	7.02%	4.4 Years
No	Yes	No	7.13%	6.3 Years
No	Yes	Yes	6.80%	5.6 Years
Yes	Yes	Yes	7.15%	5.9 Years

* Factor (F) for MVA is 0.75

CHART 12

Effect of Market Value Adjustment

o No surrender charge.

o Interest-sensitive lapses with 30% maximum.

MVA Formula Factor (F)	Initial Credited Rate	Duration
0.00	5.75%	1.1 Years
0.25	6.20%	2.6 Years
0.50	6.55%	4.2 Years
0.75	6.80%	5.6 Years
1.00	6.90%	6.5 Years

CHART 13

Duration -- Surrender Charge

o   With surrender charge, and 7.02% initial credited rate, the SPDA liability duration was 4.4 years.

o   Macaulay durations along interest rate scenarios gave:

Minimum   3.8 Years

Maximum   10.3 Years

Mean   8.0 Years

o   Macaulay duration does not give correct information for C-3 risk control in this case.

CHART 14

Duration -- Market Value Adjustment

o   With full market value adjustment, and 6.90% initial credited rate, the SPDA liability duration was 6.5 years.

o   Macaulay durations along interest rate scenarios gave:

Minimum   4.9 Years

Maximum   7.8 Years

Mean   6.3 Years

o   The mean Macaulay duration is close to the actual liability duration, partly because the put option is neutralized by the market value adjustment.

CHART 15

Some Conclusions

o   The put option "costs" about 135 basis points. This can be "paid for" through a surrender charge or a market value adjustment.

o   Surrender charge discourages lapses. It helps recover unamortized acqui-sition costs, and may help to fund disintermediation costs.

o   Surrender charge does not completely neutralize the put option. The put shortens liability duration.

o   Full market value adjustment effectively neutralizes the put option. This lengthens liability duration.

o   Full market value adjustment can pass a gain to policyholders when interest rates fall.

MR. TUOHY: I'd just like to ask one question of Don as to why there hasn't been a rush from the industry to try to get into market value adjusted annu-ities the same way the Hartford did. I think the reason is fairly similar to why there hasn't been a huge rush from the industry into variable universal life, and that is the complications and expense of getting there. The question I'm going to pose to Don is "is that complication there?" Let me split this into four parts: insurance regulators, tax, SEC, and systems.

Both the VUL and market value adjusted products have satisfactory model regu-lations, although individual state adoption is rather tardy. Don discussed the tax problems where the market value adjusted products seem to be at a disadvan-tage compared to variable products. The problem of tax reserves being a minimum of book value reserves is particularly onerous for mutual companies. Another tax problem relates to realized capital gains that are probably taxable for assets matching market value adjusted products but not for variable products.

Then there is the SEC question. Clearly market value adjusted products have some advantages over variable products, in that less compliance work is neces-sary. However, any dealing with the SEC is enough to discourage some life companies.

In regard to the systems, I know that companies considering variable universal life are concerned about the big dollars likely to be expended on administrative systems, if such systems exist. I was wondering whether Don is aware if there are any systems available to administer a market value adjusted product.

MR. SONDERGELD: As far as the companies rushing to follow the Hartford's lead, as you point out there does not seem to be a huge rush. I think the major reason has to do with the SEC considerations. There are companies that are selling a somewhat similar product with a market value adjusted formula, but the cap is 3%. That's like a shot of whiskey and a gallon of water; it's really not very effective. Many companies listen to what their agents want as far as products are concerned. If you have a field force that isn't licensed to sell securities, then you're going to have to bide some time selling other products before you get your field force to sell registered products, or you're not going to do it at all. So, distribution systems problems are a major factor.

On the administrative side we have had no problems that I know of being able to calculate the market value adjustment. For the product that I described, the policyholder gives us some money today, and we credit some interest tomorrow and we might credit a new rate of interest on that piece, etc. But when you get all done, you're really only keeping all these records separate by guarantee periods. You only really have to determine when the current guarantee period ends. There are some procedures that fall out that make it much less difficult to administer than it may sound based on having to keep track of all these little pieces. We have not found any administrative problems. On the other hand, our product is a single premium product, and although we've written fairly large amounts of this, you're not talking about that many transactions. So we haven't been overburdened by administrative problems.

MR. TUOHY: One other note on the SEC as far as annuities are concerned. Last week Rule 151 came out which defined the safe harbor for annuities -- when is an annuity an annuity and not a security? There weren't any real surprises, as the rule is similar to a draft which came out last year.

PANEL DISCUSSION

The three principal requirements for an annuity not to be regarded as a security are:

(i)   the contract must not be marketed primarily as an investment;

(ii)   credited interest must be guaranteed for at least a year; and

(iii)   market value adjustments may not applied in calculating surrender values.

It must be emphasized that this is just a safe harbor rule. However, any company issuing market value adjusted annuities is running a risk that they may be considered securities.

MR. MARTIN E. GOLDMAN: I have a question for Don Sondergeld. Now that interest rates are falling and you're having appreciations, do you disclose this regularly to the policyholders and are you seeing higher lapse rates because people want to take their money?

MR. SONDERGELD: We do provide reports to our contractholders annually indicating what their adjusted and unadjusted value is as of the policy anniversary. The problem we found with this type of product is not persistency but sales. As interest rates drop, people become uninterested in this type of a product. It seems like most people are looking for the high interest guarantees. So when interest rates are high, our sales are up, and when interest rates drop, sales go down. As far as persistency is concerned, when you have market value adjusted products and interest rates go down, if the policyholder surrenders because of a positive adjustment, he's going to surrender to be able to invest at lower rates. I don't think you get that type of adverse persistency when interest rates drop. The people sit there and say, "Gee, I'm being credited 10% interest and new money rates are at 7%," and they're happy. Conversely, when interest rates rise and the person would like to be able to receive a higher interest rate, he finds out that he can only get say 85 cents or 95 cents on the dollar because of market value adjustment, and he's dissuaded to surrender. So I think the market value adjustment has a positive effect on persistency irrespective of whether interest rates go up or go down.

MARKET VALUE ADJUSTED PRODUCTS

MR. DAVID J. CHRISTIANSON: I'm generally in favor of market value adjust-ment products, but I see some practical problems revolving around the interest rates and how you invest for the product. For example, if you had a five-year market value adjustment period, how do you invest for that? It seems to me that you need a five-year security. Then you encounter problems with the interest rates. Do you do like the Hartford does and just credit the interest rate to the policyholder, which would have some tax ramifications, or do you reinvest it with separate cells? If you use separate cells, i.e., new market value adjustments, that leads to two additional problems: (1) Can you invest in enough of those kinds of securities? Can you find enough of those? and (2) When you reach maturity, you have all these cells coming due (some of which are in their first year, second year, third year, etc.) which are subject to market value adjustment. So, whenever you want to get out, even at maturity, there is some kind of market value adjustment.

MR. SONDERGELD: We offer a 3-year, 5-year and 10-year guarantee period. Almost nobody has been buying the 10-year; the 5-year has been extremely popular. Let's use the 5-year guarantee period as an example. Our investment department tells us what rates it can get this week or today. We can change our guarantee daily. Our current practice is to change it weekly; new issues or any money that's coming due on a policy anniversary, which we've guaranteed, we treat as a new single premium. Let us say somebody gives us $100,000 and we guarantee 10% for five years. We made that guarantee because our investment department told us they can invest in a bond that's going to earn 11% or some rate higher than 10%. When we take our profit and expense charges off, we can afford to credit 10%. At the end of one year, we're going to credit $10,000 to the policyholder's account, or pay it to him in cash; the policyholder has the option. If the policyholder wants to treat it as a new single premium, we at that point ask our investment department what we can guarantee for four years. If the investment department says 15%, that $10,000 is treated as a new single premium for four years at 15%. We mix all these cells together. As far as the market value adjustment formula is concerned, we only need to determine what that policyholder's total account value is, what the aggregate interest earn-ings are on that account, and when the guarantee period ends. You just feed that information into your market value adjustment formula and you get the market value adjustment.

PANEL DISCUSSION

MR. CHRISTIANSON: But if you do it that way, in the last year you invest in only one year securities, and you must get a fairly unattractive rate at that point.

MR. SONDERGELD: The policyholder has the option of taking that money in cash, or treating it as a single premium with a one-year guarantee period. If the policyholder finds the one-year guarantee unattractive, he can take his money in cash.

MR. CHRISTIANSON: There's an underlying assumption on the SPDAs that are being marketed that you come up with one duration, stick with it all the way and don't modify that. Is it not possible to modify the assets as you go along and also, are there different equity concepts that can be used with these annuities? For example, somebody alluded to having different margins at different points in time.

MR. BUFF: I think I should address that question. The duration of the SPDA liability changes constantly for two factors. One of them is the passage of time; you get closer to the "maturity" of your horizon. The other is changes in interest rates. As interest rates rise, the durations shorten, and as interest rates fall, the durations lengthen. The key thing is to keep track of that change. You must adjust your asset duration to match the liability duration.

I'd like to briefly elaborate with an example that's not quite so interest sensitive. Somebody that creates a dedicated bond portfolio, say over a 5-year holding period, can lock in a yield-to-maturity which is at least approximately guaranteed for that 5-year period regardless of movements in interest rates. At the time the person creates the dedicated portfolio, the duration is five years. However as time goes by, the duration certainly shortens and the assets must be shortened. The difference that tends to open up has a name; it's called "duration drift." You have to control that or else you may be immunized one day and exposed to tremendous risk the next.