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Guaranteed Minimum Death Benefits (GMDB) on Variable Annuities

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Summary: Most variable annuities marketed today guarantee a minimum amount payable upon the death of the policyholder. The National Association of Insurance Commissioners (NAIC) and the American Academy of Actuaries (AAA) are considering various methodologies for reserving this GMDB. Discussion leaders cover developments in reserving requirements and methodologies, modeling the GMDB, risks associated with offering the GMDB, and investment implications.

Mr. Timothy J. Ruark: On our panel we have Steve Preston, who is senior vice president and chief actuary for Golden American. He has dealt with various actuarial functions, financial reporting, asset/liability management (ALM), and product development for both life and annuities. He is currently co-chairperson of the Academy's Commissioner's Annuity Reserve Valuation Method (CARVM) Multiple Benefits and the Academy's MGDB Work Groups, vice chairperson of the Academy's Equity Indexed Task Force, a member of the Academy's Committee on Life Insurance, the Standard Nonforfeiture Law Work Group, and the Life Disclosure Work Group. He's also vice-chairperson of the SOA Task Force on Mortality guarantees for variable products. Steve has been very active and I've worked with him on one of those committees; he's been a phenomenal volunteer.

So we look forward to hearing from him after Mr. Campbell. Tom Campbell is with The Hartford where he is currently the corporate actuary. He deals with issues like compliance, asset adequacy, valuations, and product review. He is also active in the Academy. He's the co-chairperson on the Academy's MGDB Work Group and also the Academy's CARVM Work Group I mentioned earlier. He is a member of the Annuity Valuation Task Force. Like Steve, Tom's been a great volunteer.

Mr. Thomas A. Campbell: I'm going to start with an overview of MGDB, which is going to include a look at the benefit types and reasons why companies offer these benefits. I'll also discuss the risks and the sensitivities to those risks and then get into some of the things that need to be considered when pricing these benefits.

The overview will begin with a definition! MGDBs are benefits offered with a variable annuity contract, which guarantees that the death benefit will never fall below a given level, regardless of how the underlying funds perform. As we'll discuss, fund performance is a key element to these benefits. Contract holders buy variable annuities with the expectation that the funds are going to outperform a fixed annuity. In exchange for that, they take on more investment risk. One of the risks that is included in this is the risk of death when the market is in a downturn. MGDBs address this risk.

Let's discuss some of the different types of MGDBs. This list of benefits also represents the evolution of these benefits. Initially annuity writers would offer very simple and very predictable MGDBs. One was a return of premium benefit, which guarantees that at least the principle paid into the contract would be paid out on death. A second was a waiver of surrender charge benefit, which simply pays out the full account value at death by waiving any of the remaining surrender charges.

In the late 1980s, as the variable annuity marketplace heated up, insurers were looking to differentiate their products. They began to offer richer MGDBs. One type of richer benefits was a roll-up benefit, where the death benefit increases at a given rate each year. Initially, this was a 1–3% rate, which was meant to return premium accumulated for inflation. This is a richer form of the return of premium benefit, which is actually the same thing as a 0% roll-up benefit. In addition, insurers began to offer reset and

ratchet benefits, where the death benefit at any given time would be linked to the account value at the end of a certain period. The difference between a reset and a ratchet benefit is that with a reset, if the account value is down at the end of the reset period, the death benefit will go down, while with a ratchet, the death benefit doesn't decrease—it just increases. So, with a ratchet benefit, you look back on the AVs at the end of all the previous ratchet periods and you take the maximum account value. Initially, the ratchet and reset periods were five to seven years, which were meant to correspond to the surrender charge period. These benefits were offered in part to keep business from lapsing when the surrender charge wore off.

More recently, as the variable annuity marketplace has exploded, we're seeing companies getting more and more aggressive with the MGDBs they are offering. It's now commonplace to see one-year ratchet benefits, and five and even 7% roll-up benefits. In addition, we're also seeing combinations of benefits, such as a benefit that pays the greater of a ratchet benefit and a 5% roll-up benefit.

In reviewing the definition and benefit types, I touched on a couple of the reasons for offering these benefits. One reason is to address the customers' needs. As I previously mentioned, MGDBs address the customers' concern about death when the account value is down. Another reason to offer MGDB is to enhance persistency, which is something we just discussed. When it becomes time for the contract holder to consider surrendering a variable annuity contract, they need to look at all of the benefits, and MGDBs are an added value that can help keep business on the books. A third reason is product differentiation, not only versus other variable annuities, but also versus other products, such as mutual funds. There's been a lot of discussion of the comparison between mutual funds and variable annuities, especially with the discussions of reducing capital gains taxes. When consumers compare different products, they look at the whole picture, and MGDBs are one of the many features that consumers look at. A final reason is the availability of reinsurance—I'm not sure whether this is a cause or an effect of the growth in these benefits, but companies can now reinsure their MGDBs in order to fix their cost and limit their exposure.

Now I would like to discuss the risks involved with companies offering MGDBs. The risks can be categorized as either investment risk or mortality risk. How these risks impact the cost of the MGDBs depend primarily on the benefit types and the benefit features. As I discuss the risks, I will also comment on how a company's exposure is impacted by the benefit types and features. As actuaries, we need to understand these risks and their sensitivities, so that we can either protect our companies from these risks or price the risks appropriately.

First there is the investment risk. Who has the risk? When a company writes a variable annuity contract, it passes all of the investment risk to the contract holder. However, by offering an MGDB, the company takes back some of that investment risk. The amount it takes back depends on such things as the level of the fund performance of the assets supporting the contract, and the volatility of that fund performance. What are some of the sensitivities? One is the benefit type. With a reset and a ratchet benefit, the investment risk is going to vary with the short-term volatility in the funds—particularly with a one-year ratchet or reset. In addition, a ratchet benefit will be riskier than a reset benefit because a ratchet benefit does not allow the death benefit to decrease as it does with the reset benefit.

With a roll-up benefit, the investment risk varies with both the short-term volatility and the longer-term volatility of the fund performance. For instance, if a company offers a 5% roll-up benefit and the funds return 3% over a period of time, the company will lose.

This leads me to a second vestment risk sensitivity—if a company's actual mix of funds is based on more volatile funds, such as growth funds, there will be more MGDB volatility. In addition, if the funds are skewed more toward the less volatile, lower returning funds, such as money market funds, you can get into the situation with the 5% Roll-up and the 3% return that I just alluded to. The best mix tends to be where funds are spread over all classes of funds, particularly on a contract-by-contract basis. Other investment risk sensitivities include benefit features such as the time frame of the reset or ratchet, the roll-up rate and the existence of benefit caps that will limit the death benefit to a certain multiple of the account value.

The second category of risk is mortality risk. Although mortality risk is adequately measured in most insurance products, there has been a lot of discussion about whether life mortality or annuitant mortality is more appropriate for MGDBs. At this point in time, there's no conclusive evidence either way. Some companies compromise by using group annuitant mortality, which is a little bit more conservative than individual annuitant mortality and a little less conservative than life mortality. Help in answering this question is on the way because the SOA is doing a mortality study on deferred annuitant mortality. I heard that we expect to have some preliminary results on this study later in 1997.

My belief is that you should expect to see some level of selection from a surrender standpoint. When it comes time to consider surrendering a contract holder with a death benefit that's "in the money" and not in good health, you will think twice about surrendering. I'm not sure what the cost of that selection is. I think time will tell, but it's certainly something that should be considered when pricing MGDBs.

What's more questionable is whether you can expect mortality selection at issue. I've heard the argument that people who are uninsurable from a life insurance standpoint are going to purchase annuities with rich MGDBs. I'm not sure I agree with this argument because there's no guarantee that the death benefit is going to go above the account value. However, it is something that should be considered in pricing.

What are some of the mortality risk sensitivities? One is any age limits that are built into the MGDB. These are contractual restrictions on the age at which a company would provide a death benefit in excess of the account value. As we'll see in a minute, age limits can significantly reduce the cost. Another sensitivity is who the death benefit covers. Many companies will just cover the contract owner, but some will cover both the contract owner and the annuitant. Because they can be different people, companies that offer the latter provision are obviously taking on more risk.

A third sensitivity is how the MGDB is offset for partial withdrawals. When a contract has a partial withdrawal, both the account value and the MGDB are reduced. Companies use two different methods to accomplish the MGDB reduction: dollar for dollar and pro-rata. An example will point out how that's accomplished. Let's assume you have a variable annuity

with an account value of $1,000 and an MGDB of $1,100—the death benefit is $100 "in the money." Now assume there is a withdrawal of $500. Under the dollar-for-dollar offset, both the account value and the death benefit are reduced by equal amounts. The account value is reduced to $500 and the death benefit is reduced to $600, but the amount that the death benefit is "in the money" remains at $100.

With a pro-rata offset, the death benefit is reduced in the same proportion as the account value. So in this example, the death benefit is reduced to $550 and is only $50 "in the money."

Under a dollar-for-dollar offset, there is a potential for selection. Another example will illustrate this. Assume that instead of withdrawing $500, the contract holder wants to withdraw all of the money. The contract holder can select against the company offering the dollar-for-dollar offset by withdrawing all but a dollar, so that the account value and the MDGB in this example would both be reduced by $999. Essentially, with the dollar-for-dollar offset, the contract holder could buy a paid-up life insurance benefit of $101 for a single dollar. With a pro-rata benefit however, both would be reduced by 99.9%, eliminating all selection. Therefore, by offering a pro-rata partial withdrawal offset, a company can reduce its risk.

So far I've been talking in general terms, so it might be a good idea to take a look at some numbers to illustrate these points. The numbers represent what I will call relative benefit costs, since they were developed using crude assumptions and do not represent actual benefit costs. However, I think it does give you a flavor for the relative costs when you look individually at different risks. Also note that the relative benefit costs include the cost of the waiver of surrender charge benefit (i.e., they represent the relative cost of the excess of the actual death paid over the contract cash surrender value).

Table 1 compares different benefit types for a male, age 60, investing entirely in equity funds. The tables show that the relative benefit cost of a waiver of surrender charge MDGB not only has a smaller relative cost, but also less volatility than either the one-year ratchet benefit or the 5% roll-up benefit. It's also interesting to see how the one-year ratchet benefit compares to the 5% roll-up benefit in this situation. Through the 75th

percentile, the relative benefit cost is lower for the 5% roll-up; yet when you get up to the 95th percentile, the relative benefit cost is a bit higher. At the 95th scenario we're seeing the bad scenarios with several years of fund underperformance where the MGDB is "in the money." With a 5% roll-up benefit, the death benefit continues to increase even if it's "in the money." However, with a ratchet benefit, the MGDB stays level and does not increase until the account value once again reaches the level of the MGDB. This adds to the relative benefit cost and also adds to the volatility of that cost.

TABLE 1
IMPACT OF RISK FACTORS ON RELATIVE BENEFIT COST*

			Percentile		
Impact of Benefit Type on Cost			**50th**	**75th**	**95th**
Waiver S C	Age 60	Equity	2.1	2.5	3.2
1-Year Ratchet	Age 60	Equity	3.3	6.2	15.4
5 % Roll-up	Age 60	Equity	2.2	4.1	23.1

*Average cost over 10 years at issue in bps = PV of cost / PV of AV

Table 2 shows the impact of age on the relative benefit cost. Obviously the older the age, the higher the relative benefit cost. What surprises some people is the magnitude. However, when you look at the underlying mortality table, you can see that this makes sense. This also gives you a flavor for the value of age limits.

TABLE 2
IMPACT OF RISK FACTORS ON RELATIVE BENEFIT COST*

			Percentile		
Impact of Age on Cost			**50th**	**75th**	**95th**
1-Year Ratchet	Age 50	Equity	1.5	3.0	7.4
	Age 60	**Equity**	**3.3**	**6.2**	**15.4**
	Age 70	Equity	8.5	15.1	34.8
5 % Roll-up	Age 50	Equity	1.0	2.1	11.1
	Age 60	**Equity**	**2.2**	**4.1**	**23.1**
	Age 70	Equity	6.1	10.7	62.0

*Average cost over 10 years at issue in bps = PV of cost / PV of AV

Table 3 illustrates the impact of the mix of funds on relative benefit costs. With a ratchet benefit, the relative benefit cost for an annuity invested entirely in bond funds is less than the cost for one invested entirely in equity funds. It's lower still for an annuity invested entirely in money market funds.

However, with a Roll-up benefit, this table illustrates how short-term volatility and the long-term returns impact the relative benefit costs. Through the 75th percentile, the relative benefit cost for an annuity invested in equity funds is slightly lower than an annuity invested in bond funds and significantly lower for an annuity invested in equity funds than in money market funds. In my model, a money market was returning 3%. As we previously discussed, with a 3% return for an extended period, a 5% roll-up benefit will have a high relative benefit cost. At the 95th percentile, the volatility factor catches up to the long-term return factor and you see a higher relative benefit cost for an annuity invested in equity funds than for the 5% roll-up benefit.

TABLE 3
IMPACT OF RISK FACTORS ON RELATIVE BENEFIT COST*

Impact of Mix of Funds on Cost			Percentile 50th	75th	95th
1-Year Ratchet	**Age 60**	**Equity**	**3.3**	**6.2**	**15.4**
	Age 60	Bonds	2.6	2.8	3.6
	Age 60	MM	3.0	3.0	3.0
5 % Roll-up	**Age 60**	**Equity**	**2.2**	**4.1**	**23.1**
	Age 60	Bonds	2.7	4.4	12.5
	Age 60	MM	17.1	18.1	19.6

*Average cost over 10 years at issue in bps = PV of cost / PV of AV

Table 4 shows the impact of benefit features on relative benefit costs. As expected, the three-year ratchet benefit has a lower relative benefit cost than a one-year ratchet benefit, and a 3% roll-up benefit has a lower relative benefit cost than a 5% roll-up benefit.

TABLE 4
IMPACT OF RISK FACTORS ON RELATIVE BENEFIT COST*

Impact of Benefits Features on Cost			Percentile 50th	75th	95th
1-Year Ratchet	**Age 60**	**Equity**	**3.3**	**6.2**	**15.4**
3-Year Ratchet	Age 60	Equity	2.3	3.8	12.7
5 % Roll-up	**Age 60**	**Equity**	**2.2**	**4.1**	**23.1**
3 % Roll-up	Age 60	Equity	2.1	2.9	14.8

*Average cost over 10 years at issue in bps = PV of cost / PV of AV

The next topic I'll cover is pricing considerations and I'll begin with some of the key assumptions. The most important assumption is the age distribution. As we previously discussed, age has quite an impact on the

cost of the MGDB. What makes age distribution a critical assumption is the revenue that a company receives to offset the MGDB comes from mortality and expense (M&E) charges, which do not vary by age. Unlike a life insurance policy, which is priced with higher premiums at higher ages, a variable annuity will generate the same M&E charges regardless of the age of the contract holder. Therefore, if the age assumption is incorrect, you won't get the proper return.

A second key assumption is mortality, which we discussed. My only comment there is that it is probably appropriate to use something more conservative than individual annuitant mortality.

A third key assumption is lapse rates. I mentioned that one benefit that a company receives from offering MGDBs is increased persistency. If that is the case, then you should reflect that in your pricing assumptions.

A fourth key assumption is a mix of funds and movement between funds assumed in pricing. We did look at how a different mix of funds impacts the relative benefit costs, but I have a few comments on these assumptions. First, the assumption for mix of funds should vary with age. Younger people tend to invest in riskier funds. Second, the presence of the MGDB could impact the mix. Remember, MGDBs address one of the concerns that people have in investing in volatile funds. Another comment involves the fixed account. If you have a fixed account with a variable annuity, the assumption of what percentage of funds will be invested in the fixed account is critical because there is no MGDB risk in the fixed account. Fourth, it's important to look at the mix of funds from both a contract-by-contract basis and a book-of-business point of view. A wide mix of funds on a contract-by-contract basis can further dilute the risk. My final comment on mix and movement funds is that when looking at movement of funds, assumptions that may make sense to you might not necessarily work. People tend to buy high and sell low.

The final key assumption is fund performance. What's important there is not just the return, but also the volatility. In other words, the distribution of fund performance is important. In addition, make sure you understand the characteristics of the funds. Don't just look at Morningstar and look up the fund category and use the returns there. When the Academy's MGDB Reserve Work Group worked on reserving, we did a lot of work with the

Morningstar funds categories, and there is quite a wide variance within the fund categories, especially for balance and specialty funds.

I'd also like to comment on a couple of other pricing considerations. First, market conditions, both at issue and what you expect going forward if you have flexible premiums, can impact your fund performance assumptions. Second, we discussed the impact of MGDB on fund selection, but I think it's important to do as much sensitivity testing as possible when determining the cost of these benefits. You need to look very closely at the bad scenarios to get a good feel for the impact of stressing your different assumptions on the cost. The one thing that's certain about these benefits is that the costs can be very unpredictable.

The final topic I will discuss is ways to reduce the risk of MGDBs. First, consider both age limits and caps. Both of these can reduce the actual death benefit paid. Age limits are especially effective if they fit into your marketing plan. Second, if you have a five or seven percent roll-up benefit, consider using a lower roll-up rate for money market and other low-return funds. Third, consider pro-rata offsets for partial withdrawals, as we discussed. Fourth, if you pay on the death of either the contract owner or the annuitant, consider the option for the beneficiary to continue the annuity contract. This could end up being a win-win situation for both you and the beneficiary. Finally, consider reinsurance if it fits into your costs. It will allow you to fix your costs and it will limit your exposure.

As you can see, there are many variations to MGDBs and each present their own risks and their own costs. For a given MGDB structure, there are many things to consider. As you can imagine, the Academy MGDB Reserve Work Group had quite a challenge in undertaking the task of developing a reserve methodology that fit every variation.

Mr. Stephen J. Preston: The focus of my comments will relate to the valuation considerations for MGDB, which I refer to as MGDBs. I'd like to focus on five different topics. The first topic deals with existing MGDB regulatory guidance in the area of valuation. Second, I'll want to give you a brief overview of some of the work completed by the SOA MGDB Task Force. Third, I'll provide an overview of work completed by the Academy's MGDB Work Group. Most of this discussion will focus on Actuarial Guideline MMM, which was recently adopted by the NAIC Life and Health Actuarial

Task Force. Then I'll close with a few valuation projects relating to MGDB, which are still underway.

I'd like to start out with the existing MGDB regulatory guidance. As you might expect at this point, without Actuarial Guideline MMM being formally adopted yet, there's really a lack of existing regulatory guidance in this area. One of the sources that companies go to for guidance is the NAIC Variable Annuity Model Regulation, which requires recognition of the mortality guarantees in the reserve, but doesn't address how this should be accomplished. In the absence of specific NAIC regulations governing MGDBs, some states have tried to apply the NAIC Variable Life Model Regulation. There are two variations of this Model. The variation most commonly used requires a one-year term reserve with a one-third drop in account value, with life insurance valuation interest and mortality.

Additionally, the Connecticut Circular Letter requires companies to apply their Variable Life Regulation to variable annuity MGDBs. It uses an approach similar to the NAIC Variable Life Model Regulation. It also requires mirror reserving. New York Regulation 47 provides different requirements, depending on whether the MGDB is incidental or not. New York defines incidental as return to premium or account value, and possibly ratchet MGDBs. For incidental death benefits, New York permits an accumulation type of reserve, where a reasonable target is determined and then the target amount is placed into a fund, less claims. For nonincidental MGDBs, New York requires compliance with their Variable Life Regulation, which requires a method similar to the NAIC Variable Life Model Regulation. Also, many companies have begun to use the requirements in drafts of Actuarial Guideline MMM, and many regulators have been accepting those requirements.

The SOA MGDB survey is somewhat dated, so I won't dwell on it, but in 1995 the Task Force completed a survey of MGDB and I think it is still basically up to date. The survey identified various types of MGDBs, contract charges, reinsurance, and methods used to quantify MGDB risk. The SOA Task Force also identified variable annuity reserving practices for the base contract, ignoring any MGDB. Most of the companies that were surveyed used some type of CARVM approach based on a projection of the account value, based on the valuation rate less some combination of asset charges. As far as current reserving practices on MGDB, there were

two approaches commonly used. First, the prospective method is typically a one-year term reserve, typically with a drop in account value assumed. Second, some companies use a retrospective approach, similar to the one required by New York, where you put a target amount into a fund and remove claims as they're incurred.

Overall, most of the companies that were surveyed used one of two mortality tables. The 1980 Commissioners Standard Ordinary (CSO) table has been used, particularly where companies were required to do so by certain state regulators. Also, many companies used the 1983 Individual Annuitant Mortality (IAM) table, which is at the other end of the spectrum.

As Tom mentioned, as MGDB began to emerge, the NAIC began to express concern in this area, and in March 1995, the NAIC Separate Accounts Working Group asked the Academy to form a work group to develop a framework for MGDB reserving. Shortly thereafter the MGDB workgroup was created, and the workgroup subsequently generated a report in September 1995. That report, which was preliminary in nature, took a fairly theoretical approach to MGDB reserving. They recommended a two-part formula, with a prospective element and also a retrospective, stochastic element. The feedback received from both regulators and the industry indicated that the paper was theoretically correct, but the method needed to be further simplified. Second, in late 1995, the NAIC Life and Health Actuarial Task Force concluded that a proper interpretation of Actuarial Guideline 33 was that death benefits should be integrated into the CARVM calculation, as opposed to holding a stand-alone death benefit reserve, which was the common practice at that point.

In June 1996, the Academy MGDB work group released a revised report reflecting the need to integrate MGDBs and simplify the method. Subsequently, in September 1996, the first draft of Actuarial Guideline MMM was proposed by the Academy Group to the NAIC. The project was moved from the NAIC Separate Accounts Group to the NAIC Life and Health Actuarial Task Force, who adopted MMM in March 1997. It is likely that full NAIC adoption will occur in September 1997.

I'd like to summarize the key aspects of MMM. In general, there are five sections of MMM. The first section provides general background

information. The second section addresses the overall scope of MMM, and the third lays down some basic definitions. The fourth section, the heart of the guideline, is the text section on which most of my comments will relate. Also, MMM has several appendices, providing immediate drop percentages, returns, and the MGDB mortality table.

Regarding the scope of MMM, the guideline covers variable annuities with MGDBs that have the potential to exceed the account value, whether or not the MGDB exceeds the account value on the valuation date. This would cover MGDBs such as return of premium, roll-ups, ratchets and similar types of designs. It does exclude group contracts, which are not subject to CARVM. The real purpose of the group clause is to ensure that all products with the MGDBs would be subject to MMM, irrespective of the company opinions as to whether CARVM applies to a regular variable annuity. The scope section also states that it may be inappropriate in certain situations to apply MMM. For example, if the net amount of risk decreases as the underlying funds decrease, the guideline is probably not appropriate.

The definitions section of MMM is fairly technical. I'll provide a brief summary before moving into the text section of MMM. In order to compute reserves under Guideline MMM, you need to come up with several different projections, and in general, two types of account values need to be projected. The first one is what's referred to as a reduced account value, which is determined by taking the account value on the valuation date, and applying an immediate drop factor. The reduced account value is then projected using net assumed returns that vary by fund class. The second set of projected account values are determined by starting with the account value on the valuation date (without reduction by immediate drop factors) projected using the valuation rate less asset charges. The net amount of risk is equal to the projected death benefit that reflects the minimum guarantee less the projected reduced account value. Base benefit streams are streams of projected benefits that reflect the projected, unreduced account values and ignore the MGDB. An integrated benefit stream is the concept required in proposed revisions to Actuarial Guideline 33, which was adopted by the NAIC Life and Health Actuarial Task Force at their March 1997 meeting. Integrated benefit streams, as defined in MMM, are streams reflecting the base benefits for those who are surviving, and the MGDB for those expected to

die. Essentially, this concept brings mortality into the CARVM calculation. The calculation period is any period that you were required to project CRVM reserves.

The text section of MMM requires calculation of reserves two different ways. First,a separate account reserve is calculated with no regard to the MGDB. Then an integrated reserve is determined, which is the reserve for the entire contract, including the death benefit. The MGDB reserve is the difference between those two reserves. So essentially, one solves for the MGDB reserve, rather than calculating it directly. The MGDB reserve would be held in the general account, not in the separate account.

The next major issue is how to determine an integrated reserve. The integrated reserve is a CARVM-type reserve, equal to the greatest present value of all integrated benefit streams. An integrated benefit stream is a combination of different benefit streams A, B, and C. "A" is a stream of net amount at risk for those who are going to die during the period, based on the valuation mortality. "B" is a stream of projected unreduced account values for those who are going to die during the period. "C" reflects base benefit streams that are provided to the survivors. "C" would thus be the underlying account values that generate surrender values or other types of benefits used in a traditional CARVM calculation, ignoring MGDB.

The next issue addresses the kind of valuation mortality table to be used in MMM. MMM requires the so-called Variable Annuity MGDB table, which is based on the 1994 group annuity mortality (GAM) table, with a 10% margin added (rather than subtracted) from the mortality rates for conservatism. Also, unlike the regular GAM table, no projected mortality improvement is permitted. This table does produce a degree of conservatism relative to the individual annuity mortality tables, but since it is only an interim table, the Society has undertaken an MGDB mortality study to validate the appropriateness of this table.

In terms of valuation interest rates, MMM requires that annuity valuation interest rates are used to discount all projected benefits. That would include all annuitization benefits, surrender benefits, and death benefits. This approach is consistent with the revised NAIC Actuarial Guideline 33 requirements, which were just adopted by the NAIC Life and Health

Actuarial Task Force. Adoption of the revised Actuarial Guideline 33 could occur as early as December 1997. In order to determine valuation rates using the revised guideline, integrated benefit streams must be subdivided into benefit portions, each with similar withdrawal characteristics. Then, each benefit portion is discounted at the appropriate valuation rate. So, for example, if the death benefits were identified as one particular benefit portion, a Type A valuation rate would be used to discount those death benefits. For the portion attributable to surrenders or withdrawals, the plan type would depend on the restrictions of those surrender withdrawals.

In terms of immediate drops and assumed returns, MMM requires that the returns be based on five, fairly broad asset classes: equity, bond, balanced, money market, and specialty. In the original Academy Work Group proposal, there were 11 fund classes based on Morningstar data, but the Academy Group subsequently simplified their proposal to five classes. Definitions for the five classes are defined in the appendix of MMM. Because they're fairly broad, the appointed actuary is ultimately responsible for classifying their own funds into the five asset classes. The drops and returns that are in the appendix for the five classes were based on two different sources of historical data. The first source was based upon the historical monthly return data shown in Morningstar. Unfortunately, that data is credible back only about ten years. So another study was completed with representative indices, such as Standard and Poors' (S&P) 500 and several other indices, that are identified in the Academy Work Group Report over a 35-year period.

The more conservative of the two returns was chosen, and then the immediate drops were determined in conjunction with the returns to produce reserves that would be adequate 83.33% of the time, since 83.33 represents one standard deviation on a normal distribution. Also, MMM requires you to ignore correlation between funds that adds another layer of conservatism onto the reserve. Also, it should be noted that the returns that are shown in MMM are gross returns, and therefore the company needs to deduct their own asset charges from the gross returns. Finally, MMM requires that fixed account options be treated in essentially the same manner as a general account product, where benefits are projected using the guaranteed rate, and no drop in account value.

I'd also like to make a couple of comments on reinsurance. MMM addresses MGDB reinsurance and how the reserves should be determined. MMM prescribes requirements both for reserve ceded and also for reserves assumed. In general, the integrated reserve is determined prior to reinsurance, reduced for any death benefits that are reinsured, and increased for any reinsurance premiums that are payable. The reserve ceded is then the difference between the integrated reserve gross of reinsurance and the integrated reserve net of reinsurance. The reserve assumed is determined by taking the difference between the present value of the reinsured death benefits less the present value of the reinsured premiums, which produces the greatest present value over all possible durations. This does produce a situation where, potentially, the reserve assumed is actually greater than the reserve which was ceded.

The effective date of MMM is December 31, 1998. MMM covers all contracts issued on or after January 1, 1981. There is, however, a three-year phase-in period that may be requested from the Domiciliary Commissioner. Finally, I've identified a few issues that are still unresolved regarding MGDB valuation. As mentioned, MMM is expected to be fully adapted by the NAIC in September 1997. Second, I mentioned the Society project to complete an MGDB mortality study. Also, MMM does not explicitly address asset adequacy testing. The Academy Group proposed that asset adequacy testing should be considered for material MGDBs, and there have been some proposed language revisions to the actuarial opinion and memorandum regulation, which would require disclosure of how separate accounts were tested. Finally, there has been recognition that a risk-based-capital factor for MGDB needs to be developed and the Academy MGDB Work Group will be working with the Academy's Risk Based Capital Task Force in proposing a requirement. Essentially, the risk-based-capital component plus the reserve needs to provide adequacy approximately 95–96% of the time.

Mr. Ruark: My remarks should be fairly short. There are just two main issues that I want to talk about. I joked with Steve and Tom that they handle most of the simple things and I get into the advanced topics. First, we're going to talk a bit about investing and risk management. Second, I want to talk about product extensions, things that are being done that probably relate to GMDB.

First of all, on the investing side there is theory versus practice. The theory would suggest to use a put option on the S&P 500. Put options that are purchased have a definite cost, so they are unlike many of the derivatives that have been publicized that blow up on you. You know the worst-case scenario when you buy this type of option—it's your cost going in.

It's very difficult to use this put strategy and here's why. Let's assume $5–1,000 mortality rate, $50,000 account value, with an annual ratchet. Let's use ten basis points of your M&E to cover this MGDB benefit, and so, if you have $50,000 account value and ten basis points, that means your MGDB revenue is just $50.

A 20% drop in fund value would take your account value down to $40,000. Your MGDB stays at $50,000, so you've got $10,000 of net amount at risk. That means that you have expected claims of $50 if this scenario was to stay for a year, because we're using an annual mortality rate. This situation doesn't create a problem because your MGDB revenue covers your mortality, but what happens if the drop was more than 20%? What happens if it's 30%? Then you don't have as much premium, you have bigger claims, and you have a problem. But then what does the 30% represent?

Let's use a simple example. Most VA annuities have a fixed account, and a fixed account doesn't provide any MGDB risk. In fact, it helps to alleviate MGDB risk. So you could have a situation where if a 20% drop is the magic number, but your fixed account is earning 7%, and half of the money was in the fixed and half was in something that looked like the S&P 500, then you can handle a drop in the S&P 500 of 47%. Everybody follow that?

So maybe you do have a portfolio with only two funds and you've got half of the money in fixed and half in something that's like the S&P 500. But you have to go a step beneath the surface here. Does that mean that every contract holder has put half of their money in the fixed and half in this other fund? If that's true, then what I've described is correct and you would purchase a put based on a 47% drop. But what if instead of having everybody half invested here and half invested there, you have half of your contracts invested in fixed and half of your contacts invested in the S&P 500? You still have the same overall allocation of account value, but

you have a very different situation as far as this risk. Because now you split your portfolio in two. You see, I don't care about these people on the fixed side, but all these people in the other fund could be a problem. For them, the 20% drop does end up being the magic number. Your fixed account is no longer subsidizing your variable account. So it's very tricky to know exactly how much notional and at what strike to buy for a put to cover this risk because you really have to understand the details of your book of business very well.

A further complication in buying a put is, what do you do with funds that are expected to track the S&P 500, but they don't? Well, the problem here is that you try to buy a put on the S&P 500, but your funds aren't going to move with the S&P 500. That produces what's called tracking error or basis risk.

Another problem with the put is the cash-flow burden. Most of the option dealers want all the money up front. That's what they prefer. Now there are ways to do it, where you don't pay all the money up front, but they don't prefer that. So if they don't prefer that, you can assume that you'll pay for the privilege of not doing that. For most variable annuity companies that already have a cash-flow burden, because you have to show the full premium in the account on day one and on day two, the agent is wondering where his cut is. To have to spend a significant amount of money to protect you forever from this risk creates a cash-flow burden.

It can also be expensive to purchase the put. Remember the movie "Trading Places" with Eddie Murphy and Dan Akroyd? One was a street guy and one was a trader, and the trader's boss decided to switch these two men and all of a sudden Eddie Murphy is trying to learn the trading business. At some point, a little light goes on in his head and he says to his new bosses, "it sounds like you guys are bookies." Then he understood trading. Like a bookie, you have to have a buyer for every seller. Unfortunately, there are not many sellers of puts so far out of the money, which means that the dealer may end up dealing with that risk a little differently than they're accustomed to.

Early terminations are also a problem. If you have to pay for everything up front, then it's fairly important what your termination assumptions are and who's going to be around in the years to come. You don't want to guess

wrong, but you have to acknowledge that it's very much a guess. Even if you know what your assumptions were, who's to say that those will pan out in the future. So it is difficult to use the theory in this case.

What I want to do is describe why MGDB risk can be managed well in the reinsurance setting, because there are some real reasons why this is a better risk at the wholesale level, which is where I'm at, than the retail level, which is where some of the ceding companies are.

First of all though, as Tom alluded to, reinsurance does allow you to get a guaranteed cost. You know exactly what this benefit is going to cost you and it does tend to be a long-term guarantee. It's not always a perfect guarantee, but it's very close for your purposes. We find this to be very important because, although it's great at differentiating your product and providing something for people to talk about in the field, the death benefit is a major distraction. Those of you in the variable business know that your mentality is similar to that of a mutual fund company, and you're just trying to accumulate as many assets as possible to make your spread. Reinsurance removes the distraction, allowing you to focus on accumulating assets.

As I said, this risk is better managed wholesale than retail. We talked before about some companies that might have only two funds. That's probably not real, but there are certainly companies that have ten. A reinsurer has hundreds of funds. We have a much better chance of our equity funds that are intended to mirror the S&P 500 actually doing so. Another item is dollar-cost averaging. Tom also alluded to people buying high, selling low. For you, for one company, that can be a real problem with the MGDB risk. If you introduce your product at a certain point in time, you try to make a big splash to get that product out and you may have great sales in your first year; but it may be very important to you to monitor exactly how the market performs during that year and in the next few years after that. For a reinsurer, we have our own version of dollar-cost averaging because we reinsure many companies at many times. Every time a new annuity is reinsured by us, it is bought in effect by us on a certain day, but we buy on all days throughout the year and that helps us.

The MGDB design is also important. We talked about roll ups, 3%, 5%, annual ratchet, seven-year ratchets, and return of premium. Most companies do not have an offering in each of those types of designs. A reinsurer will, because they assume business from so many companies that have the various designs. There will be times where a 5% roll up or even a 7% roll up seems like a very risky program, but I can tell you that every 7% roll up that we reinsured in 1994 we're really pleased with because the market has done so well. Does that mean that I'm pleased with every annual ratchet that I bought in 1994? No. So there's a time where certain designs under certain environments do better than others, and we're able to get the benefit of all of those.

Finally, there are economies of scale. Some of you went to one of the EIA sessions where my co-worker Inger Harrington was talking about reinsuring of EIA. She touched on something that we also see here. There are transaction costs that go on and the fact that a reinsurer can combine programs from many different companies and together go to the markets to purchase necessary derivatives is an efficiency.

On to another subject—product extensions, or packaging guarantees. That really is what the MDGB is about, allowing you to make a variable annuity sale to a customer who might be a little bit hesitant, especially because they don't want to leave their beneficiary with a problem if they should die when the market is not performing well. Now that guarantee, it's significant for everybody who dies, but that's not too many people. With EIAs, though, you don't worry about just the people who die, you package a guarantee for everybody. What you're really doing is just condensing the tails of a variable annuity. You generally don't do as well as a variable annuity when the market does well. You don't do as poorly when the market does poorly. So what it's really about is going to somebody who wants that up side and telling them that there's a guaranteed amount. They can't lose everything.

Another product extension is guaranteed income benefits on variable deferred annuities. The idea is to encourage annuitization. A company might offer to the purchaser a guarantee of a certain amount of money that they can annuitize. Usually that's at least seven years from now, or after the surrender period. But, at issue, you're allowing them to know that they have another guarantee. Now you can also suggest that's limited

because less than 1% of people agnations. But of course, the whole industry wants to change that. It may be that this type of a "guaranteed" feature will help to do that.

Another interesting product is variable life. If the funds do poorly, you don't generally reduce the face amount, you just have a greater net amount at risk. If you charge cost of insurance based on the net amount of risk, that's no big deal, but some companies don't want to do that. One prominent company currently has a program where there is an asset-based charge for mortality. So, this is similar to the GMDB, where if the account value should go down because of poor fund performance, the asset-based charge produces less premium to cover the risk. At the same time, the net amount of risk has been extended and it's a little bit larger. It's not nearly as leveraged as for the annuity, but it's real and it's there.

The last item on packaging guarantees relates to immediate annuities. Consider a variable immediate, which has some real appeal to people because they've seen how well variable products do and they know that variable products will provide some inflation protection. But at the same time, a month after that first payment comes, the next one could be half as large and that uncertainty hurts. So the concept of packaging a guarantee has become very prominent. It might work like this. If you want a guarantee that your monthly amount will never be lower than what it is initially, we can do that, but there's a cost to that. So if you got $1,000 without the guarantee, maybe you'll get $900 or $925 with the guarantee. But again, it's all about packaging the guarantee.