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Managing Variable Policyholder Behavior Risk

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Introduction

Variable insurance products such as variable universal life and variable annuity (VA) remain popular in the life insurance marketplace. Variable annuity assets under management exceeded the one trillion-dollar mark at year-end 2004. Guaranteed minimum benefits such as guaranteed minimum death benefits (GMDB) and guaranteed minimum living benefit riders are key selling points. These benefits are risky to insurers partly because contracts typically give policyholders great control of their policies. In particular, VA buyers control their asset allocation for VA subaccounts, as well as other behaviors such as annuitization, withdrawals and lapses.

There are many avenues open to insurers to manage risk — reinsurance, hedging, risk pooling, investment strategy, securitization and product design. In this article, we investigate managing one aspect of variable product risks — charging for policyholder behavior. A case study gives an example of managing risk in policyholders' asset allocation strategies through charging different

fees based on asset allocation on VAs with guaranteed minimum death benefit riders based on asset allocation.

The Challenge

Popular VA policies with minimum guarantee riders often charge level fees as risk premiums for the riders. Policyholders may allocate their assets to different subaccounts provided by insurers, and these various subaccounts have different returns and volatilities. By redefining rider design, a level fee structure can reduce anti-selection risk and other management challenges to insurers.

To illustrate, consider a VA contract with an annual ratchet GMDB design. Aggressive policyholders may allocate 100 percent of their assets to volatile assets such as equities. Under unfavorable scenarios, insurers are exposed to a significant net amount at risk. Conservative policyholders who allocate their funds to bonds may cost insurers much less under the same circumstances. Although policyholders do not voluntarily choose to exercise the GMDB option, they can keep their policies, maintaining the risk exposure to the insurer.

As another example, consider aggressive policyholders who switch to a conservative asset allocation after incurring an investment loss; they lock in the loss because of the lower (although less volatile) investment return. For VA with living benefit guarantees, policyholders may have more options, such as the right to decide when to annuitize or withdraw, and how much they want to withdraw. Savvy policyholders may choose to exercise options in a manner that is best for the policyholder, which could be the worst for the insurer.

Case Study

A case study of VA with GMDB was conducted by classifying policyholders' asset allocation strategies into five categories from conservative to aggressive. The resulting

mean returns and volatilities of these five strategies are shown in Table 1. The GMDB benefit is assumed to be the maximum of the account value at anniversaries or the initial deposit less withdrawals. We assumed the GMDB rider premium is 20 bps of account value regardless of policyholders' asset allocation strategies. We tested five new policies, one for each of the asset allocation strategies. One thousand scenarios of different asset returns were tested, and claim costs were calculated under each scenario. The

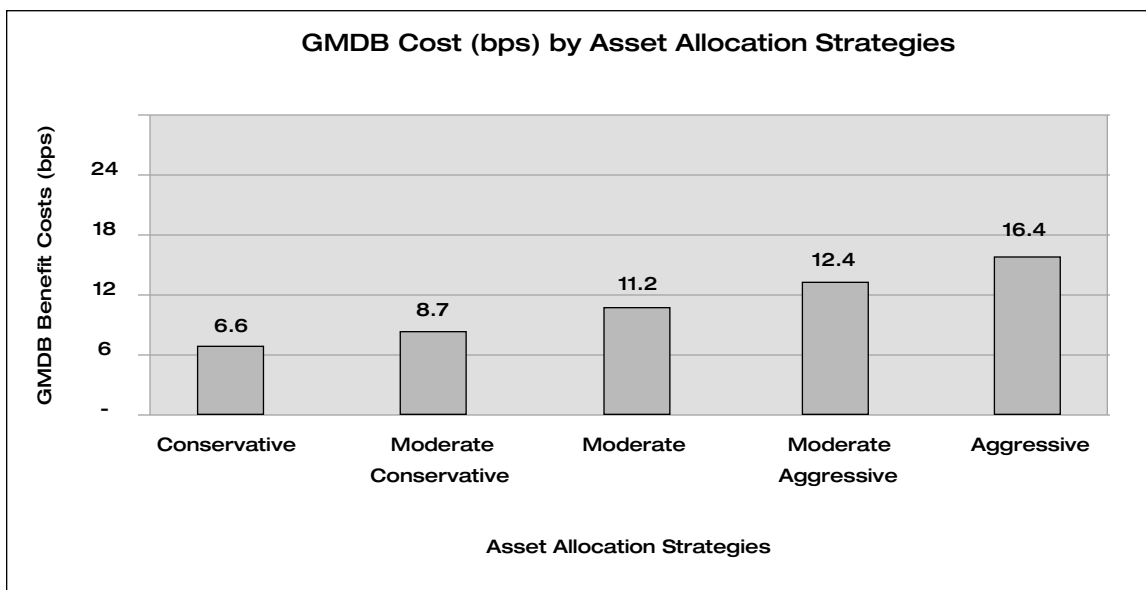
Conditional Tail Expectation at the 90th percentile (CTE 90) was also calculated for each asset allocation strategy.

The result (Figure 1) shows that annual GMDB benefit costs (in terms of basis points of account value) vary significantly by asset allocation strategies, as expected. Conservative policyholders incur only 6.6 bps annual cost, while aggressive VA buyers cost 16.4 bps, which is 2.5 times the cost incurred from conservative policyholders.

Table 1: Risk and return by asset allocation strategies

Asset Allocation Strategies	Mean Return	Volatility
Conservative	5%	6%
Moderate Conservative	7%	9%
Moderate	9%	11%
Moderate Aggressive	11%	13%
Aggressive	13%	16%

Figure 1: Annual GMDB costs (in basis points of AV) by asset allocation strategies



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From an option pricing perspective, these embedded minimum guarantees are options on the account value. The higher the volatility of underlying assets, the higher the cost of the option, all else being equal.

As C3 Phase II capital requirements are implemented, tail risk from embedded options becomes critical. C3 Phase II methodology uses CTE 90 as a measure of

a higher risk premium for their guarantees. At the same time, conservative policyholders should be rewarded for their less risky behavior to insurers by paying lower fees for the guarantees.

The case study continues with an alternative fee structure, intended to level the C3 components of RBC. We solved for fees to make the CTE 90 the same for all asset allocation strategies. The results are listed in Table 3 on page 7. Here we link the cost of the guarantee to the mean return and volatility of the strategy. Policyholders will be charged based on the corresponding weight on each asset type in their allocation strategy. Note the variable fees in Table 3 are correlated with the GMDB costs in Figure 1. If policyholders change their asset allocations, fees also change.

Revenue from aggressive policyholders under the variable fee structure is much higher than that under the level fee; this helps to bring up the negative present value of statutory surpluses, leading to capital requirement reduction under C3 Phase II. The situation caused by conservative policyholders is just the opposite. Based on the case study, using the variable fee structure does not have a strong effect on the average cost of the GMDB benefit, so the variable fees as tested here would result in larger average profits for the aggressive strategy (34 bps fee vs 16.4 bps cost) than for the conservative strategy (11 bps fee vs 6.6 bps cost).

One potential concern for insurers that retain level fees is that the variable fee structure may expose companies to anti-selection as policyholders who are intent on risky asset allocations choose level-fee companies. On the other hand, companies with variable fees may attract conservative prospective policyholders.

Conclusion

This case study shows that changing the guaranteed benefits' fee structure can be used to manage the risk in asset allocation associated with VA GMDB by aligning fees with costs and RBC C3 Phase II capital

Table 2: RBC C3 component as percentage of initial account value for GMDB with level fees

Asset Allocation Strategies	RBC C3 Component
Conservative	0.13%
Moderate Conservative	0.81%
Moderate	1.30%
Moderate Aggressive	1.77%
Aggressive	2.91%

the C3 component of risk-based capital requirements. We calculated CTE 90 as the average of the worst 10 percent of present value of statutory surpluses for the GMDB benefit. The case study shows that the CTE 90 is only 0.13 percent of account value for the conservative strategy, and it becomes 20 times as high for the aggressive strategy.

Facing The Challenge

Reinsurance, hedging, risk pooling, investment strategy and securitization have been used to transfer risk and reduce earnings volatility and RBC capital by insurers. Most of these tools accommodate, but do not reduce risks from policyholder behavior. For instance, hedging programs reduce RBC capital requirements and provide cash to offset benefit costs. Still, the cost of hedging itself can be highly variable based on policyholder asset allocations.

One example of product refinement is to assign different GMDB charges for different invested funds. For instance, the GMDB fee may be lower for a bond fund and higher for an equity fund. If policyholders are aggressive and want higher returns, they must pay



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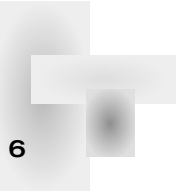


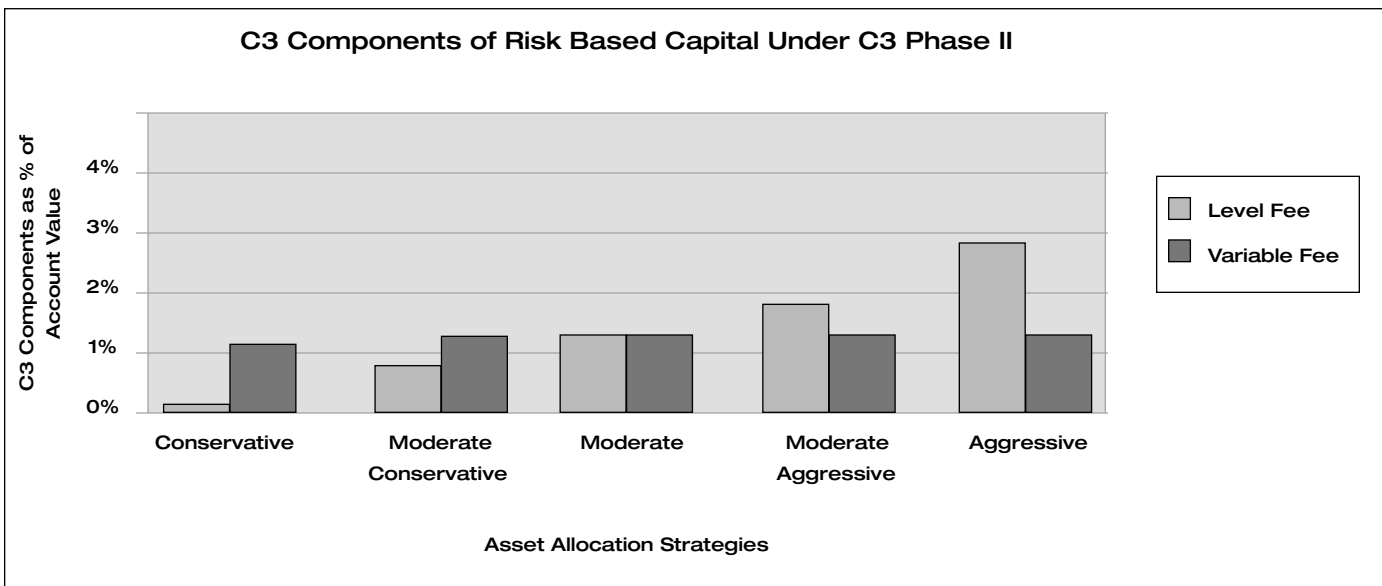
Table 3: Variable guarantee risk premium structure by asset allocation strategies

Asset Allocation Strategies	Level Fee	Variable Fee
Conservative	20 bps	11 bps
Moderate Conservative	20 bps	17 bps
Moderate	20 bps	20 bps
Moderate Aggressive	20 bps	27 bps
Aggressive	20 bps	34 bps



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Figure 2: RBC C3 component as percentage of initial account value for GMDB with different fee structures



requirements. Making rider premium a function of policyholder behavior, in this case asset allocation strategies, helps manage risks from policyholder behavior. □

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