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Insurance

Using Monte Carlo to Assess Variable Life

by Peter Katt, CFP®, LIC

Variable life (VL) insurance has various equity and fixed-income sub-accounts from which policyowners select for the investment of their policy's cash values. A life insurance policy investment strategy that uses primarily fixed-income instruments is best done via whole or universal life (WL or UL). On the other hand, VL policy expenses are high compared with WL and UL, so it makes sense to predominately select equity sub-accounts to reach for higher investment returns to recoup the higher expenses. Yet in this solution lies a serious problem. Returns for equities are volatile and unpredictable, with years of large gains and losses, and this combination of equity volatility and life insurance is a very bad mixture that I have written about on three prior occasions.

Insurance agents and buyers get their primary understanding about life insurance from illustrations provided by the insurance company. Illustrations show how a policy is *projected* to perform based on the premium pattern shown and pricing factors that remain constant throughout the illustration. The most important pricing factor is investment results, and equity volatility simply is not picked up in these illustrations because they require the use of yields. In addition to a constant yield that can be as high as 12 percent, illustrations require that a zero yield be shown. But my impression is that showing zero is so foreign to our investment view that it is utterly ignored by sellers and buyers, and serves no purpose whatsoever.

There are two types of death benefit designs that can be used. One has level death benefits from time of purchase until the policy matures. The other has low initial death benefits relative to the intended premiums, with death benefits expected to rise or fall as investment results are booked. We might think of this second death benefit design as a superfunded policy. In the case of the level death benefit design, the presale illustration informs buyers of the premiums needed to maintain a level death benefit policy. But this *knowledge* of premium costs is an illusion because of investment volatility. My December 2001 column focused on the need for a premium management system to handle this volatility for clients insisting on using level death benefit VL designs. Even in our expert hands, managing premiums for level-death-benefit variable life is challenging.

Enter Monte Carlo

Unfortunately, almost all sellers of VL haven't the vaguest notion of how inaccurate their illustrated premiums are. This is passed on to buyers who bond with these premiums that have no chance of being right. Buyers usually don't reassess this situation until disaster is about to strike.

To dislodge clients from their *loyalty* to the illustrated premium, last year our firm began routinely running Monte Carlo simulations to determine the chances a VL policy will fail if the illustrated premium is followed. To test VLs, we extract the tested policy's mortality and expense components, and its premiums, and apply an appropriate arithmetic average investment return with a standard deviation for investment volatility. For example, the average annual return for stocks from 1926 to 2003 is 12.4 percent with a standard deviation of 12.4 percent. For each test, 1,000 scenarios are run using random investment results based on the defined investment average and standard deviation.

Our Monte Carlo results are fascinating. For a recent client who had bought a level-death-benefit variable life with an illustrated target premium several months before hiring us, we found the probabilities of policy failure were 20 percent, 35 percent, and 48 percent based on average equity fixed-account yields of 12 percent, 10 percent, and 8 percent respectively. Further, we found that the average additional premiums needed on a present-value basis at the time of purchase were $250,000, $450,000, and $600,000 to prevent policy failure. This Monte Carlo analysis laid the foundation for the client to understand that a premium management system was needed for his VL because obviously we weren't going to sit by and hope for the best.

Assessing Superfunded VLs

Monte Carlo testing is also invaluable in assessing potential advantages and disadvantages using superfunded VLs. Tom's irrevocable trust has an income-producing asset that is used to superfund two life insurance policies (that is, policies having increasing death benefits). One is whole life and the other is VL. Tom had two requests of us:

1. More income than had been planned was available—what are the probabilities for *investing* the additional funds in whole life versus variable life?
2. Should he consider replacing the VL with another WL policy?

The WL policy's general portfolio has about 20 percent public and private equities and 80 percent fixed-income instruments, but its investment component of the dividend cannot produce a loss to the policy's cash values. VL investing is 100 percent equity sub-accounts. Using historical data and judgment, we assigned an arithmetic mean difference of 250 basis points between net yields for the WL (with 20 percent equities) and the VL, with a base case of 10 percent versus 7.5 percent, and a standard deviation of 20 percent for the VL.

Regarding the first question of probabilities for investing the additional funds this year, we found that there is a 65 percent greater chance that value will be provided by the VL policy with 100 percent equities. But we also found a 7 percent probability, by life expectancy, that the VL policy would fail.

As to the second question about whether it would be better to replace the VL with another WL (using the maximum wholesale design to keep selling expenses at their minimum) we found that the VL policy has a 53 percent probability of producing better value, but a 10 percent probability of complete failure. (The reason for the higher chance of failure versus the first question is because it assumes that the additional investment to the VL policy isn't made; therefore, there is a lower level of funding.) A 7–10 percent chance of failure with a superfunded VL is an extraordinary possibility and I think not at all understood by VL policyowners.

During our discussion of the Monte Carlo results, Tom wondered how the trust's VL *investment* could go to zero, thinking about equity investments not associated with VL. Equity investment volatility within life insurance has a negative synergy. The greatest internal expense of life insurance is the actual insurance cost, which is computed using the net amount at risk (NAR). NAR is determined by the difference between the policy's death benefit and its cash value. If the death benefit is $5 million and cash value is $2.5 million, the NAR is $2.5 million. For a 75-year-old male the cost of insurance is $60,000 with a $2.5 million NAR.

But let's say the cash value drops 30 percent, making the cash value $1.75 million and NAR $3.25 million. This increases the cost of insurance to $78,000. Not only have the earnings on the cash value gone down, but the policy's costs have gone up 30 percent. This is why even a superfunded VL can completely fail. The negative synergy of a lower investment base and at the same time higher costs is far worse for level death benefit designs, with chances of policy failure dramatically higher. (Policy failure can be avoided with the infusion of larger premiums, but for testing purposes only, one funding pattern is used.)

Litigation Support

Our firm does a considerable amount of litigation support in life insurance/annuity market misconduct cases. Two current cases deal with insurance agents replacing whole life policies with variable life because of representations that the policyowners could have more death benefit with less cost. In both cases, the representation was to transfer only the WL policy's cash values to *fully fund* the new VLs, with no more premiums needed. In both cases, a 12 percent constant yield was illustrated for policies with level death benefits.

Both have come apart because of significant stock market declines a few years after the transactions. Our Monte Carlo testing, using historical data from 1926 to the time each VL policy was bought, shows that there was a 65 percent chance of policy failure in one and 55 percent in the other. The agents dutifully illustrated the required constant yields, showing both 12 percent and zero. A defense used in such cases is that NASD (National Association of Securities Dealers) rules prevented Monte Carlo testing until recently. NASD Rule 2210(d)(1)(D), which has been modified, states, "Communications with the public may not predict or project performance, imply that past performance will recur or make any exaggerated or unwarranted claim, opinion or forecast. A hypothetical illustration of mathematical principles is permitted, provided that it does not predict or project the performance of an investment or investment strategy."

Certainly Monte Carlo testing is based on mathematical principles to determine the chances certain events will occur. It will be a significant miscarriage of justice if 12 percent constant yields are left standing as appropriate, while the far more sophisticated and accurate Monte Carlo testing is determined to have been out of bounds. It is hard to imagine a better tool for assessing the risk/reward balance of a specific financial transaction and to define investor suitability.

A tremendous number of variable life policies are underwater or have a significant chance of becoming so without policyowners or their advisors realizing it. Monte Carlo testing discloses the dramatic effect that equity volatility has on VL policies and has become a staple in helping our clients assess VL purchases and premium management strategies.

Peter Katt, CFP®, LIC, is a fee-only life insurance advisor and sole proprietor of Katt & Company in Kalamazoo, Michigan. His Web site is www.peterkatt.com.