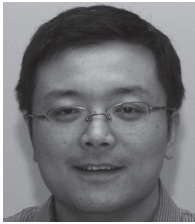


Interested in Being Interest-Sensitive?

By Hezhong (Mark) MA



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Long-term care insurance (LTCI) is usually not thought of as an interest-sensitive product. Policyholder behavior, such as filing or terminating a claim or lapsing a policy, is not believed to tie to certain economic triggers. Additionally, cash flows from policies that provide either cash or indemnity benefits are not seen as varying by economic environment.

Economic inflation, however, will generate claim inflation due to increases in the average amounts charged by care facilities. For most policyholders, the utilization rate (the ratio of benefit paid to the allowed benefit) of these benefits will generally start below 100 percent and rise later, due both to claim inflation and increased care needs. Holders of policies with reimbursement benefits would generally not use the maximum daily benefit at the early stage of care, either because they try to lengthen the policy's available coverage period or because the condition has not yet progressed to the point where the full benefit would be required.

In a hyperinflationary environment an LTCI claimant might start with a low utilization rate, but it will quickly reach the maximum daily benefit amount. Conversely, in a low-inflation environment, it will take longer for the utilization rate to rise from a low starting point to 100 percent. Based on this premise, LTCI product profitability will depend on the rate of claim inflation as well as the discount rate provided in pricing guidelines.

COMPARING TWO POLICIES

The benefit inflation protection option (BIO) plays an important role in how the discount rate and claim inflation affect the product's loss ratio, all other things being equal. We used two virtually identical policies to illustrate how the dynamic relationship of the claim inflation rate, the discount rate and the BIO rate affects the lifetime loss ratio for each policy. Both policies were issued to females, age 62, and provided at issue a three-year benefit period and a \$100 maximum daily benefit. The first

policy had a 5 percent compound inflation protection feature and the second, no inflation protection. Proprietary morbidity, mortality and lapse assumptions are used.

Each policy anniversary, the first policy's maximum daily benefit rises by 5 percent due to BIO, and the second policy's remains the same. Additionally, each calendar year, the benefit amount charged by the care facility will rise due to claim inflation. The utilization rate, again, is the ratio of what is charged by the facility to the maximum daily benefit.

For this example, we are assuming a starting utilization rate of 60 percent, meaning that the claimant will receive a reimbursement of 60 percent of her policy's maximum daily benefit for each day spent receiving long-term care services. Each year the utilization rate could rise or fall, given the relative movements of claim inflation and benefit increases, subject to a 100 percent cap.

In the first year, the average per-day payment for a claim for both these policies is \$60. Therefore, the utilization rate is 60 percent. If the claim inflation rate is 5 percent, then in the second policy year, the first policy's per-day reimbursement for the claim will rise to \$63.

Therefore, for the policy without the BIO, the utilization rate in Year 2 is 63 percent ($\$63 / \100). However, for the policy with 5 percent compound BIO, the utilization rate in Year 2 remains 60 percent ($\$63 / \105). For this example, the premium amount is selected to produce a loss ratio of approximately 55 percent at an inflation rate of 5 percent and a discount rate of 5 percent.

For each policy, we projected the lifetime loss ratios over a range of claim inflation rates and discount rates, and plotted the results for each policy in Chart 1 and Chart 2.

Unsurprisingly, at any given claim inflation rate, lifetime loss ratios for both policies decrease monotonically when the discount rate rises. At any discount rate, the lifetime loss ratio rises with a higher claim inflation rate assumption. Profitability for both policies drops dramatically as long as the rate of claim inflation is no more than the BIO rate plus a “buffer zone” of approximately 2 percent. When the discount rate goes higher, the loss ratio reaches a plateau and rises more slowly. In other words, losses are capped once the utilization rate reaches 100 percent. The size of the buffer zone will depend on the amount of time it takes for a policy to climb from the initial utilization rate, 60 percent in this case, to the 100 percent cap. Note that for the policy without inflation protection, we extended the z axis range (measuring the claim inflation rate) to 0 percent - 10 percent, in order to show the pattern.

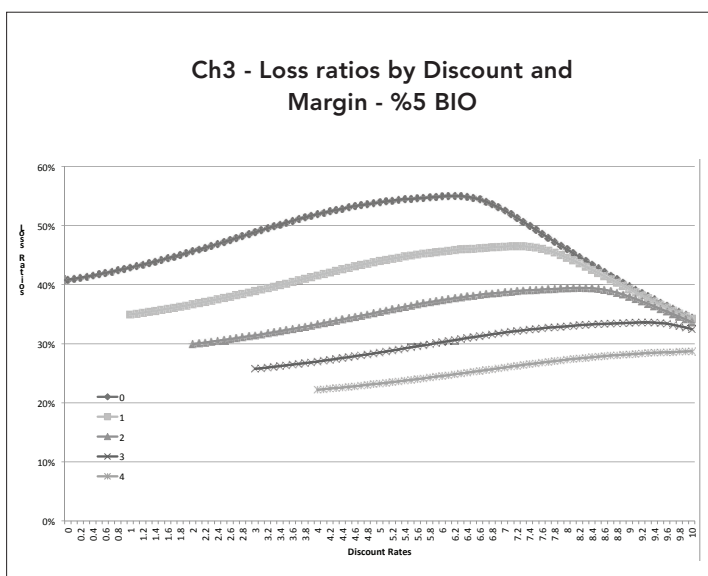
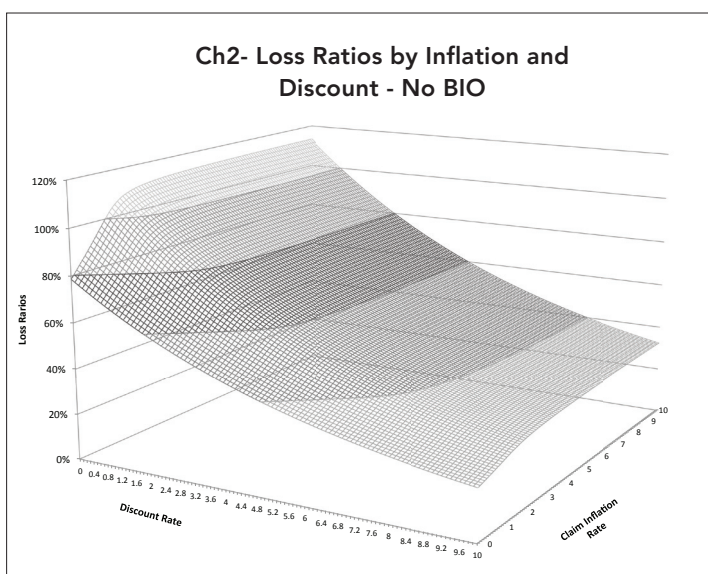
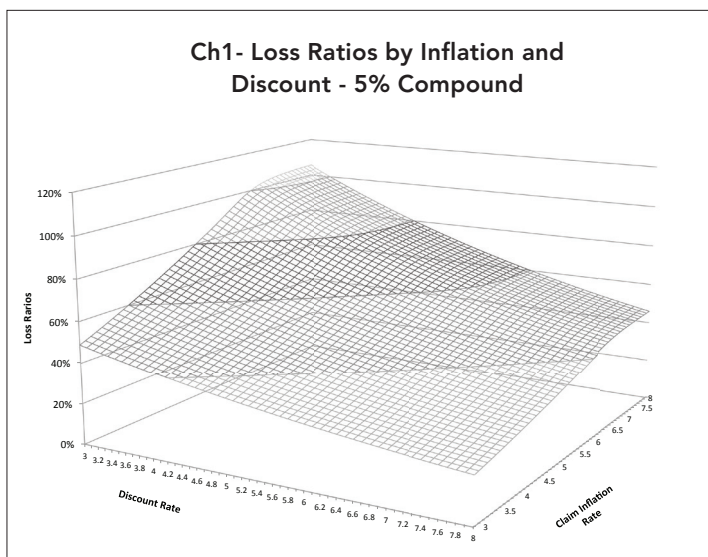
MARGIN BETWEEN DISCOUNT AND CLAIM INFLATION RATE

When examining loss ratios in terms of discount rates and claim inflation rates, it is tempting to think the loss ratios are somewhat constant as long as the difference between the discount rate and the claim inflation rate—that is, the “margin,” remains constant. Let’s examine this hypothesis by looking at Chart 1 and 2 from a different angle.

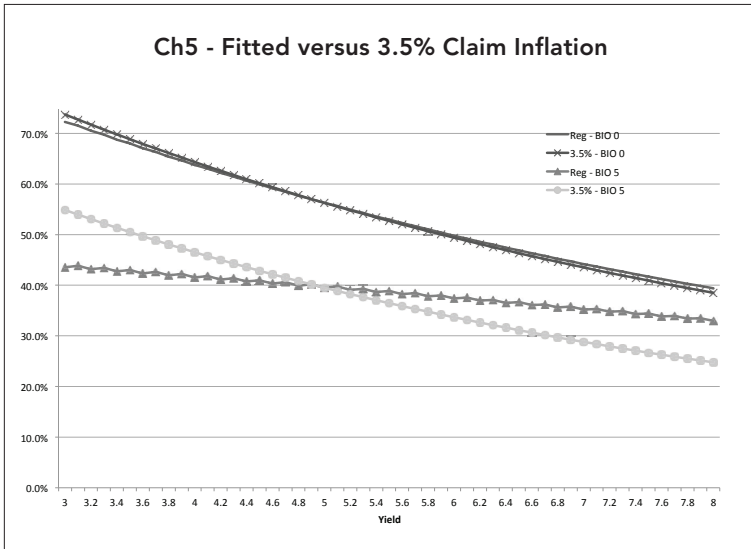
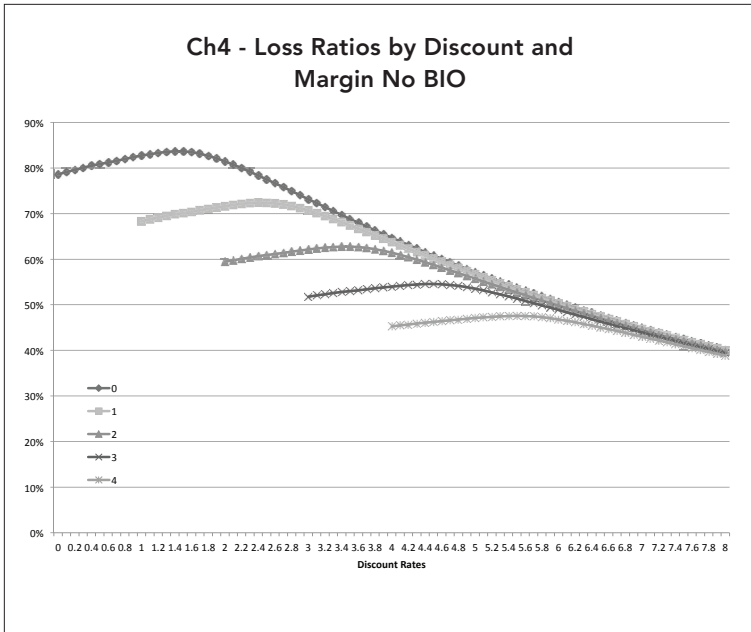
Charts 3 and 4 show loss ratios by discount rates, and the margins between the discount rate and the claim inflation rate.

If the margin dictates profitability, we should see level and parallel lines in the charts. But it does not appear to be the case. For the policy with the 5 percent BIO, the loss ratios shown in Chart 3 initially rise in a largely parallel fashion. When the discount rate goes above roughly 7 percent, the loss ratios start to converge and decrease. For the policy without the BIO, as shown in Chart 4, we observe the tail-end behavior earlier. The convergence and decrease started at low rates.

Thinking no BIO as a special case of BIO, we can generalize the observations. When the discount rate is below a certain level, which in the test cases ap-



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pears to be BIO rate plus approximately 2 percent to 3 percent, the loss ratio lines gradually rise. It suggests that the effect of the claim inflation outweighs the effect of discount rate on loss ratios. When the discount rate continues to rise, the loss ratio lines converge. In a high interest rate environment, the effect of the discount rate outweighs the effect of claim inflation on loss ratios. When the discount rate is very high, the utilization rate reaches the cap of 100 percent quickly, and the profitability is mostly driven by the discount rate. The loss ratios eventually decrease.

Therefore, the behavior of profitability depends on the level of BIO rate, discount and claim inflation rate. If the discount

rate is significantly higher than BIO rate, profitability is more sensitive to the discount rate selected. In a low interest rate environment, where the discount rate is low comparing to BIO rate, the claim inflation rate metric will frequently dictate the profit outlook for the LTCI product. In today's prolonged low interest rate environment, companies should monitor their claim inflation experience closely. This is especially important for carriers with significant exposure to policies with a benefit inflation protection feature.

INTERACTION BETWEEN YIELD AND CLAIM INFLATION

The claim inflation rate and the discount rate are both driven by the same economic factors. In a hyperinflationary environment, a policy's yield rate and claim inflation rate will be high, and vice versa. For the sake of argument, let's say the claim inflation rate = 1 percent + (50 percent x yield). Given this relationship, for each yield rate plugged into this equation, we can calculate a fitted value for the claim inflation rate and therefore find a loss ratio based on the projections we produced. As a comparison, we also provide lines corresponding to a constant 3.5 percent claim inflation rate.

For LTCI products, as yield rises, the loss ratio declines, as seen in Chart 5. However, when we model the dynamic relationship between yield, claim inflation and the benefit inflation protection option, we see that the loss ratio lines become flatter. The interest-sensitive nature of LTCI can produce narrower variances of the results and deflate the exaggerated duration (slope), especially for policies with inflation protection. Cash flow testing results across different scenarios would show convergence, and risk profile metrics would improve as well.

Are you interested yet in calling LTCI interest-sensitive? ■