A question of legacy

Measuring and managing behavioral risk in variable annuities
Executive summary

Volatility in the capital markets over the past 18 months wreaked havoc on the balance sheets of North American insurers with substantial variable annuity (VA) portfolios, as equity market and interest rate declines combined with volatility increases caused immediate damage to the capital bases of many large players. The recent market recovery has given executives and investors some reprieve from the fallout of the economic crisis. However, behind the much discussed capital markets risks lurk other insidious risks to insurer balance sheets: behavioral risks – and in particular, lapse rates.

When designing and pricing VA products, insurers had virtually no meaningful experience or data to estimate the effect of “in-the-money” guarantees on policy lapse rates. Consequently, expectations for lapse rates vary widely across the industry. For example, based on their experience with Guaranteed Minimum Death Benefits (GMDB), many insurers assume that up to 50% of policyholders will lapse their policies at the end of the surrender charge period, a so called "shock-lapse" assumption¹. With over $200 BN of guaranteed variable annuity business due to exit surrender charge periods over the next two years, insurers will gain knowledge rapidly about whether these costly policies will runoff as expected through the “shock lapse” assumption, with little impact on reserves and capital; or if they will persist, with policyholders making more optimal use of their guarantees, leading to significant capital contributions.

On an economic basis, we estimate that the potential balance sheet impact of an adverse experience relating to the “shock-lapse” assumption could be on the order of $5 BN by the end of 2011². To put this in perspective, this is approximately 10% of total industry general account reserves for living benefit guarantees. Should this adverse scenario unfold, it will slowly, but surely, erode the capital position of many leading variable annuity writers who would have to post reserves and capital for the policies they had expected to lapse. Conversely, players who have taken a more conservative approach to assumption-setting may see substantial improvements in capital and earnings over time.

¹ The “shock lapse” assumption is the expected high rate of policy lapse at the end of the policy surrender charge period when customers are first able to turn over policies without incurring any monetary penalty.
² Economic basis defined as the risk neutral or mark-to-market value of the product, including guarantees.
Lapse rates are only one of several behavioral risk factors whose dimensions will become apparent in coming years and which will drive financial performance. For example, policyholder guarantee utilization, particularly among “old style” income benefits and lifetime withdrawal benefits, is another major source of financial uncertainty.

While some of these outcomes are difficult to predict, today the industry remains woefully underinvested in understanding, quantifying and communicating the behavioral dynamics of VA books. The large differences in industry behavioral assumptions we have observed are symptomatic of continued uncertainty in expectations, which can lead to sub-optimal decisions across all aspects of the business including hedging, in-force management, product design and pricing. Furthermore, this lack of understanding has nearly frozen reinsurance and other secondary market activity, both of which are potentially valuable risk management tools in this period of capital uncertainty.

We see two imperatives for the industry to better manage behavioral risks:

First, executives should obtain a clear, quantitative understanding of the magnitude of uncertainty and explore options for improving their assessment of behavioral risk timing and dynamics. For too long insurers have focused resources and attention almost exclusively on the fast-moving market risks for variable annuities, disregarding the material risks of lapse and guarantee utilization. Just as the banking industry has devoted teams of quantitative analysts to develop mortgage prepayment rate models, insurers should go beyond the backwards-looking experience studies of policyholder behavior and develop predictive analytics. This process could start with simple and inexpensive empirical surveys of both advisors and policyholders to allow insurers to gain additional insight on the underlying forces that drive behavior.

Second, executives need to incorporate these insights into both their approach to managing the existing business and their new business strategies. New business planning, hedging, in-force management and product design should all take account of policyholder behavior, and behavioral risk should be an important factor in capital planning.
What are behavioral risks?

In addition to the performance guarantee (living benefit) on the underlying separate account funds, owners of variable annuity contracts sold in the last few years – and the advisors who influence them – enjoy flexibility, or optionality, regarding the use of their living benefit guarantees. Table 1 details these options.

**Table 1: Summary of policyholder guarantee options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lapse or full surrender</td>
<td>Policyholders may terminate their guarantee by lapsing their policy (or cancelling the rider).</td>
</tr>
<tr>
<td>Utilization (timing and magnitude)</td>
<td>The policyholder may decide when and how much of the guarantee he wishes to exercise. For example, on a Lifetime Withdrawal benefit this would involve how long to wait before commencing withdrawals and whether or not to take the maximum amount (or excess of the maximum) allowed by the guarantee.</td>
</tr>
<tr>
<td>Investment fund selection</td>
<td>Policyholders can choose how to invest their money across fund options with varying risk profiles</td>
</tr>
</tbody>
</table>

These options create risks for insurer balance sheets because the policies are valued assuming varying levels of “optimal” behavior. While assuming some level of sub-optimal or “irrational” behavior is nothing new to insurers, the specific challenge with variable annuity guarantee behavior is the assumed degree of sub-optimal exercise of options. For, unlike the assumptions in term life valuations that draw upon decades of historical policyholder data, assumptions for VA policyholder behavior are based on scant data. The risk to insurers is not whether policyholders are “rational” but whether they are more or less rational than the subjective assumptions of rationality embedded within VA reserve and capital levels.
How do behavioral risks differ from market risks?

Lapse and utilization risks – the two most significant policyholder behavior risks – differ from market risks in several ways.

First, unlike market risks, which affect the capital and earnings of an insurer via external factors, such as movements in equity prices and interest rates, behavioral risks can occur independently of any outside force or event. Insurers experience the impact of behavioral risk when policyholders manage contracts differently than insurers expect. As a consequence, behavioral risk is greatest when insurers expect a flurry of policyholder activity, particularly “irrational” activity such as the surrender of a valuable in-the-money guarantee.

The implication of this risk dynamic is a concentration of behavioral risk exposure into specific phases of contract life, such as at the end of a surrender charge period when many policyholders decide whether or not to surrender the policy. Other types of behavior, such as guarantee utilization, emerge 5-10 years post-issue as policyholders decide whether or not to utilize various guarantee provisions. Exhibit 1 illustrates the emergence of behavioral risks for a typical Lifetime Withdrawal Benefit product.

Exhibit 1: Timeline of variable annuity risk emergence

Second, the magnitude of the lapse and utilization risk exposure can be compounded by movements in the equity markets and interest rates.

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3 Economic circumstances can affect policyholder behavior. However, the risk to insurers arises from mis-estimating the extent of policyholders’ reactions to the economic circumstances.
rate levels, which impact the “moneyness” of the policies. As Exhibit 2 demonstrates, the impact of lapse mis-estimation on reserve is much more significant for a policy that is “in-the-money” than one which is “at-the-money”. Pre-crisis, the vast majority of variable annuity guarantees were at-the-money. The policyholder decision not to lapse the policy was not a significant factor because the guarantee was inexpensive to fund. However, with policy account values well below the potential value of their embedded guarantees, these risk factors now play a far greater role in determining product profitability.

![Exhibit 2: Relative reserve impact of variable annuity risks based on guarantee “moneyness”](image)

Third, many behavioral risks do not affect financial results as rapidly as market risks. As the recent financial crisis demonstrated, movements in markets – particularly equity markets – affect balance sheets almost immediately due to the impact of in-the-money guarantees on reserves and capital requirements. Policyholder behavior risks, by contrast, affect financial results through slower-moving experience deviations and assumption changes. 4, 5

Finally, behavioral risks are not as well understood as market risk. Risk measurement techniques for market risk have benefited from years of research into risk management across a wide-range of industries – not so with behavioral risks. Perhaps this reason more than any other explains why this class of risks – whose materiality arguably is far greater than market risk in today’s environment – attracts significantly less management and investor attention than market risk.

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4 Adverse deviations occur when a policyholder’s action differs from what is expected, for example when a policy does not lapse when forecasted. Although such deviations result in an immediate financial impact through reserves, they do not affect the entire portfolio at once, as does a fall in equity markets.

5 Assumption changes occur when a pattern of adverse deviations necessitates a revision to previous assumptions. This can result in a one-time, often significant financial impact, such as a write-down of Deferred Acquisition Costs. The concentration of guarantee business due to exit surrender in the current difficult environment makes this risk unusually large, as explained in the next section.
The coming reckoning with insurer lapse assumptions

Behavioral risks, and in particular lapse risk, have one similarity to market risk: the magnitude of its potential impact on balance sheets. The aforementioned concentration of in-the-money guaranteed business due to exit surrender in the coming two years creates an unusually large industry exposure to lower-than-expected lapse rates. In order to understand the potential impact of the lapse exposure, Oliver Wyman conducted a survey of the major variable annuity writers’ lapse assumptions used in pricing, hedging and valuation. The variation in results was consistent with our observations when working with insurers over the past few years: the industry is far from a consensus on what to expect.

Exhibit 3: Variation in assumed policy lapse rates due to guarantee “moneyness”

As Exhibit 3 shows, estimates of the policyholder response to the “moneyness” of guarantees vary widely. For business that is 30% in-the-money – as with much of the business in-force today – estimates of the reduction in lapse propensity due to the “moneyness” vary from 20-75%. With the great similarity of distribution channels and client demographics, it is implausible that such a wide range of expectation can be explained by the subtle variations across product designs. In essence, insurers are making very different assumptions with regard to behaviors in their annuity books.

6 Source: Oliver Wyman industry survey.
The impact on balance sheets will be significant. When a policy lapses, reserves and capital that can support future obligations are released. Should an expected lapse fail to occur, the reserves and capital to support the obligations must be maintained and funded immediately, with no opportunity for smoothing or other delays to slow the recognition of the impact. Exhibit 4 illustrates how lower-than-expected lapses can lead to a significant increase in reserves.

**Exhibit 4: Reserve impact of lapse mis-estimation in “shock lapse” period**

The math behind Exhibit 4 is simple: today’s expectation of the year-end reserves reflects an assumption that 33% policyholders will lapse and require no reserves one year from now. If the lapse rate is only 20% – an equally plausible outcome – the reserve requirements would increase by 20% (from 2,010 to 2,400), a direct reduction in surplus.

In ordinary times such mis-estimations may have a minimal impact on profitability. However, these are not ordinary times, for two reasons:

- The substantial obligations attached to now in-the-money contracts which increases the reserve intensity of a given policy
- The unprecedented volume of over $200 BN of living benefit sales exiting surrender by the end of 2011
As Exhibit 5 shows, the volume of business exiting surrender does not subside with the arrival of 2012. Indeed, this volume is likely to increase through 2014. We simply stop counting beyond 2012 because the “moneyness” profile of the business becomes less certain.

Thus, the industry faces a two-year period (2010-2011) in which:

- A new and highly critical assumption will be put to the test
- The test applies to over $200 BN of guaranteed business exiting surrender
- The impact of this test will be recognized on balance sheets immediately

Our analysis suggests that a typical policy exiting surrender today has a statutory asset requirement of approximately 10% of the original premium. However, these values are sensitive to future market performance. In Exhibit 6 we show our estimate of the impact of lapse mis-estimation on insurer balance sheets across a range of S&P 500 equity return scenarios:

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7 Source: Oliver Wyman analysis of historical sales volumes and guarantee election rates.
8 Assumes a 65-year-old policyholder whose guarantee is 30% in-the-money, has a 7% compound roll-up rate and a 6% withdrawal rate to be utilized at age 70.
### Exhibit 6: Potential impact of lapse mis-estimation on insurer balance sheets

<table>
<thead>
<tr>
<th>Balance sheet impact</th>
<th>Guarantee sales exiting surrender</th>
<th>Lapse mis-estimation</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>~200 BN</td>
<td>10%</td>
<td>1,250</td>
</tr>
<tr>
<td>× Assumption error</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× Reserve/capital intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{B/S impact} = \text{Reserve and capital} \times \text{Lapse mis-estimation} \times \text{Guarantee sales exiting surrender} \times \text{Assumption error} \\
\text{B/S impact} = \text{Reserve and capital} \times \text{Lapse mis-estimation} \times \text{Guarantee sales exiting surrender} \times \text{Assumption error} \\
\]

<table>
<thead>
<tr>
<th>S&amp;P 500 = 1,250</th>
<th>B/S impact: 1.0 BN</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500 = 1,000</td>
<td>B/S impact: 2.0 BN</td>
</tr>
<tr>
<td>S&amp;P 500 = 800</td>
<td>B/S impact: 5.0 BN</td>
</tr>
</tbody>
</table>

As Exhibit 6 shows, even if only 10% fewer policies lapse than expected, the industry will experience a loss – a so-called “adverse experience deviation” – of between $1 BN and $5 BN depending on the path of markets. Moreover, this analysis reflects only the error in the assumption actually experienced during the two-year period through 2011. Any further assumption changes regarding lapse expectations beyond 2011 – and which often follow adverse experience – could more than double the loss estimates. While not solvency-threatening, this could depress the ROE of these businesses for many years into the future.

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9 Source: Oliver Wyman analysis.

10 For example, a decline in the S&P 500 level to 800 would increase the reserve and capital intensity of the business exiting surrender to approximately $50 BN ($200 BN x 25%). A 10% lapse overestimation would then require an additional $5 BN (10% x $50 BN) in reserves and capital.
What can be done to manage behavioral risks?

Many insurer risk management frameworks classify behavioral risks as “non-hedgeable”, suggesting that they cannot be mitigated. Influencing policyholder behavior is indeed difficult. Policy conversion offers and distribution incentives are the only direct means of influencing behavior, and they are fraught with reputational concerns. Nevertheless, we believe insurers can do better at managing behavioral risks. Specifically, they should set three objectives in this area.

1. **Improve behavior modeling and forecasting capabilities**

   Most insurers have little or no ability to forecast behavior, let alone the potential ramifications for the balance sheet of any behavior mis-estimations. Additionally, most existing industry assumptions are based on the judgment of pricing actuaries and consultants without access to meaningful data or analysis. A “silver lining” of the crisis for variable annuity executives is the sudden availability of data that can be used to improve assumptions and forecasting. Insurers can utilize this data at little expense in two ways:

   - **Develop predictive modeling capabilities.** Most insurers today employ backwards-looking actuarial experience studies that compare only the behavior outcomes to the assumption. We think insurers should augment these studies to create forward-looking analytical models that reflect the drivers of various behaviors.

   - **Survey distribution channels and advisors.** With client and advisor turnover at historic highs and compliance functions at many distributors erecting barriers to 1035 exchanges, surveys focused on distributors can provide insights into future behavior.

2. **Integrate behavioral risks more fully into risk management protocols**

   Behavioral risk continues to be, at best, an afterthought to market risk when measured by the attention devoted to it by senior management, its prominence in internal and external risk disclosures and its representation in hedging and capital planning. We think this is a mistake. Given how radically deviations in behavior can alter balance sheets, insurers should take steps to improve their integration of behavioral risks into reporting and operations:
Develop behavioral risk metrics and communication materials, both for internal risk reporting and public investor and rating agency disclosure. Today most metrics have no associated confidence interval and are not well decomposed, if they are presented at all.

Reduce hedge costs by relaxing the market-risk exposure tolerances within hedge programs. Many insurer hedge programs transact within tight market risk tolerances, often at significant transactional expense. Given that reasonable different views on behavior can affect “Greeks” by over 50% of their value, we think transacting within such a tight range wastes valuable risk management dollars on reducing GAAP earnings volatility without meaningfully reducing the actual risk profile of the portfolio.

Incorporate behavioral risks into capital and new business capacity planning. Our experience suggests that many major variable annuity writers do not incorporate behavioral risks into the stress tests that dictate new business capacity analysis, despite the material impact it can have on available capital in the short-term. We think major VA writers should explicitly consider the perfect storm of lower than expected market performance and lower lapse rates when allocating capital.

3. **Revive the variable annuity reinsurance market**

The reinsurance market has been paralyzed by both a perceived asymmetry of information between insurers and potential counterparties and a lack of confidence in the behavioral assumptions on both sides of the negotiating table. With an improved understanding of customer behavioral dispositions, we think insurers could drive the resurrection of this market. This would in turn help to spread behavioral risks across parties, provide relief from onerous capital and reserving requirements, help to clean-up balance sheets and allow for a return to normal business conditions.
Conclusion

Annuity business leaders must prepare for the next wave of financial impacts from variable annuity businesses. Investor confidence in the industry's ability to write and manage profitable VA products has rebounded but remains fragile. Another crisis in variable annuity risk management could devastate support for a product line considered to be the engine of growth for much of the industry in the coming years.

Executives can perform a simple self-assessment to measure their readiness for and awareness of behavioral risk exposure. We think insurance executives at major VA companies should be able to answer each of the following questions:

- Which of my in-force blocks are most exposed to behavioral risks?
- How conservative are my lapse and utilization assumptions relative to peers? Relative to experience?
- What would be the impact on earnings and capital through 2012 if lapse rates for guaranteed businesses fall 25% and 50% below expectation? How does market performance affect this impact?
- What is the transaction cost incurred via the dynamic hedge program? By how much would this expenditure decrease if market exposure tolerances were doubled?
- More broadly, how should I incorporate the uncertainty around behavior in the design and execution of my hedging strategies?
- Do I have a business plan if behavior is worse than expected over the coming years?

In order to address these questions properly, insurers must have capabilities to forecast behavior robustly, communicate their behavioral risk exposures and incorporate behavioral information into pricing and capital planning. With over $200 BN of now in-the-money guaranteed business facing insurers who write and manage the long-term retirement income business, now is the time to ensure these capabilities are firmly in place.
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