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Measuring Benefits of Variable Annuity Volatility Management Techniques

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The fallout from the global financial crisis significantly altered both the perception of investment risks faced by policyholders approaching retirement and the management of balance sheet risks arising from equity-based guarantees written by insurers. In the wake of the crisis, insurers launched three broad solutions to manage their balance sheet exposures without upending the client proposition for investing in such products. These solutions include:

Asset transfer programs	Insurer-driven programs that reallocate client discretionary funds to bond funds based on the in-the-moneyness of contracts.
Volatility-managed/risk-control funds	Fund features that dynamically rebalance allocation to equities depending on a target or trigger level of realized volatility.
Market-linked rider fees	Fee feature that adjusts the level of rider fees tied to a prevailing market index, e.g., volatility index or U.S. treasury rates.

What remained uncertain is the benefits and risks of these solutions to both policyholders and insurance companies. In a recent white paper we developed metrics to gauge the benefits of these solutions to both groups.

Insurers introduced an array of volatility risk management solutions to address the above objectives. Solutions broadly fell into three categories: asset-transfer programs (ATP), risk-control or volatility-managed funds, and market-linked fees and benefits.

ATPs manage risk by reallocating client discretionary funds based on contract in-the-moneyness. Risk-control funds, which encompass a broad range of fund strategies, adjust positions in response to market signals of risk.

Capped volatility programs engage when market volatility exceeds a pre-defined volatility “cap.” In such instances, the equity allocation of the fund is maximized under the constraint of maintaining the capped level of fund volatility. If market volatility falls below the volatility cap, the original fund’s equity allocation is restored. The goal of this fund is to leave the traditional static allocations intact except during periods of crisis or other times of elevated uncertainty.

Similarly, a target volatility strategy sets a pre-defined fund volatility target that remains constant in the fund’s investment lifetime. The equity allocation of the fund is routinely adjusted to ensure the fund is performing at or near its desired volatility level. When market volatility is low, the fund increases equity allocations beyond long-term target allocations, and when market volatility is high, the fund reduces equity allocations below these target allocations.



The capital preservation strategy (also known as self-hedging) extends the target volatility mechanics. It uses futures and other derivatives to mitigate the risk of the fund following market declines—in this case by simulating the return impact of a put option holding. Because the mitigation of the fund occurs after a decline in market returns, the changes in asset allocation trail changes in market returns.

Market-linked fees, a more recent product innovation, seek to provide risk management by linking rider fees to movements in key market drivers. Most common market-linked fee structures include VIX-indexed features that link rider fees to the VIX, a market index reflecting implied volatility, and U.S. treasury (UST)-indexed features that link roll-up or payout rates to UST yields.

ANALYSIS OF SOLUTIONS

The rapid adoption of volatility management solutions left insurers with little time to assess implementation and communication challenges, which were important to the product proposition for clients and their advisors. Insurers experienced

three broad categories of challenges: performance benchmarking, loss of “upside potential,” and lack of clarity of investment thesis.

Performance benchmarking—insurers were unable to define suitable benchmarks for funds that had a risk-control overlay and often assigned improper benchmarks—including the use of the S&P 500 for funds with equity allocations closer to 60 percent. Clients who were “oversold” on the benefits of volatility management held false expectations of the level of risk-and-return potential, resulting in dissatisfaction during the bull market equity returns. The lack of transparency caused investors to blame “underperformance” of any type on risk-control features.

Loss of “upside potential”—in the recent bull-market, the risk control overlays in certain cases resulted in lower equity ratios and allocations, which in turn caused under-performance. This phenomenon is applicable mostly to risk-control funds, but similar issues are observed to varying extents with asset-transfer programs and market-linked fees. Regardless, as risk-control features lost money, they also started falling out of favor.

Objective	Metric	Description and evaluation	Insurer concerns
Write profitable business	Guarantee cost (GC)	<ul style="list-style-type: none"> Definition: risk-neutral GC at issue, defined as PV of rider fees less PV of guarantee claims Evaluation standard: percent reduction in “volatility cost” (difference in GC between static 60/40 and 100 percent cash fund); higher percent reduction better 	<ul style="list-style-type: none"> Do the risk controls reduce the hedge cost (risk neutral value) of the guarantees?
Stabilize ALM and hedging performance	Hedge ratio	<ul style="list-style-type: none"> Definition: efficiency with which the position is hedged Evaluation standard; percent change in PC of total cash flows given 1 percent decrease in volatility; lower hedge ratio percent reflect improved efficiency 	<ul style="list-style-type: none"> Do the volatility management strategies improve key hedge ratios (in particular Vega)?
	Hedge-ability	<ul style="list-style-type: none"> Definition: dispersion in liability value changes due to equity movements Evaluation standard: cumulative hedge P&L losses over 2008 and 2008; lower losses are better 	<ul style="list-style-type: none"> How well do the risk-control strategies minimize hedge P&L Losses in crises?
	“Basis Risk”	<ul style="list-style-type: none"> Definition: realized effect of tracking error produced by imperfect knowledge of investment positions Evaluation standard: proportion of time that weekly equity allocation changes are non-zero (illustrated for risk-control funds only); lower proportion of non-zero changes reflects less tracking error 	<ul style="list-style-type: none"> Can our risk management and hedging groups effectively mirror the changing fund positions?
Optimize capital requirements	Reserve impact and volatility	<ul style="list-style-type: none"> Definition: portfolio values in “tail” of distribution Evaluation standard: real-world conditional ail expectation at the 70th, 90th and 98th percentiles; lower losses reflect better “tail” performance 	<ul style="list-style-type: none"> Do the funds reduce statutory reserve requirements (and volatility of reserves)?

In the wake of the crisis, insurers launched three broad solutions to manage their balance sheet exposures, but we note that several challenges emerged with these solutions that no single risk control solution adequately could address completely.

Clarity of investment thesis—clients and advisors have been providing feedback that indicates a growing skepticism and concern over investing savings in “black box” solutions. Clients are unable to distinguish risk-control features that are balanced in terms of client/insurer interest from highly insurer-centric strategies that do not provide credible standalone investment theses.

An insurance company has three principal objectives in the manufacturing of equity-based guarantee products:

We can broadly express the performance and risk trade-offs that clients consider in purchasing equity-based guarantee products through two principal objectives:



Objective	Metric	Description and evaluation	Client and advisor concerns
Maintain investment upside potential	Return and volatility characteristics	Definition: historical fund returns net of fees and historical realized volatility Evaluation standard: returns relative to realized volatility over certain periods	Do the solutions materially alter the overall investment proposition? Do the solutions provide compelling back-testing?
	Long-term equity allocation	Definition: equity allocation over time Evaluation standard: average allocation to equity historically; higher allocations maximize return performance	Do the funds produce permit sufficient “upside potential”? Can the funds be adequately benchmarked?
	Cumulative fees paid (applies to VIX-indexed fee strategies only)	Definition: cumulative fees paid relative to a traditional static fund Evaluation standard: fees assessed historically, and prospectively (PV of fees as percent of PV of benefit base)	How much additional fees are required for the risk-control features?
Minimize impact to guarantee value	Guaranteed income levels	Definition: guaranteed withdrawals for a policyholder age 70 with issue age of 55 Evaluation standard: assessed historically (\$000’s) and prospectively (percent) relative to a \$100K initial premium	Do the funds maximize guaranteed income in retirement?

	Objective	Metric	Measure	Static 60/40	ATP	Capped volatility	Target volatility	Capital preservation	VIX-indexed fees
Insurer perspective	Write profitable business	Guarantee cost	Reduction in “volatility cost” of guarantee	N/A	62%	15%	61%	94%	26%
	Stabilize ALM and hedging performance	Hedge ratio	Vega—impact of a 1% reduction in volatility (% premium)	0.53%	0.25%	0.40%	0.12%	0.03%	0.36%
		Hedge-ability	Stability of hedge P&L (2008 hedge gain/loss)	4.2%	-1.3%	-1.5%	~0.0%	+0.6%	-3.0%
		“Basis risk”	% of weeks that have a non-zero equity allocation change	N/A	N/A	4%	48%	99%	N/A
Client perspective	Maintain investment upside potential	Return and volatility characteristics	<ul style="list-style-type: none"> • 2000–2009: <ul style="list-style-type: none"> – Returns -0.37% – Volatility 12.92% • 2010–2017: <ul style="list-style-type: none"> – Returns 6.19% – Volatility 8.65% 	-0.37%	N/A	-0.25%	-0.55%	-0.06%	-0.73%
		Long-term equity allocation	<ul style="list-style-type: none"> • Average allocation to real investments <ul style="list-style-type: none"> – 2000–2017 60% – 1970–2017 60% 	60%	N/A	59%	55%	33%	60%
		Cumulative fees paid	<ul style="list-style-type: none"> • (Historical) Average fees (1970–2017) • (Prospective) Fees paid <ul style="list-style-type: none"> – Average 100 – 75th %-ile 100 – 25th %-ile 100 	100	N/A	100	100	100	101
	Minimize impact to guarantee value	Guaranteed income levels	<ul style="list-style-type: none"> • (Prospective) Initial withdrawal rate of <ul style="list-style-type: none"> – 5% 8.8% – 5.5% N/A 	8.8%	8.7%	8.8%	8.4%	8.1%	8.8%

CONCLUSIONS

We summarize the results of the table on page 35, but we note that several challenges emerged with these solutions that no single risk control solution adequately could address completely.

Analysis of five common volatility management solutions in the marketplace highlight considerations relevant for insurers contemplating the introduction, augmentation, or removal of risk-controls in their products. These key considerations are as follows:

- Risk-control features provide material risk management benefits, albeit to varied extents, and their removal must be considered strongly.
- The type of market environment affects the effectiveness of risk solutions. All risk-control features are effective in the “body” to an extent, but risk-control funds and asset-transfer programs are the most effective in “tail” scenarios. VIX-indexing solutions provide insufficient protection in volatility “spikes.”
- More invasive risk-control overlays—such as capital preservation and target volatility—have historically experienced

the greatest challenges due to lack of performance transparency and persistent benchmark deviation. VIX-indexed and capped volatility funds historically have minimally affected investment performance.

Given the rapid adoption of volatility management solutions within VAs and their adoption in the broader marketplace, we anticipate continued interest in these controls and a push by insurers for innovative solutions that overcome challenges while providing significant risk management benefits. ■



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