

Equity-Based Insurance Guarantees Conference

Nov. 6-7, 2017

Baltimore, MD

Variable Annuity Volatility Management:
An Era of Risk Control

Berlinda Liu

Sponsored by



Variable Annuity Volatility Management: An era of risk control

EBIG Conference
7 November 2017 (1030 – 1200 hours)

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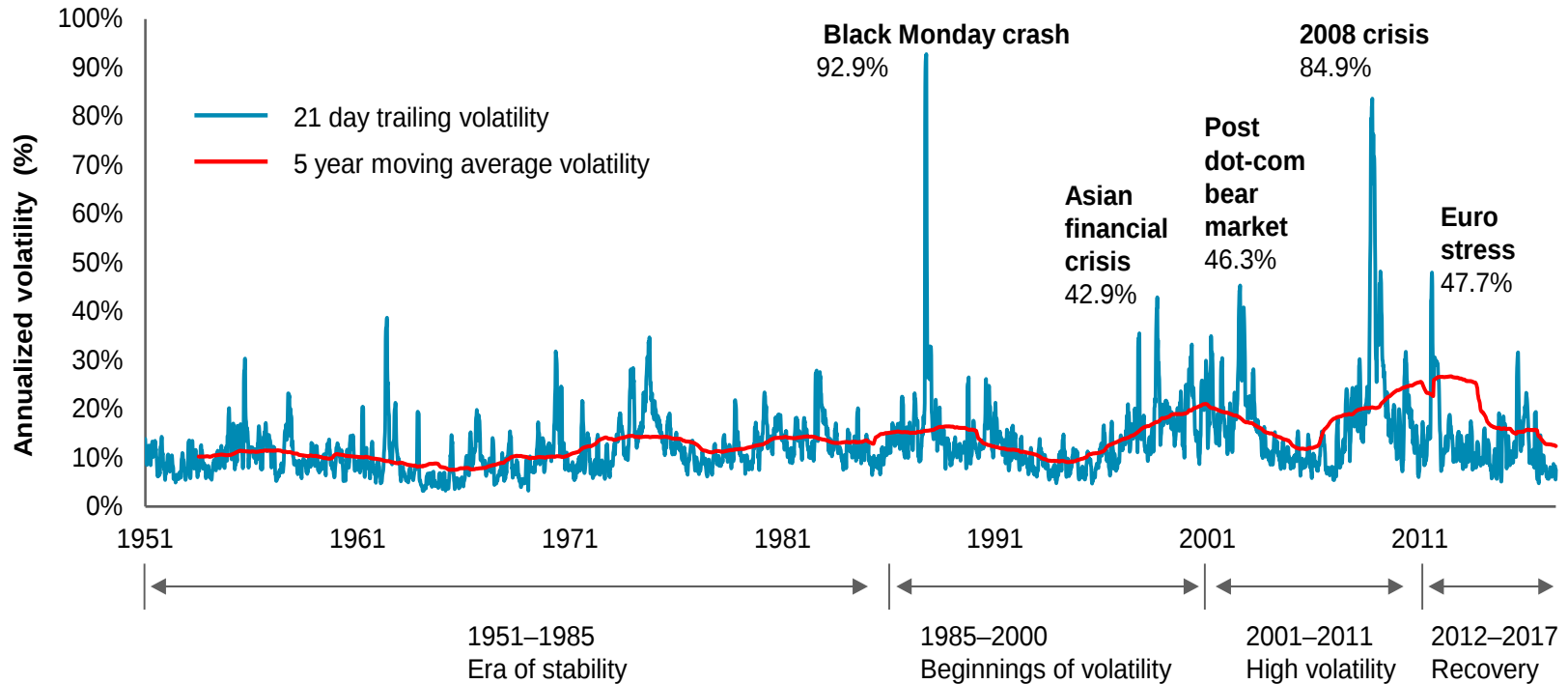
Agenda

- Recent trends in market volatility
- Analytical results of existing solutions
- Next generation of volatility management solutions

Recent Trends in Market Volatility

A New Era of Market Volatility

Realized Volatility of S&P 500 (1951 – 1H2017)



Mean	11.2%	13.9%	18.7%	11.8%
Proportion of days with >25% volatility	2.3%	4.6%	19.3%	1.5%

Source: Oliver Wyman.

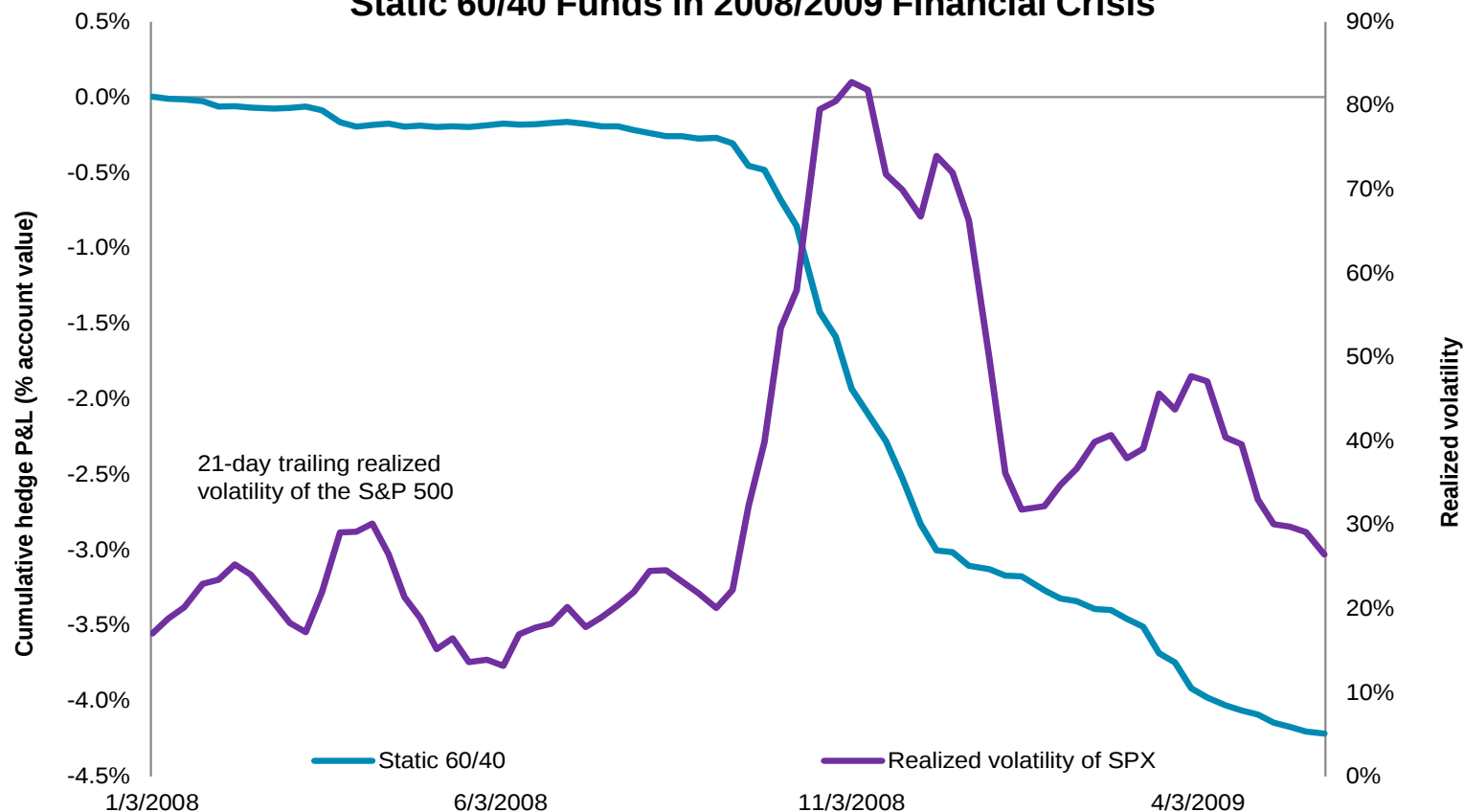
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Gamma Volatility Loss of 60/40 Funds

Simulated Delta Hedge Program Performance of Static 60/40 Funds in 2008/2009 Financial Crisis



Source: Oliver Wyman.

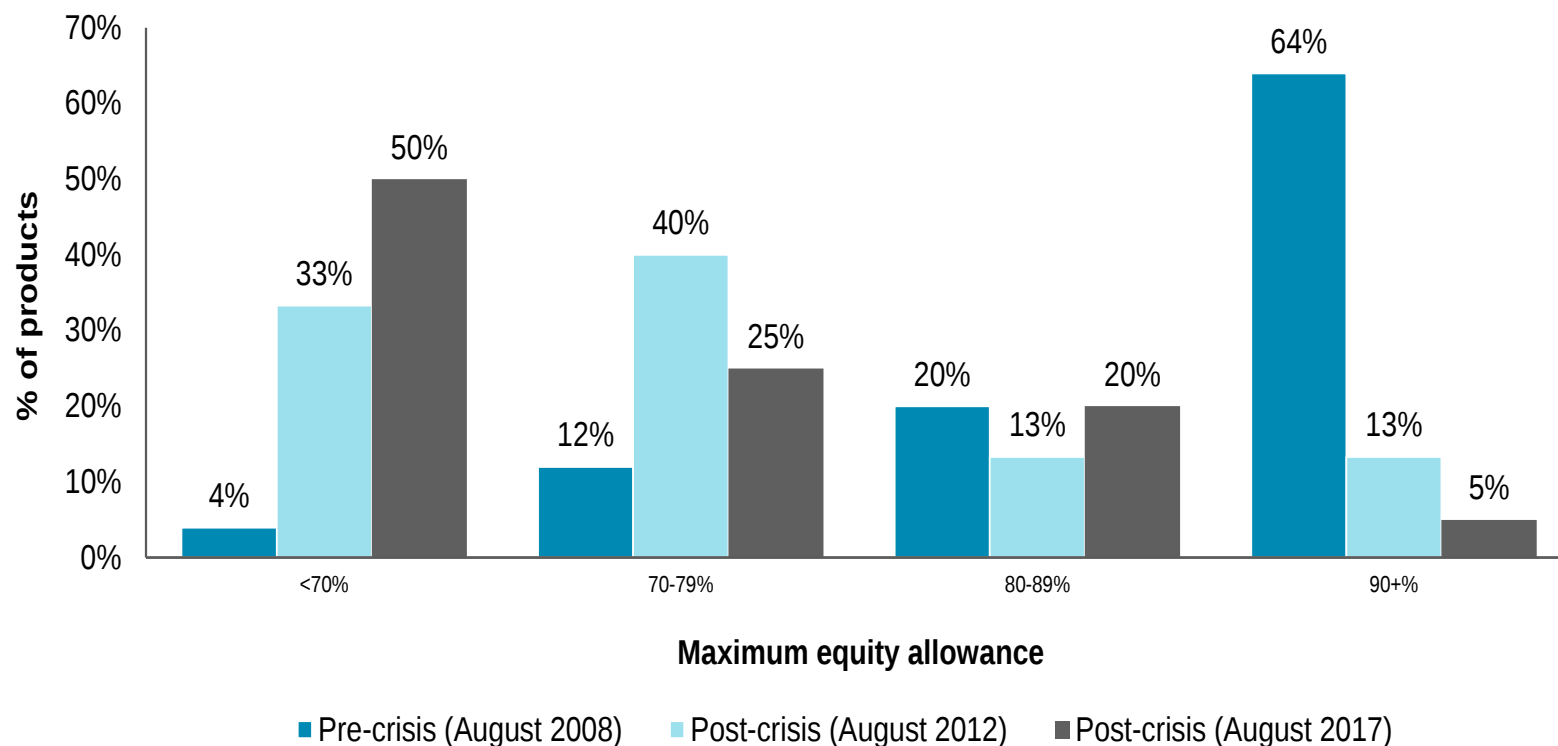
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Decreased Appetite for Equity Risk

Change in Maximum Equity Allowance of
Guaranteed Income Products



Source: Oliver Wyman.

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Innovative Volatility Management Solutions

		Performance objective of fund	Peers using solution
Asset transfer program		Re-allocate client discretionary funds to bond funds based on in-the-moneyness of the contract; transfers occur at a defined ratio of account value to benefit base (AV / BB)	Prudential Financial AXA Equitable
Volatility targeting	Capped volatility	Cap the expected volatility of fund returns at a defined level, e.g., realized volatility not to exceed 30%	AXA Equitable
	Target volatility	Target a specific and constant level of volatility of fund returns, e.g., targeting 15% volatility	Most VA manufacturers
	Capital preservation	Fund risk position declines if prior performance is poor, or positions are used to 'hedge' changes in the cost of the company's guarantees	Milliman funds
Market-linked	VIX-indexed fees	Target rider charge based on prevailing level of VIX Subject to (i) ceiling, and (ii) floor	AIG Lincoln Financial (previously)
	UST-indexed	Target rider charge or other features (e.g., roll-up and/or payout rates) based on prevailing level of 10-year US treasury	Pacific Life

Source: Oliver Wyman.

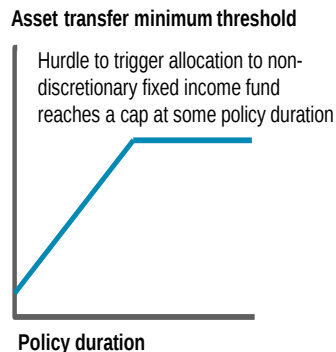
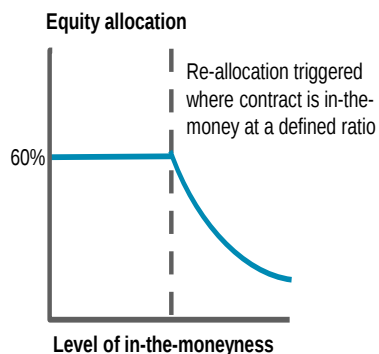
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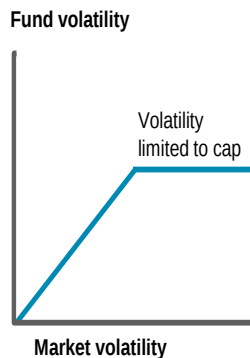
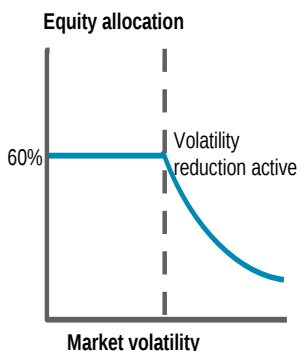
Illustration of Risk Control Solutions

Asset-transfer program (ATP)

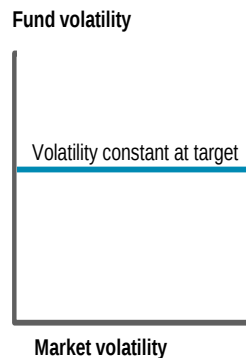
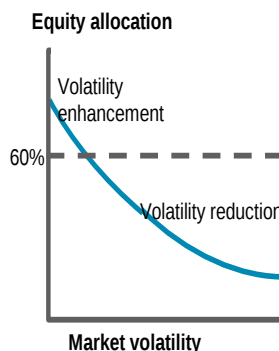


Volatility management / risk-control funds

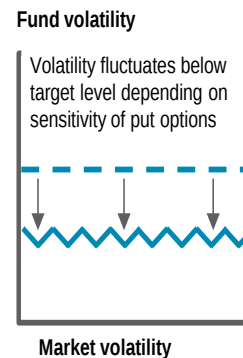
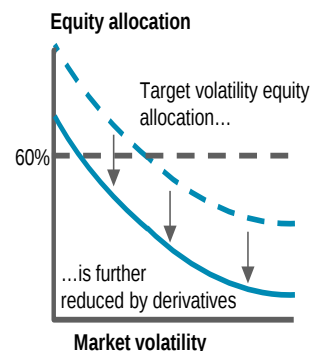
Capped volatility fund



Target volatility fund



Capital preservation fund



Source: Oliver Wyman.

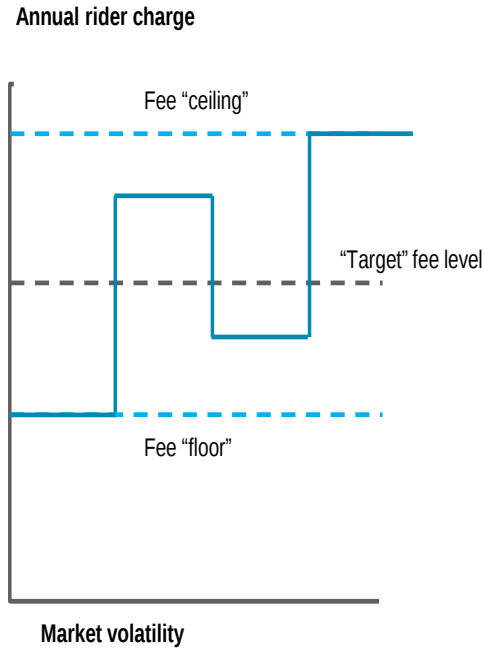
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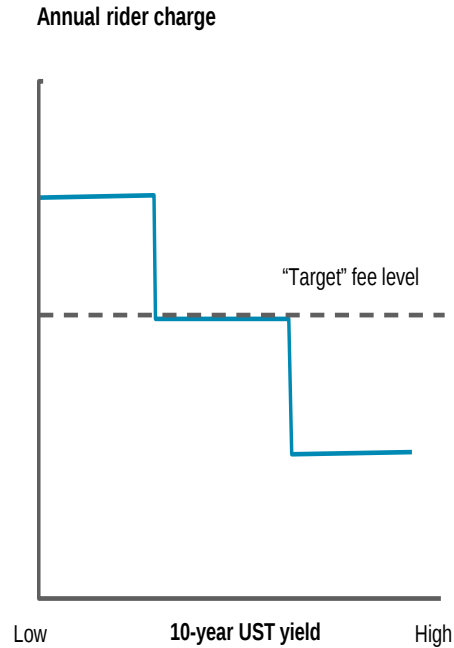
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Illustration of Market Linked Fee Solutions

VIX-indexed fees



UST-indexed fees



Source: Oliver Wyman.

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Challenges of Existing Solutions

- Performance Benchmarking
- Loss of “Upside Potential”
- Clarity of Investment Thesis

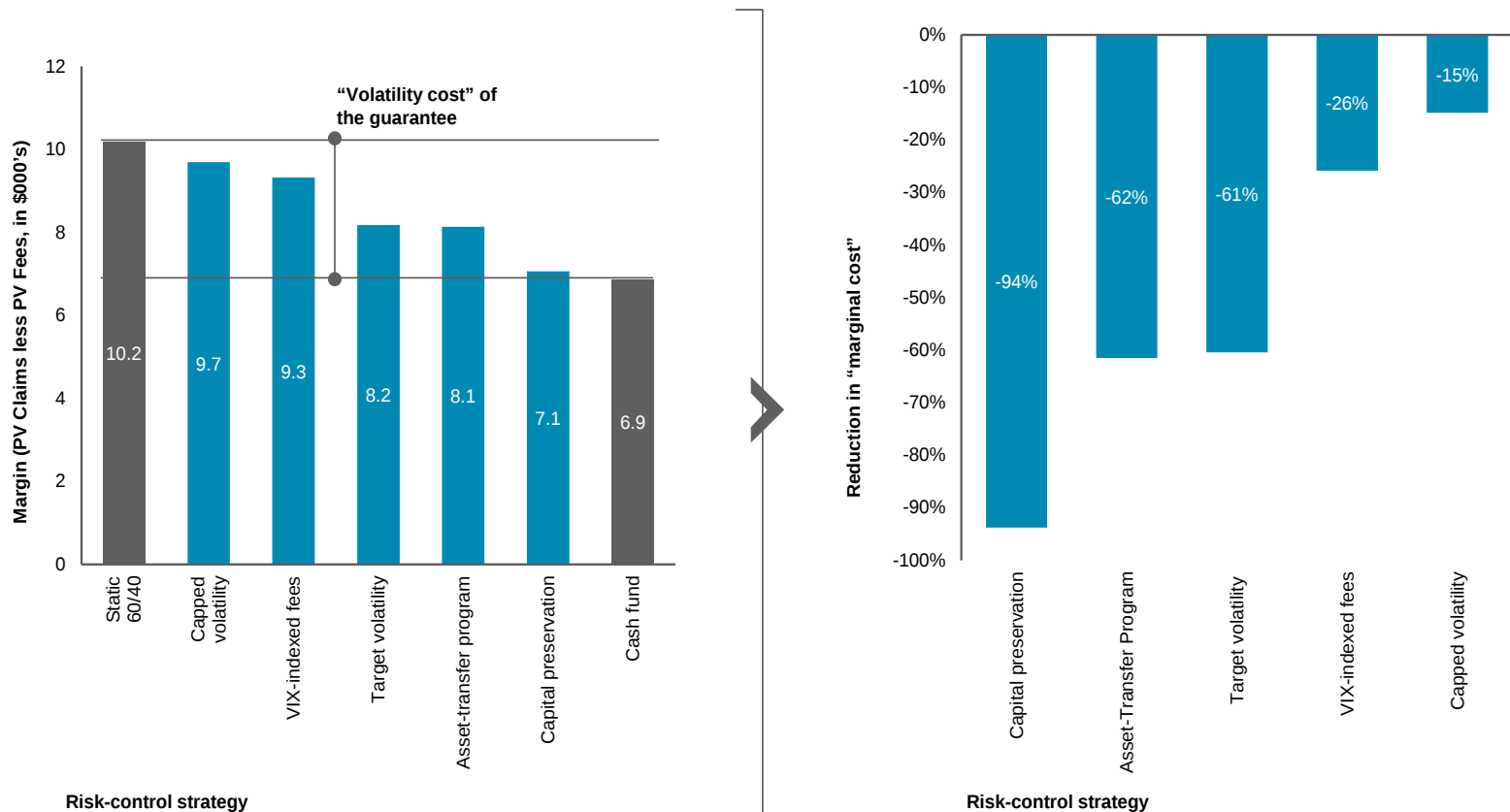
Analytical Results of Existing Solutions

Analytical Framework of Evaluation

- Insurer Perspective
 - Write profitable business
 - Stabilize asset-liability management and hedging performance
 - Hedge ratio
 - Hedge-ability
 - Basis risk
 - Optimize capital requirements
- Client and Advisor Perspective
 - Maintain upside potential
 - Return and volatility characteristics
 - Long-term equity allocation
 - Cumulative fees paid (VIX-indexed fee)
 - Minimize impact to guarantee value

Insurer Perspective: Impact on Guarantee Cost

Reduction in Volatility Cost of the Guarantee



Source: Oliver Wyman. All information presented is back-tested. Charts and tables are provided for illustrative purposes. Back-tested performance is hypothetical performance created with hindsight. Actual returns may differ from, and be lower than, back-tested returns. Index performance does not reflect fees or expenses. Please see the Performance Disclosure at the end of this presentation for more information on the inherent limitations associated with back-tested performance. .

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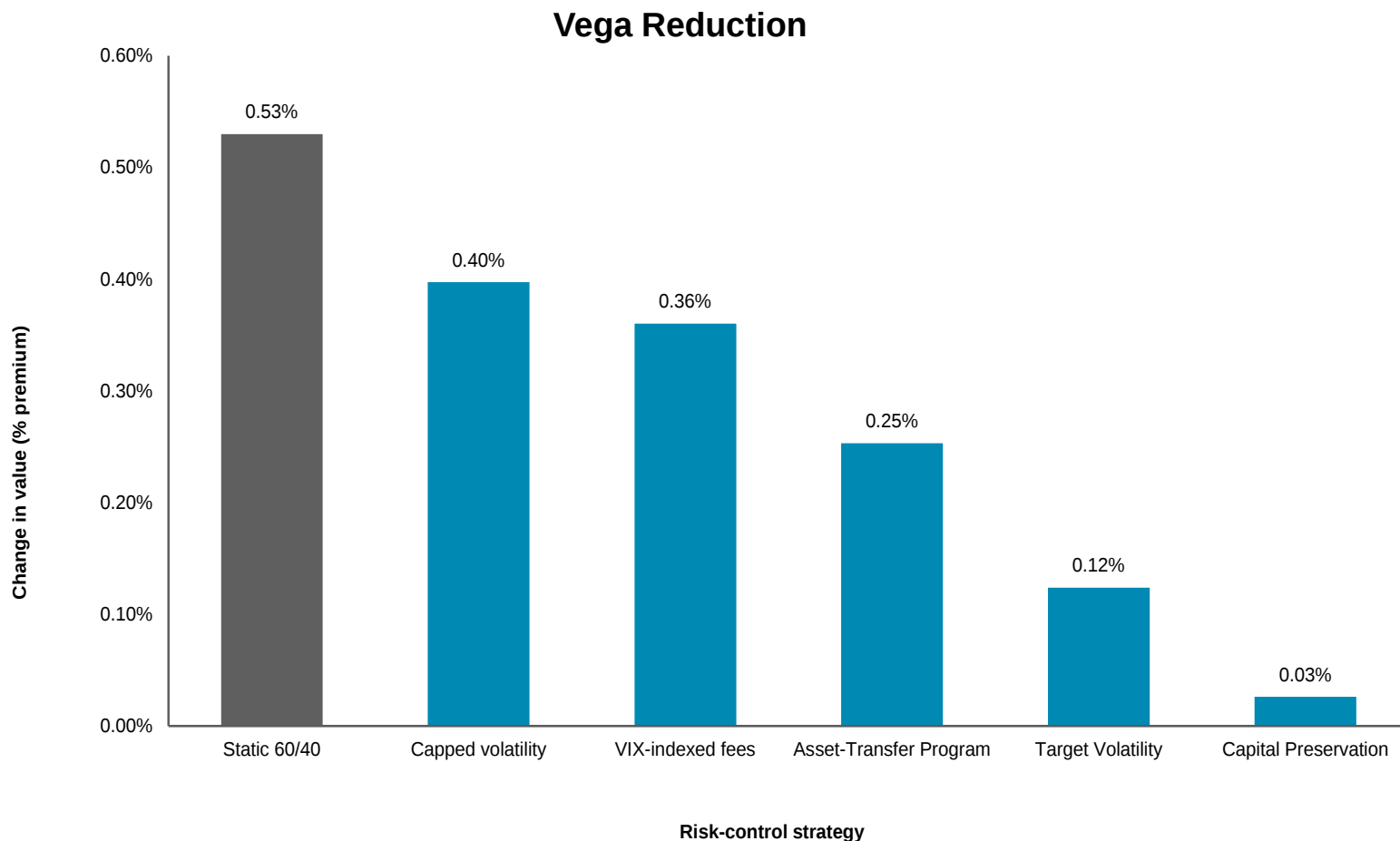
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Insurer Perspective: Impact on Hedge Ratio



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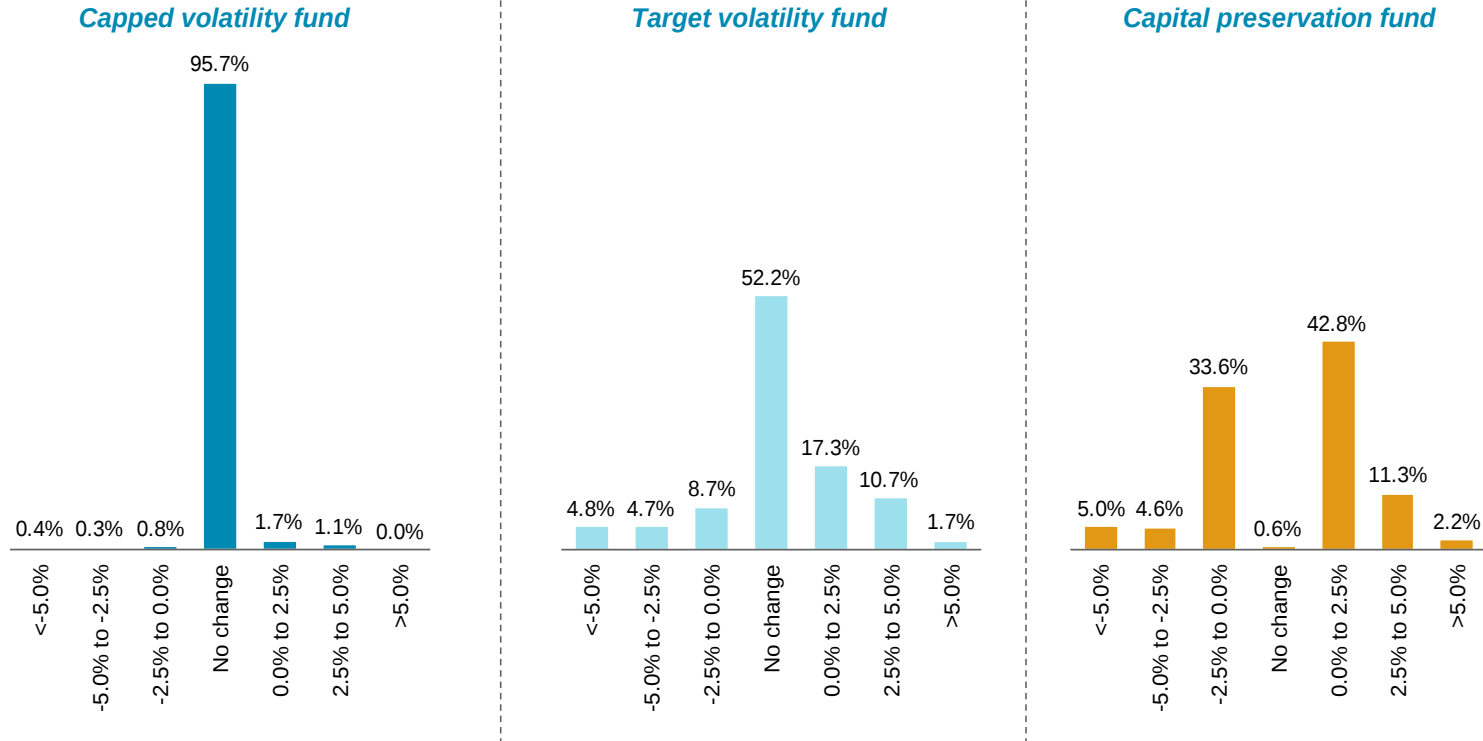
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Insurer Perspective: Impact on Basis Risk

Weekly Change in Equity Allocation (1970 – 1H2017)



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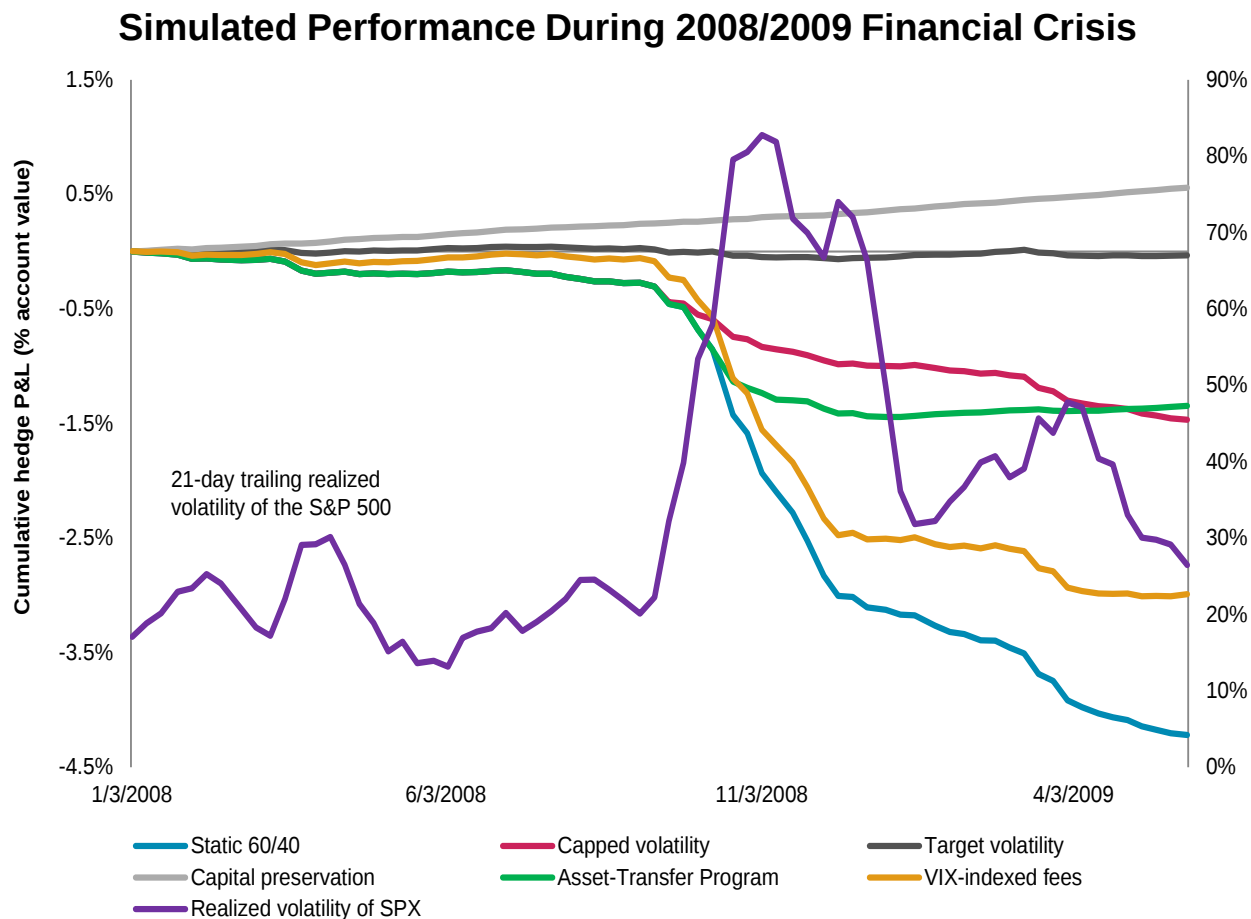
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Insurer Perspective: Impact on Hedge-Ability



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Insurer Perspective: Scorecard

Objective	Metric	Measure	Static 60/40	ATP	Capped volatility	Target volatility	Capital preservation	VIX-indexed fees
Write profitable business	Guarantee cost	Reduction in “volatility cost” of guarantee	N/A	62%	15%	61%	94%	26%
	Hedge ratio	Vega – impact of a 1% reduction in volatility (% premium)	0.53%	0.25%	0.40%	0.12%	0.03%	0.36%
Stabilize ALM and hedging performance	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

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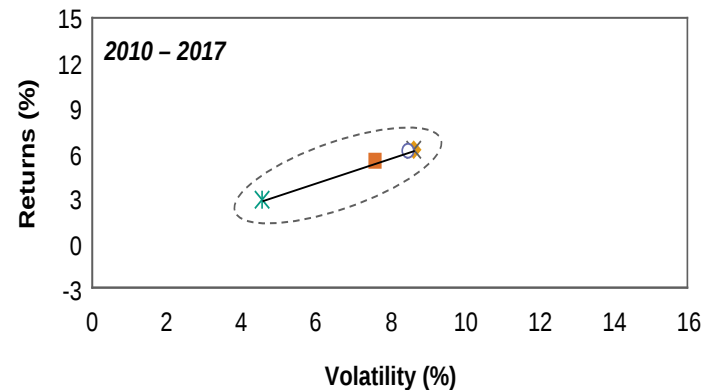
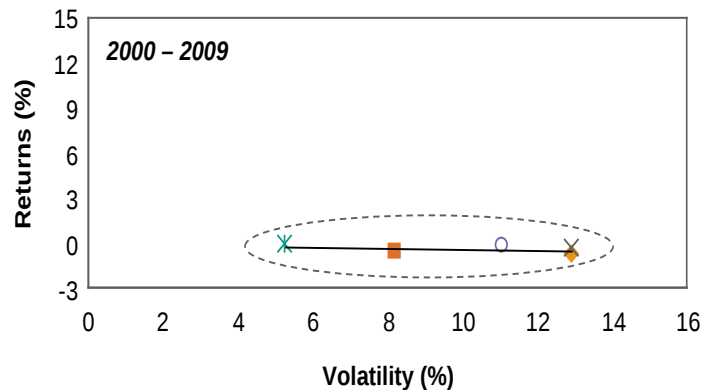
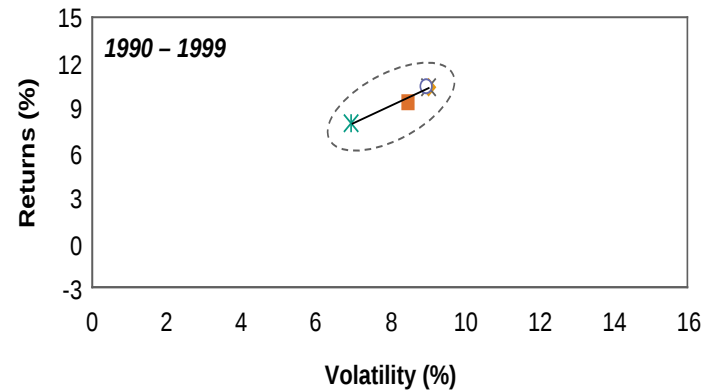
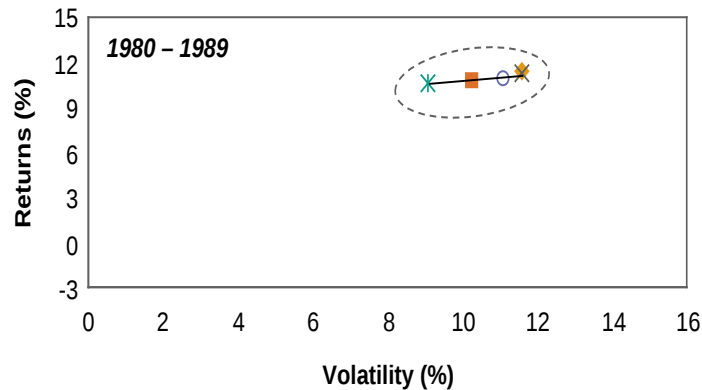
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Client Perspective: Impact on Return & Volatility

Historical Annualized Returns and Volatility

◆ VIX-indexed fees ✕ 60/40 Static ○ Capped volatility ■ Targeted volatility ✕ Capital preservation



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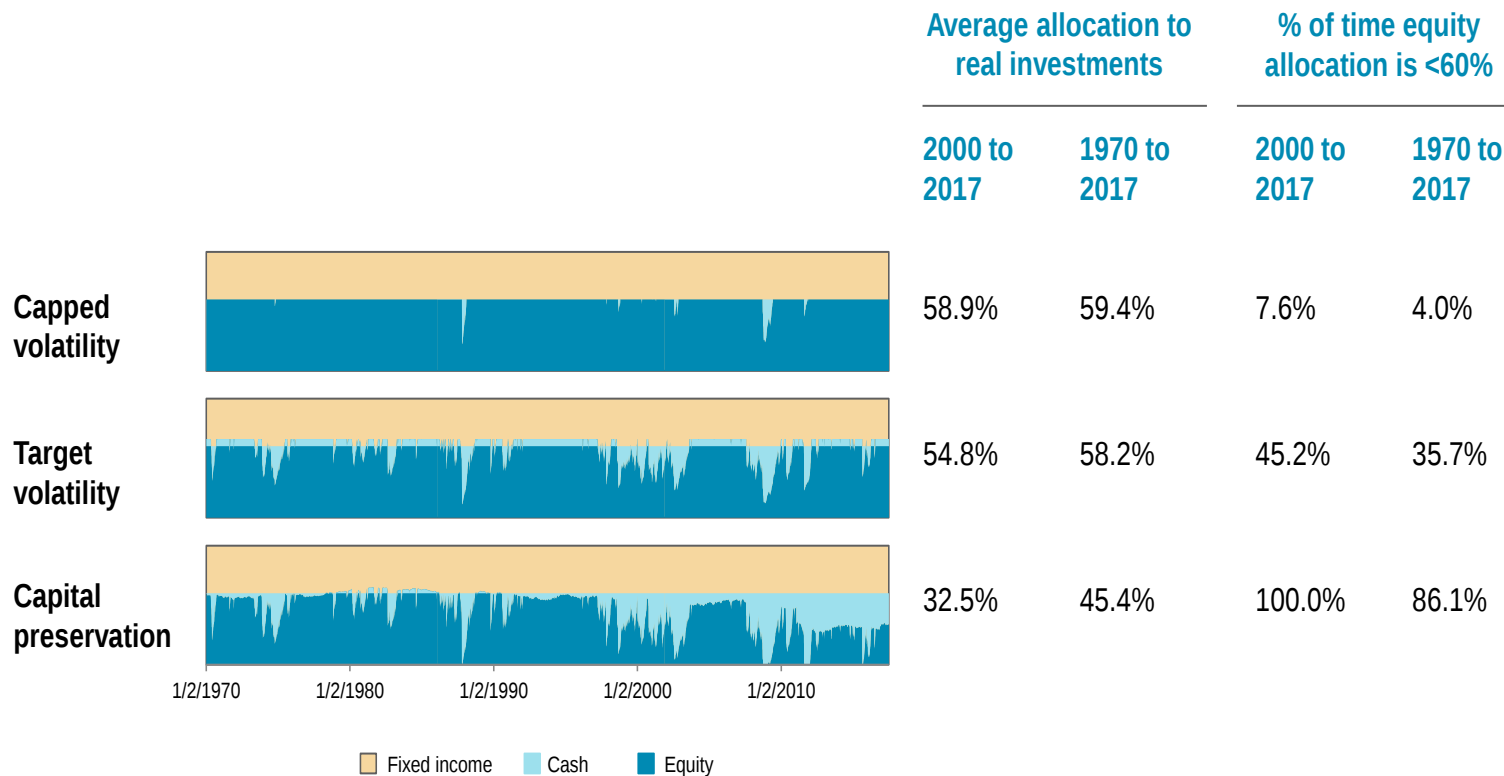
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Client Perspective: Impact on Long Term Equity Ratio

Historical Equity Allocation (1970 - 1H2017)



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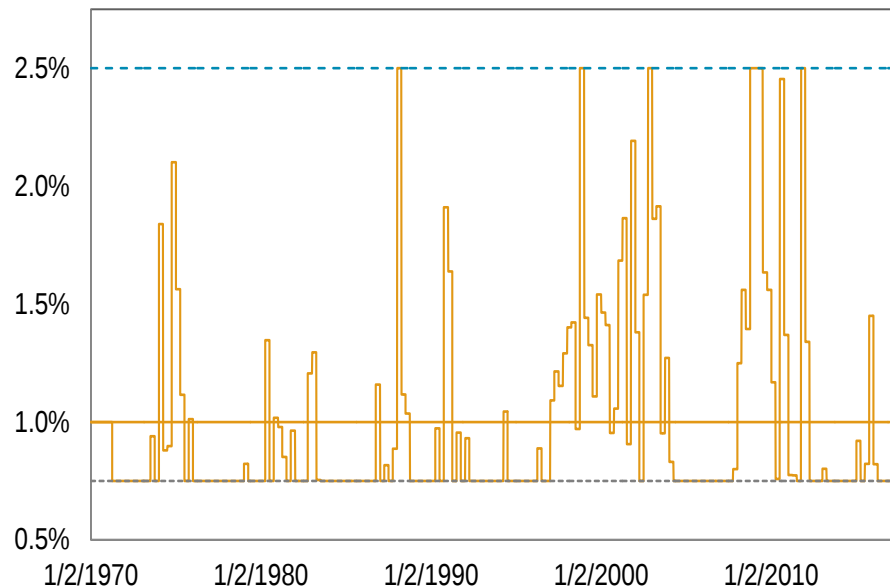
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Client Perspective: Impact on Cumulative Fees Paid

Fees for VIX-Index Strategy (1970 - 1H2017)



— VIX-indexed fee
 ----- Floor fee (0.75%)
 — Target LB fee (1.0%)
 - - - - - Ceiling fee (2.5%)

Average LB fee (%)	
2000–2017	1970–2017
1.14%	1.01%

Source: Oliver Wyman. All information presented is back-tested. Charts and tables are provided for illustrative purposes. Back-tested performance is hypothetical performance created with hindsight. Actual returns may differ from, and be lower than, back-tested returns. Index performance does not reflect fees or expenses. Please see the Performance Disclosure at the end of this presentation for more information on the inherent limitations associated with back-tested performance. .

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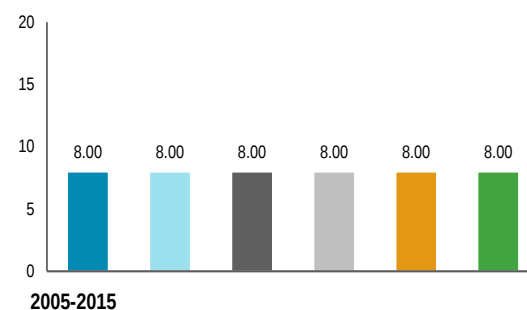
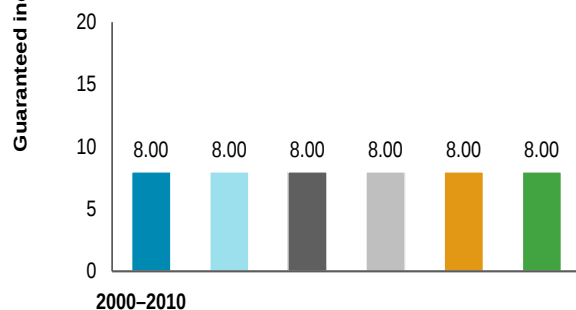
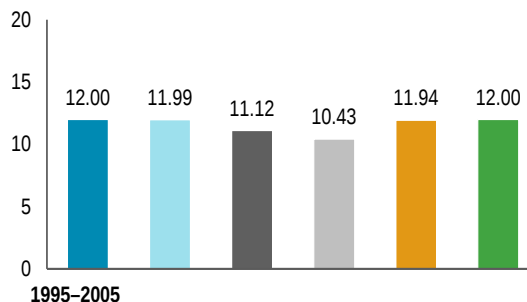
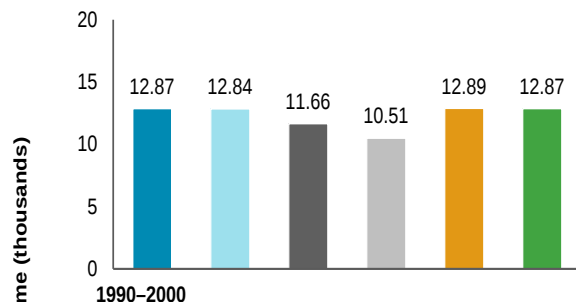
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Client Perspective: Impact on Guaranteed Income Levels

Guaranteed Income in the First Year of Retirement After 10 Years of Investment Accumulation (\$100K Initial Investment)

■ Static 60/40 ■ Capped volatility ■ Target volatility ■ Capital preservation ■ VIX-Indexed fee ■ Asset-Transfer Program



Assumptions:

- Guaranteed return of 6%
- Withdrawal rate of 5%
- Annual MER of 1.3%
- Investment management fee of 1.0%
- Rider fee of 1%

Source: Oliver Wyman. All information presented is back-tested. Charts and tables are provided for illustrative purposes. Back-tested performance is hypothetical performance created with hindsight. Actual returns may differ from, and be lower than, back-tested returns. Index performance does not reflect fees or expenses. Please see the Performance Disclosure at the end of this presentation for more information on the inherent limitations associated with back-tested performance.

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Client Perspective: Scorecards

Objective	Metric	Measure	Static 60/40	Asset-Transfer Program	Capped volatility	Target Volatility	Capital preservation	VIX-indexed Fees
Maintain investment upside potential	Return and volatility characteristics	• 2000-2009						
		– Returns	-0.37%	N/A	-0.25%	-0.55%	-0.06%	-0.73%
		– Volatility	12.92%	N/A	11.05%	8.19%	5.26%	12.92%
		• 2010-2017:						
		– Returns	6.19%	N/A	6.05%	5.40%	2.82%	6.20%
		– Volatility	8.65%	N/A	8.52%	7.60%	4.55%	8.65%
	Long-term equity allocation	• Average allocation to real investments						
		– 2000-2017	60%	N/A	59%	55%	33%	60%
		– 1970-2017	60%	N/A	59%	58%	45%	60%
	Cumulative fees paid	• (Historical) Average fees (1970-2017)	100	100	100	100	100	101
		• (Prospective) Fees paid						
		– Average	100	100	100	100	100	109
		– 75 th %-ile	100	100	100	100	100	114
		– 25 th %-ile	100	100	100	100	100	105
Minimize impact to guarantee value	Guaranteed income levels	• (Prospective) Initial withdrawal rate of						
		– 5%	8.8%	8.7%	8.8%	8.4%	8.1%	8.8%
		– 5.5%	N/A	9.6%	9.6%	9.2%	8.9%	9.6%

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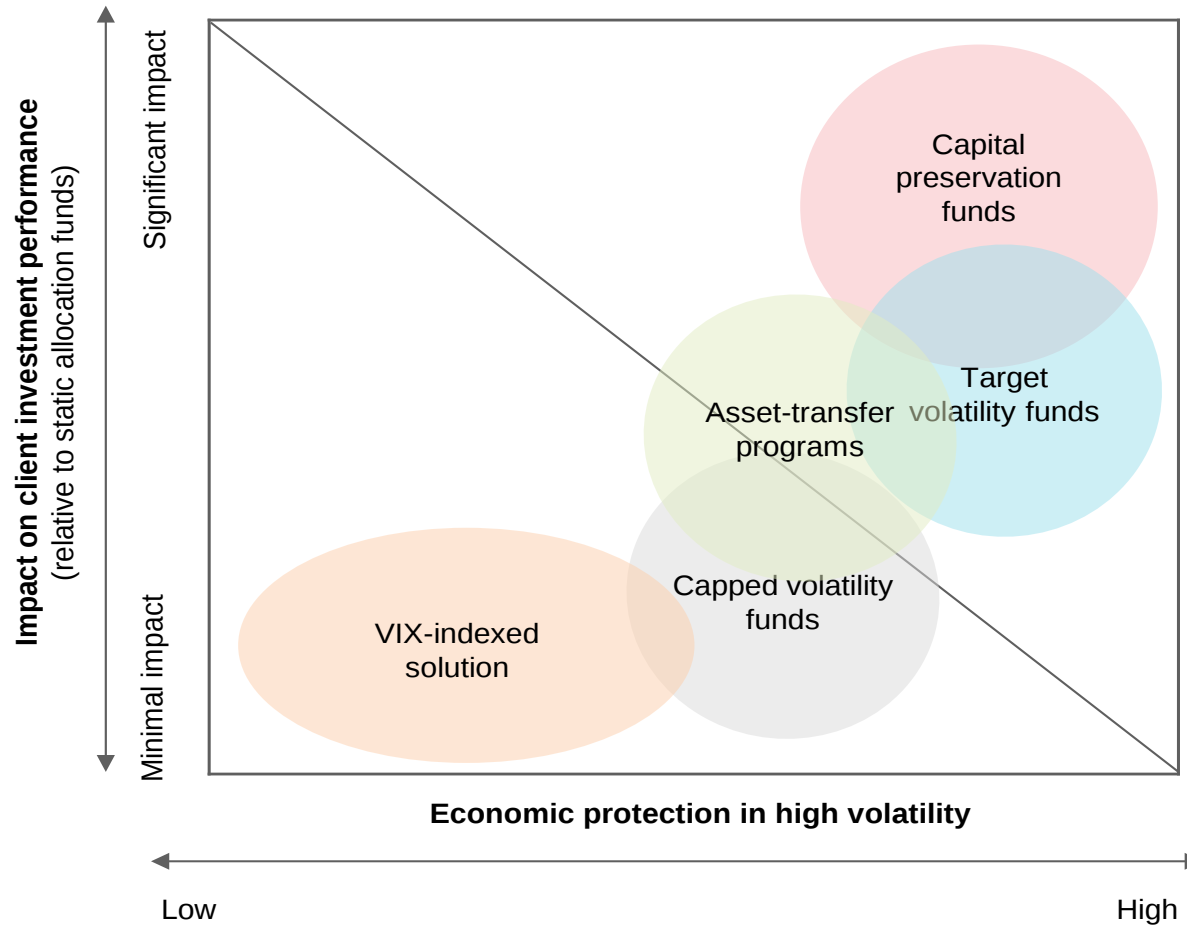
Next Generation of Volatility Management Solutions

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Liability Convexity & Effectiveness of VIX-Indexed Fee Risk Solutions



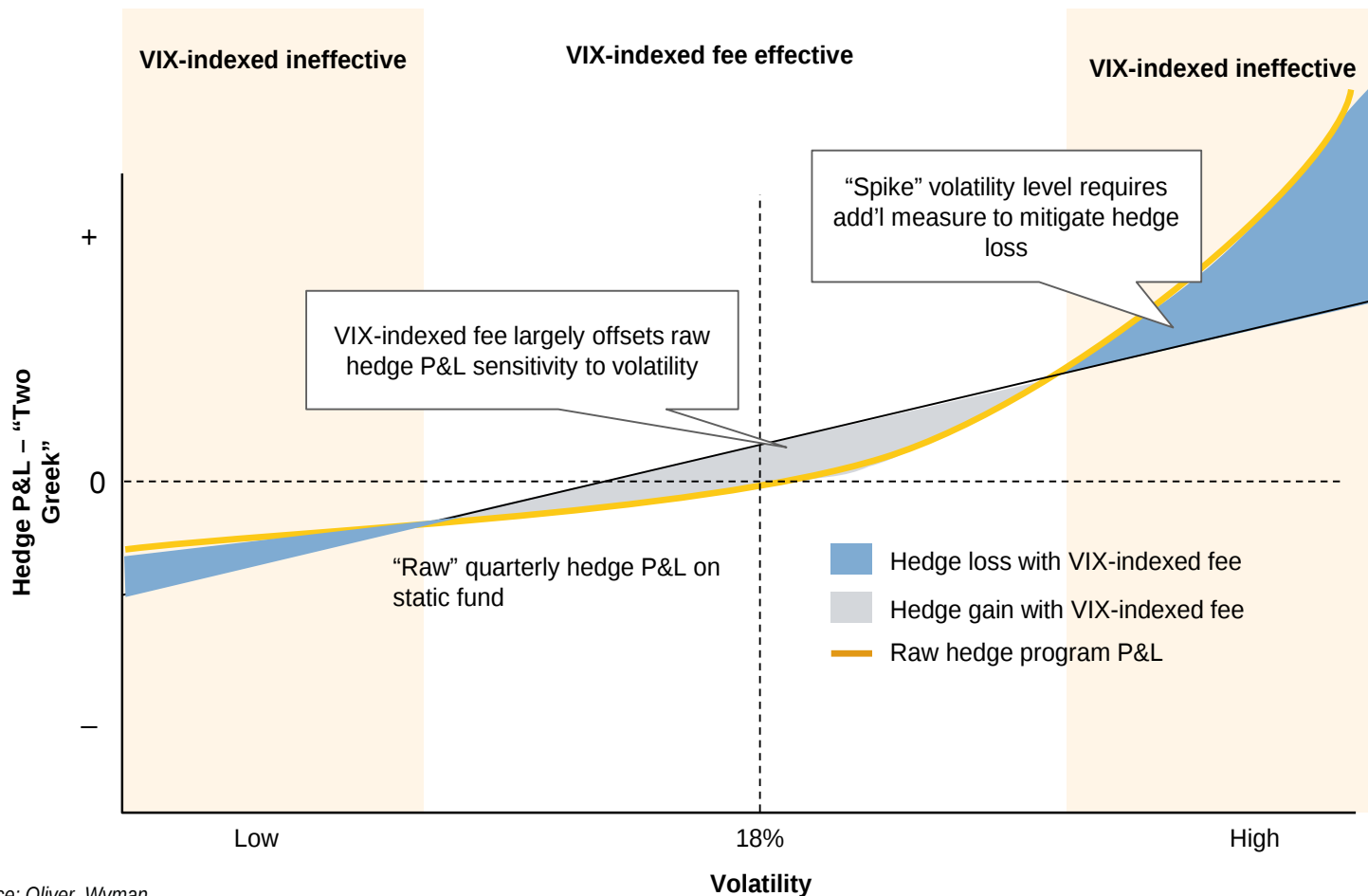
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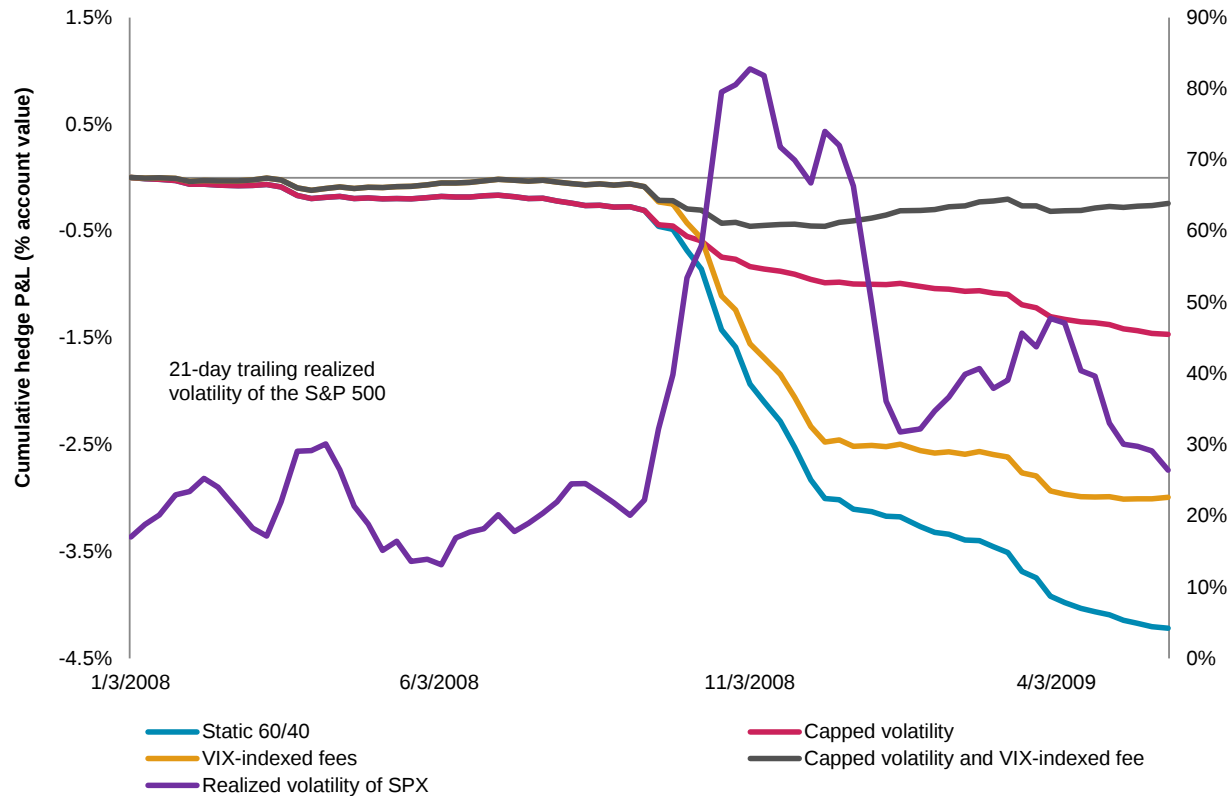
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VIX-Indexed Fee + Capped Volatility Solution: Hedge-Ability

Simulated Performance During 2008/2009 Financial Crisis



Source: Oliver Wyman.

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VIX-Indexed Fee + Capped Volatility Solution: Impact on Select Metrics

Measure				Joint risk solution	Capped volatility	VIX-indexed fee	Static 60/40 fund
Insurer metrics	Reduction in “volatility cost” of guarantee			40%	15%	26%	N/A
	Vega – impact of a 1% reduction in volatility (% premium)			0.24%	0.40%	0.36%	0.53%
	Stability of hedge P&L (2008 hedge gain/loss)			-0.24%	-1.47%	-2.99%	-4.22%
Consumer metrics	Returns and volatility characteristics	2000 – 2009	Returns	-0.61%	-0.25%	-0.73%	-0.37%
			Volatility	11.05%	11.05%	12.92%	12.92%
		2010 – 2017	Returns	6.06%	6.05%	6.20%	6.19%
			Volatility	8.51%	8.52%	8.65%	8.65%
	(Historical) Fees paid - average			101 bps	100 bps	101 bps	100 bps
	(Prospective) Fees paid – average			109 bps	100 bps	109 bps	100 bps
	(Prospective) Initial withdrawal rate at 5%			8.7%	8.8%	8.8%	8.8%

Source: Oliver Wyman.

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Conclusions

- Risk control features provide material risk management benefits to varied extents.
- Market environment affects the effectiveness of risk solutions.
- Different risk control solutions have experienced challenges due to lack of performance transparency in different degrees.
- Potential next generation solution combines VIX-indexed fee and capped volatility to balance the risk management benefit against client and advisor perception.

Appendix

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Parameters of Back Test

Volatility management	Parameter specification
Asset transfer program	- Define <i>Guarantee Ratio</i> = $1 - \text{account value to benefit base (AV/BB)}$ - Define a minimum threshold point as $\text{Threshold} = \text{minimum}(50\%, 10\% + 2\% \times \text{policy duration})$ - Fixed income allocation is driven by extent to which the ratio exceeds the threshold point within a 10% band, e.g., given a ratio of 30% and a threshold of 20%, the allocation to fixed income would be 100%
Capped volatility	- Realized volatility not to exceed 30% - Equity allocation to not exceed target of 60%
Target volatility	- Realized volatility of 15% targeted - Fund can at most allocate 66% to equities through the use of leverage
Capital preservation	- Assumes a similar implied equity allocation as the target volatility - Implied equity allocation is adjusted down based on the delta of a 5-year rolling put option
VIX-indexed fees	- After an initial lock-in year at a base fee, the rider fee calculated each quarter as $100 \text{ bps} + 10 \text{ bps} \times (\text{VIX} - 20)$ - Rider fee is subject to an overall floor of 75 bps and a ceiling of 250 bps - Value of the VIX input is based on spot VIX for simplicity of modeling

Source: Oliver Wyman

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