

# Equity-Based Insurance Guarantees Conference

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## Hedging Challenges in Current Market Environment

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# Hedging challenges in current market environment

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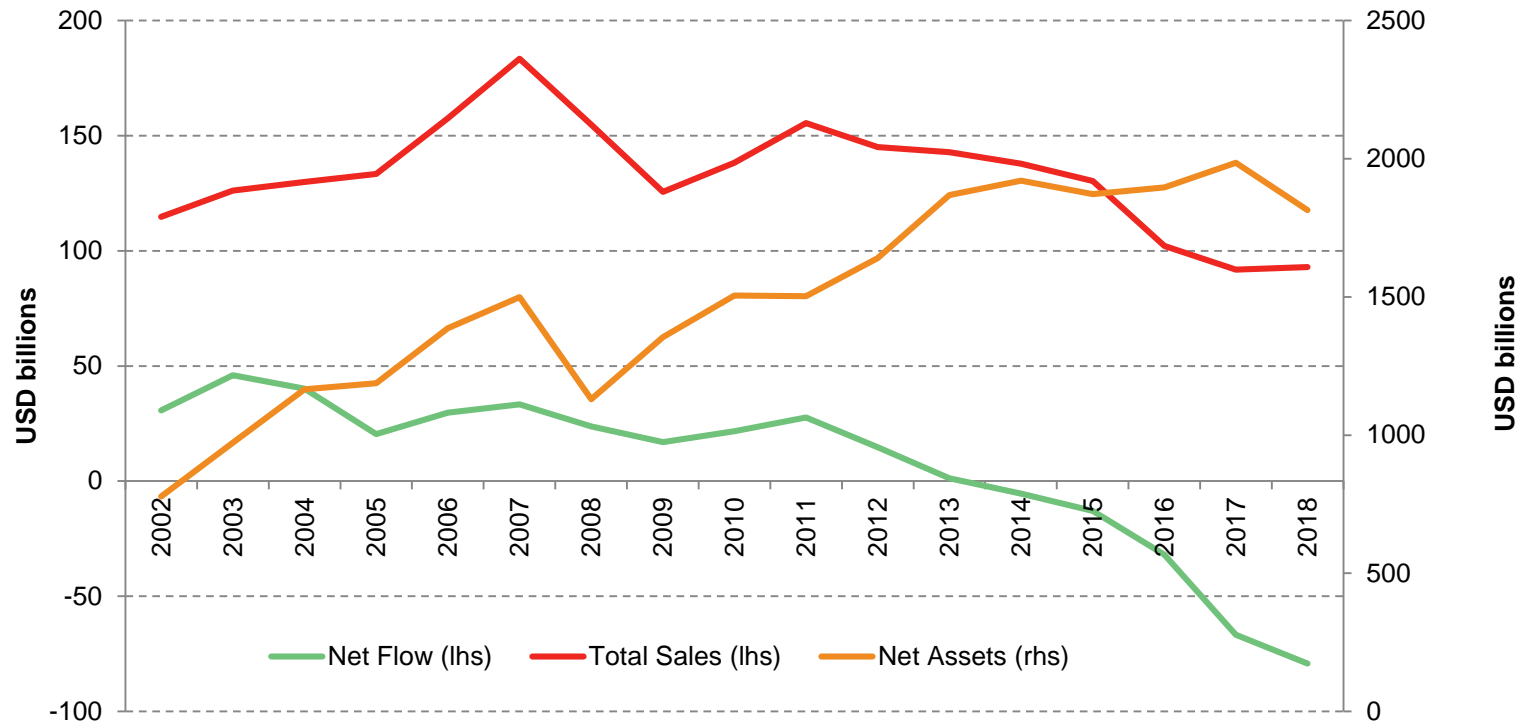
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# Variable Annuity Sales

Variable annuity sales and net flows have steadily decreased since 2011. But total asset value has been growing.

## Variable Annuity sales, net flows and assets per year



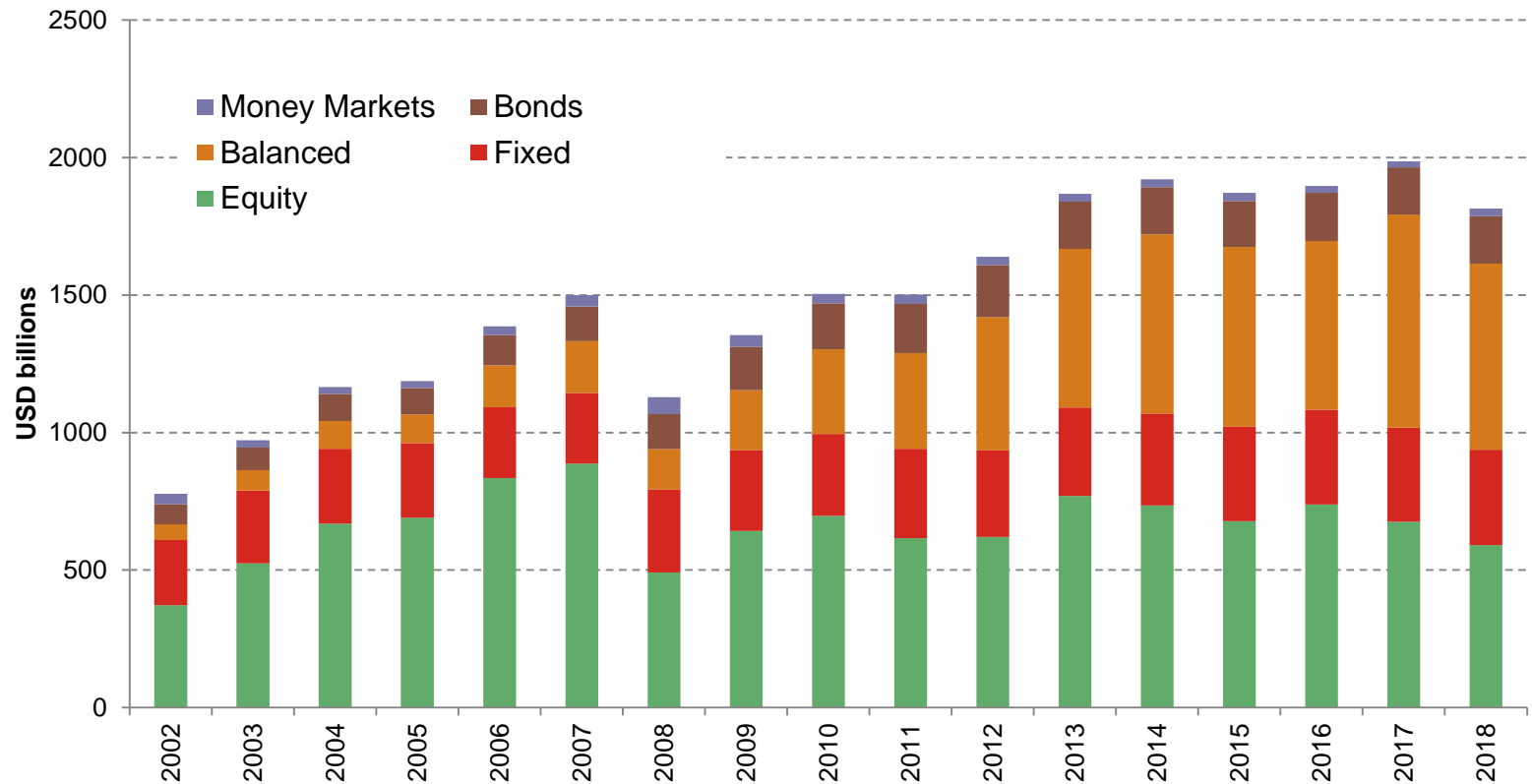
Source: BNP Paribas, Morningstar



# Variable Annuity Assets

Equity fund allocation has remained relatively stable and balanced fund allocation has increased significantly.

## Variable annuity assets per type



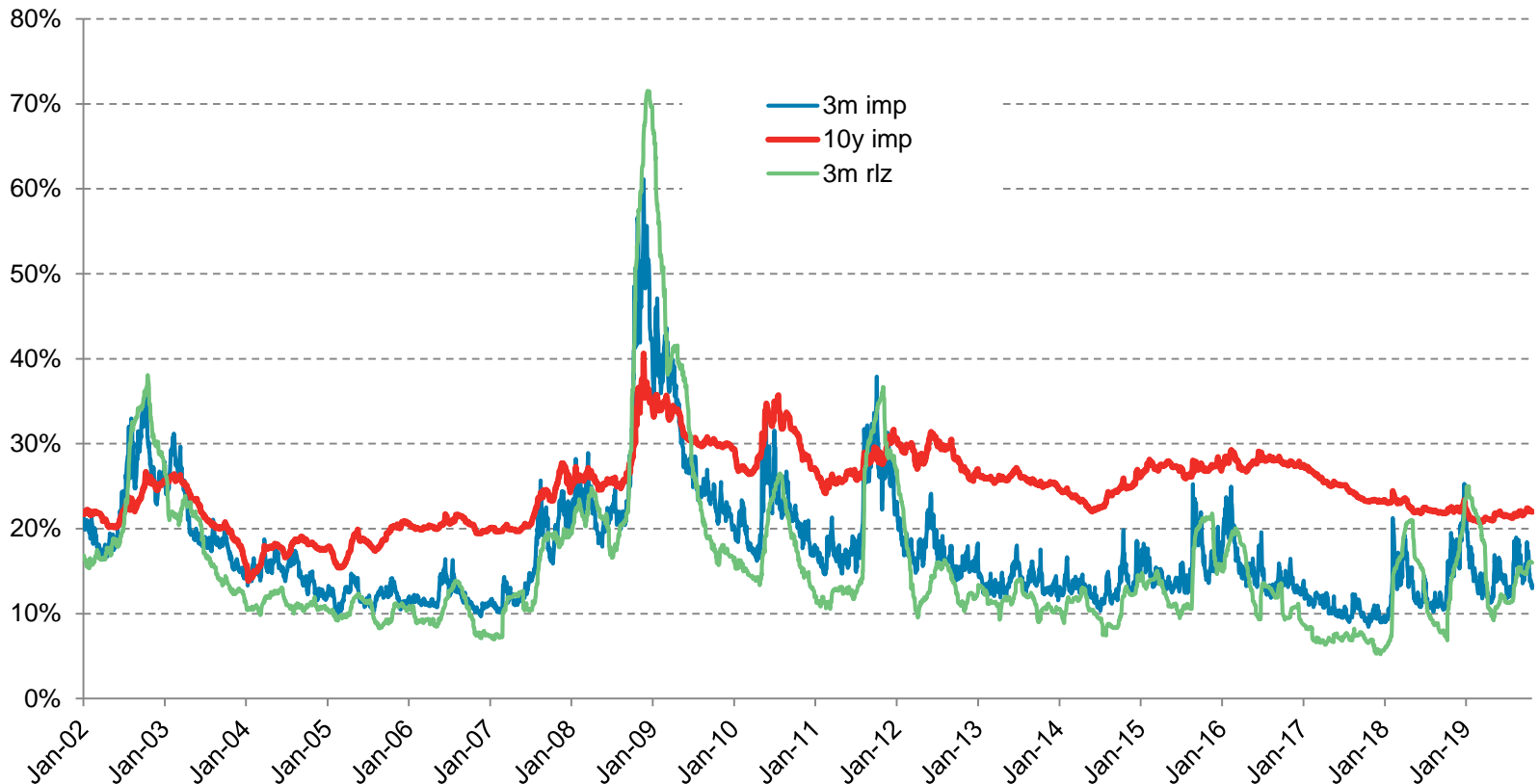
Source: BNP Paribas, Morningstar



# S&P 500 implied volatility term structure

Current S&P500 long term implied volatility remains elevated relative to short term even though buying flows are now a small fraction of the pre crisis flows.

## S&P 500 implied and realized volatility



Source: BNP Paribas



# COMPARING HEDGING STRATEGIES

## Hedging strategy gearing to equal 3m ATM put historical carry cost

	Annualized Carry	GEARING							
		3m ATM Put	3m 95% Put	1y ATM Put	1y 90% Put	Short Term VIX Future	Medium Term VIX Future	1m ATM Put	1m 95% Put
Since May 2014	7.0%	100%	160%	150%	230%	14%	33%	100%	220%
Since Dec 2016	8.2%	100%	250%	175%	350%	8%	15%	85%	450%

## Hedging Strategy Historical Performance During Recent Market Corrections (Using "May 2014" Gearing)

Start	End	SPX	HISTORICAL PERFORMANCE							
			3m ATM Put	3m 95% Put	1y ATM Put	1y 90% Put	Short Term VIX Future	Medium Term VIX Future	1m ATM Put	1m 95% Put
29-Apr-10	1-Jul-10	-15%	8%	7%	9%	8%	8%	14%	9%	5%
22-Jul-11	3-Oct-11	-18%	14%	14%	17%	17%	25%	19%	12%	11%
17-Aug-15	29-Sep-15	-10%	8%	6%	10%	6%	10%	10%	7%	3%
29-Dec-15	11-Feb-16	-12%	9%	8%	13%	9%	8%	9%	8%	4%

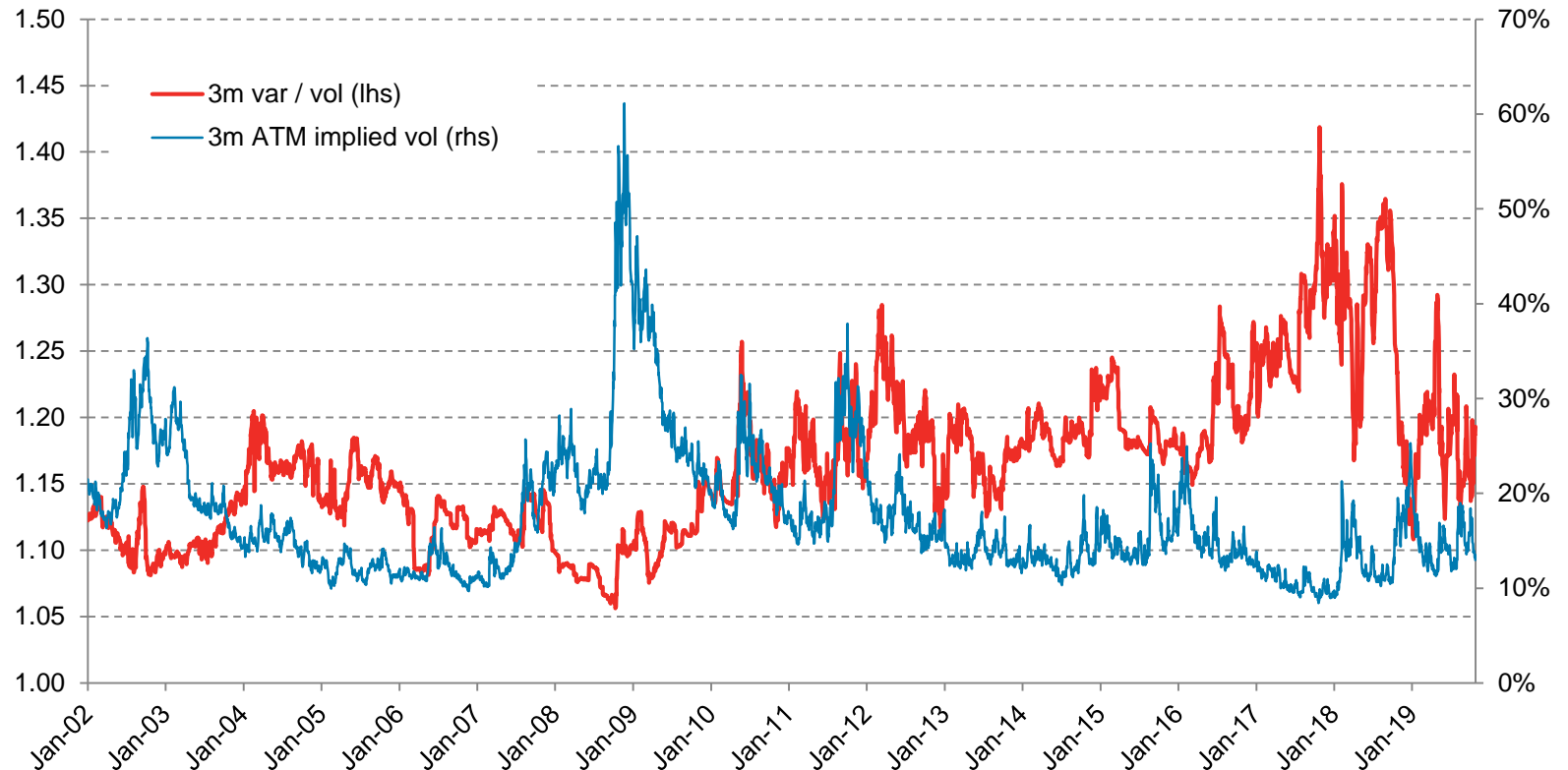
Source: BNP Paribas, Bloomberg



# S&P500 convexity

Current S&P 500 convexity remains elevated compared to pre crisis levels. But it has decreased significantly since December 2018.

## S&P 500 3 months ATM implied volatility and variance



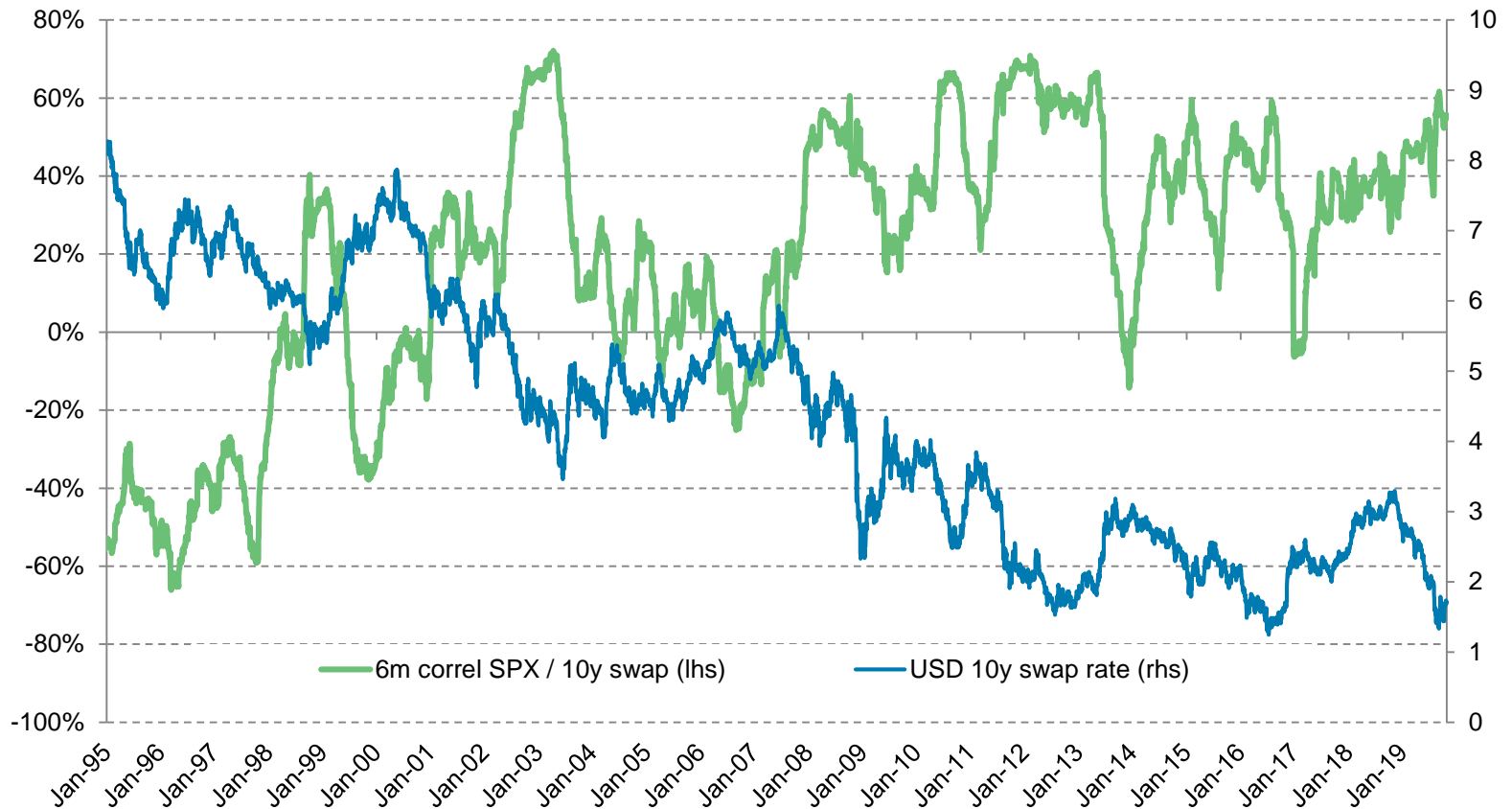
Source: BNP Paribas



# Equity vs Interest Rates correlation

Realized and implied correlation between equities and long term rates remains positive. S&P500 puts with a notional gearing increasing as rates go down are well suited for VA liability.

## S&P 500 3 months ATM implied volatility and variance



Source: BNP Paribas

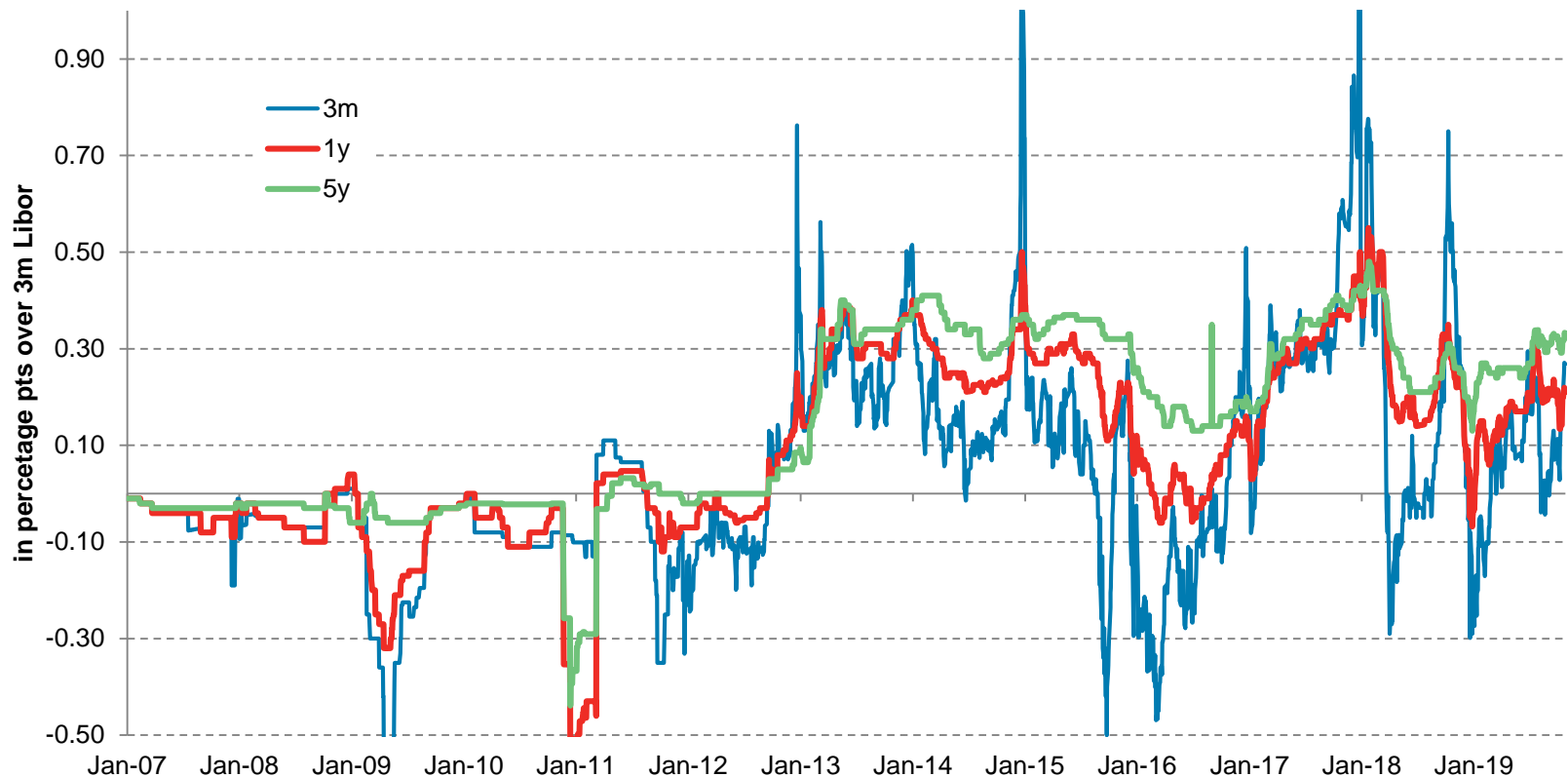




# S&P500 Total Return Swap Spread

S&P 500 total return swap spreads are volatile especially around year end.  
Banks balance sheet costs remains constraint.

## S&P 500 total return swap spreads



Source: BNP Paribas



# Structured Variable Annuities

- Introduced in 2010 by AXA, Structured VAs (also called “Hybrid VA”, “Buffered Annuities” or “Index Linked VA”) have been designed to fill the gap between FIA and VA.
- Sold by a few insurance carriers until recently (AXA, Brighthouse, Allianz), Structured VAs are getting broader traction because of:
  - Demand from future retirees for higher potential returns
  - Interest from carriers to diversify their offering with less capital-intensive structures than traditional VA
- A Structured VA offers more upside potential to policyholders than a traditional FIA by allowing some downside risk through a buffer or a floor.
- Structured Variable Annuities are one of the fastest growing segment of the U.S. annuity market, although only at \$9bn in annual sales in 2018.

## Structured VA SALES in 2018

<u>ILVA Sales</u>	in USD Bln
1 AXA US	\$3.93
2 Brighthouse Financial	\$3.24
3 Allianz Life	\$2.12
4 Lincoln National Life	\$0.93
5 CUNA Mutual Life	\$0.82
6 Great-West	\$0.14
7 Great American	\$0.03
8 Protective Life Companies	\$0.004

Source – Wink Sales and Market Report – Q4 2018 –  
Excludes recent launches



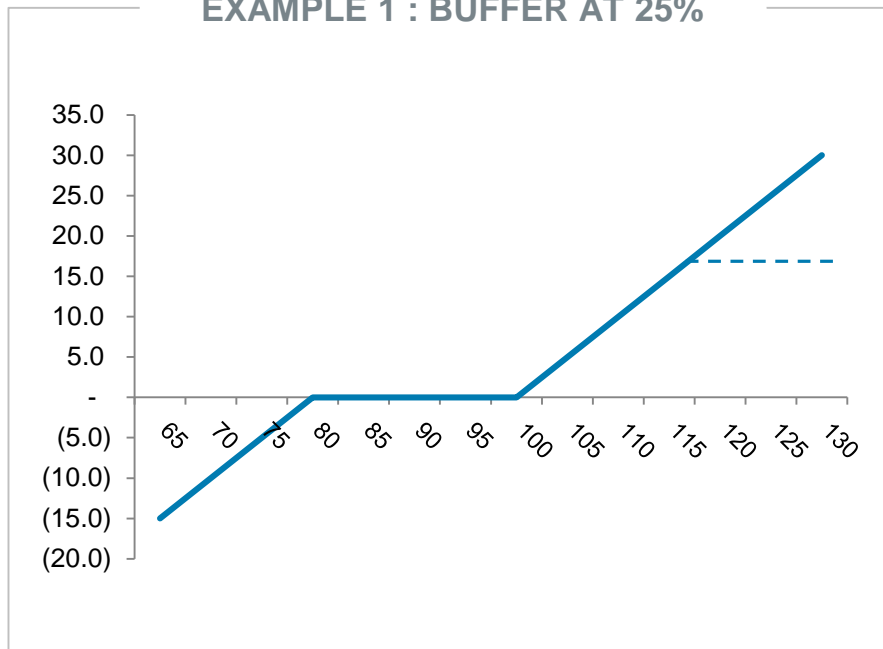
# Structured VA Crediting methodology

Structured VA crediting methodology usually falls into 2 main types depending on the downside risk

- Upside gain usually up to a cap and downside loss in excess of a **Buffer** rate
- Upside gain usually up to a cap and downside loss up to a **Floor** rate

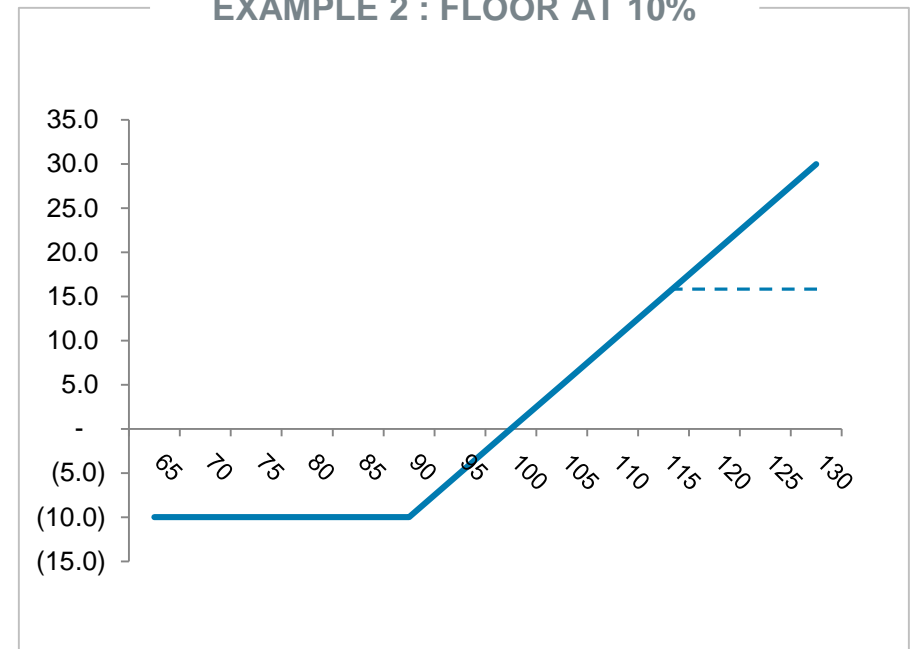
Downside exposure allows Insurance Carriers to offer higher upside participation than regular indexed annuities.

EXAMPLE 1 : BUFFER AT 25%



Source: BNP Paribas , for illustration purposes only

EXAMPLE 2 : FLOOR AT 10%



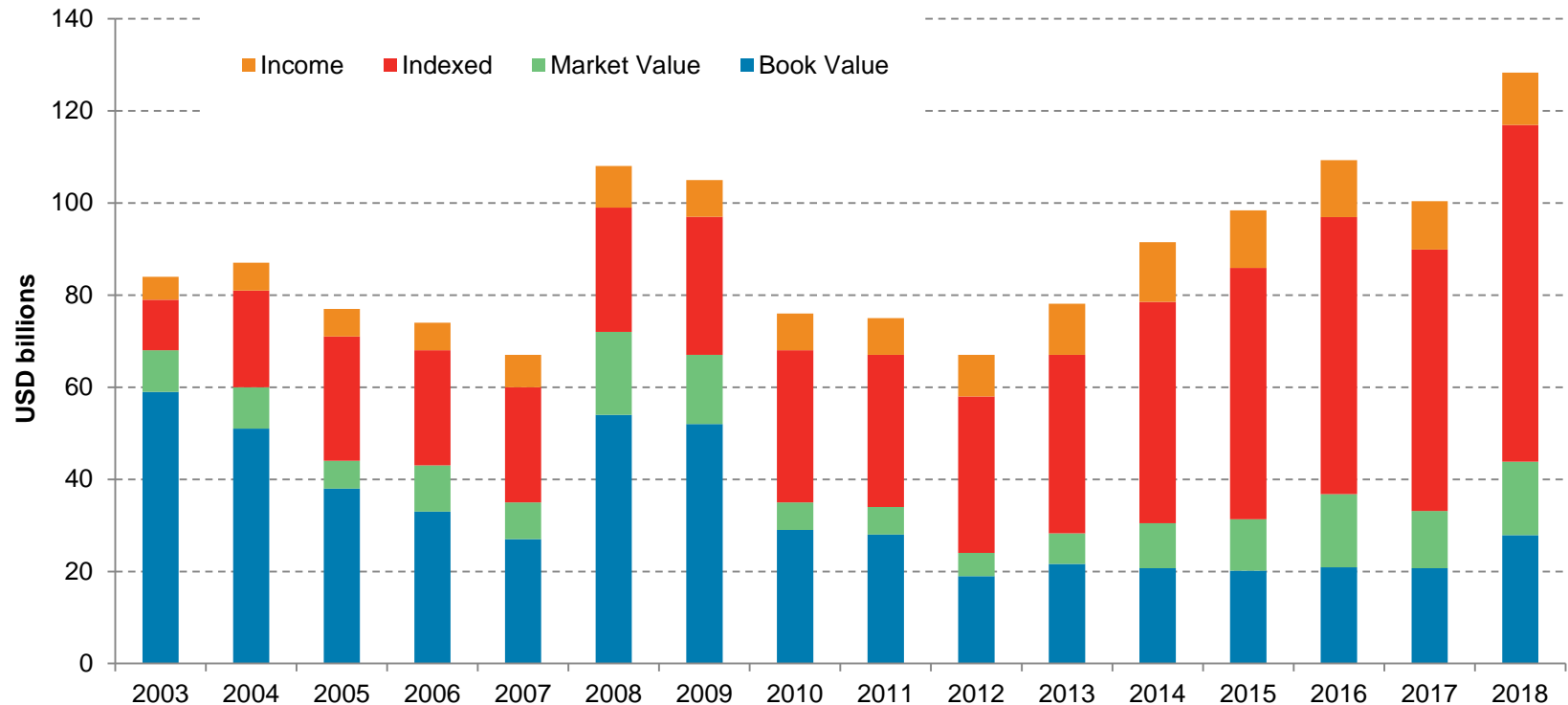
Source: BNP Paribas , for illustration purposes only



# Fixed Annuity Sales

Fixed annuity sales have increased steadily since 2011 mainly driven by indexed annuities. Hybrid indices represent now close to 50% of crediting indices.

## Fixed annuity sales per type



Source: BNP Paribas, Morningstar

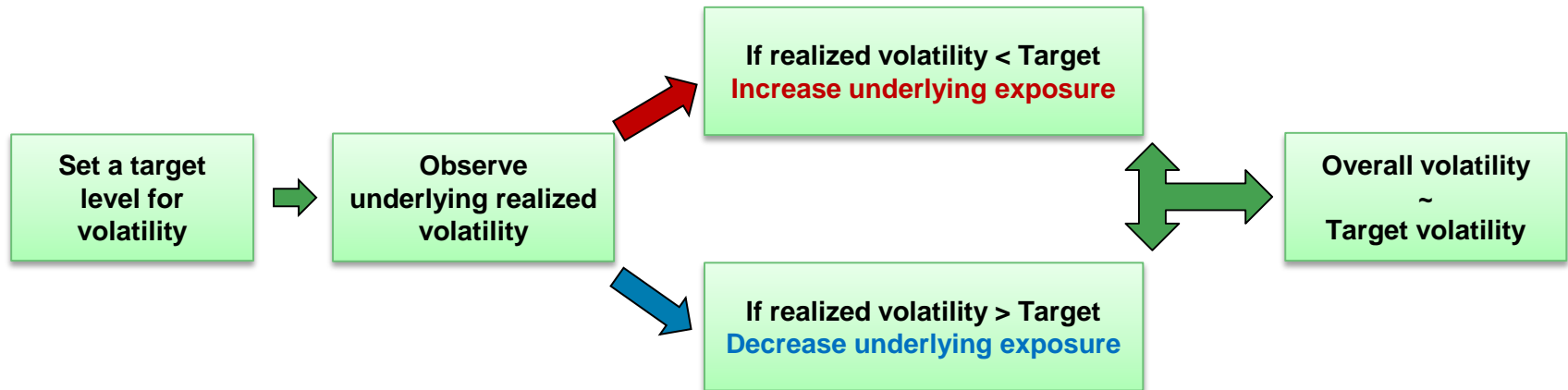


# Volatility target overlay : methodology

To create a viable product for a fixed index annuity, hybrid indices usually included a volatility target overlay.

A volatility target overlay adjust the exposure to the underlying assets with the aim of achieving a target volatility

- The volatility control deleverages the underlying risky asset exposure when realized volatility is rising and leverages when volatility is falling. Exposure not allocated to the underlying assets is usually allocated to a synthetic overnight cash



$$\text{Exposure} = \frac{\text{Target Volatility}}{\text{Realized Volatility}}$$

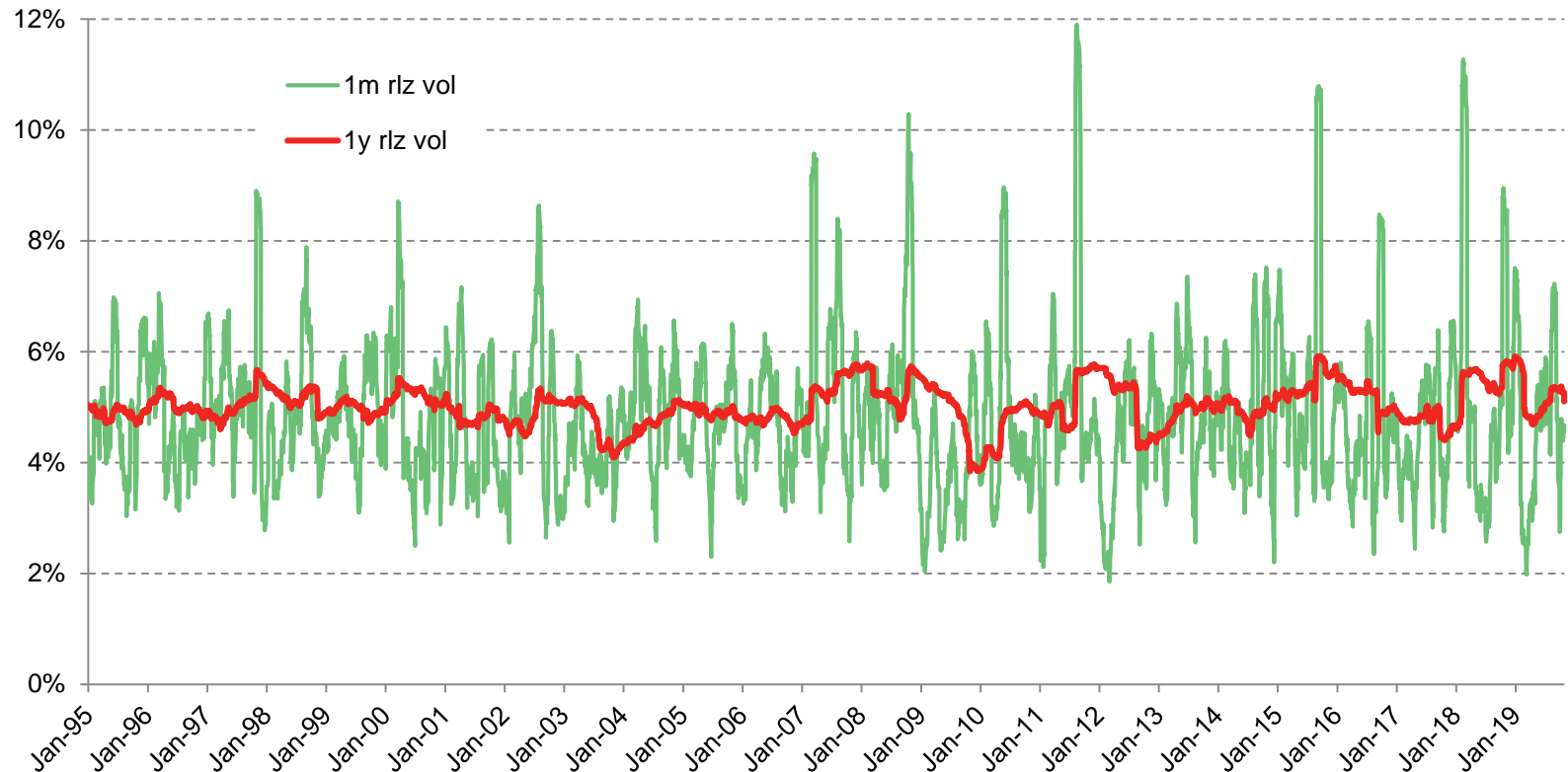
Source: BNP Paribas, for illustration purposes.



# Hedging volatility target indices

Even though long term realized volatility tracks the target volatility, short term volatility can oscillate widely. Hedging P&L will be driven by the gamma profile when the gap occurs.

## Realized volatility of S&P 500 daily vol control 5%



Source: BNP Paribas



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