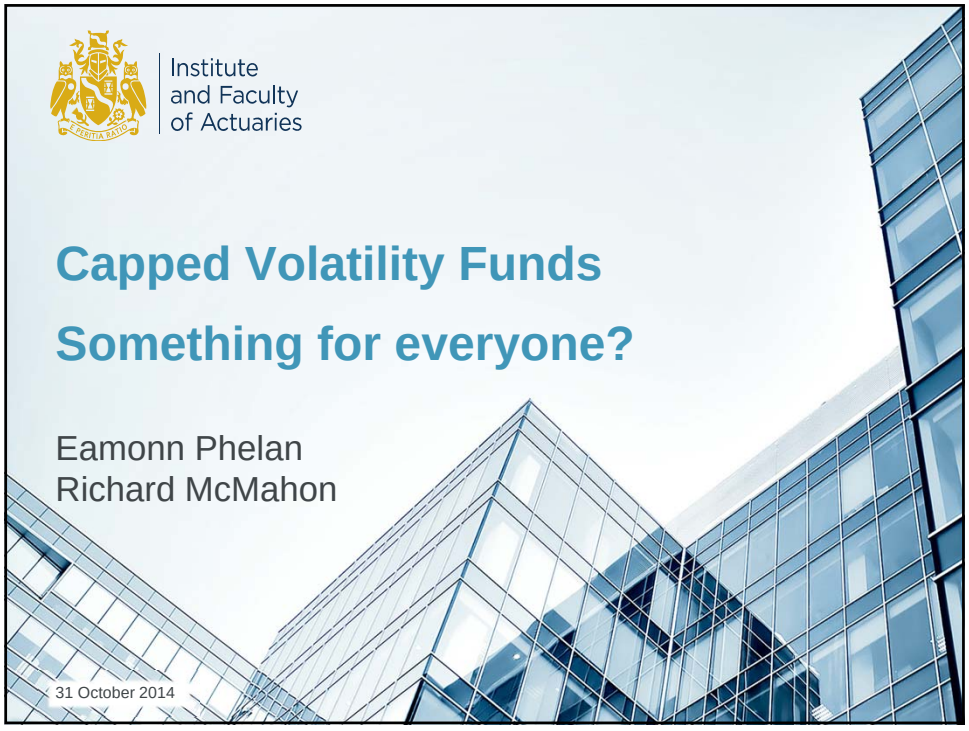


Agenda

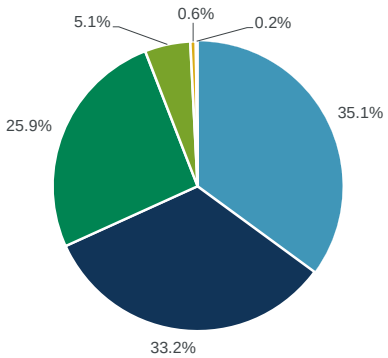
- Managed risk fund strategies
- Target Volatility
- Capped Volatility
- Pros and Cons
- Communication with policyholders
- Challenges and opportunities for providers

Managed Risk Fund strategies

Volatility Management	Asset Allocation	Risk Parity
Equity Minimum Volatility	Long/Short Equity	Multi-alternative
Market Neutral	Managed Futures	Bear Markets

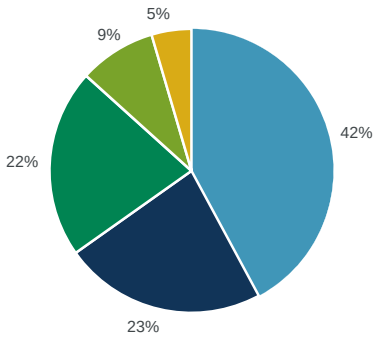
VA Managed Risk Funds (US market)

$200 billion AUM at 31.12.13



UL Managed Risk Funds (US market)

$140 billion AUM at 30.05.14



Source: Wall Street Journal Article (June 2nd, 2014 - *Alternative Mutual Funds)*

Managed Risk Funds in the UK

Some examples:

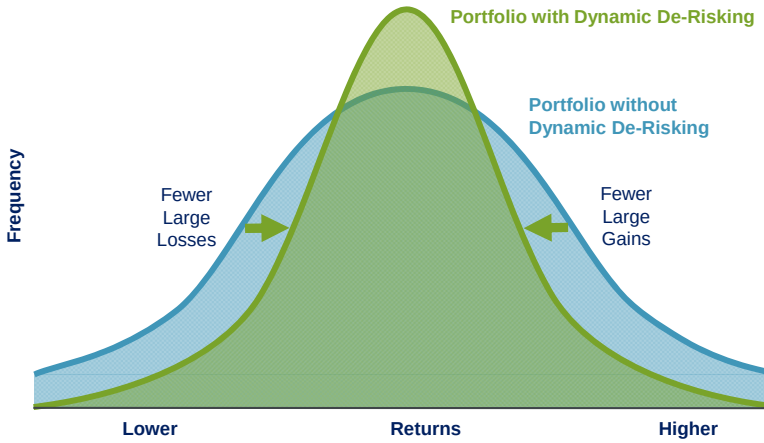
- Standard Life GARS
- Aviva AIMS
- AXA Secure Advantage
- MetLife Managed Wealth Portfolio

Target Volatility – how it works

- Common features:
  - Dynamic asset-allocation
  - Vary participation in a risky asset in response to that asset's estimated future volatility
  - Reduces allocation to stocks/shares into cash/cash-like instruments if market volatility exceeds the predefined target
  - Conversely, if realised volatility falls below the target, the mechanism uses leverage to boost the fund's equity holdings and multiply its volatility exposure

- Relies on two basic empirical facts about the market:
  - Market volatility and return have strong negative correlation
  - High or low volatility tends to cluster together for a sustained period of time

Target Volatility – spread of returns



Target Volatility algorithm

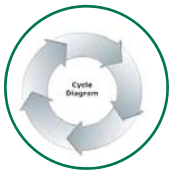
A simple algorithm for the allocation to equity when rebalancing a target volatility fund:

$$w_t^{equity} = min\left(\frac{\sigma_{target}}{\hat{\sigma}_t^{equity}}, 100\%\right)$$

Where:

- σ_{target} is the target volatility
- $\hat{\sigma}_t^{equity}$ is an estimate of current equity volatility

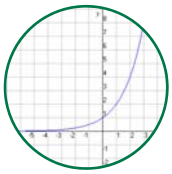
Volatility Estimator



Key design consideration

If it reacts too slowly to volatility spikes, the fund could be over-exposed to falling markets

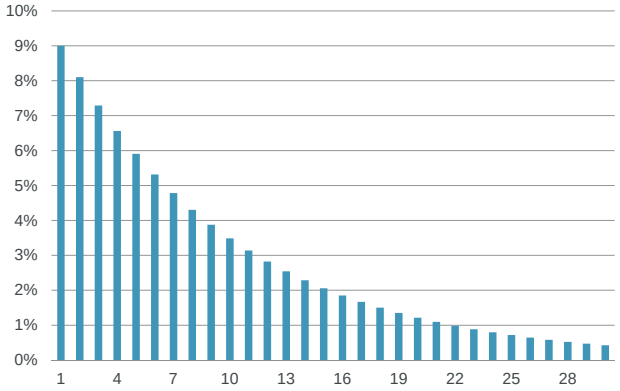
Alternatively if volatility is overestimated the fund will underperform



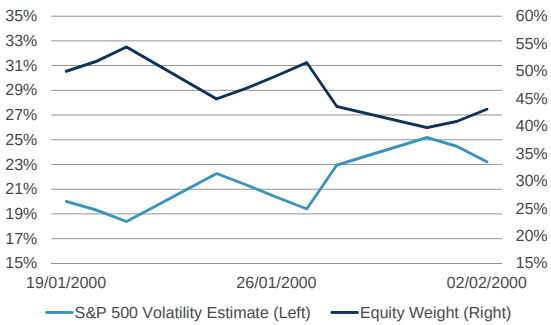
EWMA (exponentially weighted moving average) estimators are common

EWMA Estimators

Exponential decay of weights over 30 days (λ = 0.90)



Rebalancing of Weights

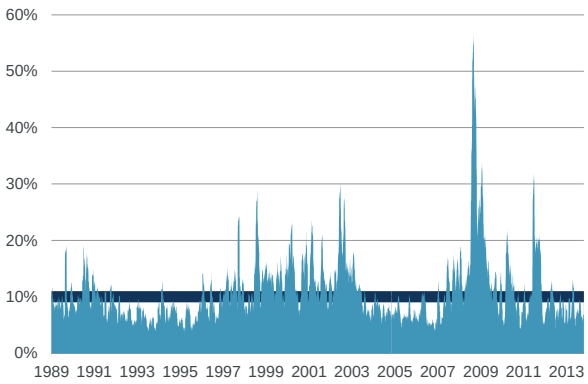


Date	Volatility Estimate	Equity Weight
19/01/2000	20%	50%
20/01/2000	19%	52%
21/01/2000	18%	54%
24/01/2000	22%	45%
25/01/2000	21%	47%
26/01/2000	20%	49%
27/01/2000	19%	52%
28/01/2000	23%	44%
31/01/2000	25%	40%
01/02/2000	24%	41%
02/02/2000	23%	43%

Fund invests in the S&P 500 and cash

Target volatility is 10%

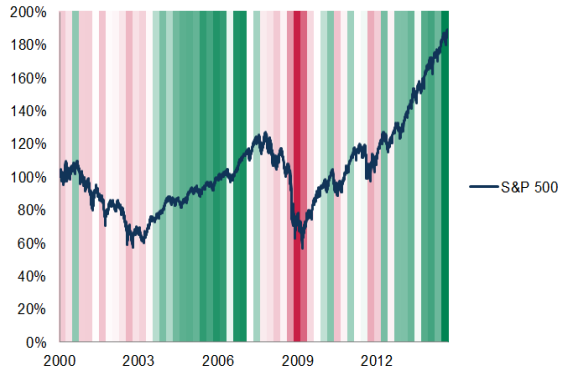
Volatility of volatility



Historic volatility for a fund split 70/30 between the S&P 500 Index and the Barclays US Aggregate Corporate Bond Index

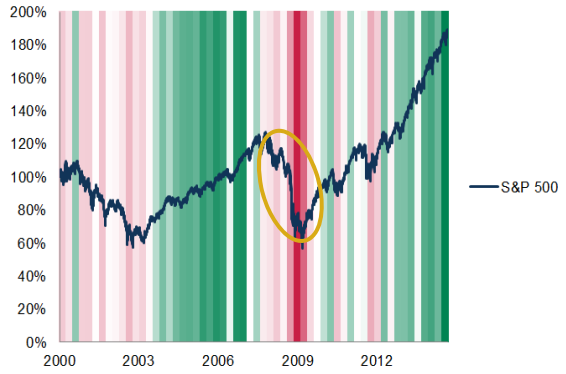
Equity market behaviours

- Periods of high or low volatility tend to cluster together
- Market returns are negatively correlated with market volatility



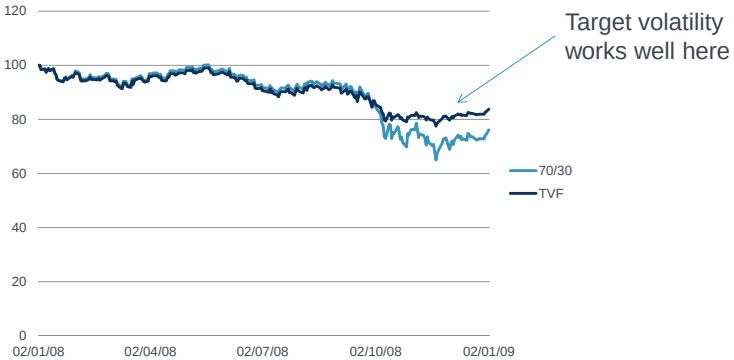
Fund performance – example 1

- Very high volatility Bear market - 2008



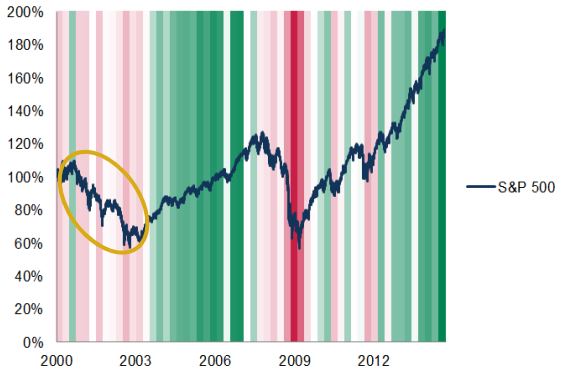
Fund performance – example 1

Very high volatility Bear market - 2008



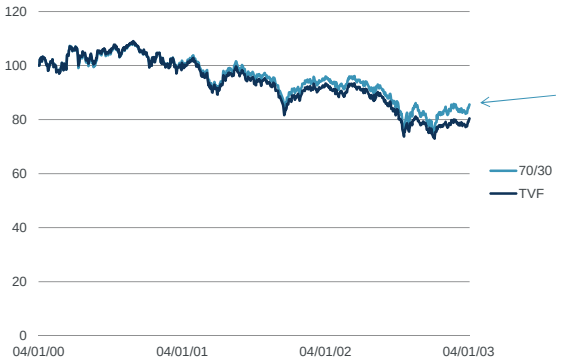
Fund performance – example 2

- Relatively low volatility Bear market



Fund performance – example 2

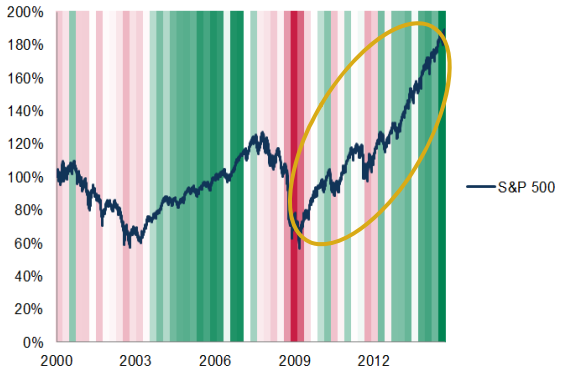
Relatively low volatility Bear market - 2000-2002



Target volatility does not work as well here

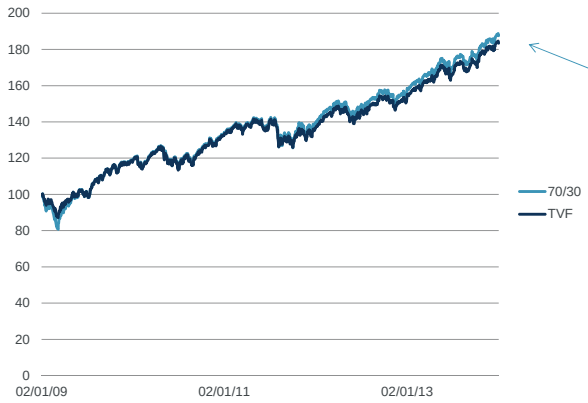
Fund performance – example 3

- Low volatility Bull market



Target Volatility Mechanisms

Low volatility Bull market - 2009-2013



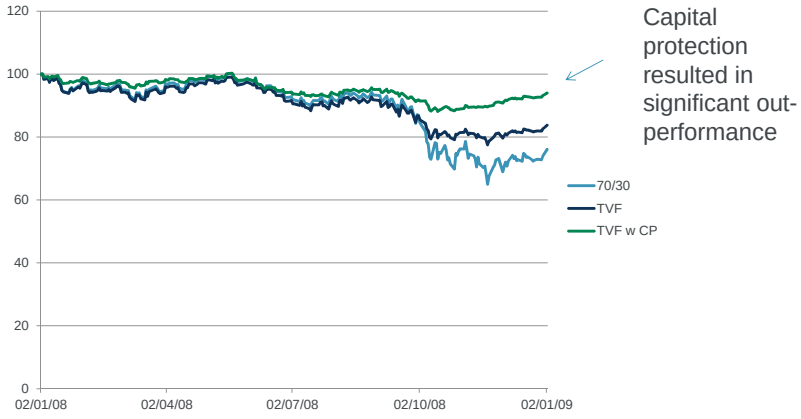
Target volatility performance keeping pace with index

Capital protection overlay

- Capital protection can be added to a Target Volatility fund
- As volatility is stable a more efficient capital hedge can be created
- Variety of approaches including variance swaps

Capital protection overlay

Performance of Milliman Managed Risk Strategy – 2008



Target Volatility and Income Drawdown

Target volatility funds help overcome sequence of returns problem

- ✓ May be a good default investment strategy
- ✓ Downside protection without sacrificing upside participation
- ✓ National Employment Savings Trust?

	S&P 500 Index	Target Volatility Only	With Capital Protection Overlay
Average of the annualised returns	5.87%	5.57%	6.58%
Compound annualised growth rate	3.96%	4.31%	6.16%
Internal rate of return (5% withdrawals)	1.77%	2.05%	5.11%

Based on actual performance 2000-2013

Target Volatility and Income Drawdown

Year	Volatile Growth Rate
1	-19.7%
2	-7.3%
3	10.0%
4	-9.9%
5	12.0%
6	-21.1%
7	17.9%
8	-7.7%
9	1.5%
10	22.1%
11	12.4%
12	-13.6%
13	7.3%
14	-23.5%
15	9.9%
16	11.8%
17	5.6%
18	16.1%
19	-14.8%
20	11.3%

Withdrawals are 4% of premium per annum

Capped Volatility Funds

- Capped Volatility Funds (sometimes known as 'VolCap') are examples of Managed Volatility Structures
- VolCap and 'Variable VolCap' exist in the market place
- The key aim is to manage the volatility of the fund performance at or below a pre-defined level
- This is achieved in its simplest form by rebalancing the underlying asset mix
- Rebalancing can be formulaic or discretionary
- Variable VolCap is an interesting variation. This works by automatically reducing the level of the volatility cap as markets fall and portfolio losses develop. The opposite happens when markets recover

Pros and Cons – some Pros

- Volatility management structures can make hedging program outcomes and earnings more predictable
- Volatility management structures can be more capital efficient for providers of guarantees
- The strategy is more transparent possibly making it a more appealing alternative to certain types of with-profits business
- Funds de-risk while also retaining the opportunity to participate in market upside => funds don't become cash locked
- As illustrated funds can perform better than managed portfolios especially in volatile bear markets
- Volatility management can be beneficial in drawdown

Pros and Cons – some Cons

- The strategy may not protect against sudden jumps in volatility
- There may be restrictions on where policyholders can invest their funds
- Customer communication may be a challenge
- Volatility management structures can react to the market with a ‘lag’. Hence they may miss a significant or sudden market rise and in such scenarios may underperform compared to other fund types
- Costs of rebalancing may be significant compared to a ‘buy and hold’ strategy
- Ratchets on Variable Annuity products may become less valuable

Communication with policyholders

- Two key touch points with customers
    1. Point of Sale
    2. Ongoing throughout policy life cycle e.g. annual benefit statements
- Observations in relation to communication with customers
    1. Are these funds well understood in the market place?
    2. Can stochastic models / scenario based output enhance customer communication
    3. Can actuaries assist advisers to improve the customer experience?
    4. Graphs and pictures generally work well !

Communication with policyholders
Point of sale

What is 'volatility'?	Fund Definition Managed, Target, Capped, Variable Cap etc.	Fund Mechanics underlying algorithm, frequency of re balancing etc.
Asset Mix Equity/Bond mix, PRE, Range in different market conditions	Expected Fund Growth market scenarios, comparison with managed funds	Back testing vs forward looking projections
Expected Cost	Current disclosure rules?	Algorithm vs discretion

Communication with policyholders
Point of sale

Some examples from existing customer communication

'Volatility, for example, is a measure of how much the returns of an asset or portfolio fluctuate over time.'

'Volatility is a statistical measurement of the frequency and level of changes in the value of an asset, index or instrument without regard to the direction of those changes.'

Communication with policyholders

Policy life cycle

- Actual Performance
- Actual de-risking
- Comparison with traditional managed funds
- Actual asset mix vs expectations
- Switching 'in' or 'out'?

Challenges and Opportunities for providers

Capital Modelling	Practical issues	Structure
• Apply for Partial Internal Model in Solvency II • Inclusion of Managed Volatility approaches in an existing Internal Model • Is the Standard Formula appropriate • Interaction with guaranteed business • ESGs	• Operational issues – ability to de-risk • In-house funds or outsource to an external provider • Cost – set up and ongoing • Expertise required • IT systems • Possible regulatory hurdles • Training needs – sales force, advisers	• Algorithm vs discretion • Key algorithm parameters – e.g. speed of re balancing/de-risking, volatility estimator, etc. • Exposure to operational risk • Leverage cap (if applicable) • Hedge instruments to use (if applicable)

Contact details

RICHARD McMAHON, AXA LIFE INVEST

Richard.mcmahon@axa-lifeinvest.com

EAMONN PHELAN, MILLIMAN

Eamonn.phelan@milliman.com

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