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Dynamic Hedging Working Party

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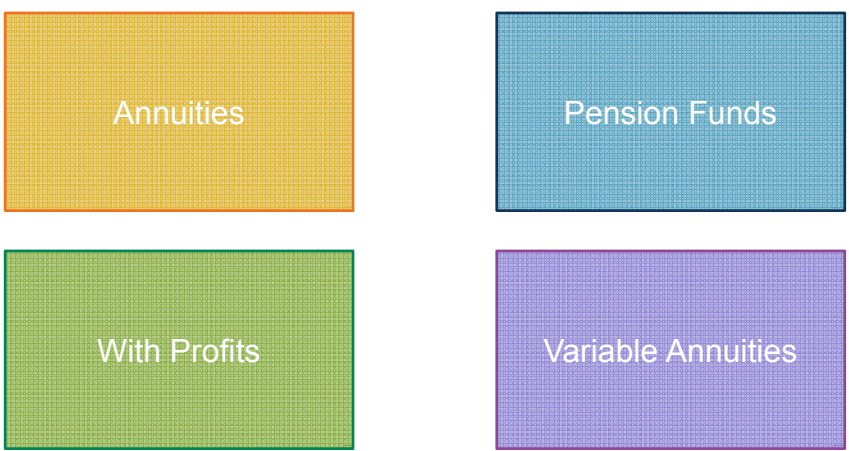
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Introduction to Working Party

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Our approach



- Annuities
- Pension Funds
- With Profits
- Variable Annuities

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Hedging within annuities

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Initial observations

Annuities



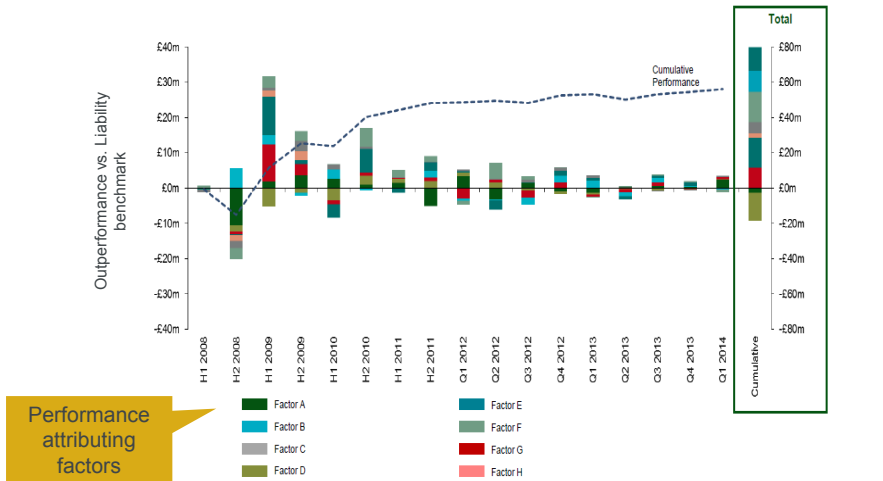
Pensions



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Cumulative outperformance of active LDI vs. liability benchmark



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Hedging currency risk

1. Individual cross-currency swaps

Asset 1 – USD → GBP
 Asset 2 – EUR → GBP
 Asset 3 – USD → GBP
 ...

"the expected cash flows of the assigned portfolio of assets replicate each of the expected cash flows of the portfolio of ... obligations in the same currency and any mismatch does not give rise to risks which are material in relation to the risks inherent in the ... business to which the matching adjustment is applied"

Article 77b(1)(c)

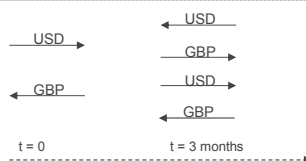
2. Portfolio level cross-currency swaps

Asset 1 – USD	Asset 2 – EUR
Asset 3 – USD	Asset 5 – EUR
...	(Liab 1028 – EUR)
Σ USD → GBP	Σ EUR → GBP

"... assigned a portfolio of assets, ... and maintains that assignment over the lifetime of the obligations, except for the purpose of maintaining the replication of expected cash-flows between assets and liabilities where the cash-flows have materially changed"

Article 77b(1)(a)

3. Rolling forward rate hedge



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Decision making factors

Factor	Individual swaps	Portfolio swaps	Rolling forwards
Matching adjustment eligibility	😊	😐	😞
Current approach	?	?	?
Transaction/rebalancing costs	😐	😐	😊
Liquidity of market	😐	😐	😊
Collateral management	😞	😐	😐
Capital requirements	😊	😐	😞
Monitoring/management costs	😊	😐	😞
Data and governance	😐	😊	😊

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Dynamic Hedging of Guarantees

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Back to Basics: Why Hedge?

No risk mitigation → may be sensible?

Hedging can be successful:

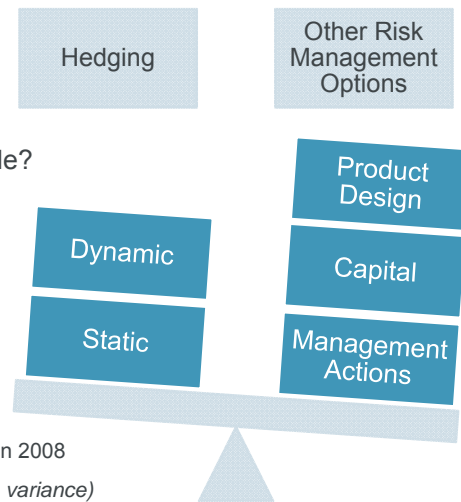
- VA: Hedges saved \$40 billion in 2008
- >90% of "in-scope" liability movements

Source: Milliman

Hedging can have its limits:

- VA: \$4 billion additional hedge "breakages" in 2008
(e.g. hedge basis risk; illiquidity; assumption variance)

Source: McKinsey



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Dynamic Hedging: What do we mean?

Dynamic Liabilities	<ul style="list-style-type: none"> • Non-market factors • Material impact on risk exposures
Dynamic Replication	<ul style="list-style-type: none"> • Rather than full static solution • Continual adjustment of shorter term hedge assets
Dynamic Asset Management	<ul style="list-style-type: none"> • Multiple ways to hedge a single exposure • Optimising reward from hedging approach

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Dynamic Hedging: Why do it? (1)



Variable Annuities

- Complexity (path dependency from ratchets)
- Policyholder behaviour
- High Gamma (ratchets keep policies ATM)
- Liability uncertainty (need for flexible hedges)



With Profits

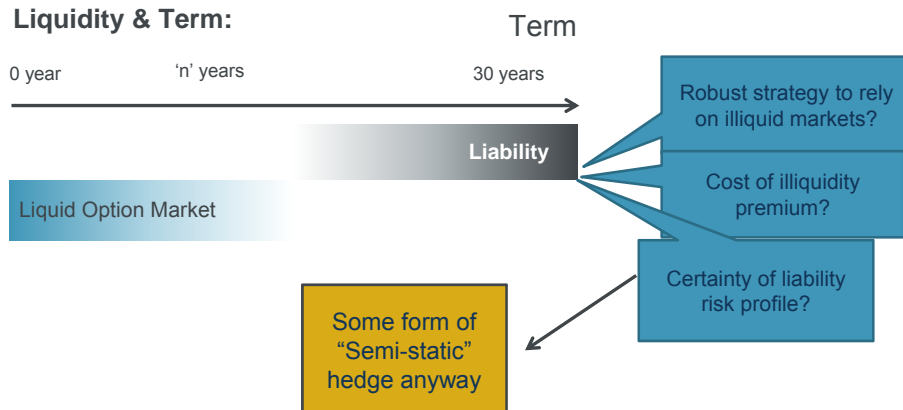
- Complexity (subjectivity)
- Policyholder behaviour less significant
- Lower gamma (breathing room from management actions)
- Liability uncertainty (why hedge with such sophistication?)

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Dynamic Hedging: Why do it? (2)

Liquidity & Term:

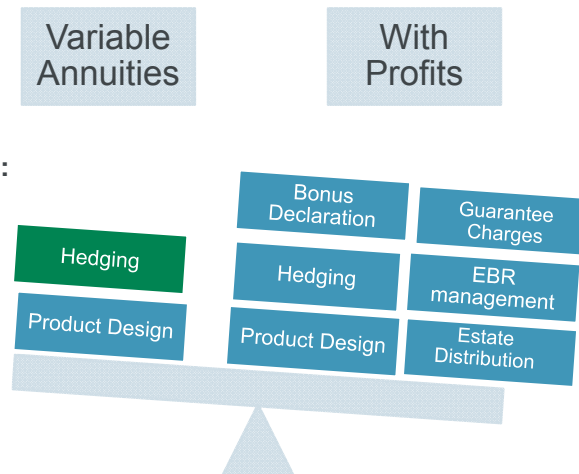


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Dynamic Hedging: Why do it? (3)

Available Risk Management Options:

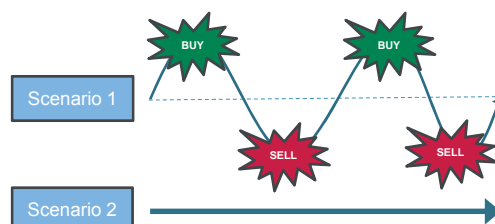


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('Pure') Dynamic Hedging: The Key Problem

Uncertain hedging cost from realised volatility:



- Both scenarios start and end in same place
- More volatile scenario has much higher on-going dynamic hedge re-balancing cost, due to "buy-high / sell-low"

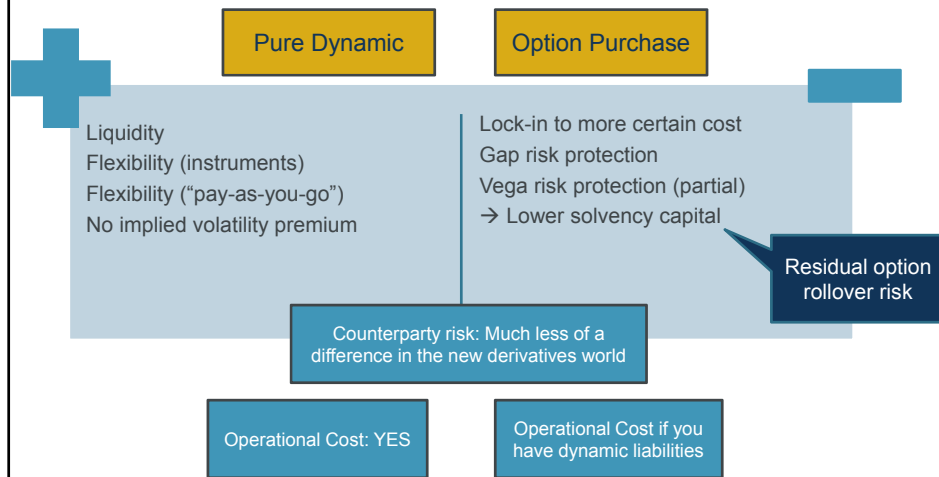
Priced for but on uncertain basis:

- Actual vs expected hedging cost
- How much can capital & pricing margin withstand?

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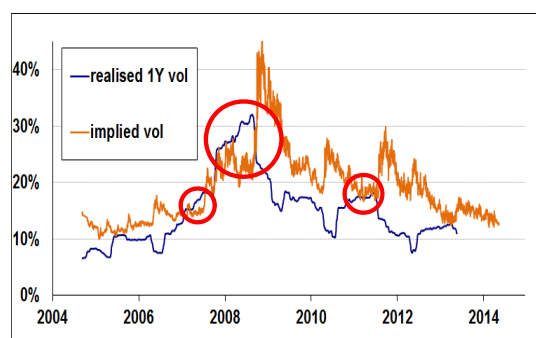
Dynamic → Semi-Static?



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Realised vs Implied Volatility



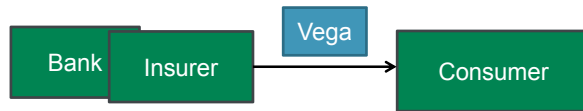
- Component of volatility premium compensates for volatility and gap risk
- Does this sit better with an insurer or a bank?
- Basel III → significant capital increase
- Solvency II → more risk focused
- Illiquidity premium too

Complex
Hedging
Decision

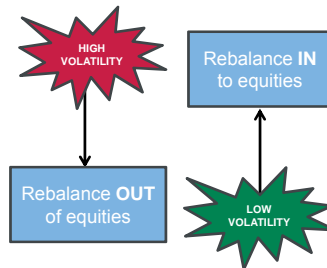
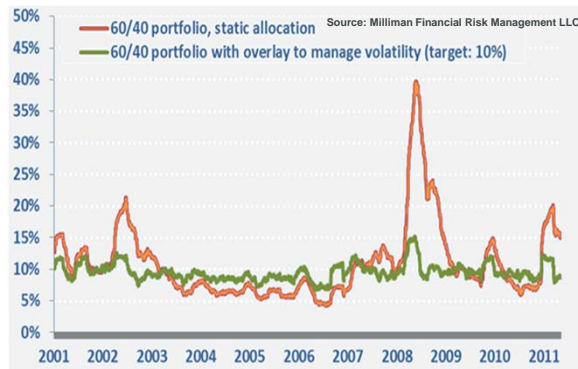
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Managed Volatility Funds



Quarterly Realised Volatility



- Systematic approach. Objective = target or cap
- Requires volatility model of fund assets
- Best practice = **Daily** assessment and trading
- Typically synthetically traded with futures, as an overlay

VA Solution: Fund & Product Design

Managed Volatility Funds

- The solution that the VA industry has settled on
- Greatly reduces equity volatility risk
- Greatly reduces uncertainty over dynamic hedge re-balancing cost

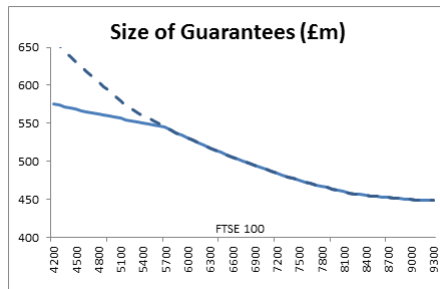
Equity
Volatility
Risk

Interest Rate Risk

- Help give dynamic hedging an easier job:
 - No more GMIB nor GAO (i.e. explicit guarantees on interest rates)
 - Single premium or recurrent single premium only

Interest
Volatility
Risk

With Profits View: Flexibility



Wide Range of Error

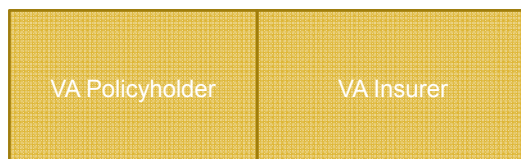
Other Levers

Tight Hedging can be Spurious

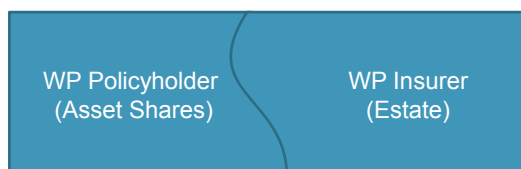
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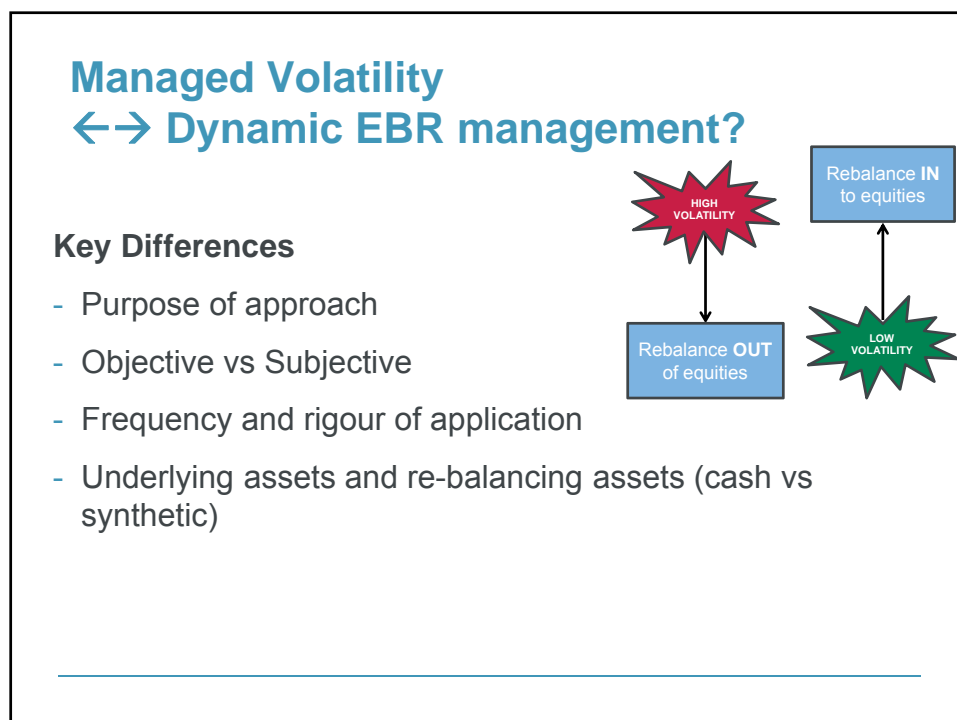
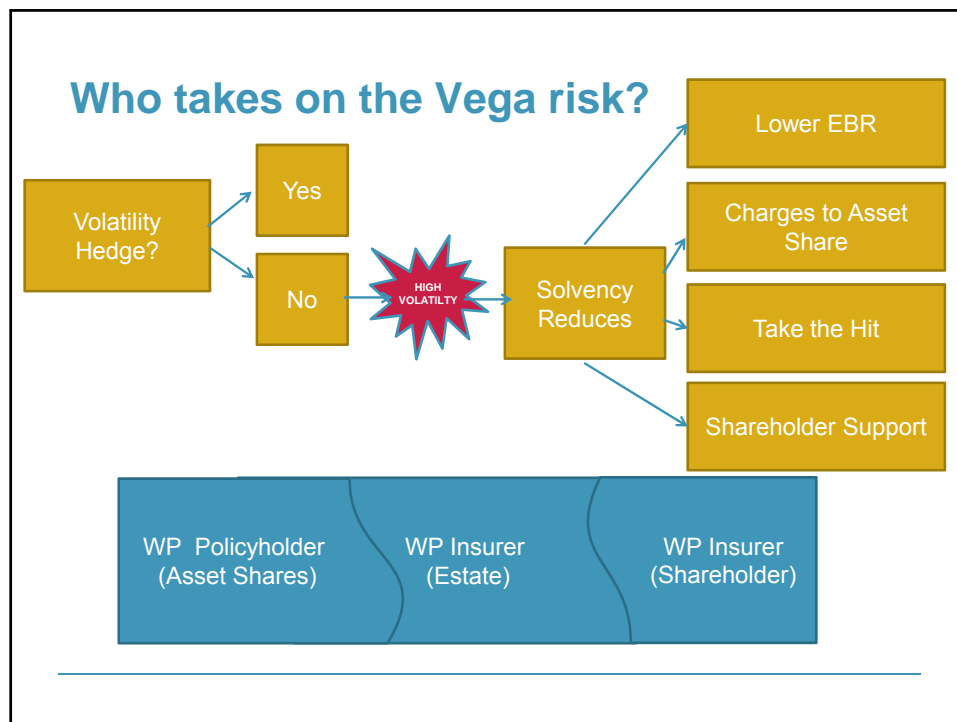
Who takes on the Vega risk?



- *Rigorous approach*
 - *Few alternatives*
- *Extreme application of lever*



- *More flexibility*
 - *Many alternatives*
- *Some implied transfer*



Passing on the Vega – a good thing?

Policyholder Return

- Pass risk back to the consumer OR provide a 'risk-free' return and charge them for the privilege
- Assuming volatility is not a leading indicator there is a buy-high and sell-low strategy and a reduction in return:
 - Do customers understand this?

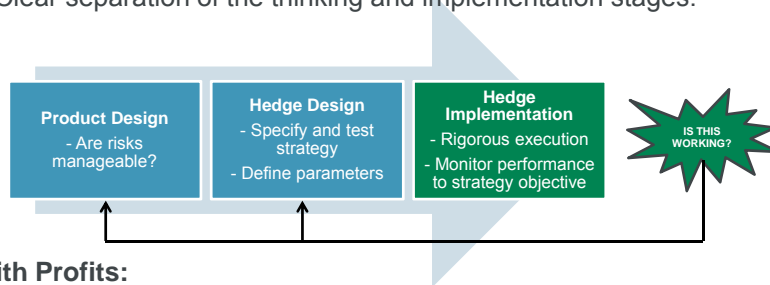
Systemic Risk

- Short-term: incremental trades, so on a trade-by-trade basis manageable to not impact the market
 - Longer-term: is there a problem if more of the industry uses these approaches?
-

VA → With Profits

Variable Annuity approach

- Clear separation of the thinking and implementation stages:



With Profits:

- Forward-load the thinking and subjective evaluation?
 - Rigorous framework for the objective implementation of thinking?
 - Level of “operationalising” depends on risk tolerances and exposure?
-

What do you think?

- Your views on the industry's approach to the Matching Adjustment
- How relevant is the relative capital efficiency of banks and insurers in a Basel III and Solvency II framework?
- Is there a marmite element to dynamic hedging within With Profits?

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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