



Institute
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Dynamic Hedging Working Party

28 May 2014

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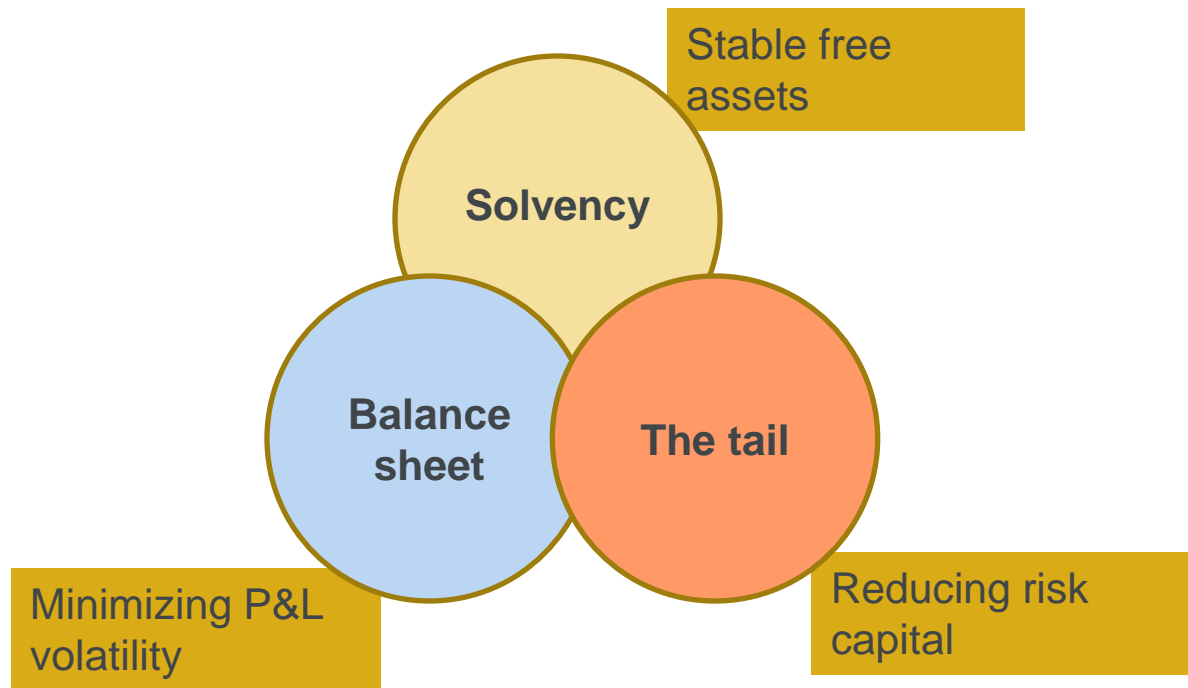


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Setting the Scene

28 May 2014

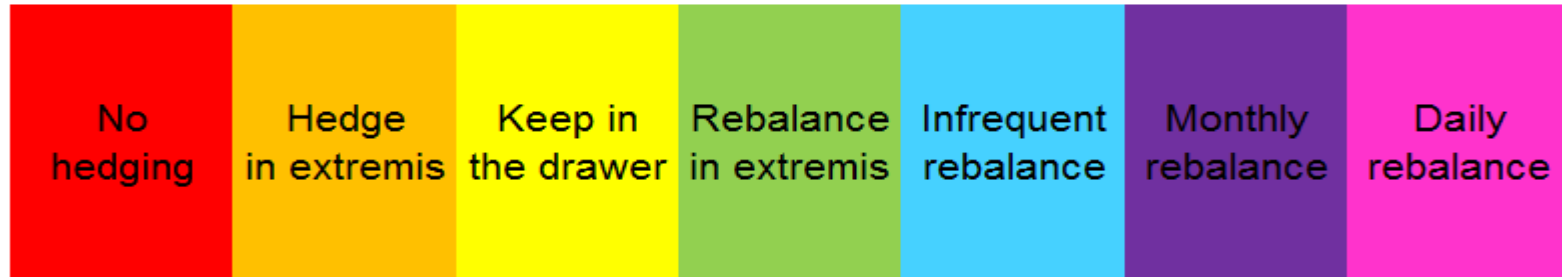
What to hedge?



Often what works for one will **work for all**, but there may be conflicts, especially if metrics don't represent a true economic view.
Example: hedging of Peak 1 free assets.

Extent of dynamic hedging

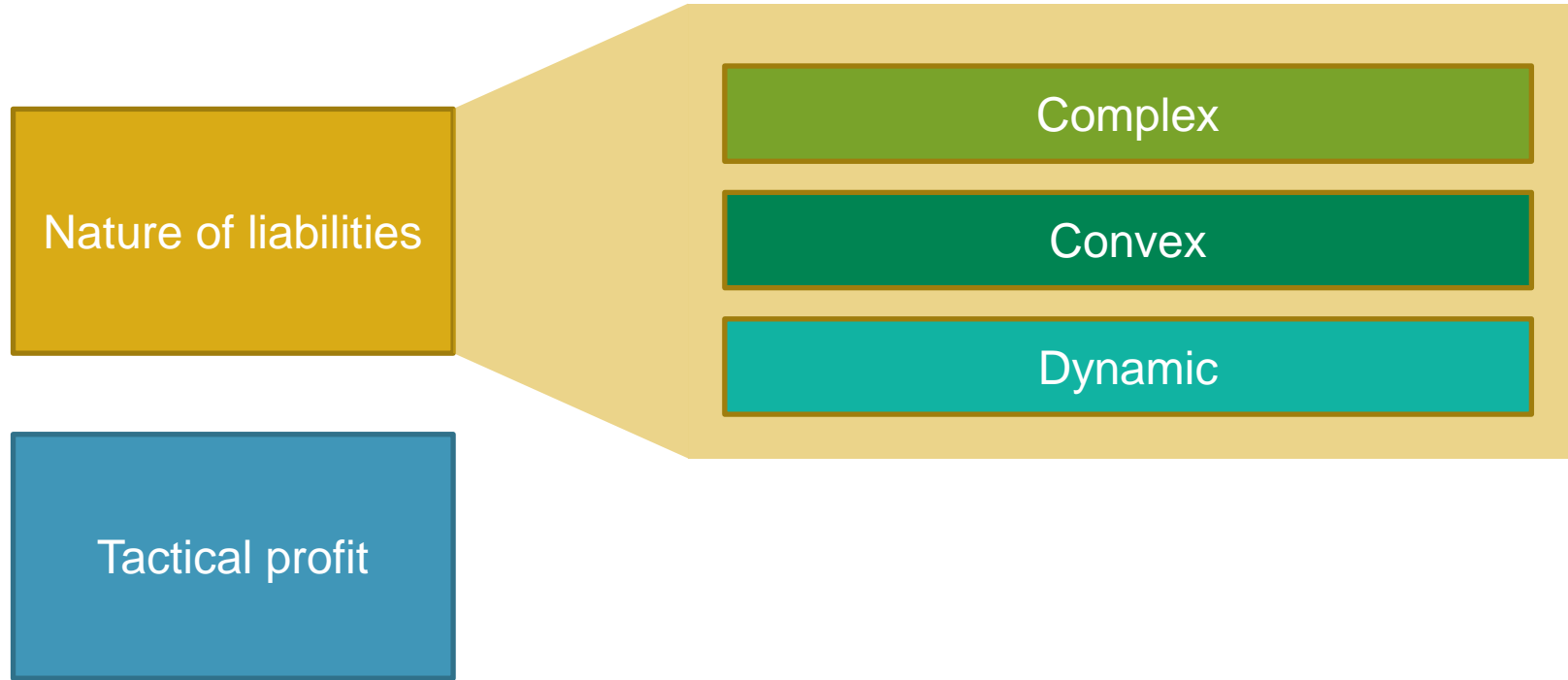
No hedging	Static	Semi-Static	Dynamic hedging
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Hedging for dummies



Why hedge dynamically?



Benefits and setbacks of dynamic hedging

LDI switch boosts London scheme funding

08/05/2013

By Peter Davy

The London Pensions Fund Authority (LPFA), one of the UK's largest local government pension schemes is almost fully funded, it announced today. An initial assessment carried out by actuaries Barnett Waddingham put the funding level of the £4.7bn scheme at 95 per cent, up from a weighted average between active members' and pensioners' subsections of 81 per cent at the last valuation, three years ago.

The scheme, covering about 200 employers, attributed the improvement in funding to changes in the asset and liability strategy, and strong investment performance since the last valuation. It has used an active LDI strategy to hedge inflation and interest rate risk since 2006, and in February made a large tactical switch to reduce the interest rate hedge and increase its inflation hedge, crystallising a book profit of some £200m.

LPFA CEO Mike Taylor, said: "We have implemented a new strategy, and are delighted

Source: www.pensionsage.com

Volatility hedging loss prompts Axa variable annuities redesign

Author: Laurie Carver

Source: Insurance Risk | 02 Mar 2010

Categories: Insurance



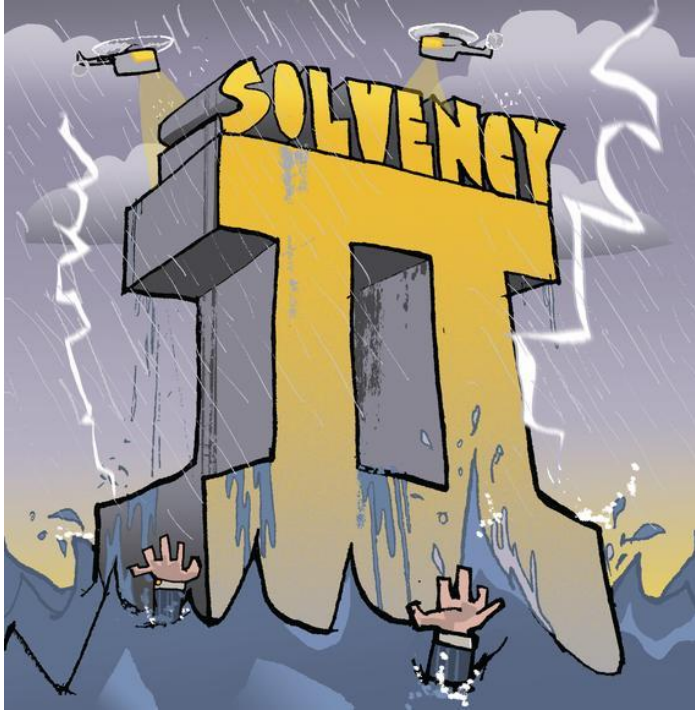
The US subsidiary of Paris-based insurer Axa is to launch a new feature in its variable annuities (VAs), aimed at limiting client exposure to market volatility after a €121 million (£106 million) loss in its volatility hedging programme undermined a much improved hedging margin in 2009.

Although this figure is down from a €183 million loss in 2008, in 2010 the company's newly sold VAs will feature a mechanism to automatically divest investors' portfolios of equities when a historical volatility measure hits a threshold.

"We are going to address [volatility hedging] in 2010 by implementing what we call the volatility threshold. We will take the clients out of equities when the volatility reaches a certain level. We have

Source: www.risk.net

Other aspects of dynamic hedging



Source: www.insurancetimes.co.uk



Source: www.independentaudit.com

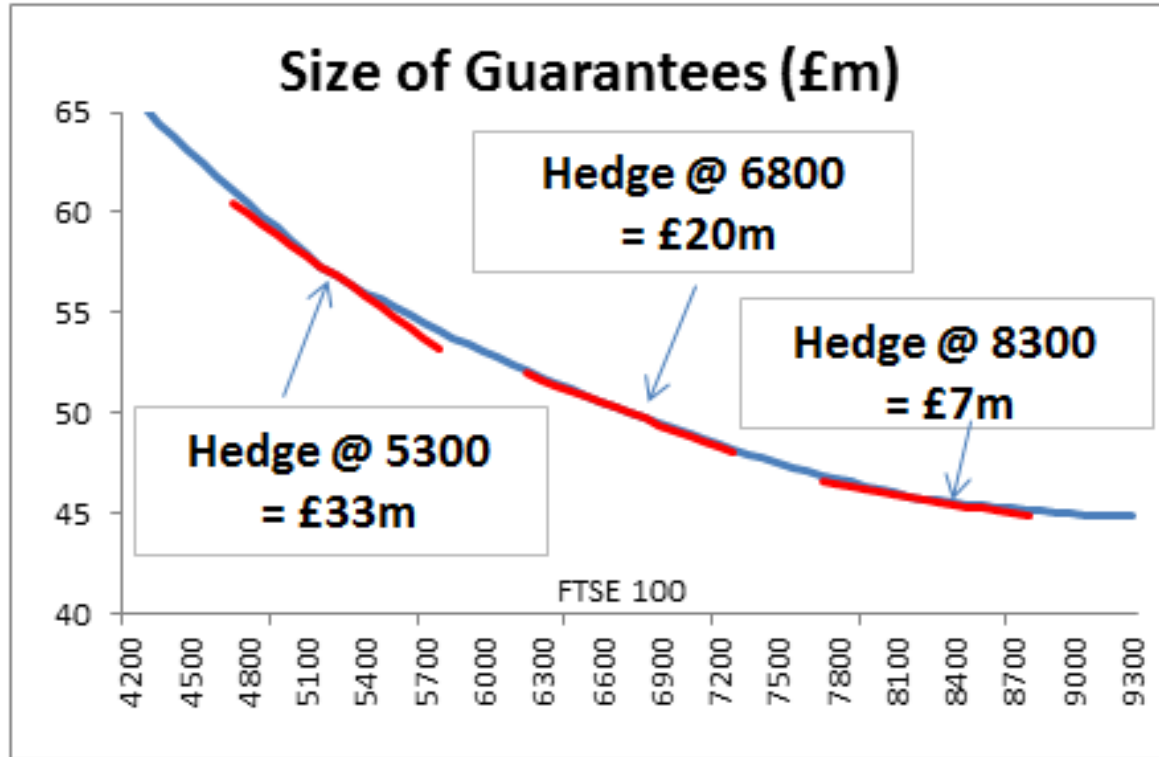


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Challenging the norm

Equity risk hedging in with profits and variable annuities

Delta and Gamma



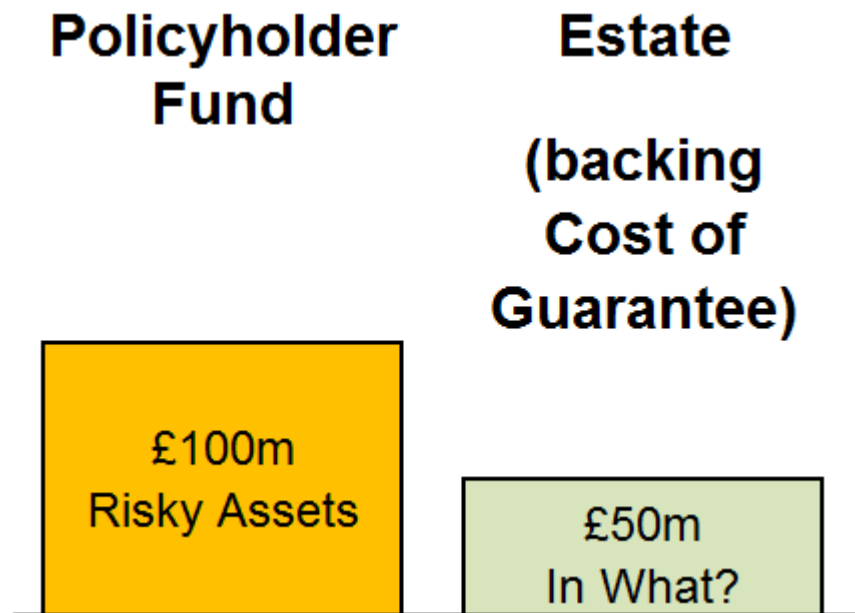
Delta hedging

With Profits:

- Policyholder Fund
- Estate (owned X% by Policyholders)

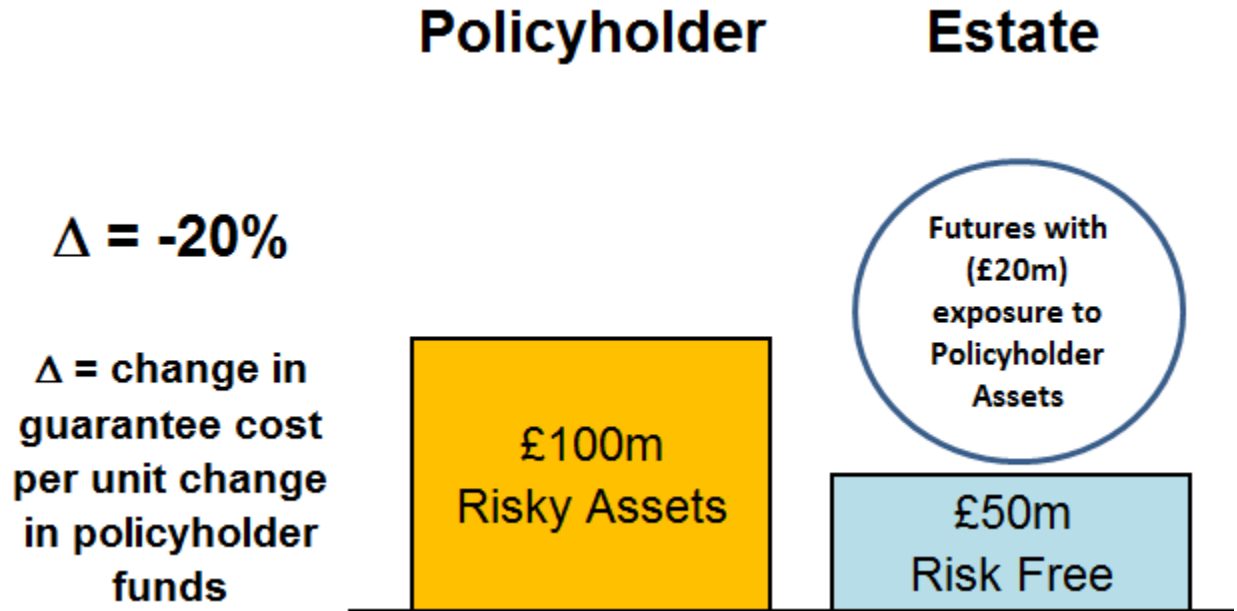
Variable Annuities:

- Policyholder Fund
- Insurer's account

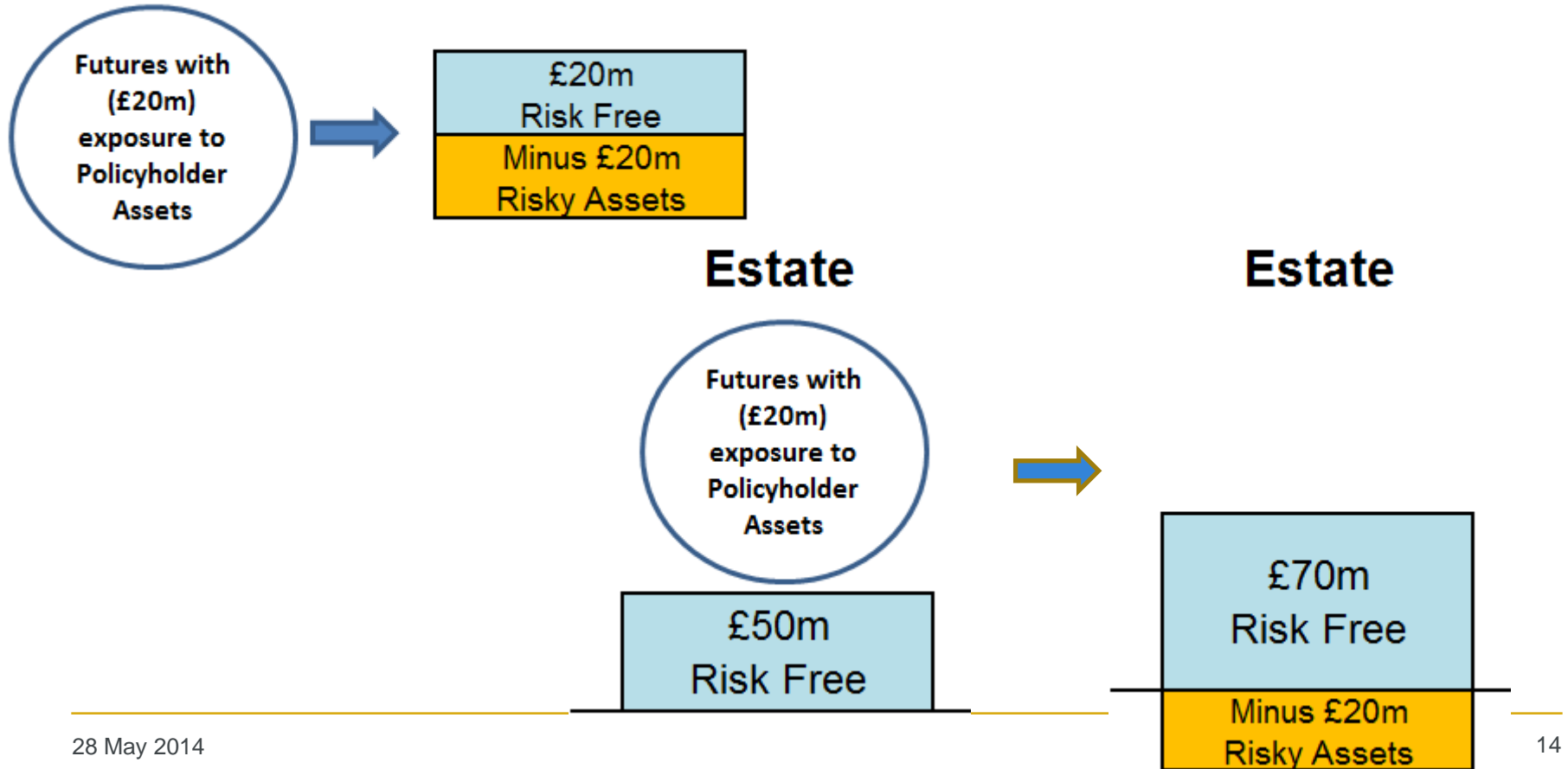


Delta hedging – using futures

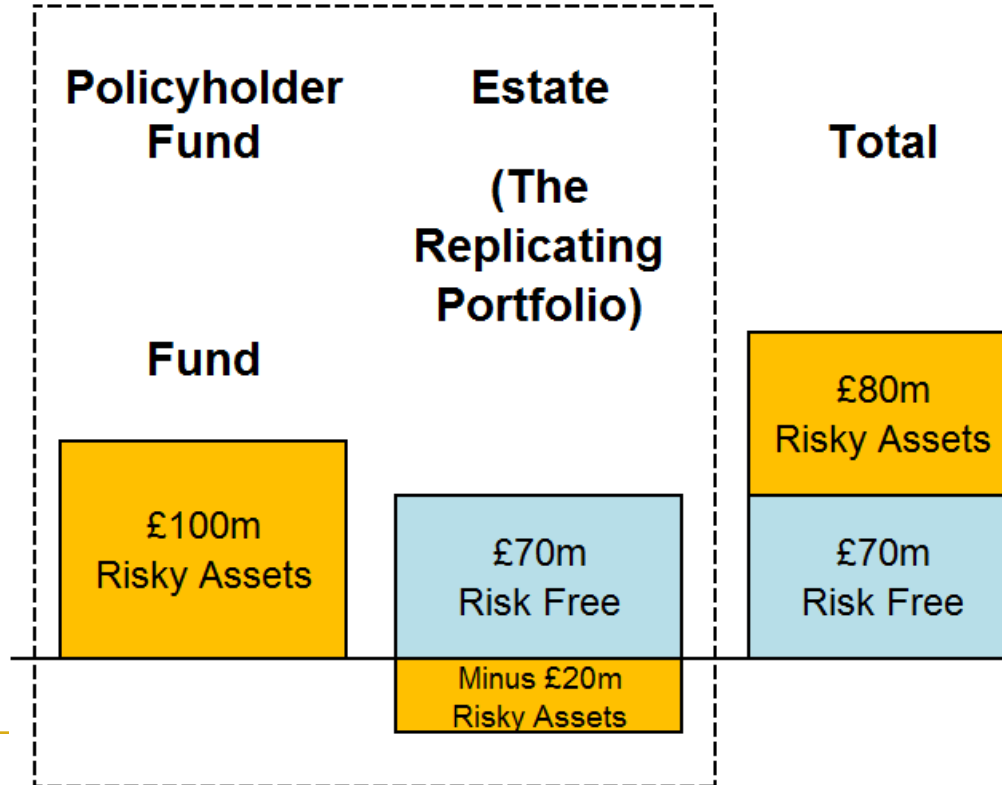
Futures offset changes in
Cost of Guarantees
arising from the Δ



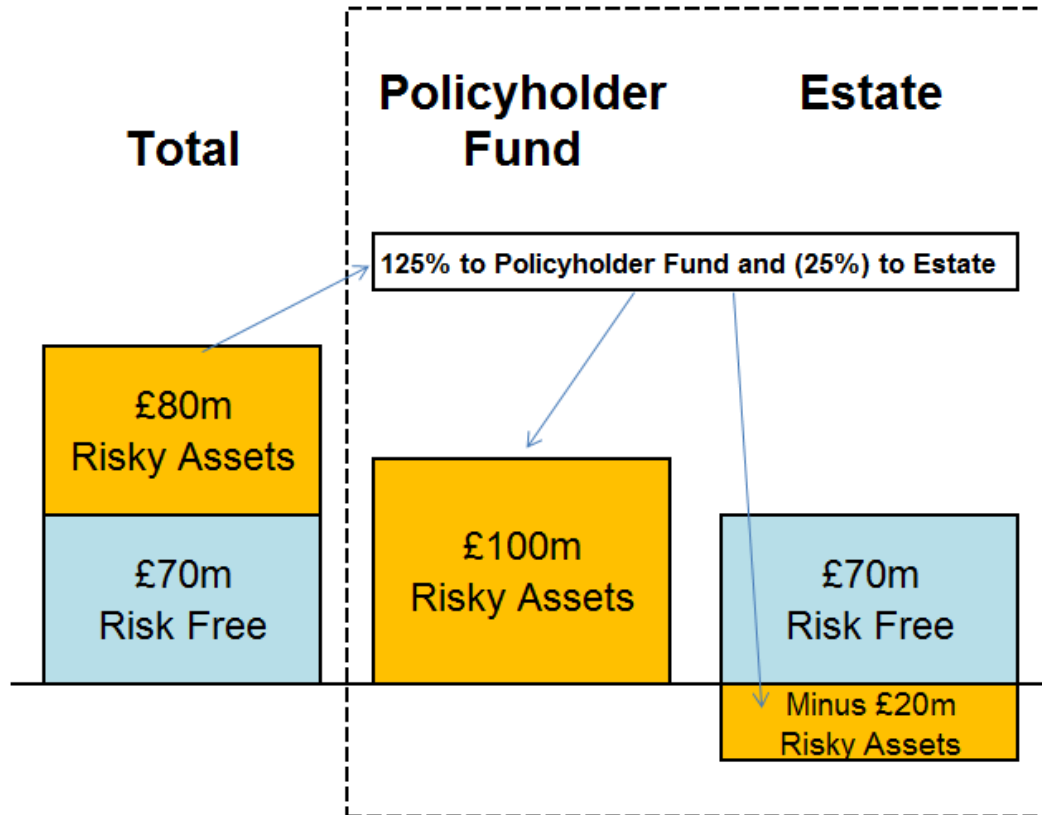
Delta hedging – futures equivalence



Delta hedging – replicating portfolio

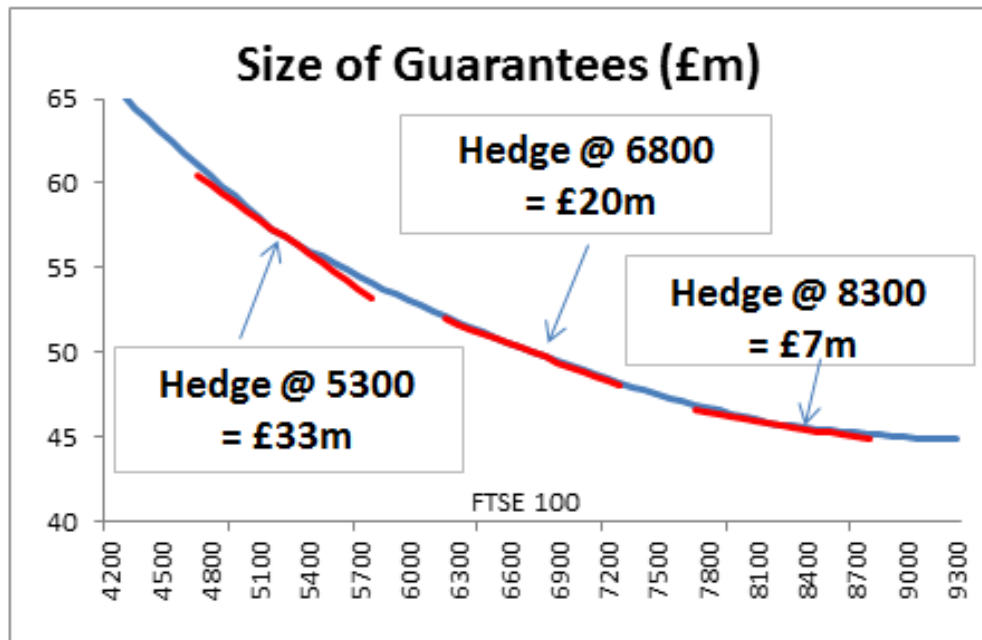


Delta hedging – notional shorting



With Profits	Variable Annuities
Now common practice	Equivalent is short selling stocks

Delta and Gamma



Potential Issues:

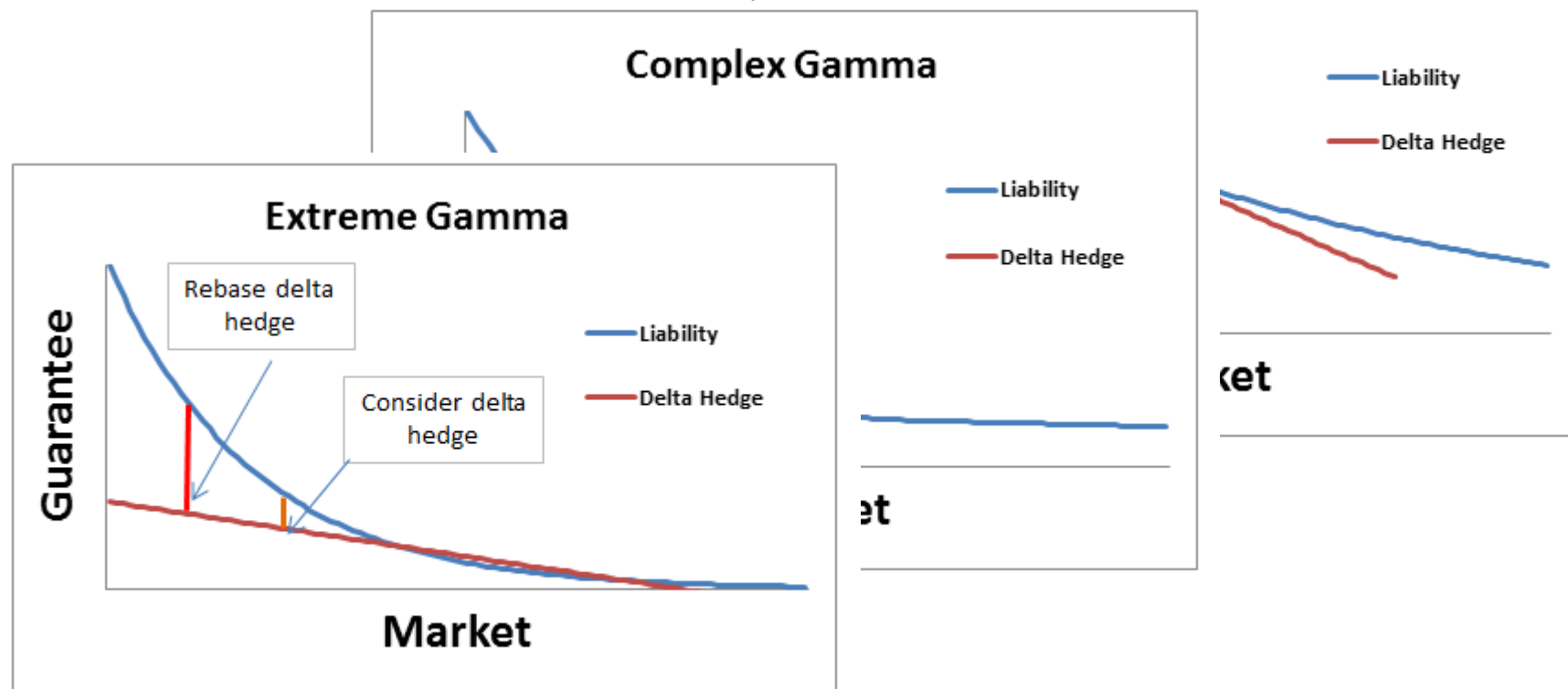
	Futures	Shorting
Basis Risk	Material?	Near-zero
Trading	Cheap & Nimble	Costly & Cumbersome

Potential Solutions:

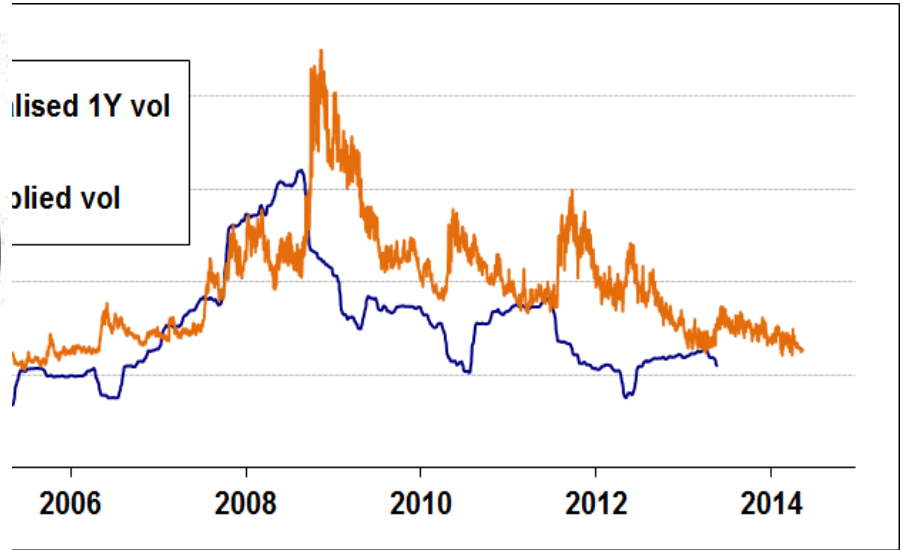
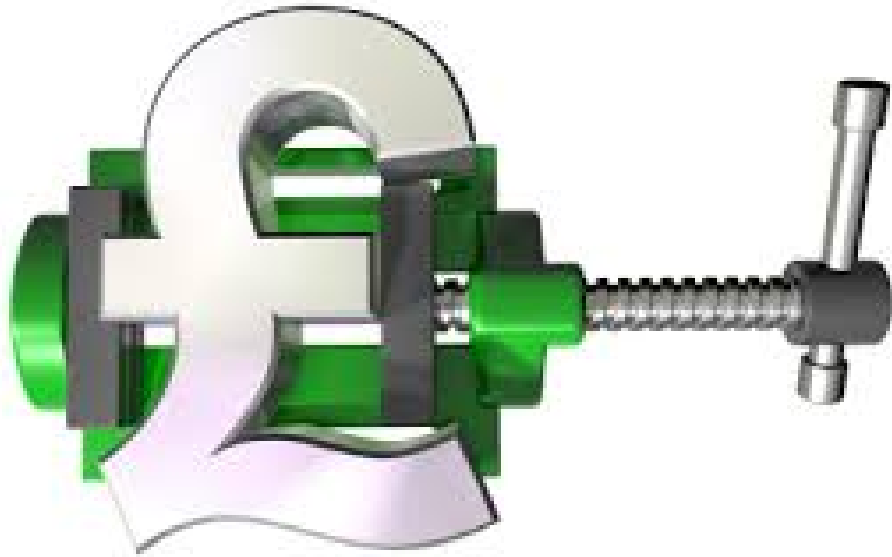
Bit of both

A Gamma hedge using options

When to use Options



Whether to Hedge Gamma



Peace of mind

Source: RBS / Bloomberg

Variable annuities vs With Profits

What	Variable Annuities	With Profits
Current practices	Hedge equity delta and interest rate rho	Variety depending on guarantees / strength of the Fund
	Close to half hedge equity gamma	
Objectives of the hedge	Pay guarantee claims	Pay guarantee claims
	Minimise amount and volatility of capital requirements	Minimise amount and volatility of capital requirements
	Competitive guarantee pricing	Work with other risk reduction levers
Instruments used for hedging	Derivatives	Derivatives + Notional Shorting

Variable annuities vs With Profits

What	Variable Annuities	With Profits
Hedging process	Active Daily valuation Real time monitoring Weekly hedge reporting	Pragmatic $\frac{1}{4}$ or $\frac{1}{2}$ yearly review of liabilities Active under extreme conditions
Governance	Detailed hedge strategy mandates	Varies from prescriptive with clear delegation to judgmental

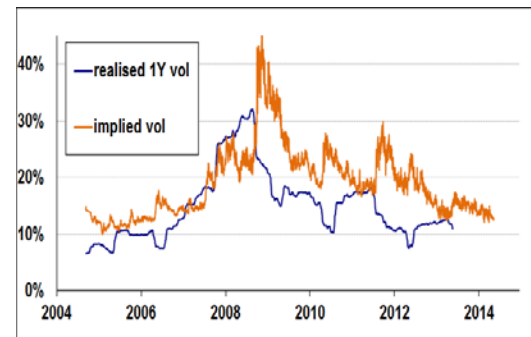
Capital Requirements – Vega breakeven

Realistic Balance Sheet
Realistic Capital Margin

Delta stress (20%)

Economic Capital
99.5th %ile stress

Delta stress (40%)
Vega stress 6%



		Duration	
		2	10
Money-ness	At-The	0.8%	0.7%
	Out-The	1.3%	0.8%

		Duration	
		2	10
Money-ness	At-The	3%	6%
	Out-The	6%	8%



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Challenging the norm

Inflation and interest risk hedging in traditional annuities and pension funds



28 May 2014

Traditional annuities vs Pension Funds

What	Traditional Annuities	Pension Funds
Current practices	Hedge interest rate, inflation and FX exposure Not credit risk	Partial hedging of interest rate and inflation exposure
Objectives of the hedge	Minimize capital	Reduce and stabilise shortfall between assets and liabilities
	Inflation matching mandatory	Target nominal/real/inflation hedge ratios by term
Instruments used for hedging	Bonds	Bonds
	Derivatives: interest rate and inflation swaps	Derivatives: interest rates/inflation swaps, swaptions, TRS/Repo.

Traditional annuities vs Pension Funds

What	Traditional Annuities	Pension Funds
Hedging process	Duration or cash-flow matching	Trigger based: Yield/funding level, Averaging in
	Fairly static	Predominantly passive, some active LDI
Governance	Established mandates	Initial negotiations can be lengthy
Other	Regulation	Third party fund managers
	Matching adjustment	

Initial observations

Annuities



Pensions



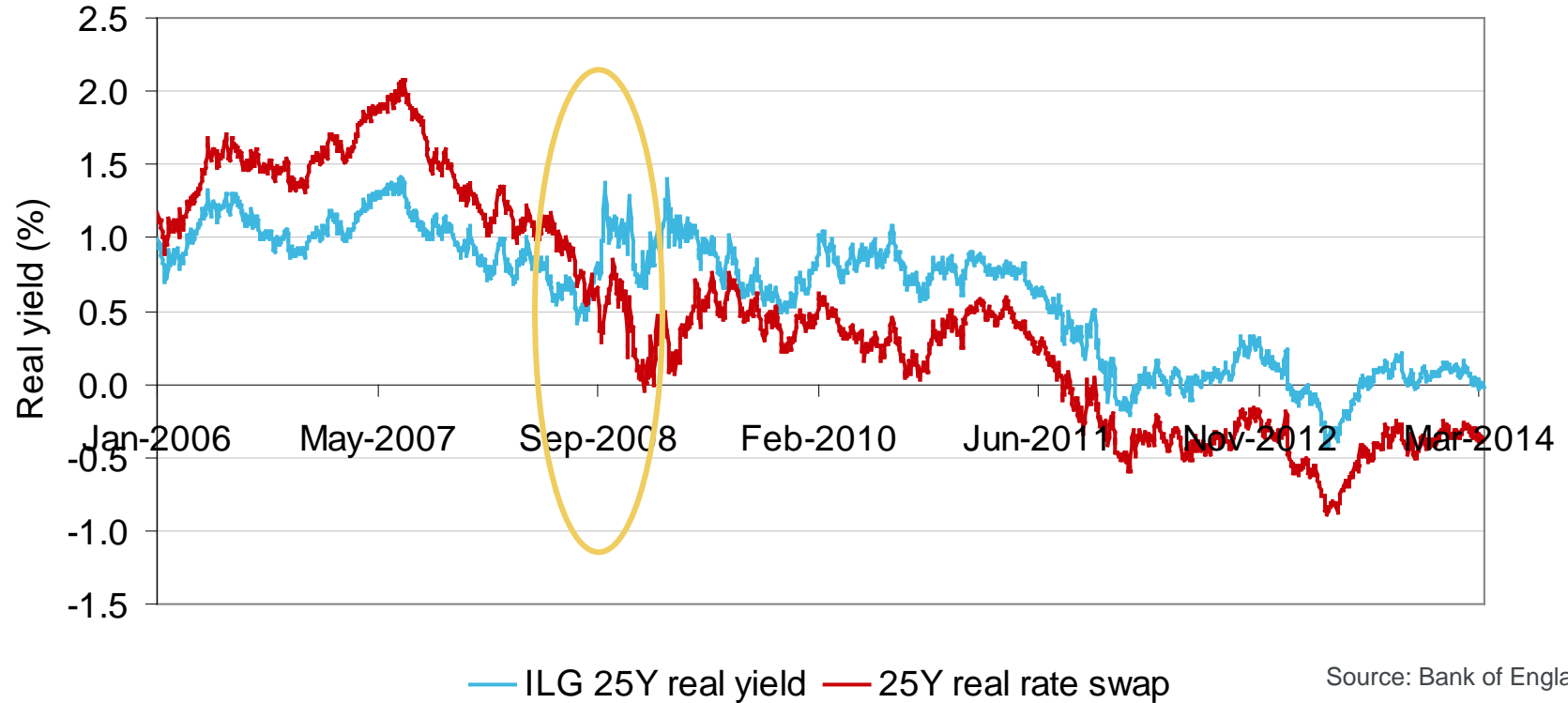
Cumulative outperformance of active LDI vs. liability benchmark



Performance
attributing factors

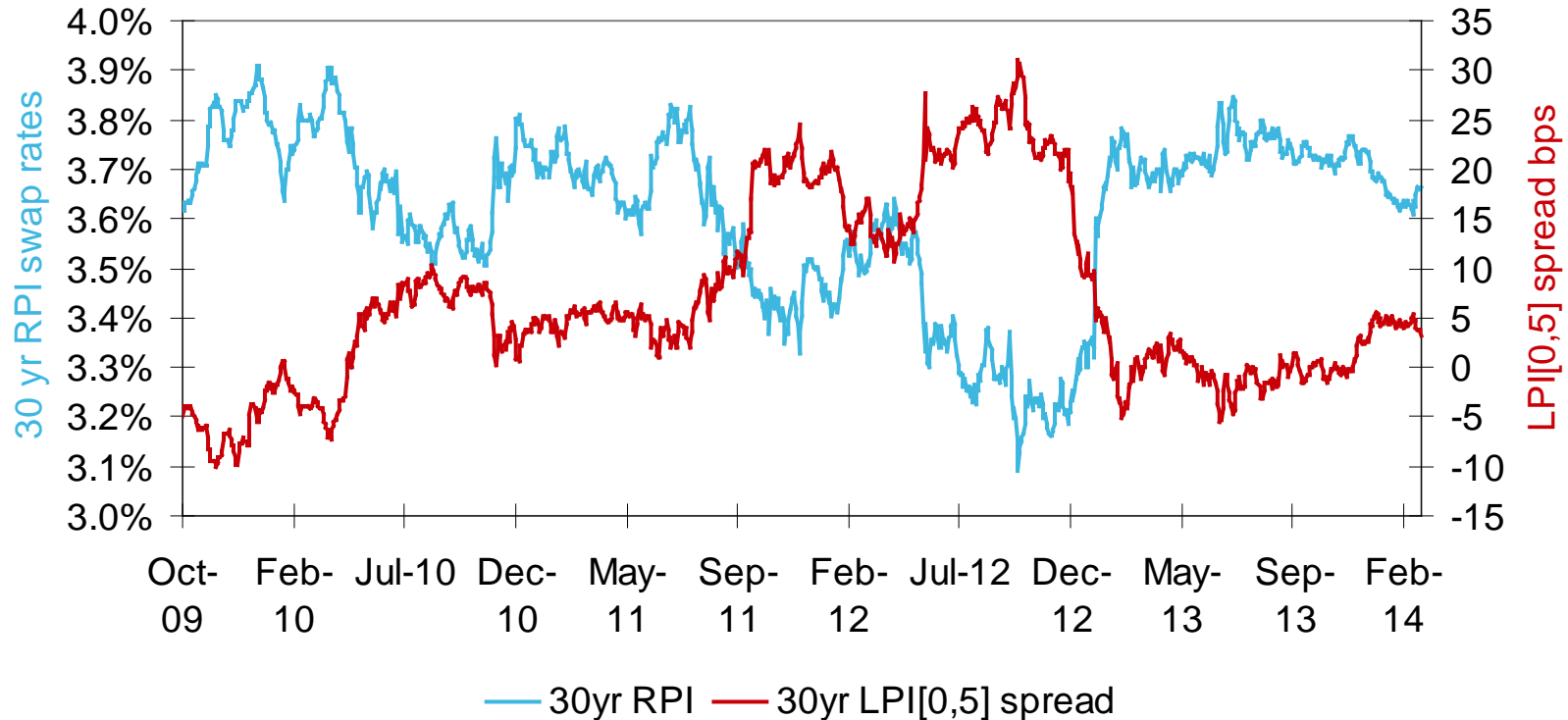
Source: Insight Investment

Hedging real yields: Gilts or Swaps?

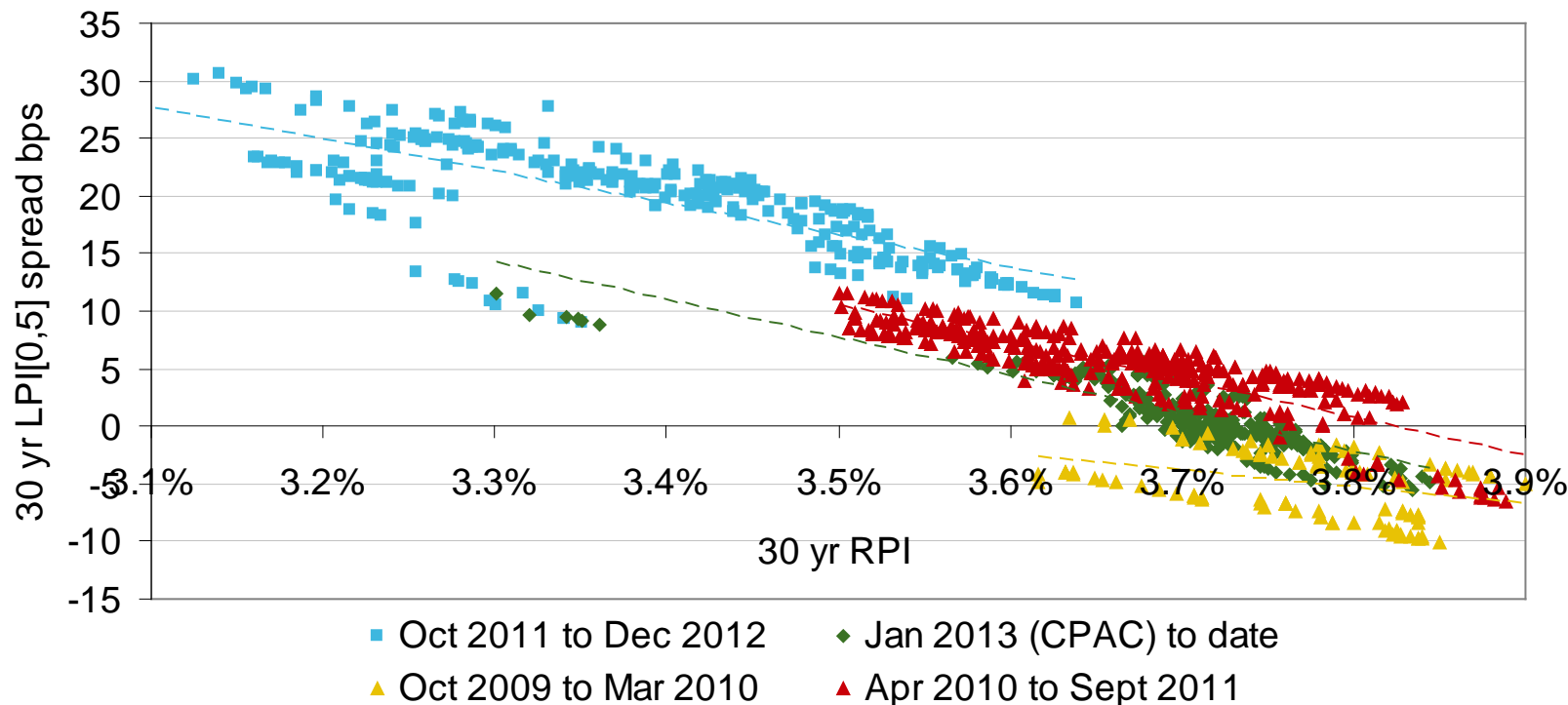


Source: Bank of England, RBS

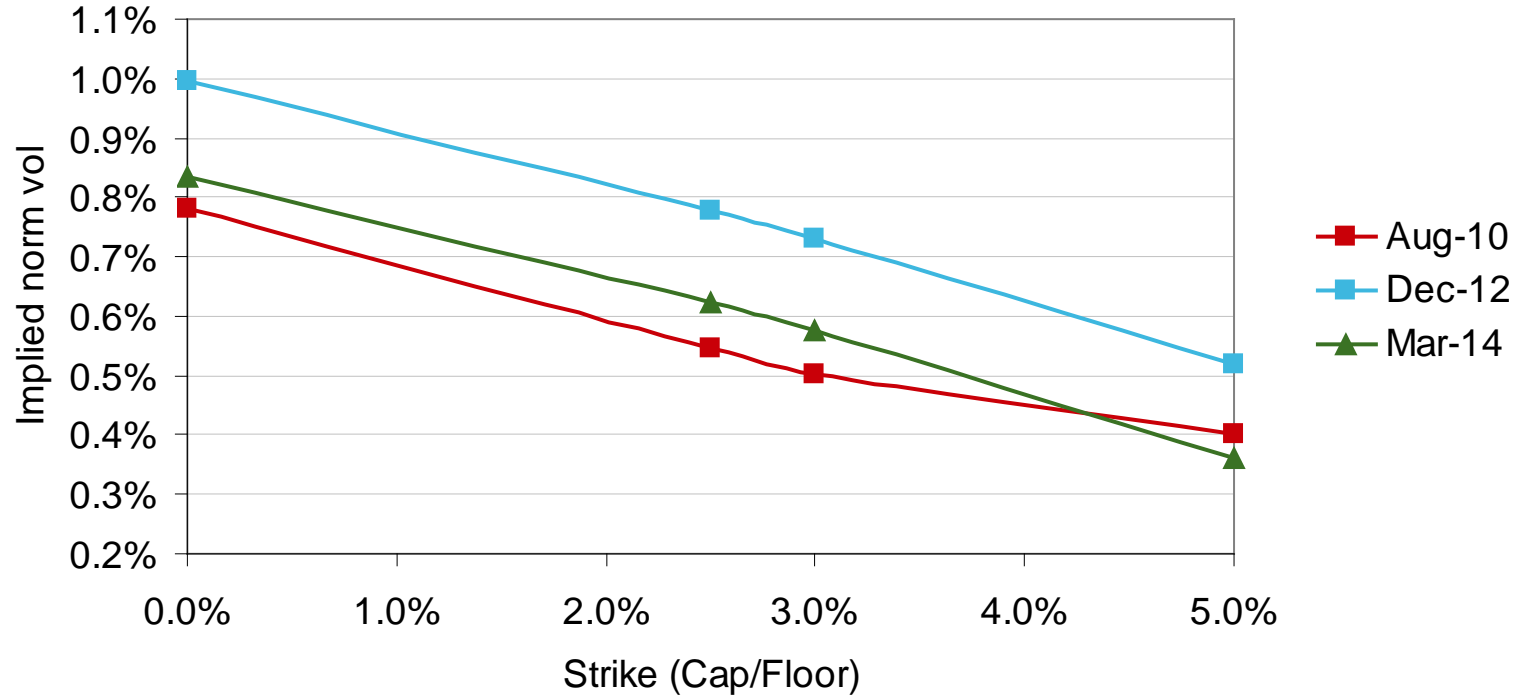
Inflation options: 30 year LPI[0,5]



Inflation options: 30 year LPI[0,5]



Market distortion – Implied vols 30 yr RPI



Capital implications – April 2014

	RPI swap	Market cost of LPI[0,5]	'Real world' cost of LPI[0,5]	Inflation stress	'Real world' cost of LPI[0,5] under stress	Capital requirement
10Y	3.29%	-3 bps	-3 bps	-97bps	3 bps	6 bps
20Y	3.61%	-2 bps	-6 bps	-84bps	4 bps	10 bps
30Y	3.67%	4 bps	-8 bps	-66bps	3 bps	11 bps
50Y	3.67%	9 bps	-6 bps	-66bps	5 bps	11 bps

Cheaper to hedge

Source: RBS ALM Emily Penn, Robin Thompson

Capital implications – Dec 2012

	RPI	Market cost of LPI[0,5]	'Real world' cost of LPI[0,5]	Inflation stress	'Real world' cost of LPI[0,5] under stress	Capital requirement
10Y	2.69%	17 bps	3 bps	-97bps	10 bps	7 bps
20Y	2.96%	24 bps	0 bps	-84bps	6 bps	5 bps
30Y	3.14%	29 bps	-2 bps	-66bps	5 bps	7 bps
50Y	3.21%	33 bps	-1 bps	-66bps	6 bps	7 bps

Source: RBS ALM Emily Penn, Robin Thompson

Cheaper not to hedge



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Conclusions

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Conclusions





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 presenters.