The Actuarial Profession
making financial sense of the future

Variable Annuities Seminar – 17 September 2010

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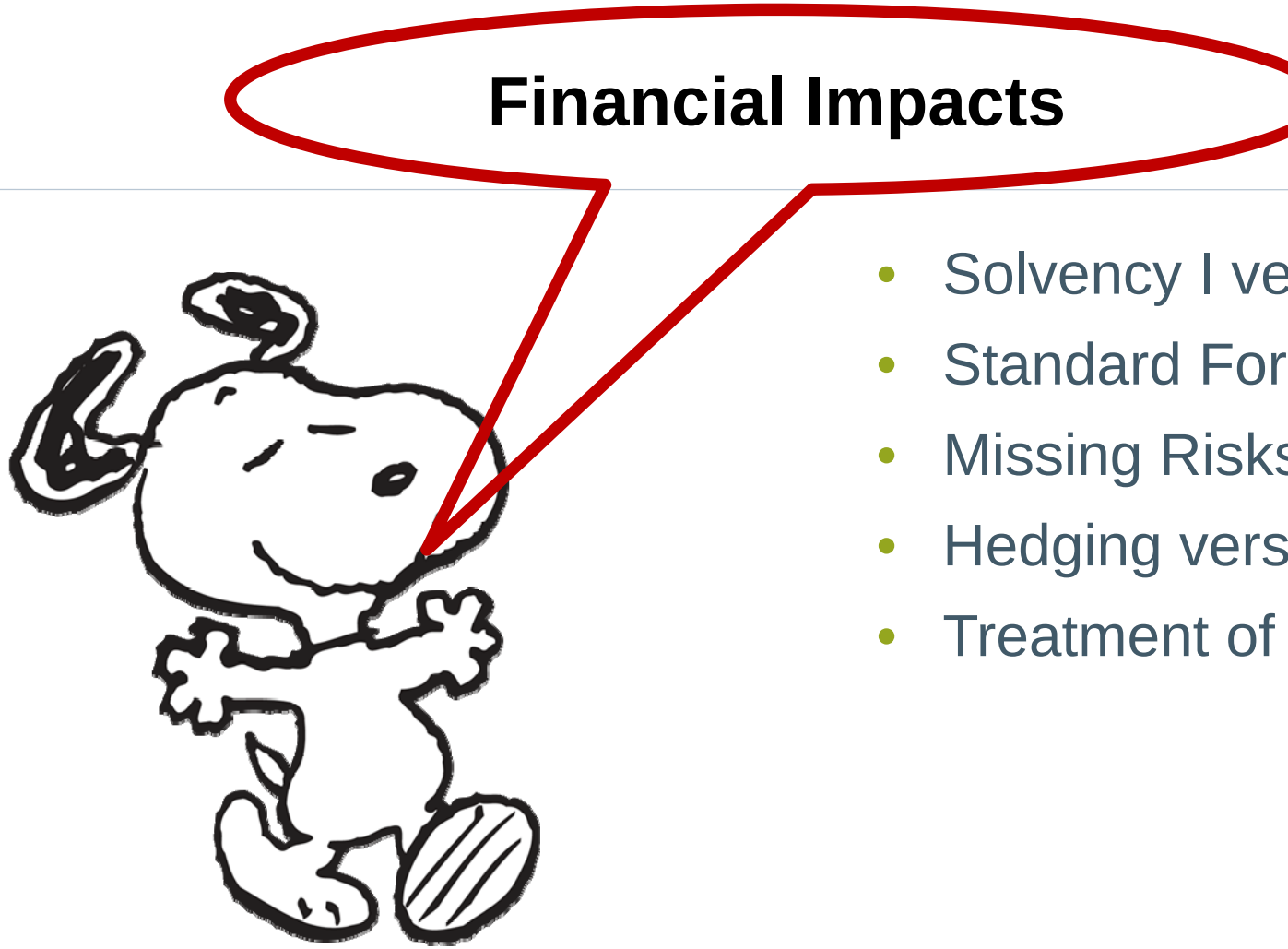
Solvency II Impacts, Implications and Opportunities for Variable Annuities

Final_17September 2010

Content

- Financial Impacts
- Implications
- Opportunities

Financial Impacts



- Solvency I versus Solvency II
- Standard Formula (“SF”)
- Missing Risks in SF
- Hedging versus Reinsurance
- Treatment of Hedging

Financial Impacts
Basis for Analysis

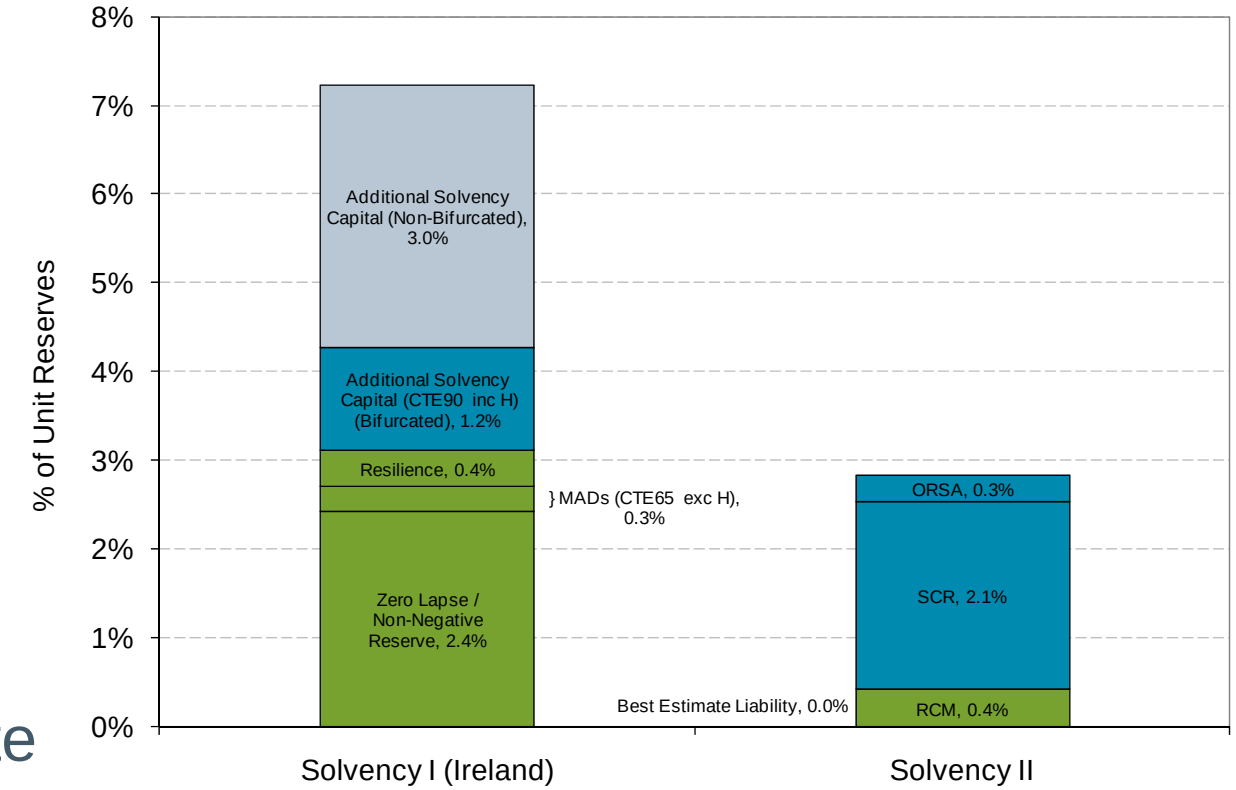
- Monoline variable annuity insurer based in Ireland
- Single VA product:
  - GMWB for Life at 4.5%
  - 3-year ratchet
  - 50% equity / 50% bond
- Single representative “straw” model point:
  - 65-year old immediate start
  - Hedge cost = 46bp at 31 December 2009
- We consider un-hedged; 2-Greek; and 3-Greek hedging

Financial Impacts
Solvency I (Ireland) vs Solvency II

Capital Ratios

- SI (bifurcated) 4.3%
- SI (combined) 7.3%
- SII 2.8%

- Graphs assumes:
  - DRV hedge
  - 0% profit margin
- Most currently bifurcate
- Solvency II VIF would likely enhance benefit further

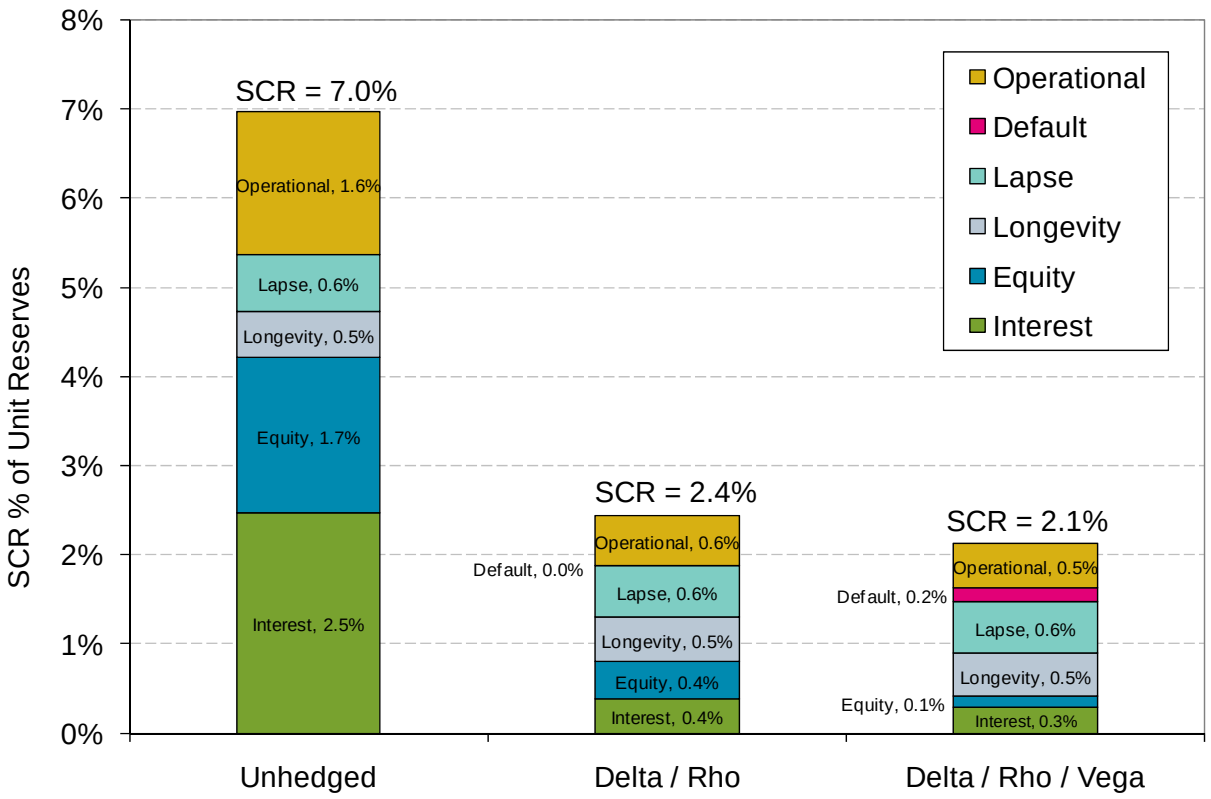


Financial Impacts
SCR (QIS5) Standard Formula by Hedge Strategy

Capital Ratios

- Un-hedged 7.0%
- Delta / rho 2.4%
- Delta / rho / vega 2.1%

- Market Risk ↓
- Demographic Risk ↔
- Default Risk ↑
- Operational Risk
  - Assumed 30% minimum
  - Subjective considerations



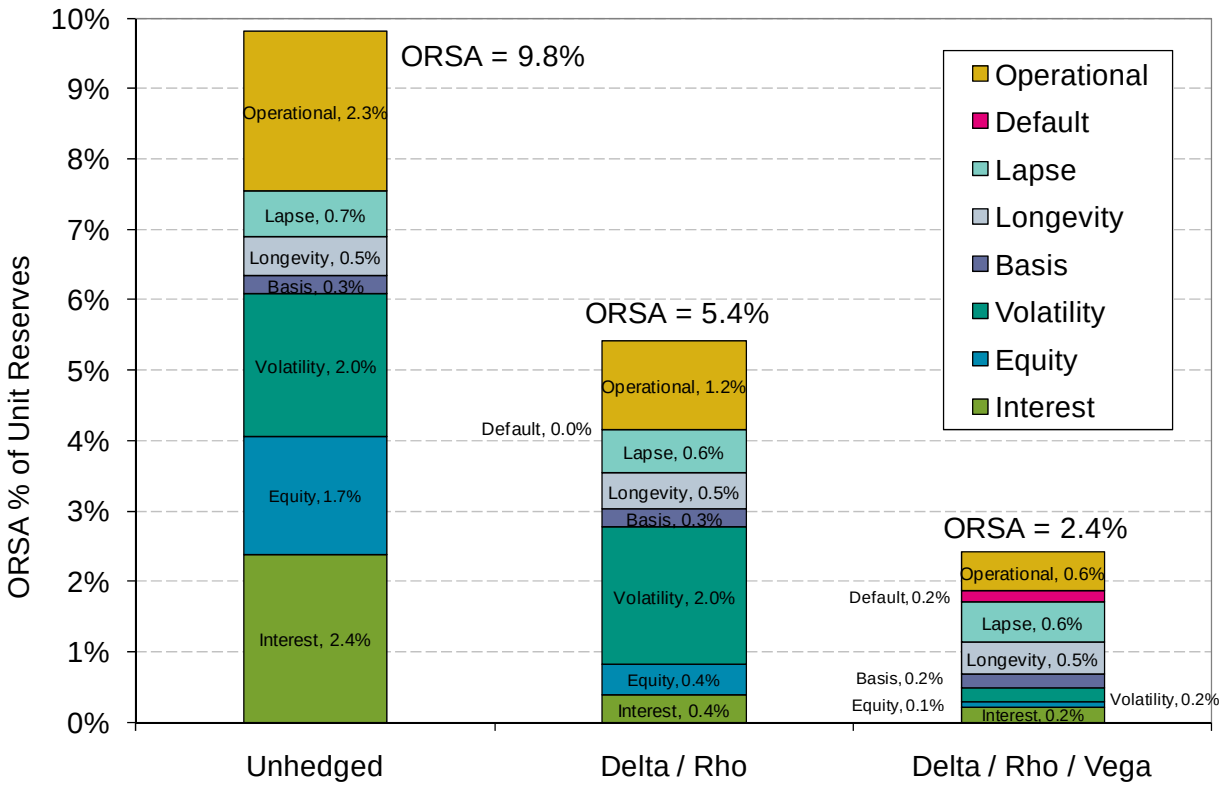
Financial Impacts
ORSA by Hedge Strategy

Capital Ratios

- Un-hedged 9.8%
- Delta / rho 5.4%
- Delta / rho / vega 2.4%

Additional Risk Factors

- Basis Risk
  - Un-hedged?
- Volatility Risk
  - Equity
  - Swaption / Interest Rates



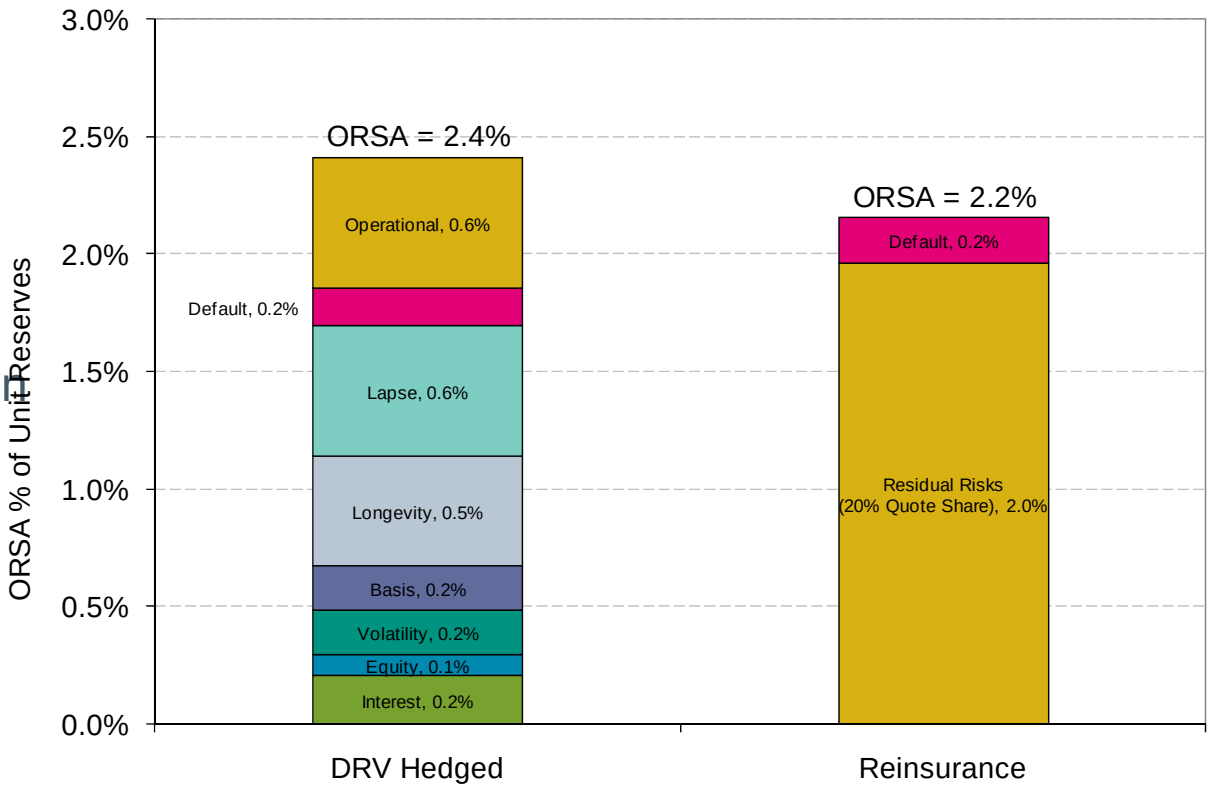
Financial Impacts
Hedging vs Reinsurance

Capital Ratios

- Delta / rho / vega 2.4%
- Reinsurance 2.2% or less
- 80% Quote Share
- Default risk similar between banks / reinsurers. Depends on collateralisation.
- Concentration risk
- Relative Value:

a) Cost of Capital x Capital Saving

b) Reinsurance Premium



Financial Impacts
Hedge Effectiveness

Stress	Liability Movement	Asset Movement (Delta / Rho)	Asset Movement (Delta / Rho / Vega)	Hedge Ratio (Delta / Rho)	Hedge Ratio (Delta / Rho / Vega)
Equity prices down 30%	2,304	1,679	2,127	73%	92%
QIS5 Rates Down	3,286	2,758	2,883	84%	88%
QIS5 Rates Up	-1,813	-2,355	-2,194	130%	121%
Equity Vols up by a quarter	1,406	0	1,307	0%	93%
Equity Vols up by +10%	2,332	0	2,060	0%	88%
Swaption Vols up 400bps	210	0	185	0%	88%
Swaption Vols up 800bps	460	0	368	0%	80%

- Delta / rho / vega hedge performs better for delta and rho under extreme stress scenarios
- Option / swaption assets also exhibit convexity with respect to vega stresses

Financial Impacts
Treatment of Hedging under Solvency II

SCR.12.5/ 12.18 Rolling & Dynamic Hedging

• *Where a risk mitigation technique covers only a part of the next twelve months, but a rolling hedge program exists, this should be permitted as a risk mitigation technique under the following conditions:*

a) *There is well-documented and established process for the rolling forward of hedges;.* ☑

b) *The risk that the hedge can not be rolled over due to an absence of liquidity in the market is not material (no material liquidity risk);* ☑

c) *The costs of renewing the same hedge over a one year period are reflected in the SCR calculation by reducing the level of protection of the hedge;);.* ☑

d) *Any additional counterparty risk that arises from the rolling over of the hedge is reflected in the SCR. Dynamic hedging should not be treated as a risk mitigation technique.* ☑

INTENDED INTERPRETATION? *dynamic re-balancing (except for rolling of 3-month maturity futures contracts) is not allowed under stress scenarios – i.e. only account for the impact of current in-force hedge assets at the valuation date.*

Implications

- Internal Model (Calculation Core)
- Published Information
- Governance
- Diversification

Implications
Internal Model (Calculation Core)

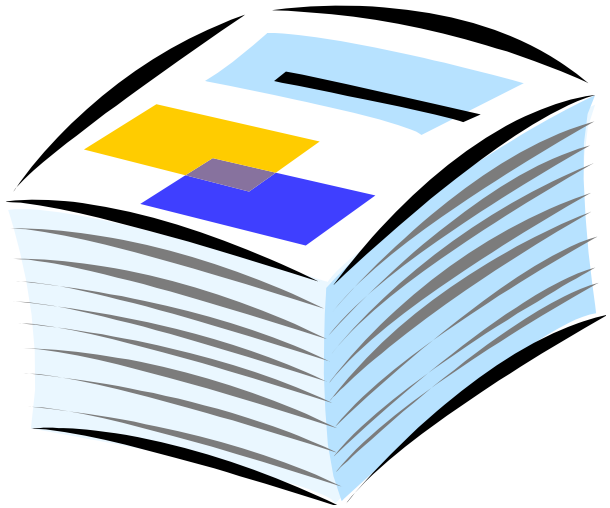
- Issues with Standard Formula
  - Excludes certain risks
  - Allowance for hedging
  - Instantaneous stress
- Nested Stochastic
  - Weekly intervals
  - Better reflects risks and hedging
  - Model point basis

Implications
Internal Model (Calculation Core)

- Regulatory Approval of Internal Model
  - Internal Model Approval Process (“IMAP”)
  - Documentation
  - Calibration
- Use Test
  - Management understanding
  - Embedding
- Greater Hedging
  - Incentivises greater hedging
- Simpler Products
  - E.g remove Basis Risk

Implications
Published Information

- Details of Risk
- Risk Mitigation Strategies for:
  - Market risk
  - Insurance risk
  - Credit risk
  - Operational risk



Implications
Governance

- Tougher
- Hedging

Implications
Diversification

- Monoline
  - Move in to diversified entities
- Products
  - End bifurcation of base and guarantee
  - Risk business
  - Guaranteed Equity Bonds

Opportunities

- Hurdles to Entry
- Competitiveness versus Traditional Annuity
- Hedging Programme
- CEIOPS Task Force

Opportunities
Hurdles to Entry

- Limited Reinsurance Capacity
  - Hedging involves high initial cost
- Higher Governance Threshold
- Internal Model
  - Standard Formula not allowed
  - Determines the amount of capital

Opportunities
Competiveness versus Traditional Annuity

- Annuity Price
- VA Price
- Better Relative Competitiveness

Opportunities
Hedging / Internal Model

- Better Hedging
  - Less Capital
- Better Internal Model
  - Less Capital
  - Better understanding of risks

Opportunities
CEIOPS Task Force

- Systemic Risk

Questions ???

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