



**The Actuarial Profession**  
making financial sense of the future

**Health and Care Conference 2011**  
Workshop E1, Friday 20<sup>th</sup> May, 11:25 - 12:15



E1: No more tiers! – A practical look at the impact of Solvency II on a Critical Illness portfolio

Dafydd Harries, Ernst & Young;

John O'Neill and Duncan Zorn, PartnerRe

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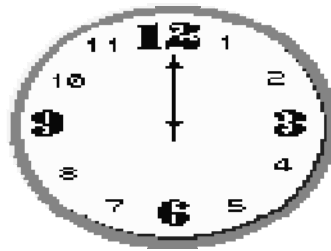
## Introduction & Biographies:

- Duncan Zorn, PartnerRe
  - Introductions & Workshop Chairman
- John O'Neill, PartnerRe
  - "Overview of Solvency II"
  - Market Practitioners Survey - "6 questions you should be asking"
- Dafydd Harries, Ernst & Young
  - Impact on SCR of different reinsurance strategies on Solvency II
- John O'Neill, PartnerRe
  - "Results of Market Practitioners Survey"

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## The clock is ticking.....

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## Current thinking

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- Securing Budget
- Resourcing
- Establishing our projects team
- Creating a SII roadmap
- Internal Model/Standard Formula debates
- Capital implications for our current portfolio
- .....the list goes on.....
- Crying like a baby!

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## Current thinking

The things we've probably not considered, but should

- How product design/structures might be optimised under SII
- What opportunities might arise from changing capital requirements
- How we can access greater diversification
- How reinsurance use/structures might be optimised under SII

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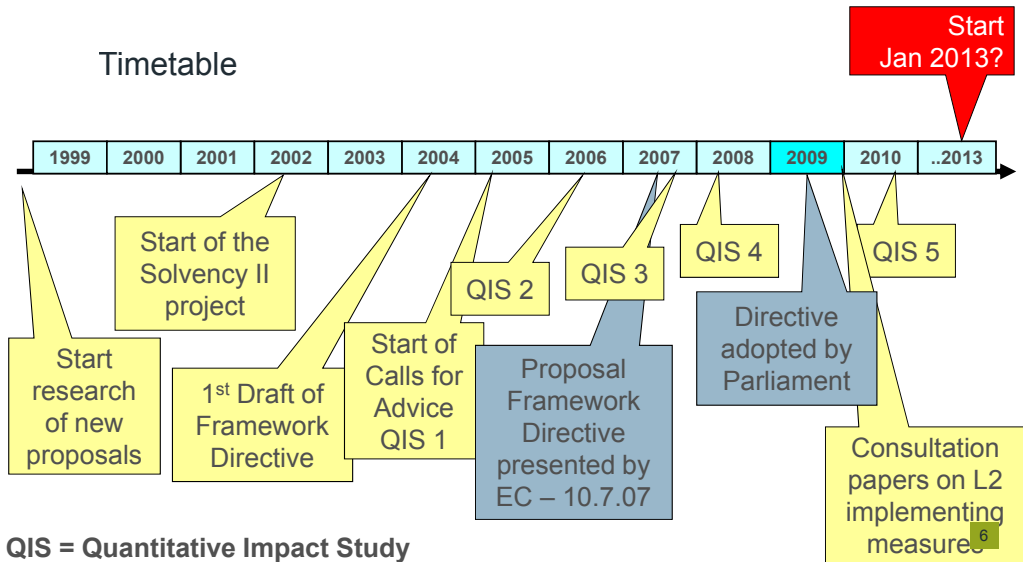
## Agenda:

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## The Solvency II Project

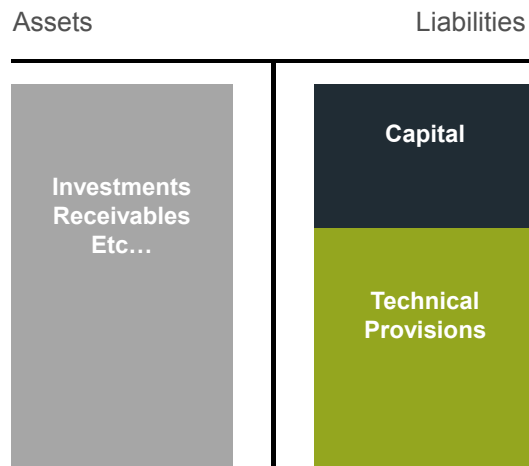
### Timetable



## Basic Concepts

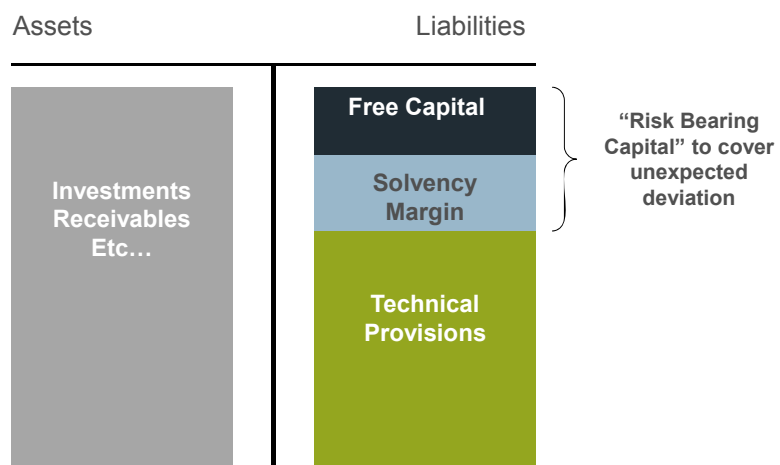
- What is Solvency? Some definitions
- The extra capital that should secure survival of the Insurer and its ability to provide for the protection of policyholders' interests in the long term
- The Solvency Margin is the extra capital Insurance providers are required to hold as a buffer against unforeseen events such as
  - higher than expected claim ratio
  - unfavorable investment returns

## Basic Concepts



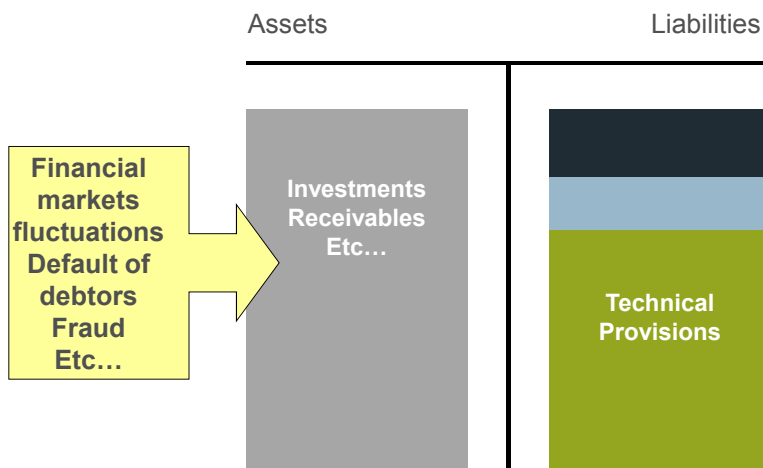
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## Basic Concepts



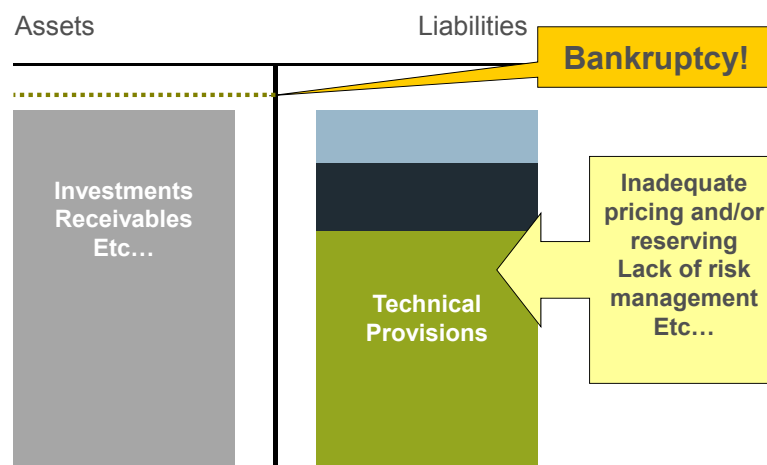
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## Basic Concepts



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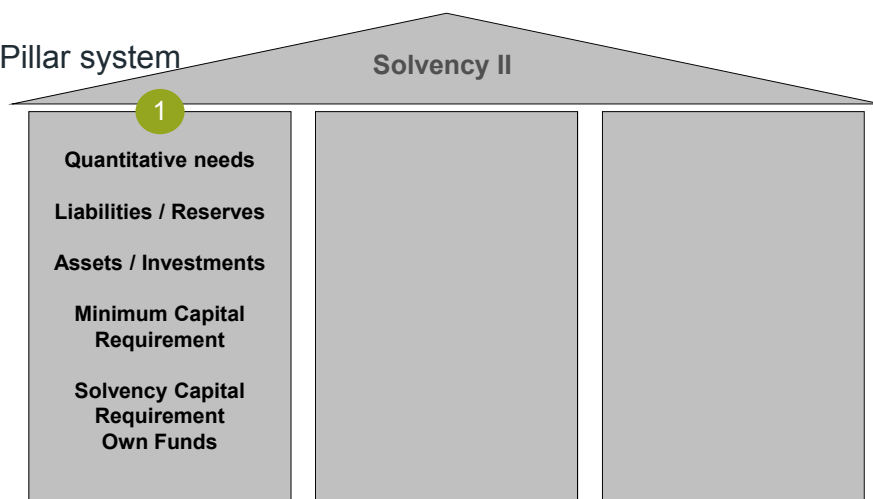
## Basic Concepts



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## Solvency II - Methodology

- 3-Pillar system



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## Solvency II - Methodology

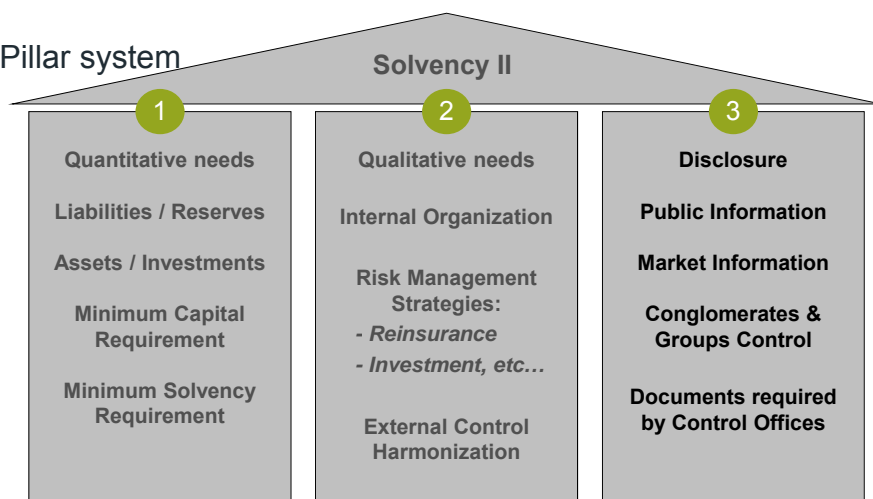
- 3-Pillar system



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## Solvency II - Methodology

- 3-Pillar system



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## The Methodology

- Pillar 1



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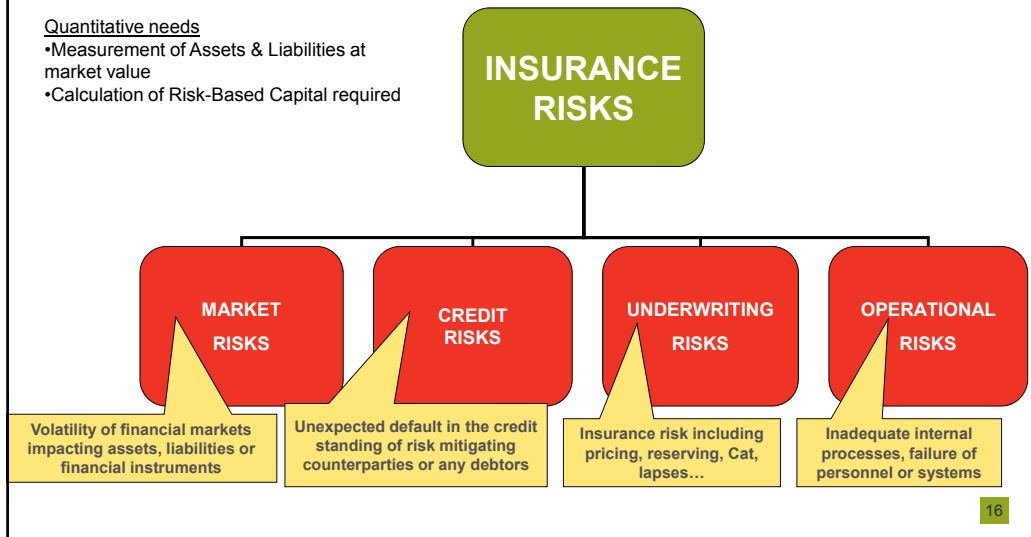


## Pillar 1 – Financial Strength

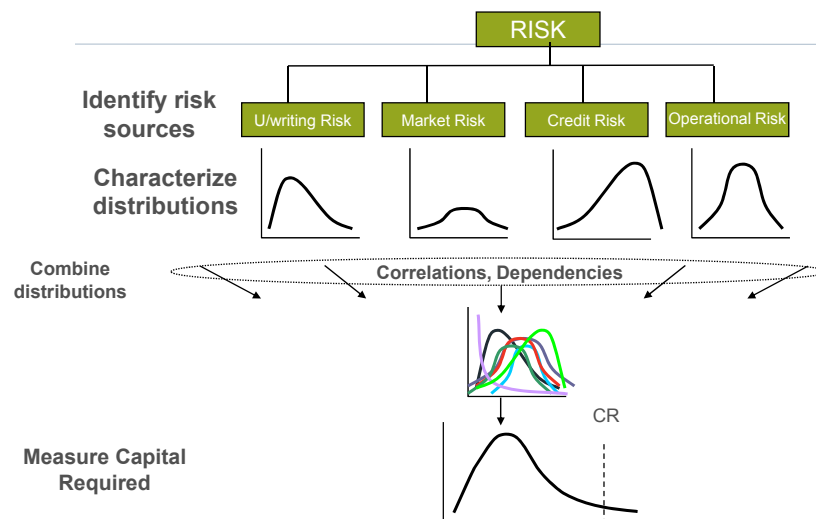


### Quantitative needs

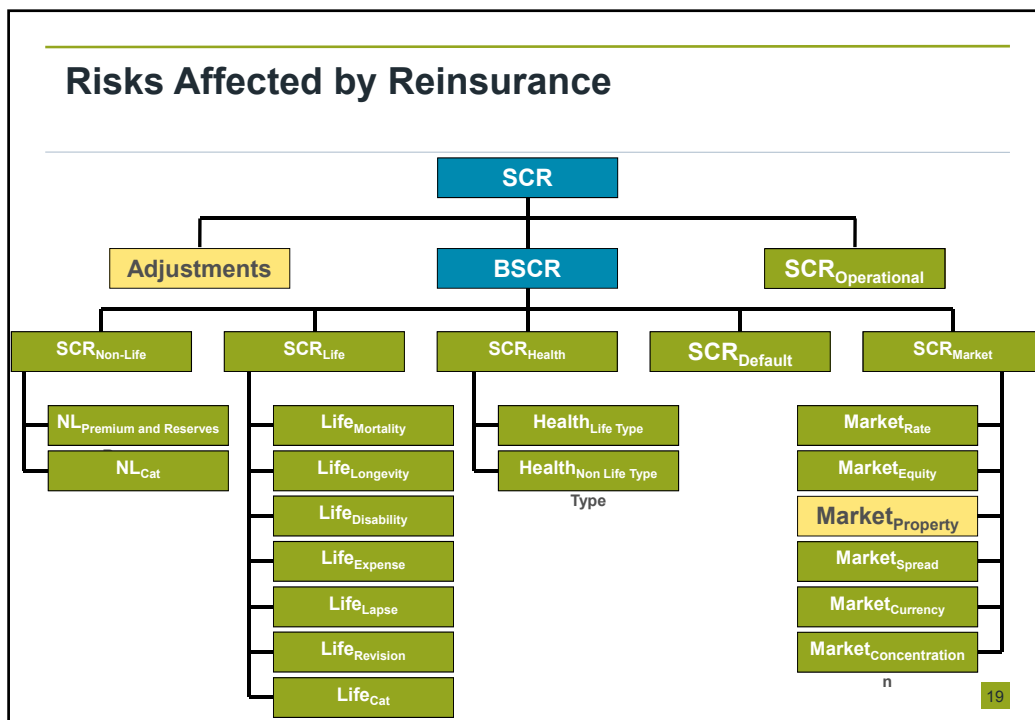
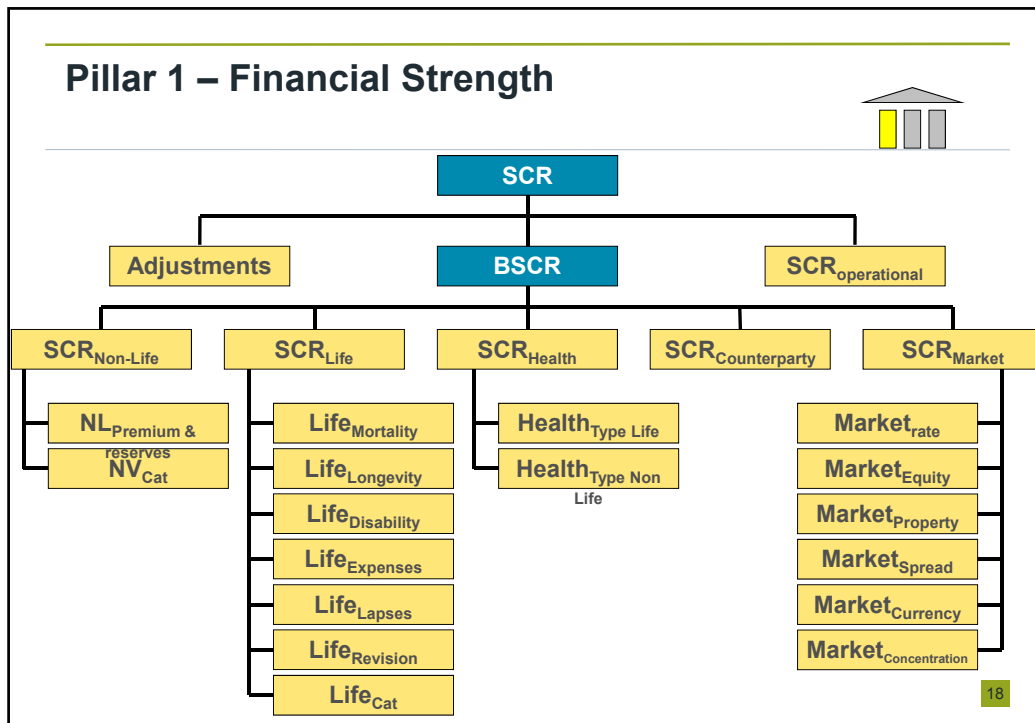
- Measurement of Assets & Liabilities at market value
- Calculation of Risk-Based Capital required



## The Methodology



Final model is the combination of a number of models



## Market Practitioners Survey

### 6 Questions a Protection Product Actuary should ask

**Question 1:**

On a scale of 1(not at all) to 10(very), how prepared do you think life companies are for the impact that Solvency II will have on Protection product design?

**Question 2:**

Outline the 5 key areas you believe life companies need to focus on to optimise their Protection products for a Solvency II environment?

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Any other impacts, possibly unforeseen or inadvertent, which you feel life companies need to consider on their Protection portfolio post Solvency II?



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- Hamish Wilson, Royal London
- Robert Wolfe, New Ireland

**THANK YOU!**

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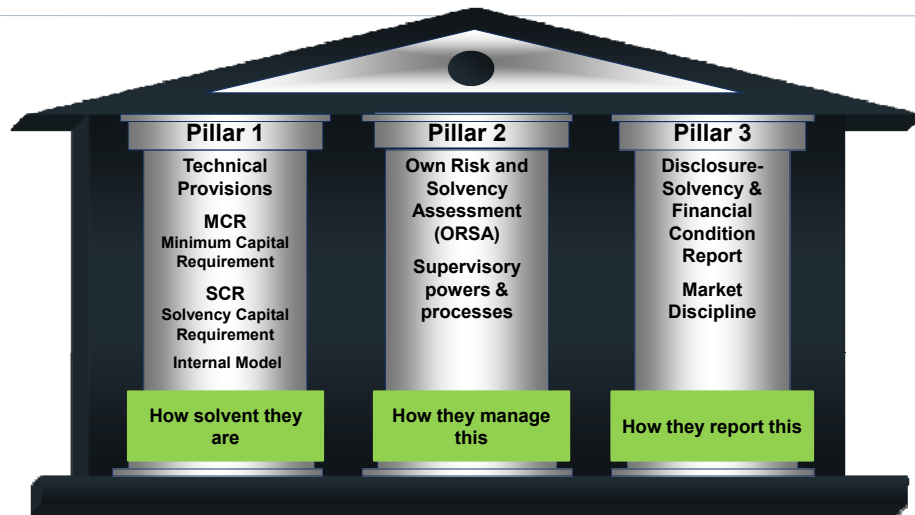
## Introduction and background

- Solvency II is the proposed new Europe-wide framework for prudential supervision of insurance
- Aims to address problems with Solvency I:
  - Outdated system
  - Insufficiently risk-sensitive
  - Does not reflect best practice
  - Difficulties in supervising multinational, diversified groups
- A fundamental change to Solvency requirements:
  - Principles based approach to supervision
  - Market consistent approach for valuing liabilities
  - Capital requirements linked to risk profile
  - Convergence of economic capital and regulatory capital
  - Lead supervisor for groups
  - Major focus on risk management
  - Compliance with the 'Use test' will need to be demonstrated
  - Significant disclosure requirements
  - Capital add-ons for deficiencies
  - Links to other reporting measures

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## Quick overview of Solvency II

### Three Pillar structure

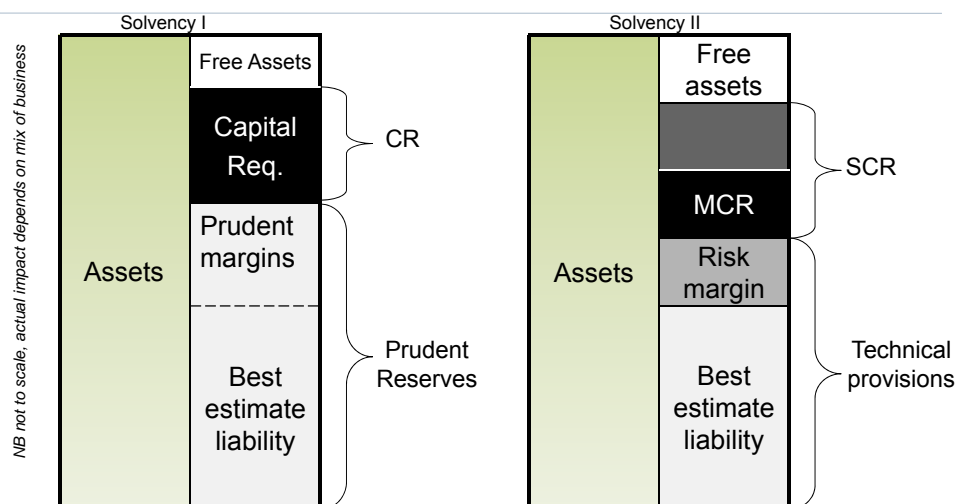


Solvency II Training P1 Part 3

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## Solvency I versus Solvency II

A movement from implicit to explicit margins



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## Calculating the SCR

### Standard formula versus internal model

- The SCR is equal to the change in NAV pre and post stress (eg, increase in mortality)
- The basic Solvency Capital Requirement (SCR) may be calculated using either:
  - Standard formula (which will be specific)
  - Internal model (either 'partial' or 'full' and requires regulatory approval)

#### Standard formula

- ▶ Comprises individual risk modules, aggregated using correlation matrices
- ▶ Each of the risk modules will be calibrated using a Value-at-Risk (VaR) measure, with a 99.5% confidence level, over a one-year period
- ▶ Same design and specifications for risk modules used for all undertakings
- ▶ At least comprises: non-life/life/health underwriting, market risk, counterparty default risk

#### Internal model

- ▶ Should enable improved insight into the risk profile and capital requirements
- ▶ Could result in significant benefits to the management, governance and strategy of the company
- ▶ Could result in more efficient use of capital
- ▶ Challenges: regulatory approval, external and internal validation, resourcing constraints for model development
- ▶ Pressure from the regulator for major players to apply for model approval

**It is important to be familiar with the standard formula since it is a requirement to calculate the SCR using the standard formula regardless of which approach is adopted**

*Article 110: after having received approval from supervisory authorities to use an internal model, insurance and reinsurance undertakings **may, by a decision stating the reasons, be required to provide supervisory authorities with an estimate of the SCR determined in accordance with the standard formula***

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## Counterparty default allowance in SCR

### Type 1 exposure versus Type 2 exposure

CEIOPS Final Advice (ex CP 28 and 51) introduced a split between Type 1 and Type 2 Counterparty Risk Exposures.

#### Type 1 exposure

- Covers exposures which may not be diversified
- Counterparty is likely to be rated
- Includes exposure from reinsurance arrangements, deposits with ceding institutions, securitisations and derivatives etc

#### Capital requirement – Type 1

$$SCR_{def,1} = \min \left( \sum_i LGD_i; q \cdot \sqrt{V} \right)$$

- $LGD_i$  = Loss-given-default for type 1 exposure of counterparty  $i$   
 $q$  = Quantile factor  
 $V$  = Variance of the loss distribution of the type 1 exposures

- $q\sqrt{V}$  estimates the 99.5% quantile of the loss distribution.
- The quantile approximation is capped by the sum of LGDs to avoid inconsistencies in extreme circumstances.

#### Type 2 exposure

- Covers exposures which are usually diversified
- Counterparty is likely to be unrated
- Includes receivables from intermediaries and policyholder debtors, deposits with ceding institutions etc

#### Capital requirement – Type 2

$$SCR_{def,2} = x \cdot E + y \cdot E_{past-due}$$

- $x$  = Risk factor for type 2 exposures  
 $E$  = Sum of the values of type 2 exposures, except for receivables from intermediaries which are due for more than 7 months.  
 $y$  = Risk factor for past-due receivables from intermediaries  
 $E_{past-due}$  = Sum of the values of receivables from intermediaries which are due for more than 7 months.

- If the number of independent counterparties in relation to deposits with ceding institutions does not exceed 15, these should be treated as Type 1 exposures.

#### Aggregation of Counterparty Default Capital Requirement

$$SCR_{def} = \sqrt{SCR_{def,1}^2 + 1.5 \cdot SCR_{def,1} \cdot SCR_{def,2} + SCR_{def,2}^2}$$

## Counterparty default allowance in SCR

### Impact analysis of Type 1 exposure

#### Case study

• A life insurance company that has €500k worth of reinsurance agreements with rated reinsurance institutions only. (€5m of recoverable implies €2bn of Sum assured reinsured, €2m life u/w capital and €3m catastrophe, before reinsurance). So, €16,766 is just 3% of these items.

The table below illustrates the impact on counterparty default capital requirement for a number of scenarios with collateral amounts and counterparty credit ratings.

$$SCR_{def,1} = \min \left( \sum LGD_i; q \cdot \sqrt{V} \right)$$

Example	No of reinsurer	Collateral	Refinings	Total recoverable	Sum of LGDs	PD (based on QIS 5)	V	q	SCR (def)	% change in SCR(def) from example 1
1	1	0	A	500,000	250,000	0.05%	5,589	3	16,766	0.0%
2	3	0	A	500,000	250,000	0.05%	4,329	3	12,986	-22.5%
3	5	0	A	500,000	250,000	0.05%	4,030	3	12,089	-27.9%
4	5	125,000	A	375,000	200,000	0.05%	3,224	3	9,671	-42.3%
5	5	250,000	A	250,000	150,000	0.05%	2,418	3	7,254	-56.7%
6	5	0	AA	500,000	250,000	0.01%	1,803	3	5,408	-67.7%
7	5	0	2 AA / 3 AAA	500,000	250,000	0.01%	1,170	3	3,511	-79.1%
8	5	0	AAA	500,000	250,000	0.00%	806	3	2,419	-85.6%
9	5	0	BBB	500,000	250,000	0.24%	8,817	3	26,452	57.8%

• LGD is calculated assuming recovery rate of 50%.

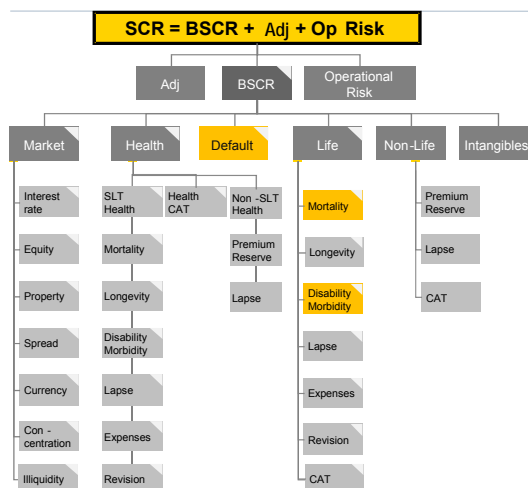
•  $SCR_{def}$  is mainly driven by the 99.5% quantile of the loss distribution,  $q \cdot \sqrt{V}$ , as we have assumed a **rated** insurance institutions.

• The following impacts on counterparty risk capital requirement can be seen from the table above.

- The higher the **number of reinsurer**, the lower the **concentration of losses**, the lower the  $SCR_{def}$ .
- The higher the **collateral**, the lower the **LGDs**, the lower the  $SCR_{def}$ .
- The better the grade of **counterparty credit ratings**, the lower the **probability of default**, the lower the  $SCR_{def}$ .

## Solvency Capital Requirement (SCR):

### Standard formula modules impacted by reinsurance (1/2)



◁ = included in the adjustment for the risk mitigating effect of future profit sharing

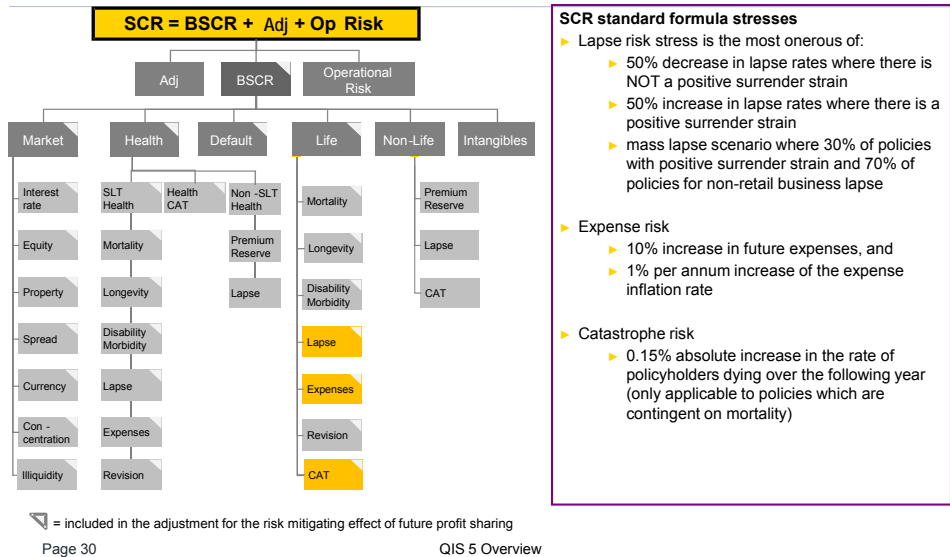
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QIS 5 Overview

#### SCR standard formula stresses

- Default risk (type 1 exposures)
  - Main inputs are estimated loss-given-default of an exposure and the probability of default of the counterparty
  - For non rated entities, the probability of default is now dependent on the Solvency Ratio where the undertaking is subject to Solvency II
  - Probability of default remains 10% where undertaking is not subject to Solvency II
- Mortality risk
  - 15% permanent increase in mortality rates for each age
- Disability risk
  - Inception rates: 35% increase in year 1 and 25% increase thereafter, and
  - 20% permanent decrease in recovery rates where applicable

## Solvency Capital Requirement (SCR): Standard formula modules impacted by reinsurance (2/2)



## Will Solvency II benefit me?

- There is potentially some advantage to be derived from Solvency II compared to current-world Pillar 1 basis
- However there are a lot of "it depends on" factors, eg,
  - What the company's internal model basis looks like compared to standard formula
  - Where the Solvency II rules eventually end up
  - Other business the company writes (diversification)
  - Strength of current reserving and capital bases
  - Product design and reinsurance arrangements (including internal reinsurance)
  - The level to which the company wants to capitalise
  - The definitions of tier 3 capital and whether the company is restricted in how much tier 3 it can use to back SCR
- Need to consider impact of reinsurance on the whole balance sheet, in particular:
  - Best estimate liabilities
  - Risk margin
  - SCR



## Impact of reinsurance on the SCR

– The following case studies consider the following new business portfolio:

- Combination of Life and Life with accelerated CI cover
- Mixture of level and decreasing cover
- Single life and joint life policies
- Variety of ages, sums assured and policy terms
- Reinsurer (where applicable) is 'A' rated
- Reinsurance structure differs

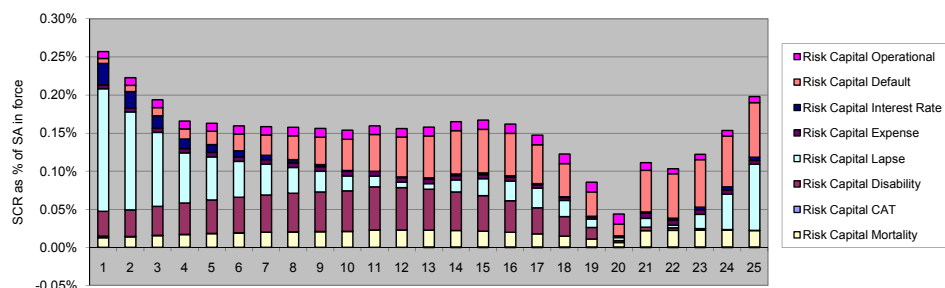
– Some simplifying assumptions:

- Life and accelerated CI treated within Life module
- Only SCR modules which are important to these policies are considered
  - E.g. Market stress only takes into account interest rates
  - Non Life and Intangibles not modelled
- No Type 2 defaults
- Same policyholder premium applies throughout
- No account of diversification from writing other products

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## Case study: What does SCR look like in different reinsurance arrangements?

With reinsurance (level with rebate):



### Dominant contributors to capital:

- ▶ Default risk capital
- ▶ Lapse risk capital
- ▶ Mortality risk capital
- ▶ Disability risk capital

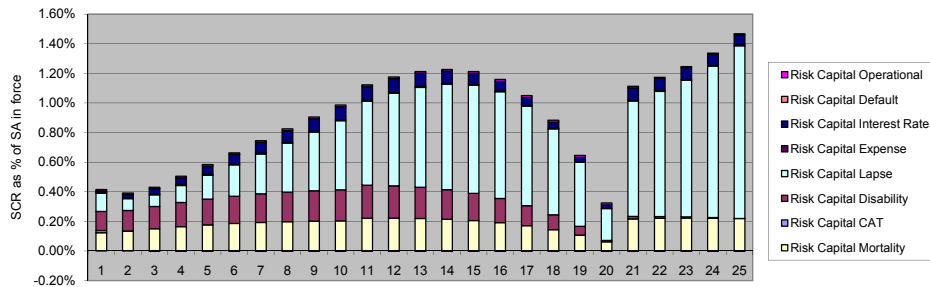
### Minor contributors to capital:

- ▶ Operational risk capital
- ▶ Interest rate risk capital
- ▶ Expense risk capital
- ▶ CAT risk capital

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## Case study: What does SCR look like in different reinsurance arrangements?

No reinsurance:



### Highlights:

- ▶ A different SCR profile
- ▶ More volatile over time
- ▶ Greater initially and throughout

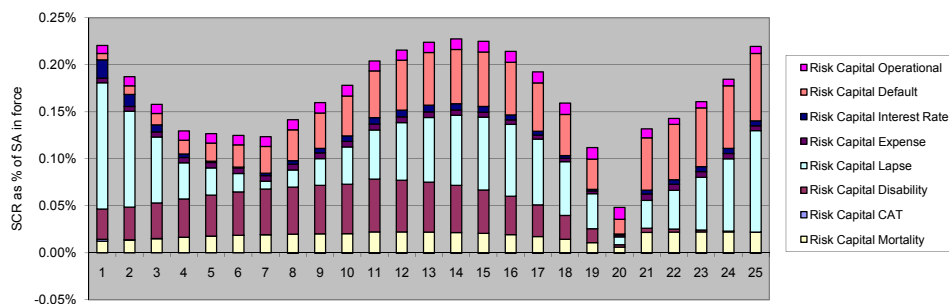
### Drivers to SCR change:

- ▶ Lapse risk capital
- ▶ Mortality risk capital
- ▶ Disability risk capital
- ▶ Default risk capital

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## Case study: What does SCR look like in different reinsurance arrangements?

With reinsurance (level with rebate); 5% reduction to policyholder premium:



### Highlights:

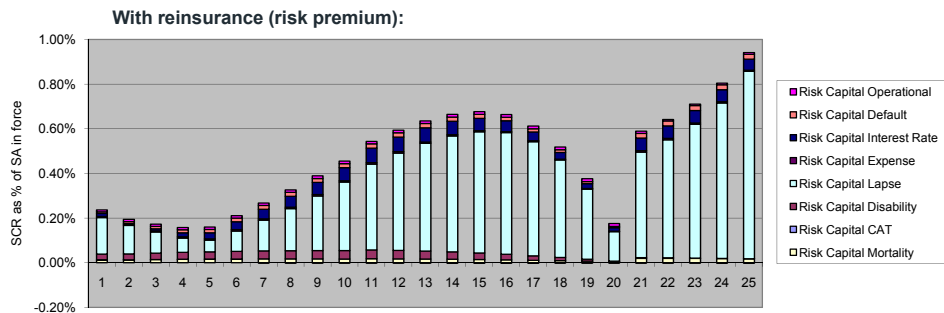
- ▶ A different SCR profile
- ▶ More volatile over time
- ▶ Lower SCR initially
- ▶ SCR over time alternates between being greater than or less than the SCR for with no premiums reduced

### Drivers to SCR change:

- ▶ Lapse risk capital
- ▶ Default risk capital

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## Case study: What does SCR look like in different reinsurance arrangements?



### Highlights:

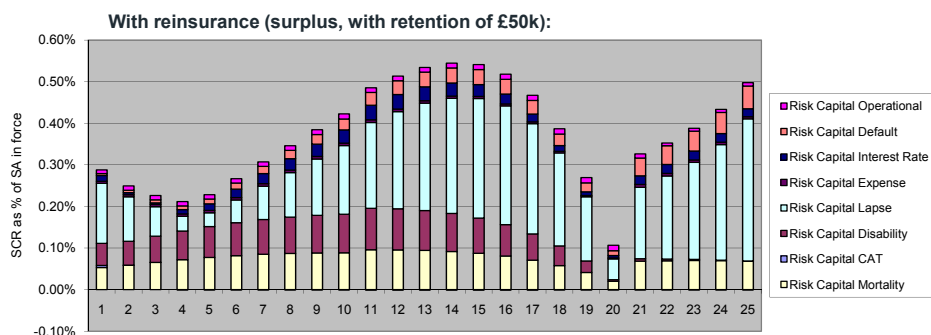
- ▶ A different SCR profile
- ▶ More volatile over time
- ▶ Lower initially, but significantly greater over time
- ▶ Exposed to relationship between office premium and reinsurance premium

### Drivers to SCR change

- ▶ Lapse risk capital
- ▶ Default risk capital

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## Case study: What does SCR look like in different reinsurance arrangements?



### Highlights:

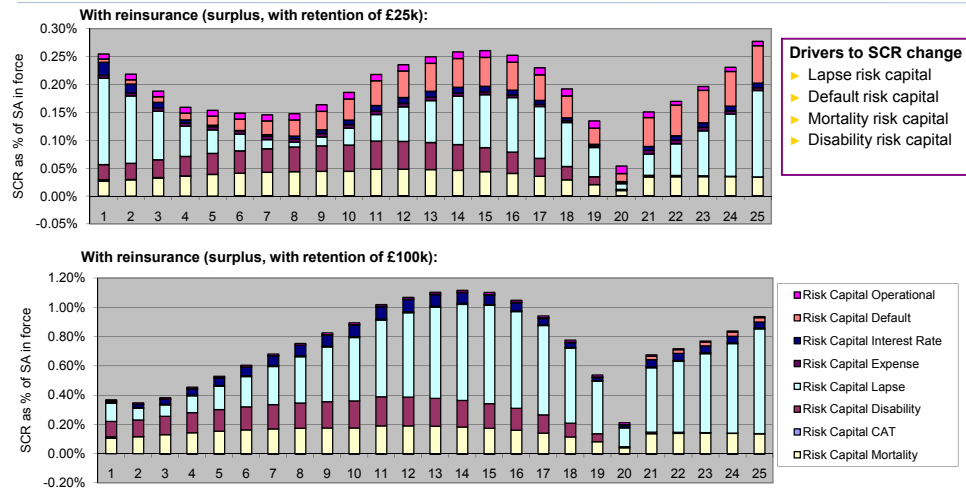
- ▶ A different SCR profile
- ▶ Relatively low SCR initially, but is greater over time
- ▶ Exposed to relationship between office premium and reinsurance premium

### Drivers to SCR change

- ▶ Lapse risk capital
- ▶ Default risk capital
- ▶ Mortality risk capital
- ▶ Disability risk capital

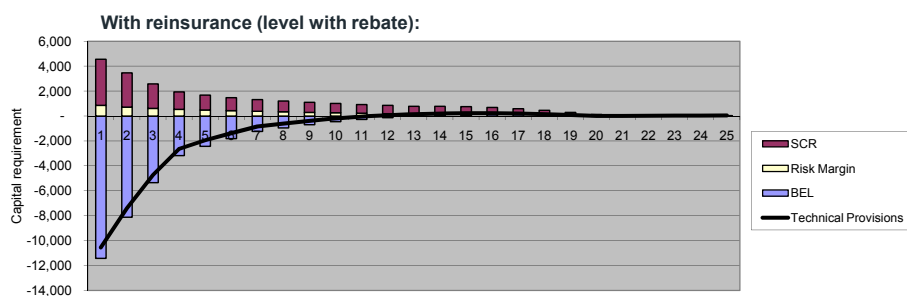
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## Case study: What does SCR look like in different reinsurance arrangements?



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## Case study: How does the balance sheet alter with different reinsurance arrangements?

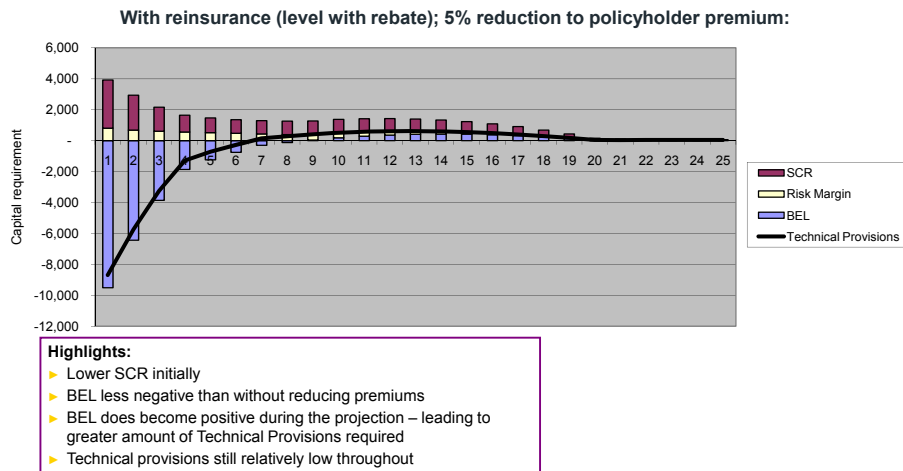


### Highlights:

- ▶ BEL negative initially, indicating profit making contracts
- ▶ SCR runs down over time
- ▶ Technical provisions = sum of BEL + Risk Margin
- ▶ Technical provisions is negative initially
- ▶ Relatively low level of TP required over life of contract

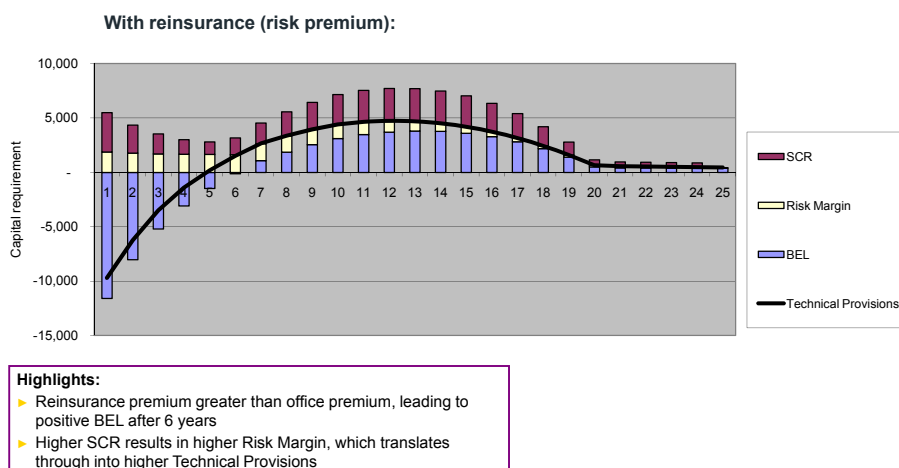
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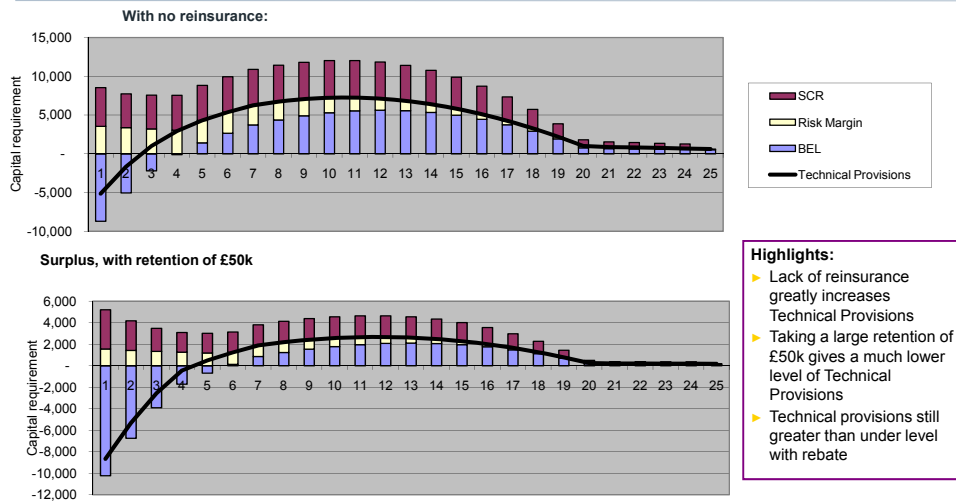
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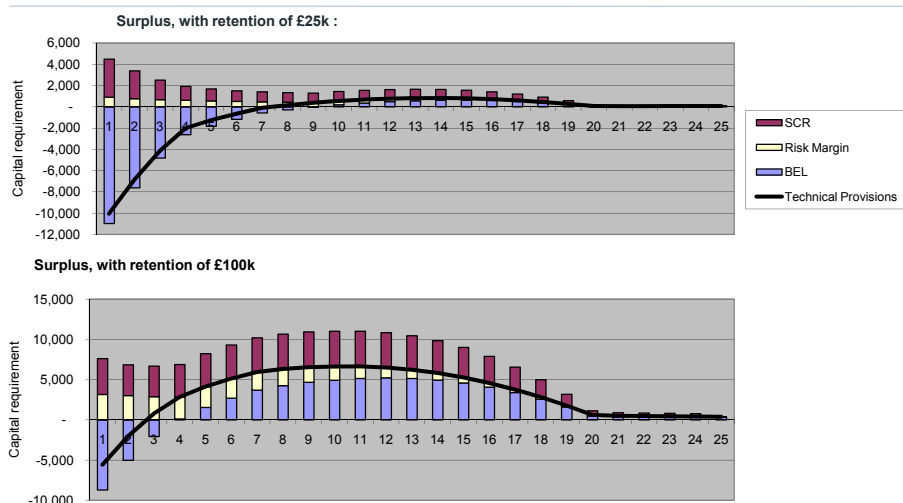
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## Case study: How does the balance sheet alter with different reinsurance arrangements?



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## Case study: How does the balance sheet alter with different reinsurance arrangements?



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## Conclusions

- **Use of reinsurance:**
  - Reinsurance will still play a big part post Solvency II
  - Optimal reinsurance strategy will differ according to profitability and profit emergence
  - Working with your reinsurer to optimise your capital requirements is key
- **Use of reinsurance:**
  - Important to consider the full balance sheet when carrying out a re-price – the level and profile of the SCR and Technical provisions will change as a direct result
  - An ability to project capital requirements under different re-pricing scenarios becomes critical
  - A streamlined capital model becomes essential in order to be able to satisfy the use test
- **Capital requirements:**
  - Diversification becomes important: being able to access the negative correlation of the longevity stress will lower capital requirements
  - Need to be able to optimise the lapse & default risk SCR modules to minimise overall SCR and resulting Risk Margin

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## 6 Questions a Protection Product Actuary should ask

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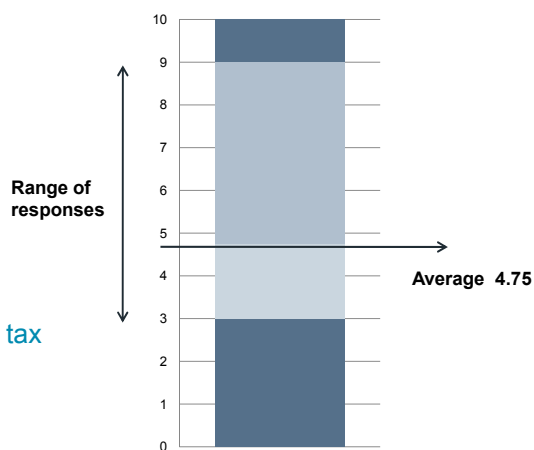
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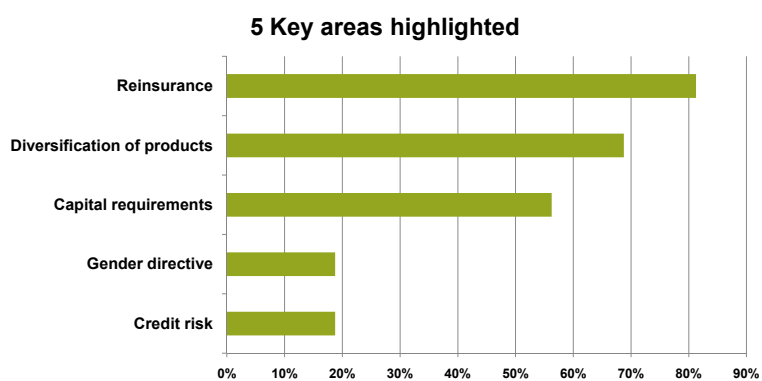
“companies are either keeping their thoughts closely guarded or haven't yet done the detailed thinking”

“Gender directive, UK tax and RDR will have a bigger impact”



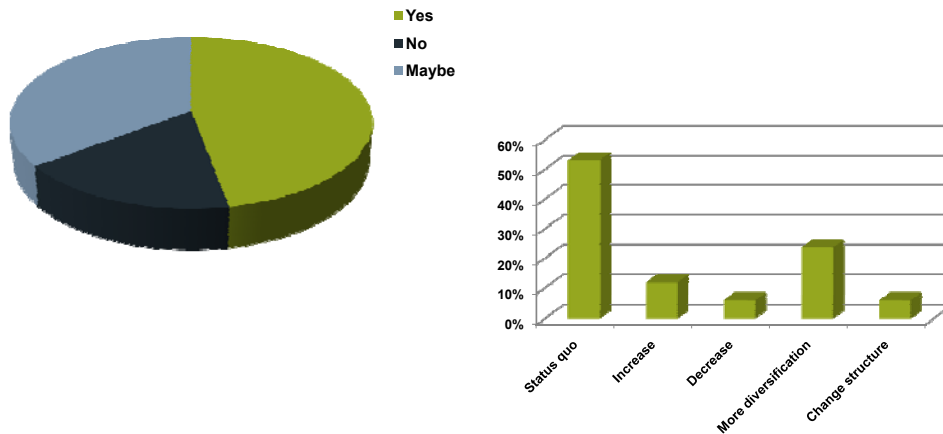
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Question 3: Will Solvency II impact the structure or quantum of reinsurance purchased by life companies on their Protection product suite? If so, how? Will this differ for life, CI, IP, Group?

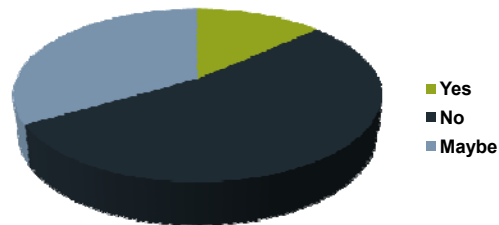
*"I think companies will move away from the current situation of "transfer as much risk to the reinsurer as possible for the lowest price" to considering in much more detail how the level and structure of reinsurance affects their internal capital model"*

*"don't believe it's a clear cut reduction"*

*"previous changes to reserving rules haven't resulted in the changes to reinsurance levels that should have logically followed . Access to competitive rates and other services from reinsurers continues to be a consideration."*

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Question 4: Will the ORSA assessment under Pillar II encourage life companies to purchase tail risk covers such as CAT Excess of Loss and Stop Loss cover for their Protection portfolio?



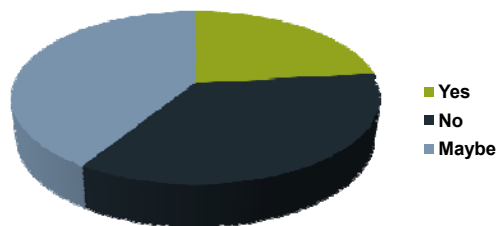
*"Not for companies who continue to reinsure a significant amount of their business."*

*"if companies are assessing their risks correctly already it shouldn't"*

*"Companies will be required to show that they've assessed the value in such arrangements rather than actually place them"*

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Question 5: Under Solvency II Life companies are required to specifically set-up capital against the risk of reinsurer default - will this lead to greater diversification of Protection reinsurance placement post Solvency II?



*"Maybe for companies who tend not to diversify but there are already several reasons to diversify."*

*"Insurers will need to look at overall exposures and ensure a reasonable spread"*

*"expense of multiple covers may outweigh the capital advantage"*

*"price will remain the determinant factor."*

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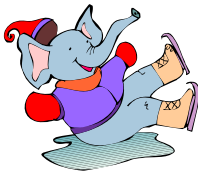
Question 6: Any other impacts, possibly unforeseen or inadvertent, which you feel life companies need to consider on their Protection portfolio post Solvency II?

*"A big risk is that the SII teams set up to assess and implement it don't link up with the pricing guys and some detail causes protection pricing problems"*

*"Guarantees need careful consideration"*

"release of capital is going to mean that...protection books are not the "cash-cow" to the same extent"

*"More conservative product development"*



"Diversification benefits with annuities may lead to closer integration of tactical pricing of the two product lines to balance sales volumes."

**"GENDER DIRECTIVE"**

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## Overall Survey Take-Aways



- Product diversification important
- Capital requirements going to drive decision making
- Tail risk not major issue in UK market
- Reinsurance diversification in hand



- Impact on Protection product design not clear
- Link between Solvency II teams & coal-face?
- Other significant issues – Gender directive, RDR...

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## Questions



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E1: No more tiers! – A practical look at the impact of Solvency II on a  
Critical Illness portfolio

Dafydd Harries, Ernst & Young;

John O'Neill and Duncan Zorn, PartnerRe

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