The Actuarial Profession
making financial sense of the future

Health Insurance & Solvency II

John Smith, BUPA

Elliot Varnell, KPMG

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Agenda – Solvency II for Health Insurers

- **Brief Introduction to Solvency II**

- Short Tailed Health Insurance Example
  - Traditional Pricing Actuarial Viewpoint
  - Solvency II / Risk Management Viewpoint
  - Economic Balance Sheet and Solvency Capital Requirement
  - Internal Model

- Role of the Actuary
  - Actuarial Function under Solvency II

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(Very) Brief Introduction to Solvency II

- European wide regulatory capital regime which goes live in 2012.
- Likely to form the basis of a global regulatory framework.
- S2 will replace current FSA and Solvency I capital requirements.
- Likely to affect every part of the insurance business.

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Pricing Actuary Perspective

Typical Questions the Actuary Asks
•Where are pure risk costs going?
•Are there any shifts in consumer behaviour?
•What are competitors doing with products and prices?
•What is up with the NHS and its funding?

Risk Cost ···· Rolling Average – – Projected

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  - **Solvency II / Risk Management Viewpoint**
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Solvency II Perspective
Risk Centric Viewpoint

What does the 1 in 200 event look like for health business?

"How does this good scenario arise? What would we do if this happened? How could we exploit the lower risk charge?"

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Solvency II Perspective
Risk Centric Viewpoint

What would your experience and management actions look like under stressed conditions? Is the company holding enough of the right type of capital to back extreme events given the business' risks?

Plotting the 5% and 95% percentile points shows the funnel of doubt we expect for the risk cost.
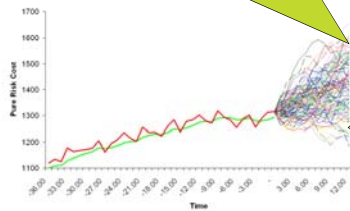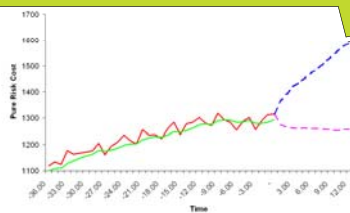

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Agenda – Solvency II for Health Insurers

- Brief Introduction to Solvency II

- Short Tailed Health Insurance Example
  - Traditional Pricing Actuarial Viewpoint
  - Solvency II / Risk Management Viewpoint
  - **Economic Balance Sheet and Solvency Capital Requirement (SCR)**
  - Internal Model

- Role of the Actuary
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Quantifying Risk Under Solvency II
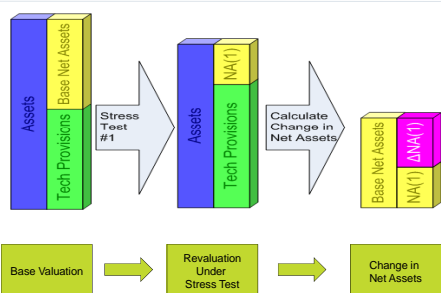**Simple Example**

- Assumptions:
  - £100m of PMI premium with trend at 10% and operating profit of 3%
  - Policies renew and profits emerge evenly across the year
  - LR=80%, typical claim settlement speed, and reserves = 15% of premiums
    - → The risk margin for PMI will be about 2% of best estimate
  - Highly secure bank deposits and no fancy assets
  - Costs expensed when incurred, so therefore no DAC
  - Target an A rating, requiring say 20% more capital than a BBB level

Balance sheet prior to any risk capital added (in £m):

	Assets	Liabilities	
Policyholder debtors	50.0	46.6	Technical provisions: premium
Cash	12.0	15.3	Technical provisions: claims
		0.0	Capital and reserves
	62.0	62.0	

- *How much risk capital should be added to balance sheet?*

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SCR Calculation
Standard Formula

SCR Calculation
Standard Formula

SCR Calculation
Standard Formula – Health Insurance Aggregation

SCR Calculation
Standard Formula

SCR Calculation
Standard Formula
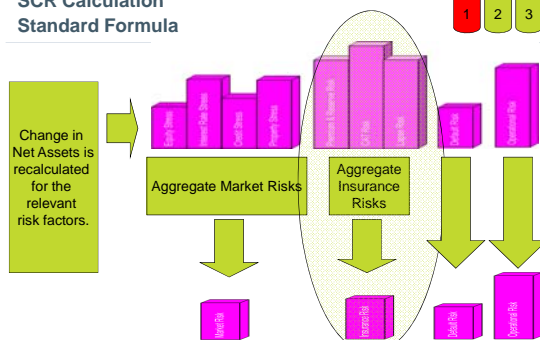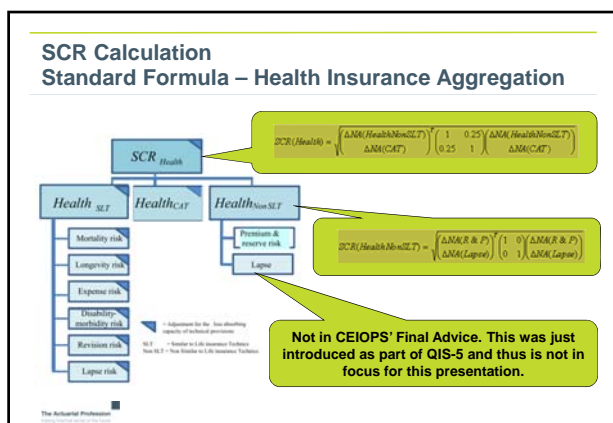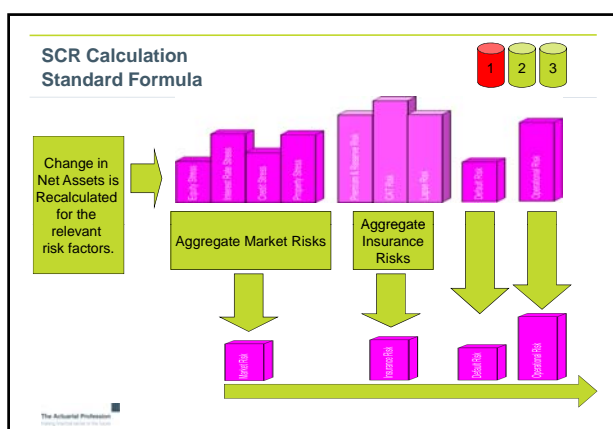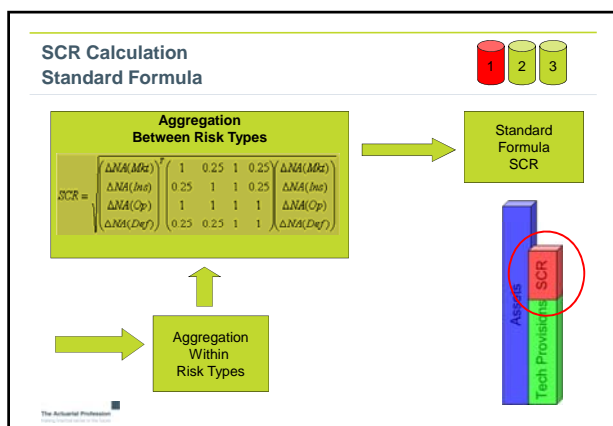
Quantifying Risk Under Solvency II
Same Example as Previously

- Solvency Capital Requirement *standard formula* would be:

	£m
Premium: 27% times premium (max of prior or ensuring 12 months)	29.7
Reserve: 37% of outstanding claims	5.6
Diversification adjustment: 50% correlation	-2.5
Health insurance underwriting risk charge	32.8
Plus credit and market risk charges on bank deposits	< 0.1
Plus 3.8% of premiums for operational risk	4.2
Solvency Capital Requirement (SCR)	37.0

- Solvency I would require only £**19.5m** of capital in this example!

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Balance Sheet Meeting the SCR
(£m)

- Previous example capitalised to meet the standard formula …

	Assets		Liabilities	
Policyholder debtors	50.0		46.6	Technical provisions: premium
Cash	49.0		15.3	Technical provisions: claims
			37.0	Capital and reserves
	99.0		99.0	

Meets the bare minimum

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Target Rating Balance Sheet
(£m)

- Previous example with a target of 120% of SCR .,,

	Assets		Liabilities	
Policyholder debtors	50.0		46.6	Unearned premium reserve
Cash	56.5		15.3	Claim reserve
			44.5	Capital and reserves
	106.5		106.5	

Most companies will maintain a buffer above the SCR

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Will PMI be Economic Under Solvency II?

- Assume shareholders require 15% return on capital

- Then 15% times £42.7m would be £6.4m

- But you expect a 3% operating profit on £110m of <u>expected</u> premiums, or £3.3m

- You will pay 28% of this in corporation tax, leaving £2.4m

- The £4.0m "shortfall" would have to come from elsewhere
  - Such as a doubling your operating profit …
  - … or getting a 7.1% return on your £56.2m of cash (which is hard to do these days!)
  - remembering that purchasing risky assets would require holding more risk capital
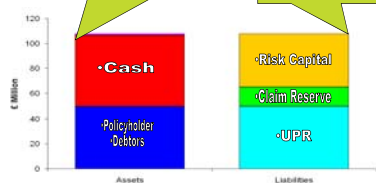
Example Balance Sheet

With a 3% operating profit on £110m of premiums the cash asset would need to earn 7% in order to give shareholders a 15% p.a. return on their risk capital.

This risk capital needs to be provided by the shareholders and requires a return of, say, 15% p.a.

·Cash
·Policyholder ·Debtors

·Risk Capital
·Claim Reserve
·UPR

Assets   Liabilities

The Next Conversation …

Pricing Health Actuary

"What the #(*%^@$!"

Surely our business is not that risky?

Our shareholders will get a much lower return.

Chief Risk Officer:

That was using the Solvency II **standard formula**.

If you can build an internal model we can better understand our risk profile and hence calculate an appropriate capital requirement.

Agenda – Solvency II for Health Insurers

- Brief Introduction to Solvency II

- One Product (PMI) under Solvency II
    - Traditional Pricing Actuarial Viewpoint
    - Solvency II / Risk Management Viewpoint
    - Solvency II (Economic) Balance Sheet and Capital Requirement
    - **Internal Model**

- Role of the Actuary
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Health Insurance Internal Model
Insurance Risks Sub-Module
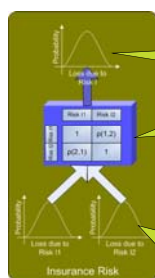
The aggregation engine provides a loss distribution for insurance risks

The risks can be aggregated using an **aggregation engine.**

Each insurance risk has a loss distribution. *Loss* refers the loss of net assets.
In this simple case we just assume two insurance risks but more can be considered.

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Health Insurance Internal Model
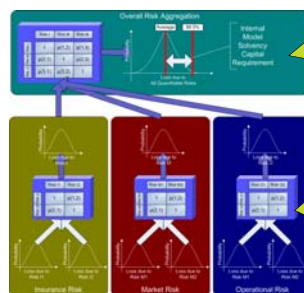
The aggregation engine can be applied to the risk distributions to create and overall risk distribution.
We can use this risk distribution to read off the SCR for regulatory capital.

We could create a loss distribution for the following risks:
•Insurance
•Market
•Operational
•Credit (not shown)
•Other Risks (not shown)

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Getting an Internal Model Approved

- It is **not** simple to get approval for an internal model
- There is a lengthy model approval process
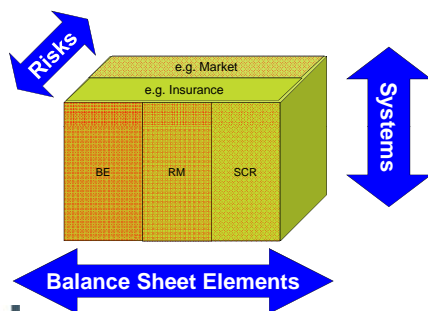 – Pre-Application Stage is in Autumn 2010.
  – Followed by Full Application
  – Major model changes need to be approved too.
- Using an internal model is **non-reversible.**
- Prior to approval firm need to have done an **ORSA** to define the risk scope of their internal model.

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Internal Model Scope Dimensions

Risks

e.g. Market

e.g. Insurance

Systems

BE   RM   SCR

Balance Sheet Elements

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Internal Model Scope
Balance Sheet Items

The T=0 best estimate liability and asset valuations (and T=1 re-calculations) define the SCR – so to what extent should best estimate be in-scope for the internal model?

OF

SCR

Assets

RM

Best Estimate

The SCR calculation is the focus of the internal model so is **in-scope**.

The Risk Margin has a circular relationship with the SCR: it uses the SCR calculation **and** defines the SCR. Should it be in-scope for the internal model?

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Internal Model Scope
Risk Scope

1 2 3

CEIOPS says that quantitative risks are intended to be modelled in the Internal Model.

CEIOPS say that the Internal Model needs to model the material risks. Material needs to be defined.

Non-Material Risks

Material Risks

An Internal Model scope is required as part of Internal Model approval.

Risk Management | Capital

Risk Management | Capital

ORSA | ORSA

ORSA | ORSA

ORSA | Internal Model

Internal Model Scope

ORSA | ORSA

ORSA | ORSA

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Internal Model Scope
Systems Scope

1 2 3

The scope of an internal model would include could extend to include the data systems that feed the calculation engine.

Annuities | Protection | Participating

Financial Reporting

MI

RP | Aggregate

Data Warehouse

ALM / Cash Flow Engine

PSD | CAT Model | Credit Model

The scope of an internal model could just include the core calculation engine.

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Internal Models
6 Test Summary – First 3 Tests

1 2 3

STATISTICAL QUALITY

USE TEST

VALIDATION

PROFIT AND LOSS ATTRIBUTION

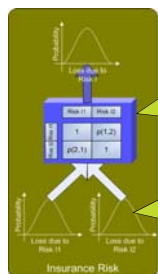DOCUMENTATION

CALIBRATION STANDARDS

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The Statistical Quality Test
Testing the technical quality of the SCR calculation

What is the quality of the risk aggregation?

Consideration include:
•The Data Quality
•The Methodology Used
•The Expert Judgement Used

What is the quality of the risk distributions?

Consideration include:
•The Data Quality
•The Methodology Used
•The Expert Judgement Used

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The Use Test
The Business Critical Test – Using The Model

- What are your business decisions?
  - Pricing levels and structure of margins within the portfolio
  - Planning
  - Product design, excess levels, benefit levels, etc
  - Risk / return ratios
  - Embedded value
  - Provider contracting and risk sharing
  - Commission structure
  - Reinsurance purchases
  - Market entry

- If you do not use it (or meet other standards set out in Consultation Paper 56), you cannot substitute the model's result for the SCR standard formula

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Key use: What Do We Know and Don't Know?
1-in-200 events are not well understood, perceived, or behaved

- The Credit Crunch occurred due to a too narrow view possible downsides.
  "*We have never had a decline in housing prices on a nationwide basis. What I think is that house prices will slow, maybe stabilise.*"
  - Ben Bernanke, 29 June 2005
- Crisis are not linear and firms do not jump to insolvency. Typically one stress leads to another through complex dependency structures and interaction of risks.
  - House Price Falls *leads to…*
  - Failure of some Sub-Prime Securities *leads to…*
  - Fall in Share Prices *leads to…*
  - Fall in Confidence and Capital *leads to…*
  - Reduced Market Liquidity *leads to…*
  - Reduced Free Cash-Flow *leads to…*
  - Further Fall in Confidence *leads to…*
  - Operational Risks … and now Sovereign Risks
  - *etc etc ….*
  Stress-testing is one means to promote an understanding of exposures and linkages

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Health Insurer 1 in 200 Event
Recent Quotes from Newspapers …

1 2 3

Low Business Volumes

Health Insurance Death Spiral

California death spiral
Paul Krugman

Stagflation Comes to the U.K.

Stagflation

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Sources of Stress for Health Insurers

1 2 3

Possible Scenarios:
Recession
Inflation
Unemployment

Economy
Competitors
Asset Prices
Customers

Possible Scenarios:
Lower Prices
Substitute Products
New Entrant

Possible Scenarios:
Property Price Falls
Equity Price Falls
High Interest Rates

Possible Scenarios:
High Lapses
High Claims
Anti-Selection

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Health Death Spiral
Non-linear and Opaque Negative Feedback Loop

1 2 3

Economy
Competitors
Asset Prices
Customers

External Event

Worse Experience

Death Spiral

Feedback Effect

Rate Reaction

Lapses Increase
Claims Increase
But how much is:
-Volatility?
-Seasonal?
-Random?

Increase Premium?

Medical Inflation?
Competitor Reaction?
Customer Reaction?
Timing?

Wrong Move?
Inflation can lead to excessive premiums rises.
Recession will (in time) lead to lapses.
Anti-selection leads to worse experience.

"Normal" reactions can fail !
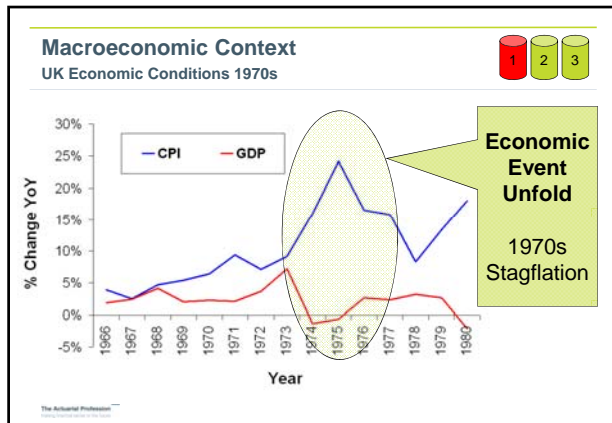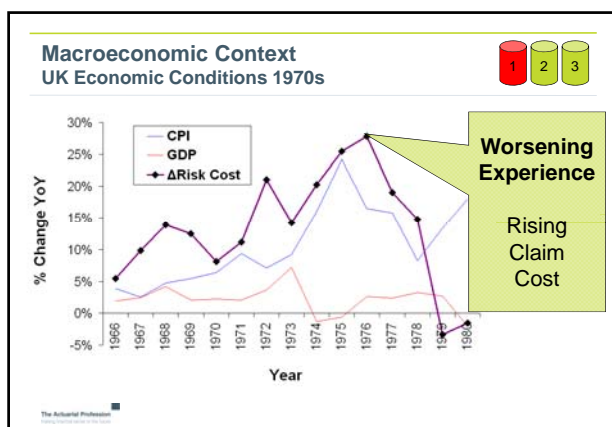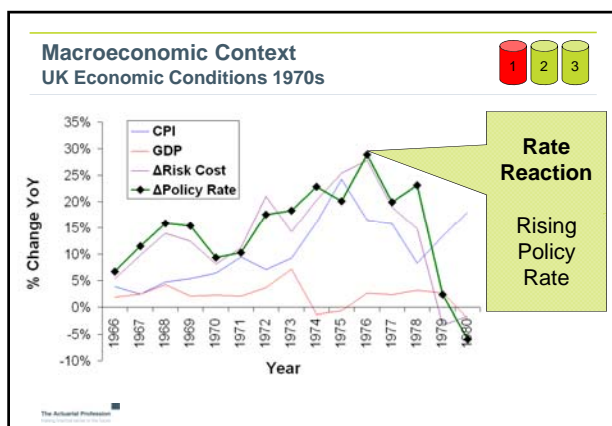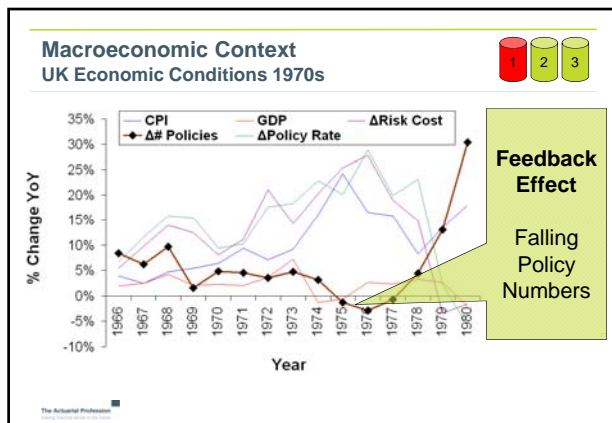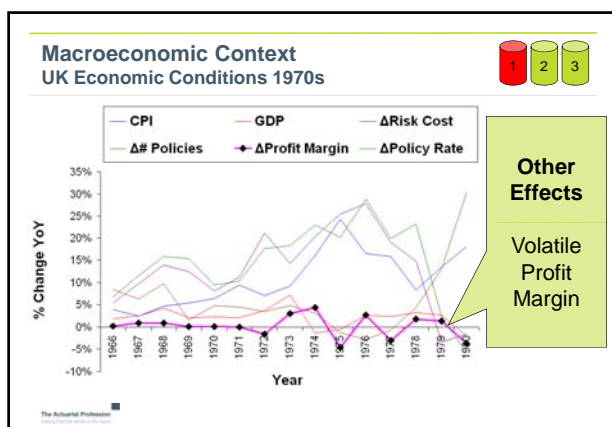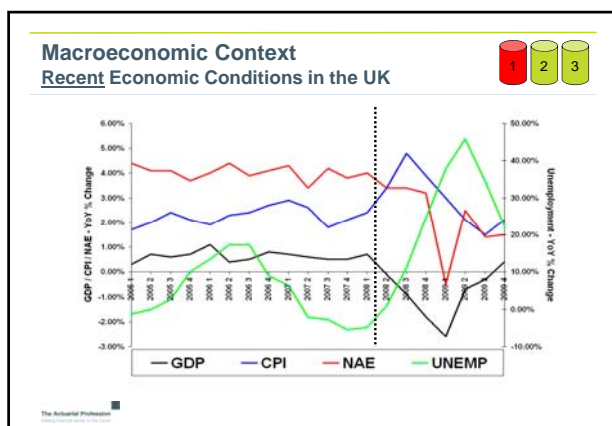
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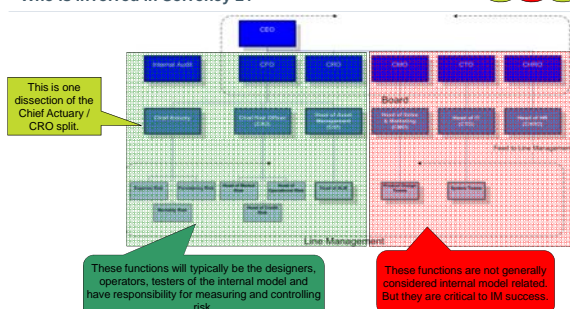The Actuarial Profession

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Health Actuaries and Solvency II

- Solvency II makes provision for the an *Actuarial Function*.
  - *The Actuarial Function has responsibilities for the calculation of the technical provisions → less challenging for health*
- Solvency II describes a *Risk Management Function.*
  - *Solvency II suggests the Risk Management Function owns the model.*
- Roles and Functions
  - *You do not have to be a professional risk manger (e.g. GARP) to run the Risk Management function.*
  - *You do not have to be an Actuary (e.g. FIA) to run the Actuarial Function.*
- European Practice Differs
  - *UK: Strong Actuarial Roles*
    - *CRO roles held by actuaries. Actuaries have a risk oriented business focus.*
  - *Continent: Technical Actuarial Roles*
    - *Focus on reserve calculations and mathematics.*

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Health Actuaries and Solvency II
Who is involved in Solvency 2?

This is one dissection of the Chief Actuary / CRO split.

These functions will typically be the designers, operators, testers of the internal model and have responsibility for measuring and controlling risk.

These functions are not generally considered internal model related. But they are critical to IM success.

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Possible Actuarial / Risk Department Splits

	Actuarial	Risk Management
#1(S2/EEA)	Technical Provisions Calculation Model (Best (Central) Estimate)	Risk Model (Full Risk Distribution)
#2(EEA)	Insurance Risks (Persistency, Mortality, Morbidity)	Non-Insurance Risks (Market, Credit, Operational)
#3 (UK)	Non OpRisk (Market, Credit, Persistency, Mortality, Morbidity)	OpRisk (Operational)

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Health Actuaries and Solvency II
Where Do Actuaries Feature?

Actuaries in these roles are part of the audit function. *3rd Line of Defence*

Actuaries in these roles are part of the risk management system. *2nd Line of Defence*

Does an department containing all the actuaries make sense if actuaries cover roles in different lines of defence?

Actuaries in these roles are part of the business. *1st Line of Defence*

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Actuaries as Risk Officers?

- What does a CRO need?
  - Quantitative understanding
  - Understanding of all risks incident on an insurer?
  - Business perspectives
  - Professionalism

- Do actuaries have these skills?

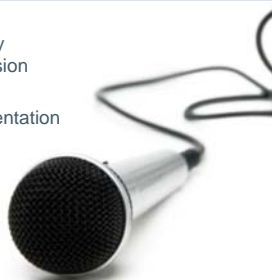- Health tends to be lower risk … broader actuarial opportunity?

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Questions or comments?

Expressions of individual views by
members of The Actuarial Profession
and its staff are encouraged.

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

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48

Appendix

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Internal Models
6 Test Summary – First 3 Tests

| 1 | 2 | 3 |

STATISTICAL QUALITY — The Statistical Quality standards for internal models describe requirements that components and inputs of the internal model and in particular the calculation of the probability distribution forecast underlying the statistical quality standards. Regulations focus on the methods and data used to calculate the probability distribution forecast.

VALIDATION — Validation of an internal model is intended to give the undertakings a degree of confidence that the internal model is appropriate for the purpose for which the model is to be used. This test includes general advice relating to validation for internal models, both in terms of quantitative tests and qualitative processes and policies.

DOCUMENTATION — Documentation is the primary way to communicate with supervisory authorities about internal model to allow them to form a continuing judgment on the internal model's appropriateness and reliability. This test requires a documents of almost all aspects of the internal model.

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Internal Models
6 Test Summary – Second 3 Tests

CALIBRATION STANDARDS
The calibration used should provide the adequate level of protection to the policy holder. Undertakings for which the standard risk measure and time horizon are not appropriate and who express their risk appetite with a different calibration, are allowed to use another calibration for their internal model as long as they comply with this test to ensure the same degree of policyholder protection.

PROFIT AND LOSS ATTRIBUTION
This test has general Advice relating to Profit and loss attribution for internal models. Insurance undertakings shall review, the causes and sources of profits and losses for each major business unit. The profit and loss attribution for each major business unit needs to be as transparent as possible.

USE TEST
Insurance undertakings need to demonstrate that the internal model is widely used in and plays an important role in their system of governance, in particular in their risk-management system, their decision-making process and their economic and solvency capital assessment and allocation process.

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