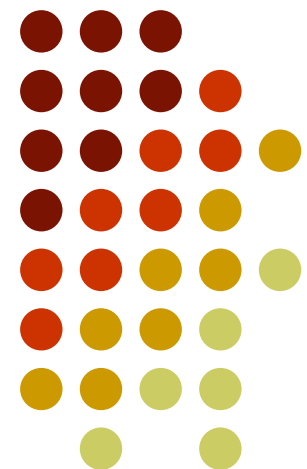


Capital Requirements for Life Companies

Nick Dumbreck

Caribbean Actuarial Association Conference

Suriname, 7 December 2006





Agenda

- **Drivers behind risk-based capital**
- Individual Capital Assessment
- Solvency II
- Economic Capital

Why has risk-based capital become so important?



- Changes in economic conditions
 - Eg lower interest rates causing guarantees to bite
- Stakeholder influence
 - Regulators
 - Protection of policyholders
 - Risk sensitive capital requirements
 - “Use test”
 - Shareholders
 - Protect and create value
 - Identify and quantify material risk drivers
 - Assess trade-off between risk and return
 - Rating agencies



Rating agencies' views

- Moody's
 - *We are already moving towards adoption of risk-based measures*
 - *We will work with firms on their internal capital models and incorporate results into our ratings*
- Standard & Poor's
 - *...economic capital...may be recognized by regulators as the minimum regulatory capital requirement, superseding any other regulatory requirements*
 - *...S&P will continue to develop robust processes of evaluating companies' economic capital processes to better inform our overall view of financial strength*

Rating agencies are beginning to expect firms to have operating Economic Capital models

Source: Moody's and Standard & Poor's

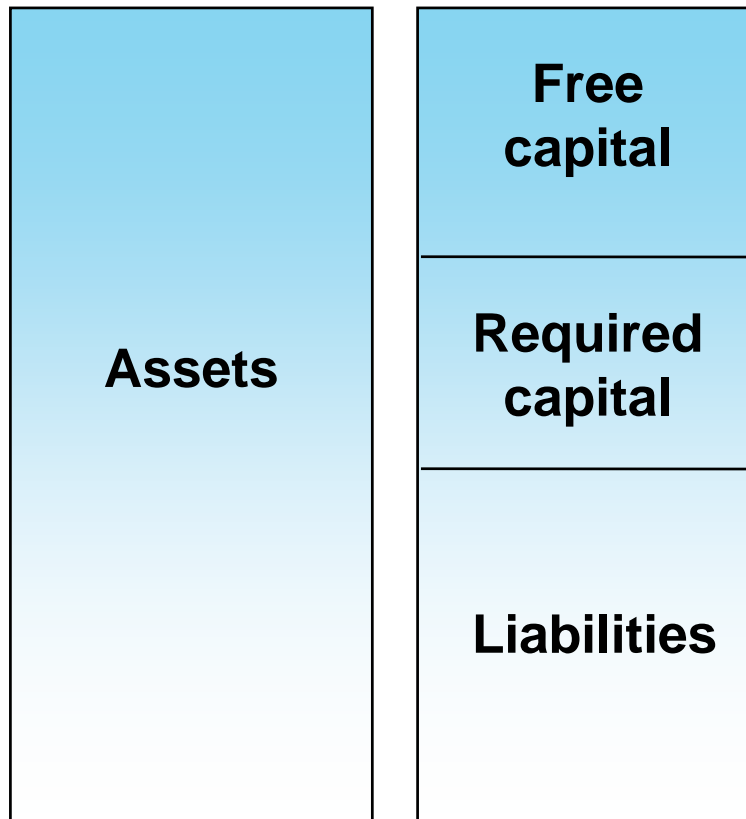


Agenda

- Drivers behind risk-based capital
- **Individual Capital Assessment**
- Solvency II
- Economic Capital



The traditional regulatory balance sheet



Assets

Admissibility limits

Possibly reflected at book value

Liabilities

Discounted at a constant rate of interest and ignores the time value of any policyholder options or guarantees

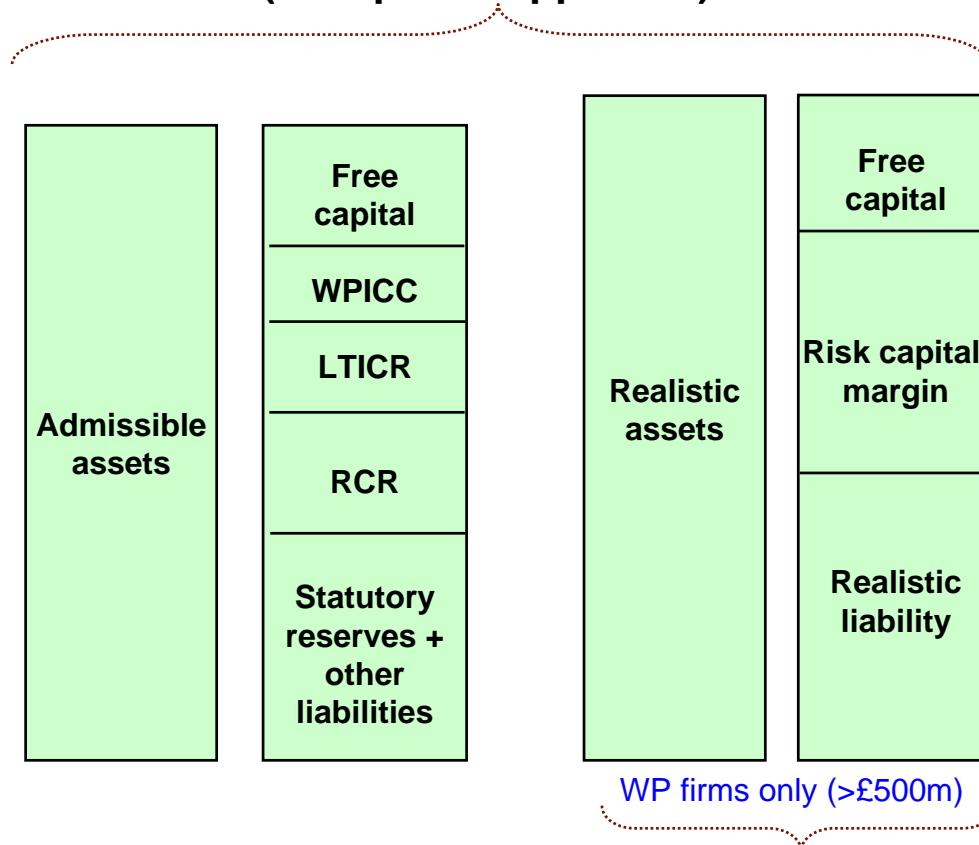
Required capital

Generally *relatively insensitive to the true riskiness of the business*



The UK framework

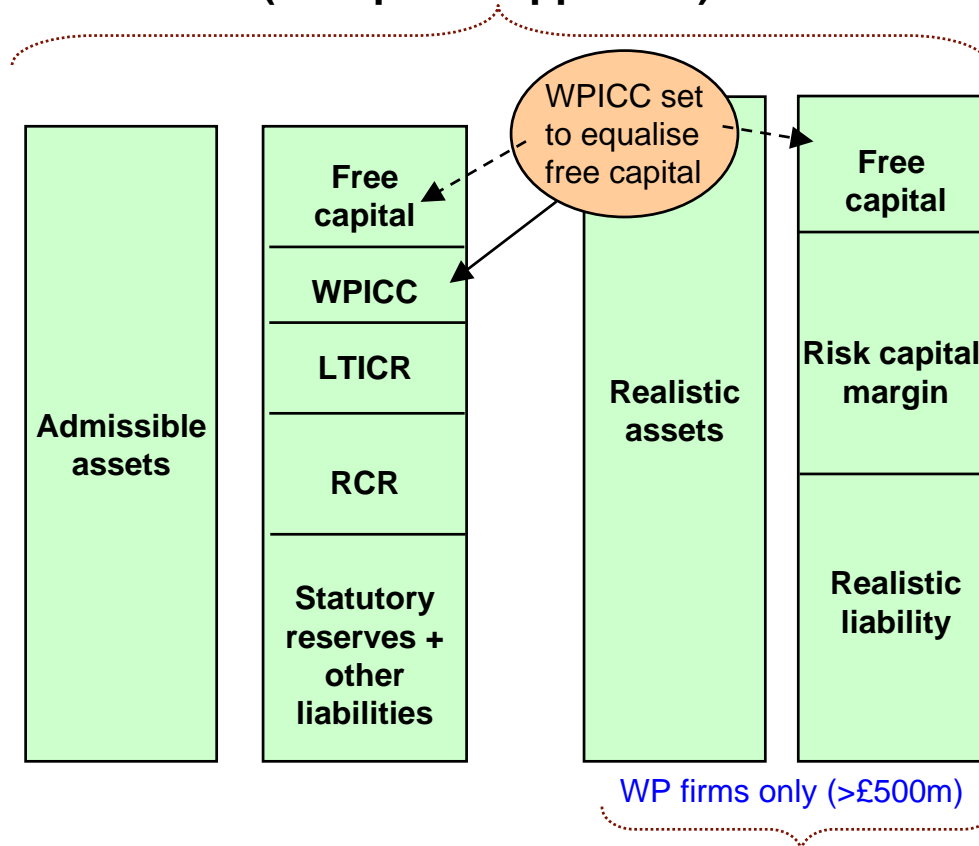
Pillar 1 basis
(twin peaks approach)

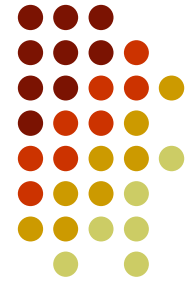




The UK framework

Pillar 1 basis
(twin peaks approach)

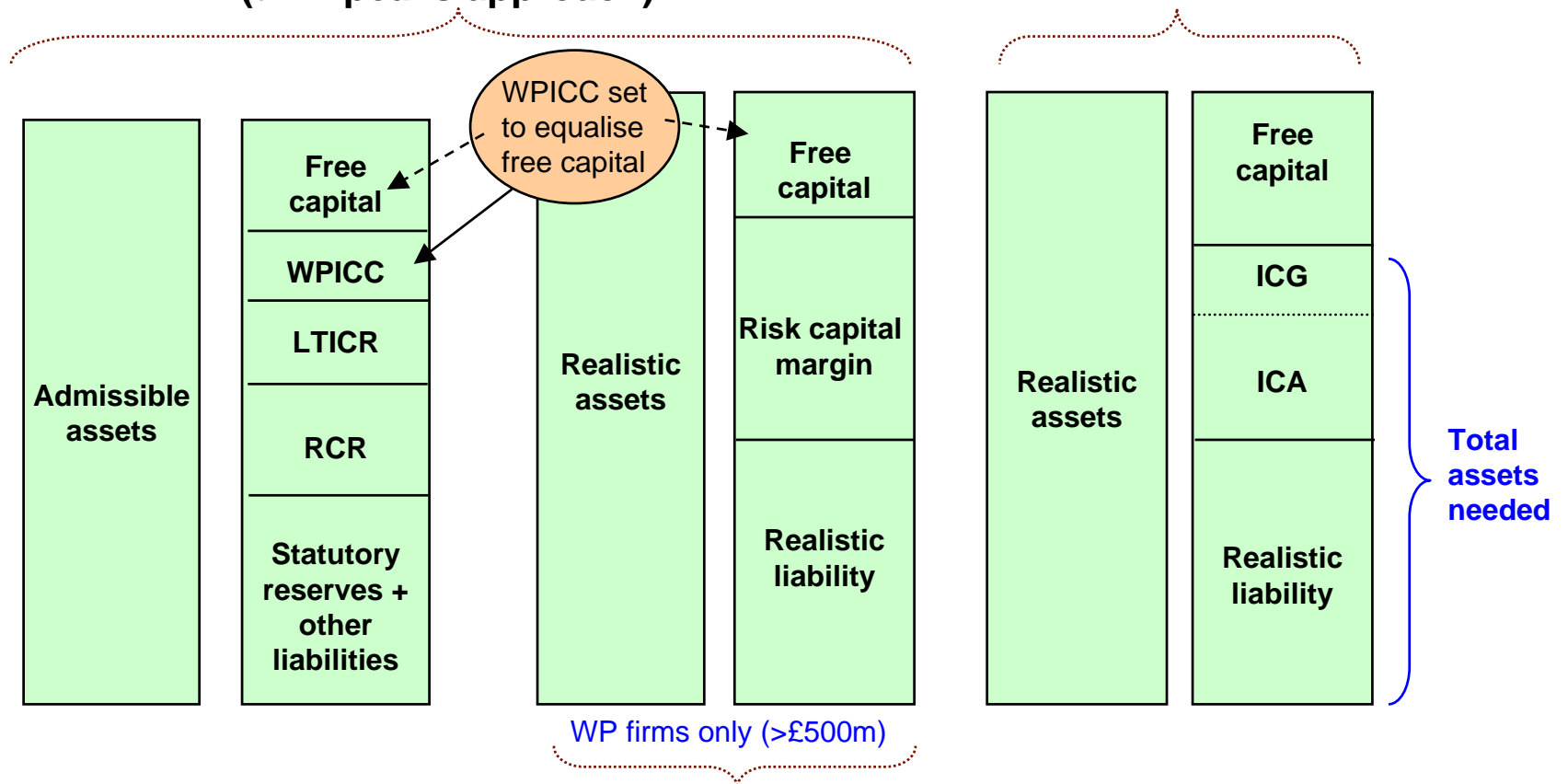




The UK framework

Pillar 1 basis
(twin peaks approach)

Pillar 2 basis

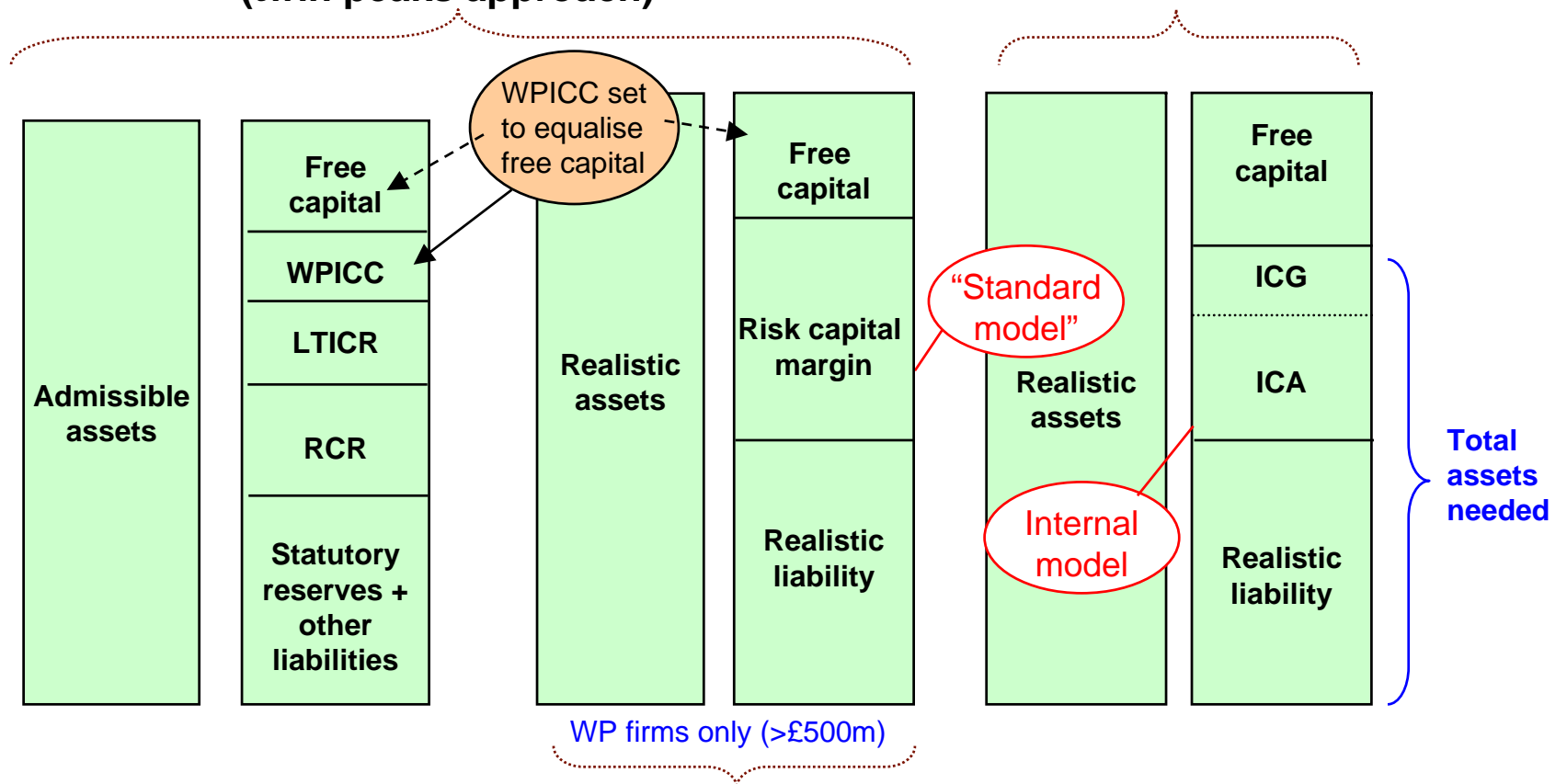




The UK framework

Pillar 1 basis
(twin peaks approach)

Pillar 2 basis





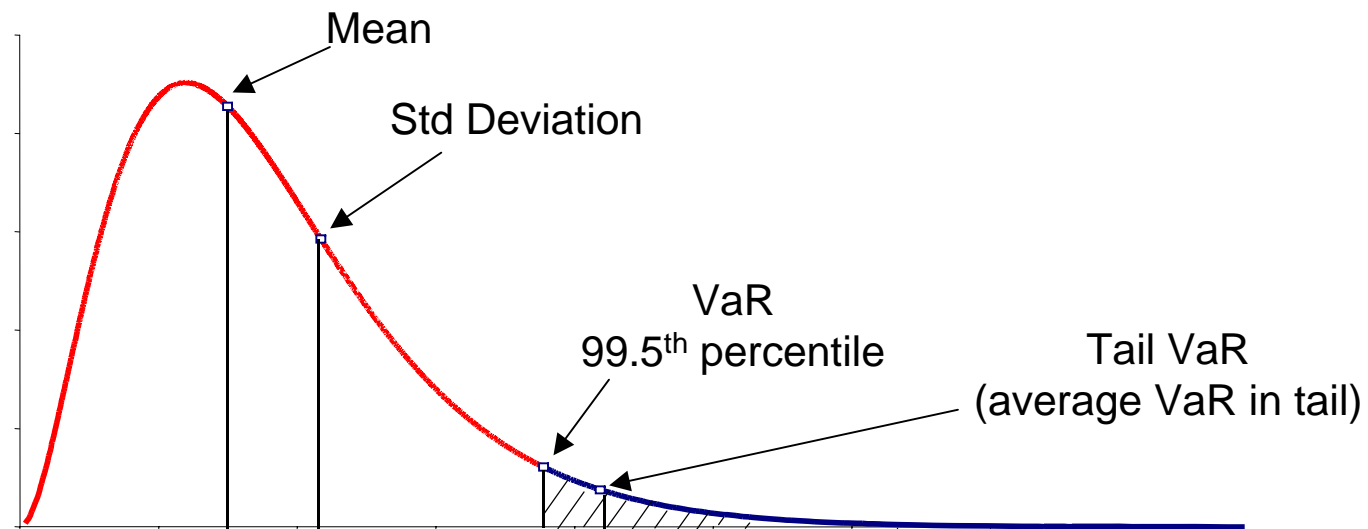
The Individual Capital Assessment (ICA)

- The ICA is a **self-assessment** by the insurer of the amount of capital needed to ensure that there is "**no significant risk that its liabilities cannot be met as they fall due**"
- Each insurer must prepare an ICA at least annually from 31 December 2004
- **All** material risks are considered explicitly (including market, credit, liquidity, insurance, operational and group risks)
- There is no requirement to publish the ICA



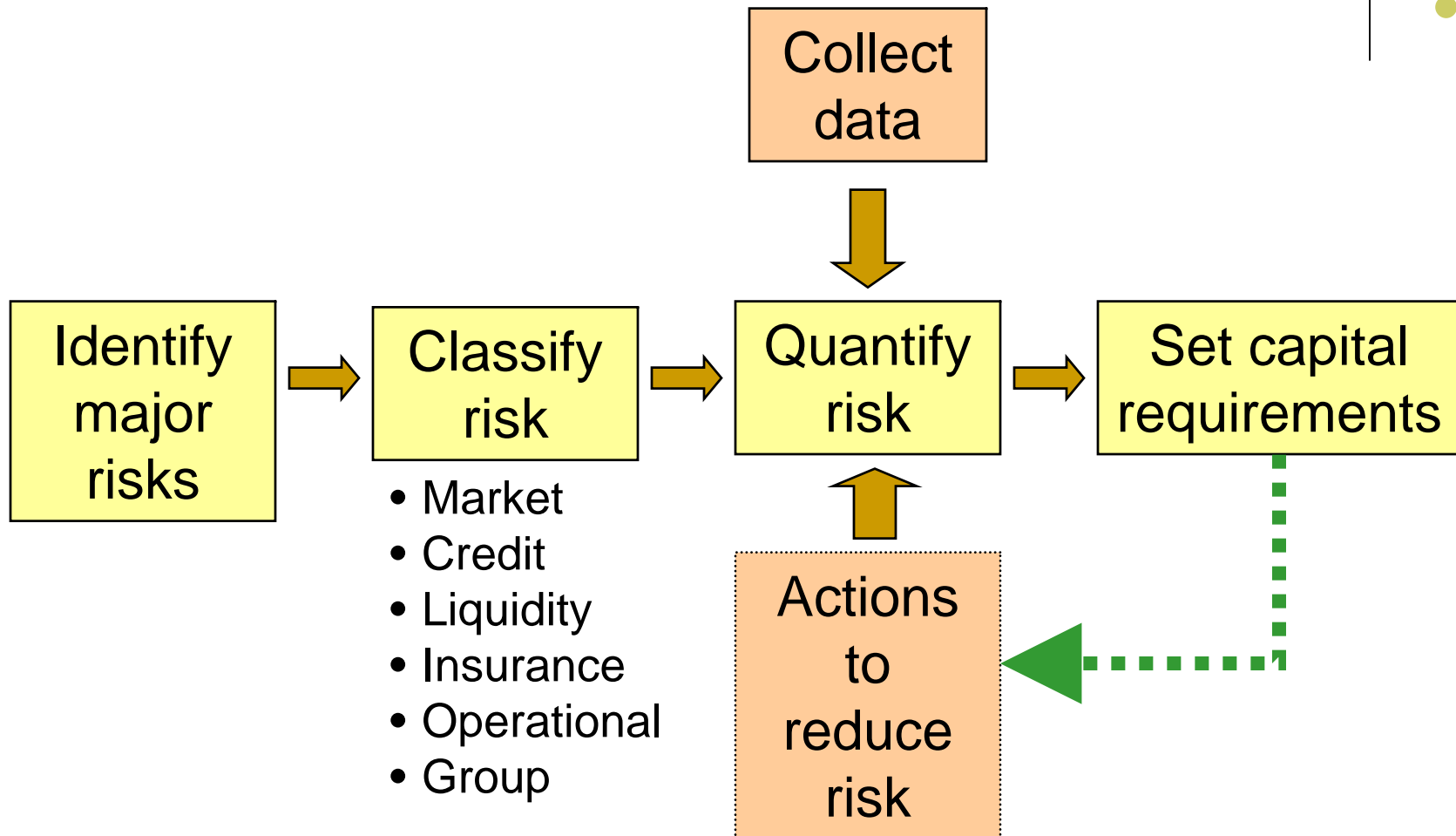
ICA capital requirement

- Defined for ICG purposes as **99.5% confidence level over one year** that assets will be equal or greater than liabilities





ICA model



Calculating capital requirements – A popular method



1. Calculate base balance sheet

Base	£m
Assets	1200
Liabilities	1000
Surplus	200



2. Recalculate base balance sheet in scenarios to get capital for each risk

Equity down	£m
Assets	1000
Liabilities	840
Surplus	160

Capital	
Equity	40
Interest	10
Property	5
Credit	5
Equity vol	10
Mortality	5
Lapse	10
Operational	15
Total	100



3. Apply aggregation formula

Correlation Matrix

	Eq	Int.	Prop.	Cred	Eq vl	Mort	Lps	Op
Equity	1.0	-0.2	0.5	0.5	0.7	0.0	-0.5	0.6
Int.	-0.2	1.0	-0.1	0.3	0.0	0.0	0.1	-0.1
Prop	0.5	-0.1	1.0	0.2	0.5	0.0	0.0	0.2
Credit	0.5	0.3	0.2	1.0	0.0	0.0	0.0	0.2
Eq vol	0.7	0.0	0.5	0.0	1.0	0.0	-0.4	0.5
Mort	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Lapse	-0.5	0.1	0.0	0.0	-0.4	0.0	1.0	0.0
Op	0.6	-0.1	0.2	0.2	0.5	0.0	0.0	1.0

$$ICA = \sqrt{\sum C_i^2 + \sum \rho_{ij} C_i C_j}$$





Risk aggregation in the ICA

- The most common approach for life insurers is to:
 - Derive 99.5th percentile stress for each risk
 - Calculate 99.5th percentile capital required for each risk separately
 - Aggregate to derive total capital required using a "correlation matrix formula" approach
 - Adjust as necessary for any weaknesses in approach
- Non-life insurers typically consider 98.5th percentile over 3 years or 97.5th percentile over 5 years using a DFA model



The correlation matrix

Capital (C _i)			Eq	Int.	Prop.	Cred	Eq vl	Mort	Lps	Op
Equity	40	Equity	1.0	-0.2	0.5	0.5	0.7	0.0	-0.5	0.6
Interest	10	Int.	-0.2	1.0	-0.1	0.3	0.0	0.0	0.1	-0.1
Property	5	Prop	0.5	-0.1	1.0	0.2	0.5	0.0	0.0	0.2
Credit	5	Credit	0.5	0.3	0.2	1.0	0.0	0.0	0.0	0.2
Equity imp. vol	10	Eq vol	0.7	0.0	0.5	0.0	1.0	0.0	-0.4	0.5
Mortality	5	Mort	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Lapse	10	Lapse	-0.5	0.1	0.0	0.0	-0.4	0.0	1.0	0.0
Operational	15	Op	0.6	-0.1	0.2	0.2	0.5	0.0	0.0	1.0
Total	100									

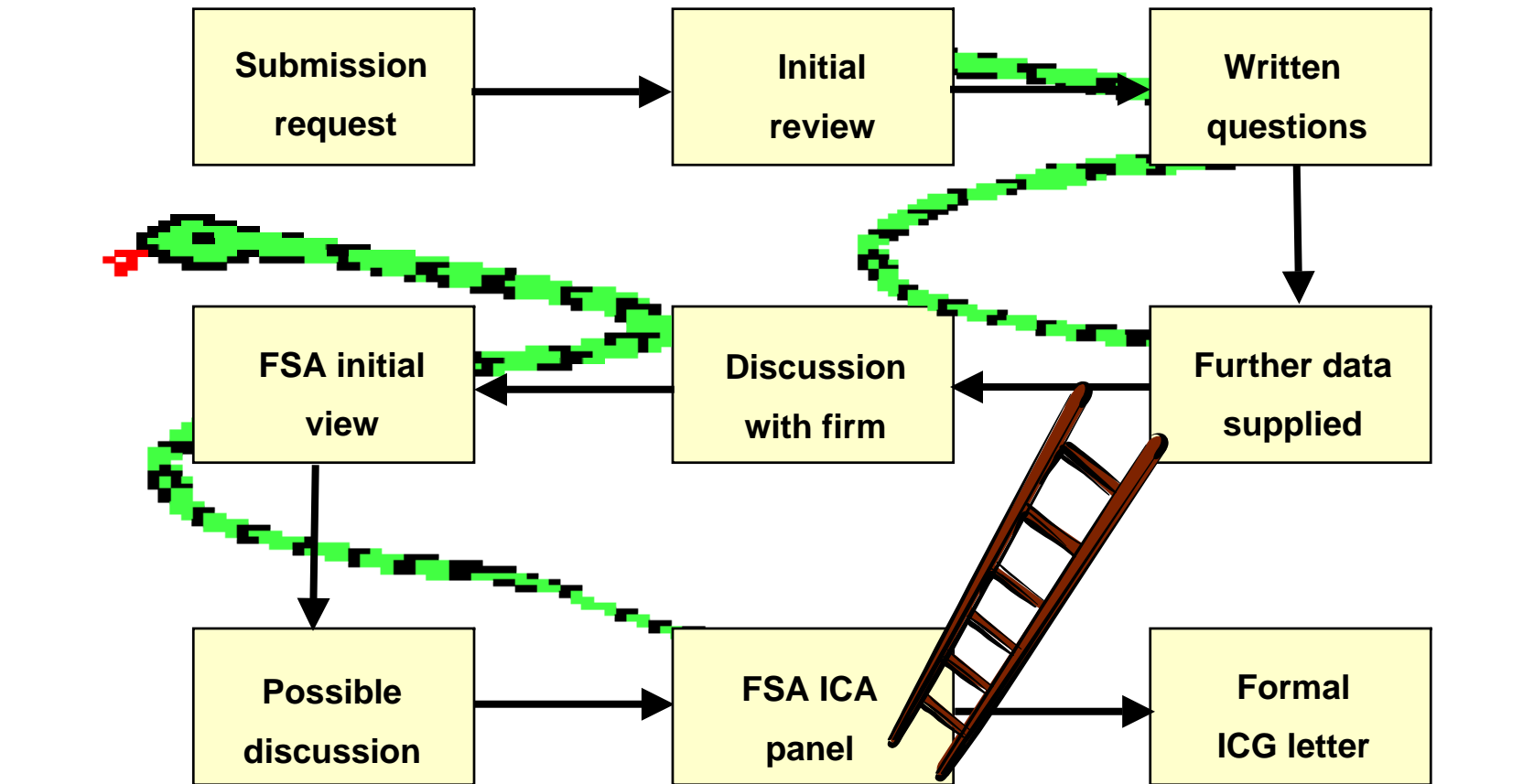
$$\text{Aggregate capital figure} = \sqrt{\sum C_i^2 + \sum \rho_{ij} C_i C_j} = 59$$

$$\text{Square root of sum of squares} = \sqrt{\sum C_i^2} = 47$$

Warning: correlations for example only



FSA ICA review process





Agenda

- Drivers behind risk-based capital
- Individual Capital Assessment
- **Solvency II**
- Economic Capital



The existing Solvency I regime

- In place since First EU Directive in 1970s
- Fit for purpose at time but has not moved with the times
- Lack of harmonisation across Europe
- Capital not aligned with risk and no explicit allowance for diversification
- Limited incentive for good risk management

Solvency II project initiated in 2000



Solvency II reform

- Risk-based regulatory framework for all insurers based in EU
- Harmonise standards across the EU to create level playing field
- Moving to a single lead supervisor in Europe for large groups
- Technical advisor to European Commission: CEIOPS
- Proposals must be accompanied by impact assessment
- Framework Directive expected to be finalised in 2007
- Due for implementation in 2010 (perhaps optimistic?)
- Some regulators already adopting risk-based framework in advance, e.g. FSA (UK), BPV (Switzerland), Finansinspektionen (Sweden)

Solvency II will significantly change the European insurance solvency system

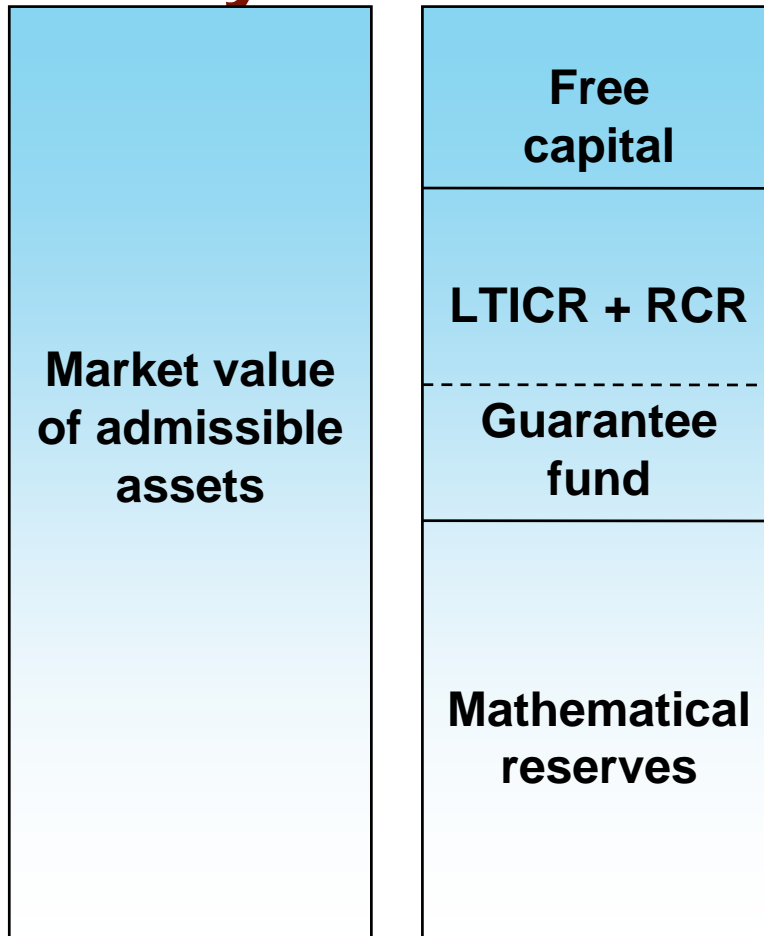


Solvency II - General principles

- 3 pillar approach:
 - Pillar 1 - Technical provisions and capital requirements
 - Pillar 2 - Supervisory review process
 - Pillar 3 - Market discipline and disclosure
- Adopting market-based valuations of assets and liabilities
- Full account to be taken of the costs of options and guarantees
- Embedding the use of sophisticated risk management tools (including the use of firms' own internal capital models) – reviewed as part of the supervisory review process



Solvency I – UK framework



LTICR

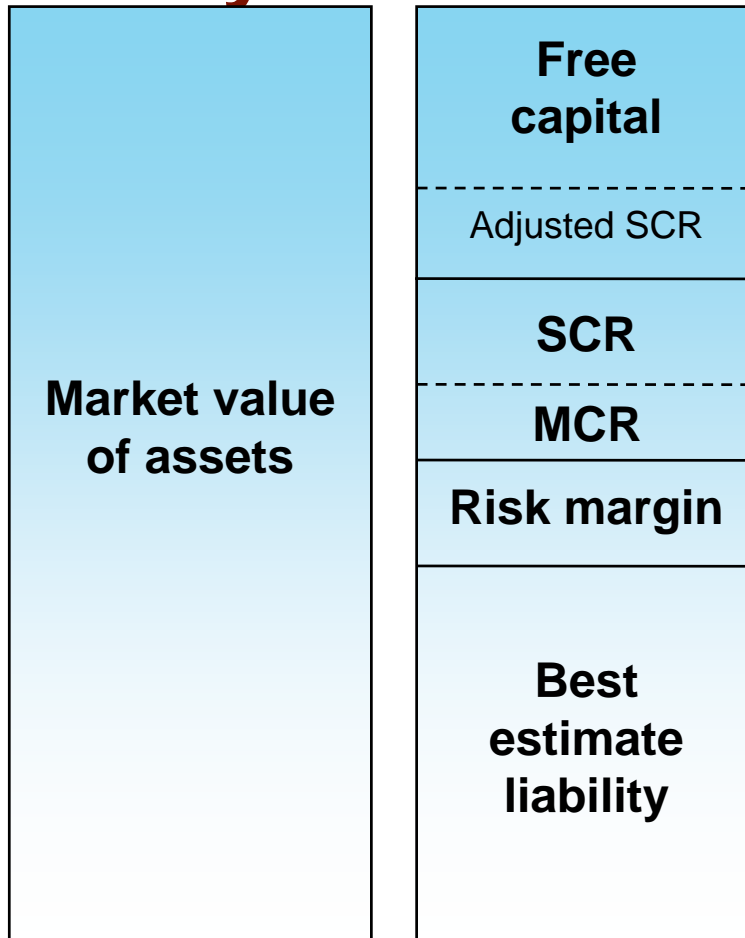
Factor-based approach

RCR

Prescribed falls in market values



Solvency II framework



Risk margin

Percentile approach

Cost of capital approach

Best estimate liability

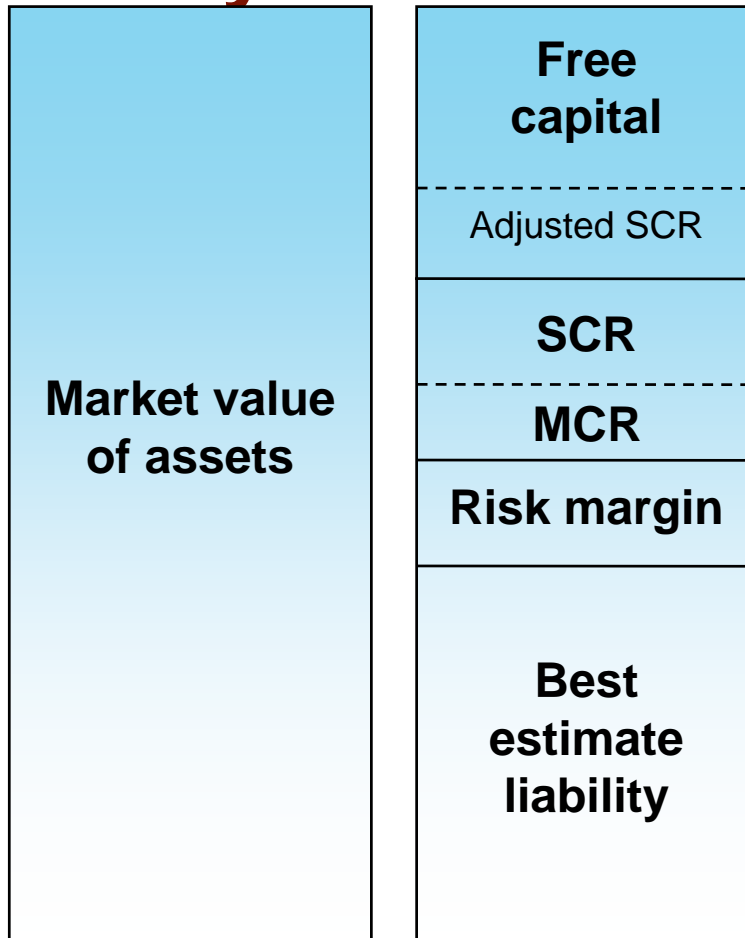
Term structure of discount rates

Management/policyholder actions

Stochastic modelling of options
and guarantees/replicating
portfolio approach



Solvency II framework (cont.)



Solvency Capital Requirement

Standard approach vs. internal model approach

Aggregation through correlation matrix

(Alternative scenario-based approach)

Minimum Capital Requirement

Transitional MCR based on Solvency I

Final MCR based on simplified standard SCR method?

Subject to min expressed in Euros



Current Solvency II issues

- Risk margin - *Percentile or* cost of capital approach?
- Risk criterion – VaR vs. Tail VaR and confidence level
- Definition of the discount rate
- Format of the MCR
- Allowance for correlation in the SCR
- Internal model validation criteria
- Group issues

Solvency II - Implications for European insurers



- Strengthening of the link between risk and capital management will become increasingly important
 - Demonstrate to supervisors that it is sufficiently embedded in its overall decision making processes
 - Demonstrate Board and senior management responsibility
- Insurers will have to spend considerable time and resources to prepare for the new solvency system and to ensure that they have the appropriate expertise

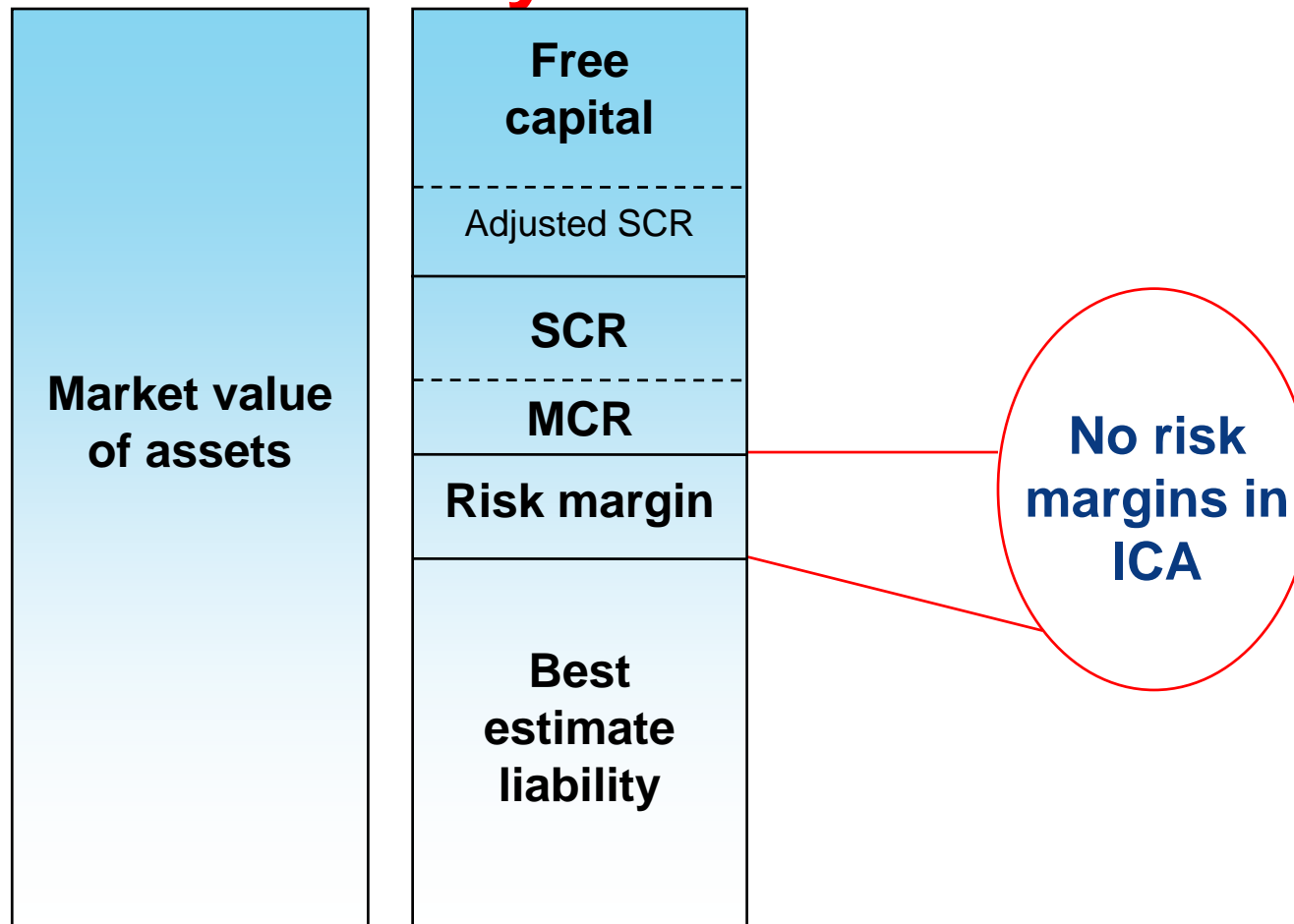


ICA vs Solvency II

- Similarities between ICA and Solvency II
 - Three pillar approach
 - Risk-based capital assessment
 - Similar confidence level
 - One-year time horizon
 - Supervisory review process
- ICA possibly very similar to internal model SCR
- However, some important differences expected
- Differences may include...



ICA vs Solvency II





ICA vs Solvency II

Eligible assets (all eligible in ICA)

Possible asset limits (no limits in ICA)

Market value of assets

Free capital

Adjusted SCR

SCR

MCR

Risk margin

Best estimate liability



Agenda

- Drivers behind risk-based capital
- Individual Capital Assessment
- Solvency II
- **Economic Capital**



What is Economic Capital?

Actual capital



The capital actually available

Required regulatory capital



The capital a company **must** have to be solvent

Allocated or Economic Capital



The capital a company **should** have to achieve its goals

- ICA and Solvency II driven by regulators
- Economic Capital driven by companies' own desire to manage risks better to gain competitive advantage and maximise shareholder value
- Some differences in approach between ICA, Solvency II and Economic Capital, but many components of the capital models are similar

Ultimate goal is to improve risk management



Lack of agreement over the best approach



Will companies move in the same direction?



Trends

Market consistent valuations

Modelling management actions and policyholder behaviour

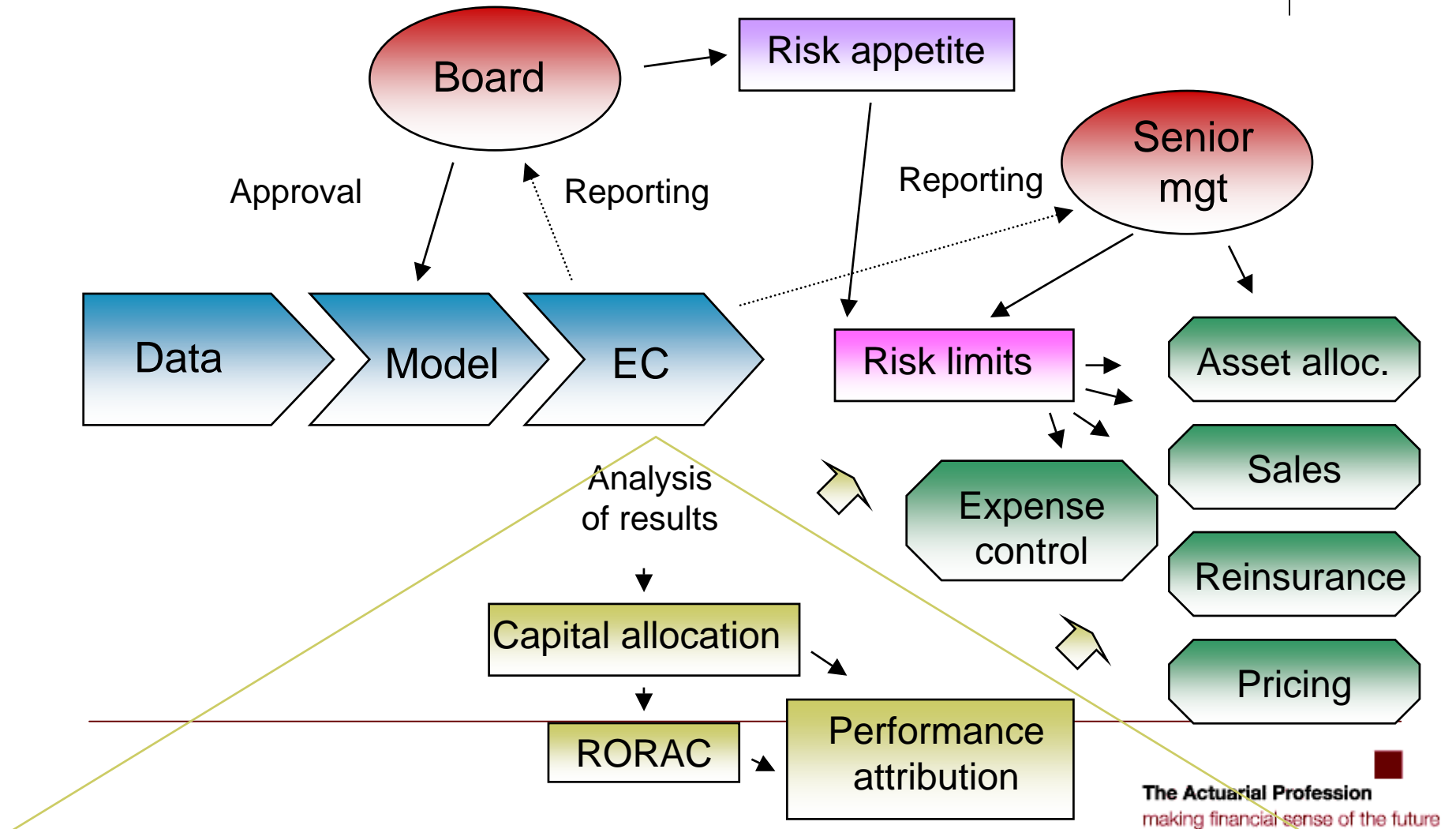
One year time horizon

VaR risk measure

Some consensus emerging

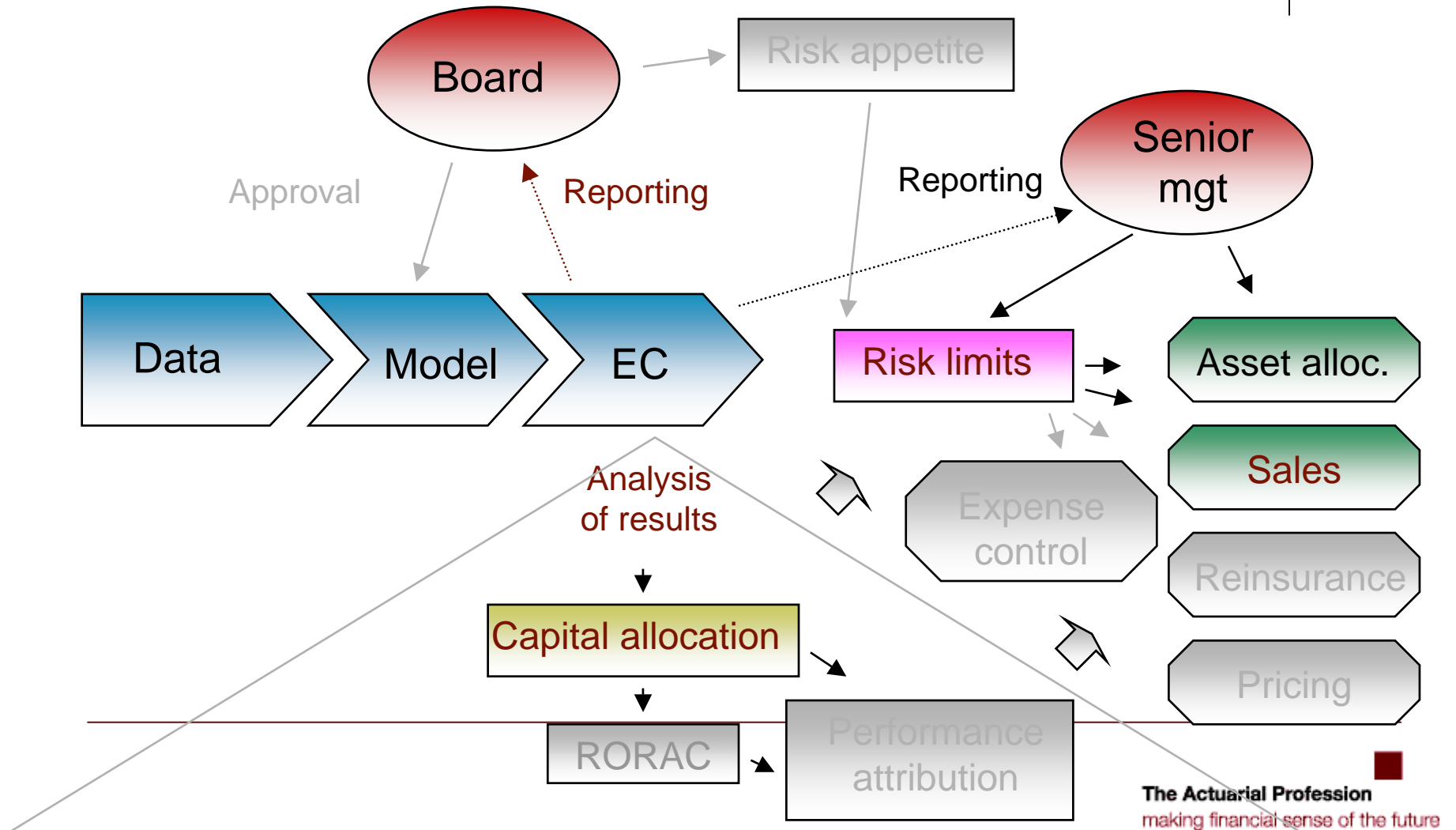


The embedded Economic Capital framework





The current Economic Capital framework



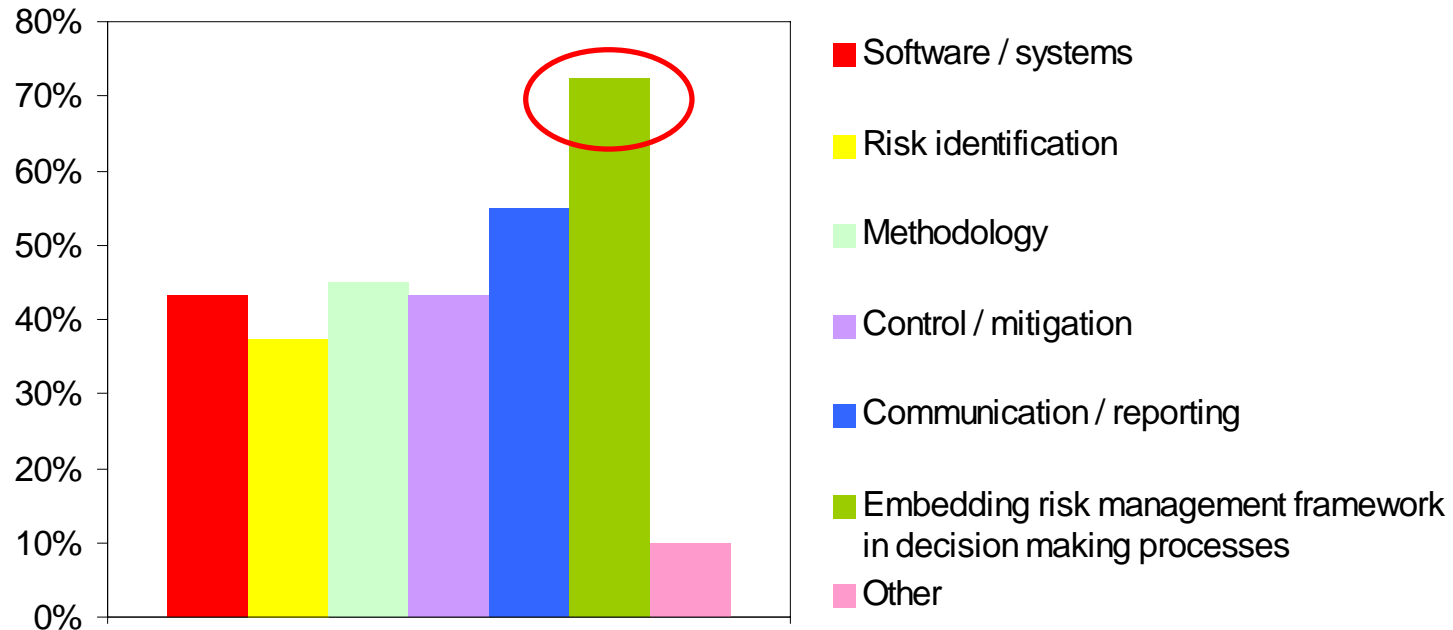


Barriers to implementation

- No regulatory pressure - delays in implementation
- Lack of resources
- Scepticism about value of Economic Capital framework
- Data availability and integrity
- Successful implementation into management decision-making



What improvements are envisaged for the risk management process in the next 1-2 years?



Source: Watson Wyatt Risk Management Survey 2005

Still some way to go before companies gain full benefits from Economic Capital approach



Conclusion

- A multitude of equally valid approaches and choices of assumptions exist
- In the UK the ICA regime laid much of the groundwork for Solvency II
- Shape of Solvency II starting to emerge but plenty of work still to be done on finalising the details
- European insurers need to gain a clear understanding of the implications of Solvency II and to monitor and consider any future developments
- Economic Capital evolving as an important risk measurement and decision making tool to gain a competitive advantage

Risk-based capital models are becoming the norm!

Capital Requirements for Life Companies

Nick Dumbreck

Caribbean Actuarial Association Conference

Suriname, 7 December 2006

