

# Life Reinsurance Regulation

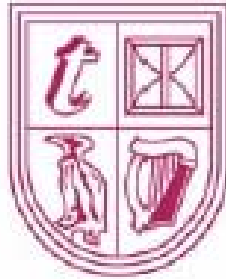
Presentation to Society of Actuaries in Ireland  
Date 29 November 2007

Your Team :  
James Maher  
Brian Morrissey  
Colin Murray  
Stephen Devine



# Agenda

- 4:30 – 5:30pm
  - Reinsurance Directive/ Statutory Instrument 380
  - Financial Regulators Consultation Papers and Guidance Notes
  - Initial reference to Finite/Financing and Risk Transfer Testing
- 5:30 – 6:10pm
  - Regulatory Returns
  - Actuarial Guidance
- 6:10pm – 6:30pm Break
- 6:30pm – 7:10pm
  - Classification Systems
  - Internal Models
  - Augmented Solvency Model
- 7:10pm – 7:30pm
- Actuarial Certification



# Session 1

## Regulations and Regulatory Guidance

Presentation to Society of Actuaries in Ireland  
29 November 2007

James Maher



# Contents

1. Overview and Essential Reading
2. Summary of Parts 1 to 3 SI 380
3. Part 4 – Reserves/Technical Provisions
4. Part 4 – Assets
5. Part 4 – Solvency Margin
6. Risk Transfer and Finite Reinsurance

Will not be addressing Parts 5 through 17



# Essential Reading and Websites

- [www.irishstatutebook.ie](http://www.irishstatutebook.ie)
  - Regulations
  - Underlying referenced regs.
- [WWW.IFSRA.ie](http://WWW.IFSRA.ie)
  - Implementation
  - Guidance papers and additional requirements
  - Consultation Papers/FAQs
- [www.iaisweb.org](http://www.iaisweb.org)
  - Principles and Guidance (Core Principles, Notes on Finite and Risk Transfer etc)
  - Lots of good stuff
- [http://ec.europa.eu/internal\\_market/insurance/reinsurance\\_en.htm](http://ec.europa.eu/internal_market/insurance/reinsurance_en.htm)
  - Background and Context
  - Evolution
  - Regulation in development



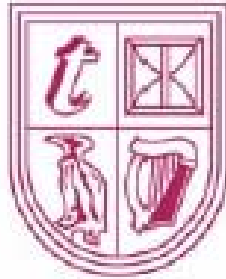
# Reinsurance Directive

- Fast-track built on Solvency I as a stop gap to SII
- Non Life Framework
- Life Framework as an option for investment related life business
- Wiggledy bits – Finite, Financial and SPV's
- Implemented July 2005 in Ireland via Statutory Instrument 380 (SI 380)
- Full implementation 10 December 2008



# Supplementary Requirements and Guidance

- Life Transitional Paper – Implementation of SI 380 and Extension of Part 4 in respect of Life R/I
- Corporate Governance –Essential reading by all, in particular the Directors
- Finite/Financial – Essential reading owing to the requirement for classification systems, irrespective of intention to write Finite/Financial
- Frequently Asked Questions
- **Phone:** +353 1 4104000



# Summary Parts 1 to 3

1. Scope
2. Restrictions
3. Authorisation





# Part 1 Scope

- Application to persons undertaking R/I in the state
- Exemptions
  - Exempt undertakings (insurers, branches)
  - Exempt activities (social insurances)
  - In run-off by 10 December 2007
- Provisions for Branches of R/I undertaking with head office in 3<sup>rd</sup> Country



## Part 2 Restrictions

- Reinsurance Activity is restricted to Authorised undertakings
- Authorisation is restriction to classes permitted under a companies authorisation



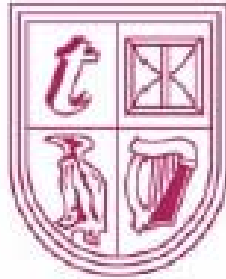
## Part 3 – Authorization

- Application
  - Detailed requirements including Scheme of Operations
  - Grounds for Refusal
- Grandfathering Provisions
  - If authorised pre 10 December 2007
  - subject to satisfaction of requirements
    - letter of authorisation
    - transitional requirements
    - Compliance submissions
- Publication of a list after 10 December ?



## Part 3 – Authorization

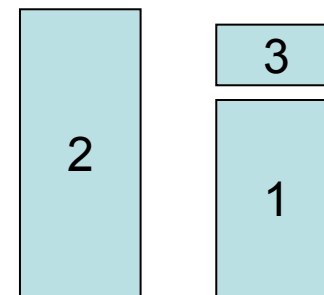
- “Objects” clause restricted to reinsurance and “related operations”
- Cancellation of Authorisation
  - Fail to comply with conditions of authorisation
  - Fail to comply with a direction
  - Failure to trade for 6 months
  - Insolvency
  - Naughty stuff

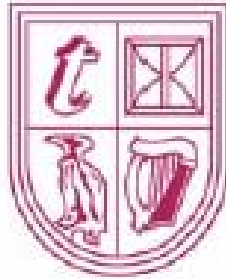


# Part 4 Regulation of Undertakings

*Regulatory Returns (to be covered by Brian)*

1. Reserves/Technical Provisions
2. Assets
3. Solvency Margin





# Technical Provisions

1. Regulations and Regulatory Guidance
2. Basis of calculation
3. Gross and Net
4. Surrender Values



# Reserves/Technical Provisions

- SI 380
  - S 23(1)** In accordance with Insurance Accounts Directive (Directive 91/674/EEC)
  - S 23 (2)** Bank may from time to time make rules
  - S 25** Bank may give directions to an Undertaking (in determining liabilities, having regard to generally accepted accounting concepts)
- Additional Regulatory Requirements and Guidance
  - “Requirement for Life Reinsurance Undertakings, Including transitional requirements” – **Section 2**



# Insurance Accounts Regulations

- SI 23 1996
  1. “on the basis of recognised actuarial methods,
  2. annually,
  3. by a Fellow Member of the Society of Actuaries in Ireland,
  4. **with due regard** to the Actuarial Principles laid down in Council Directive 92/96/EEC”
- a copy of the relevant requirements from Article 20 are included in the Appendix to the Transitional requirements
- Not the more detailed requirements of 1994



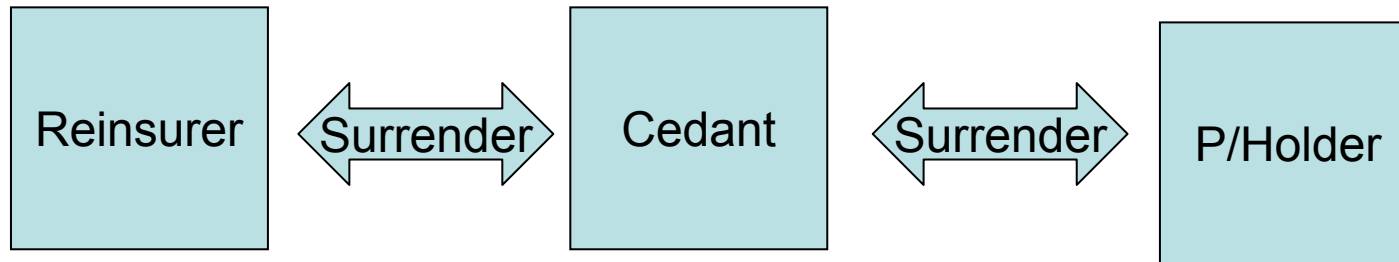


# Gross/Net Calculations

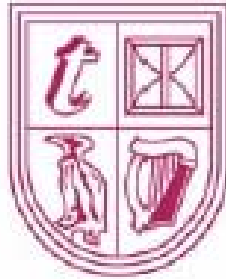
- 2.2 – Gross and Net Calculations
  - Own Calculation of Gross Reserve
  - Evaluate reserve recovery (ie not a pro-forma deduction)
- Board requirement to have established a Retrocession Strategy
  - Insurance Company Guidance
  - Strategy
  - Security



# Surrender and Recapture



- No requirement to assume 100% lapses or ensure no negative reserves
- In considering lapse experience have regard to experience and effect at the level of the underlying policyholder and at the level of the reinsurance contract.
- Section 2.3 - Guaranteed Surrender Values
  - Surrender = “Recapture” at the level of the reinsurance contract
  - Value rights and options in treaties/contracts



# Assets

1. Regulations and Supplementary Requirements
2. Deposit Back/Funds Withheld
3. Deferred Acquisition Cost
4. Intercompany Transactions

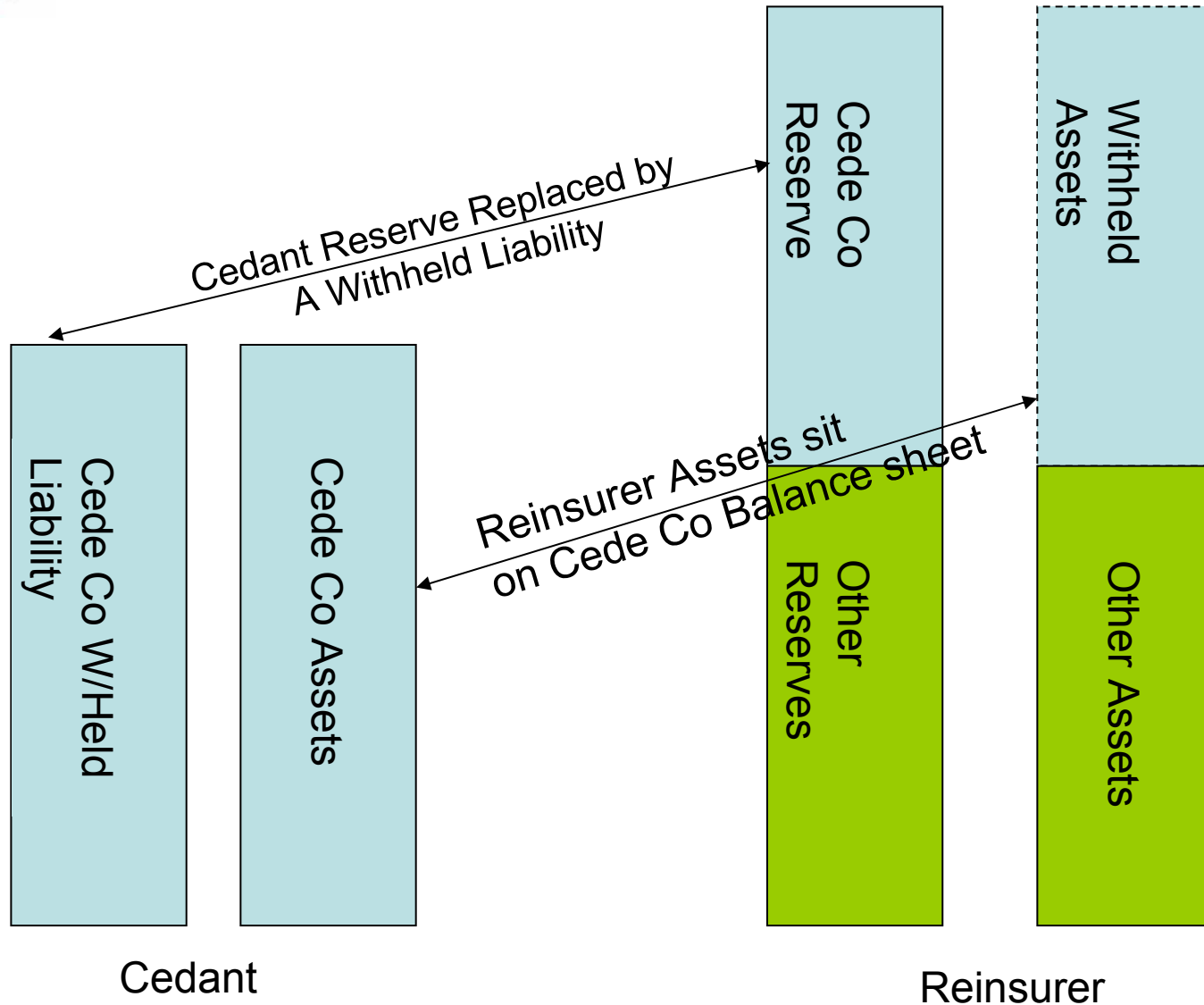


# Assets

- SI 380 – Section 26
- Prudent Person (not admissibility)
- Requirement for Life Reinsurance Undertakings, Including transitional requirements” – **Section 3**
  - **“Demonstrate”** adherence to the requirements upon request
  - Generally have regard to
    - Insurance Account Valuation of Assets
    - Guidelines for insurance Companies on Asset Management
    - Guidance on Investment Risk Management
- In summary you need to have a board approved investment strategy that is properly informed by the business you write with regard to the level of financial resources available
- Additional Specific Rules in respect of :
  - Debtors (90 days/ Debtors ledger)
  - Funds Withheld
  - Deferred Acquisition Cost
  - Inter-Company Transactions

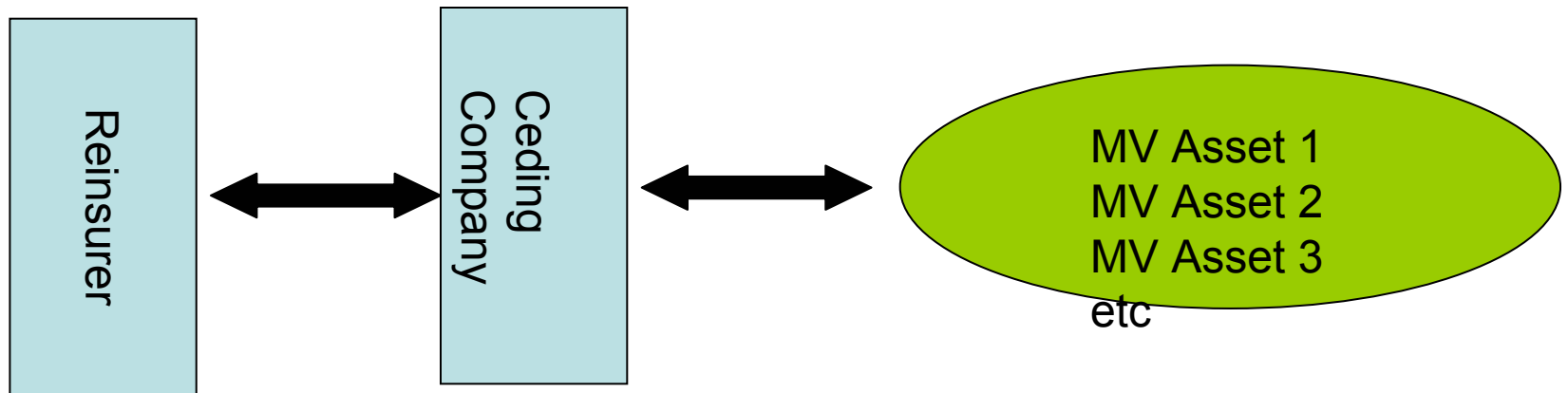
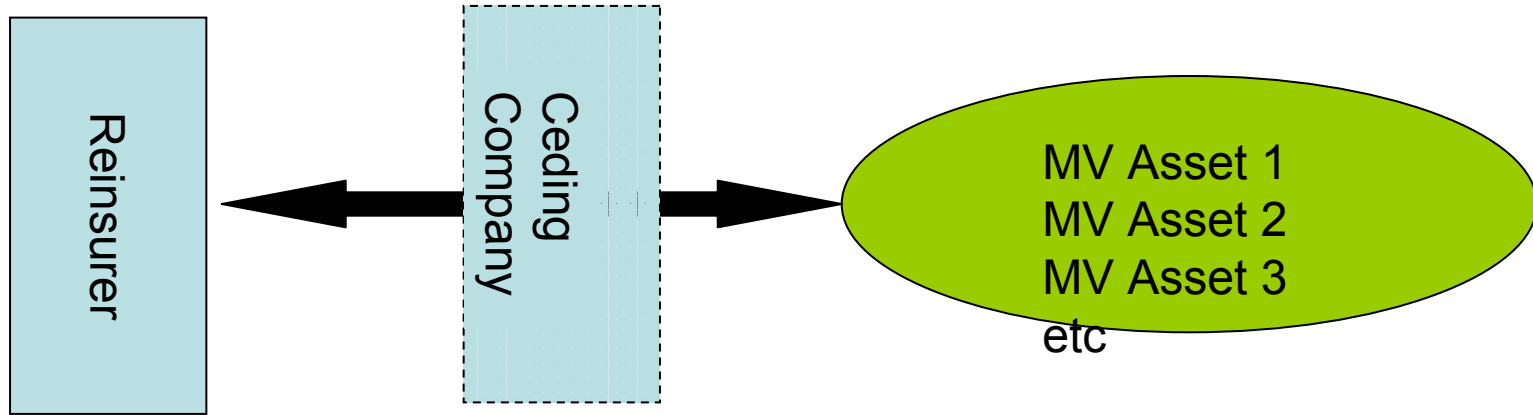


# Deposit Back/Funds Withheld



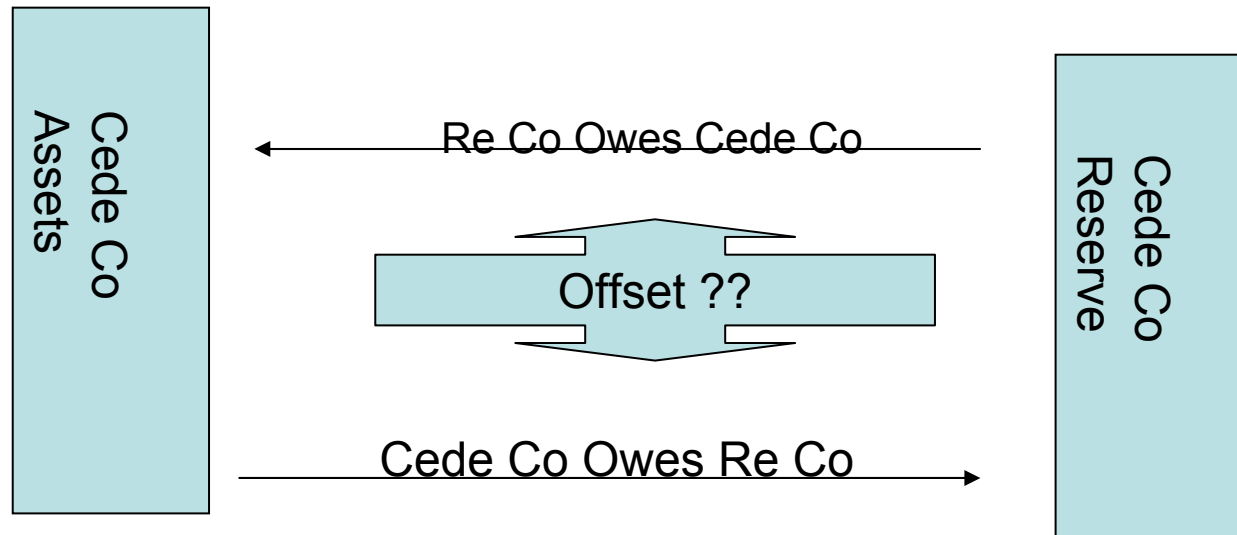


# Step 1 – Look Through





# Step 2 – Cedant Credit Risk



- **Enforceability of Offset**
  - Natural Justice or a Legal Concept ?
  - Situation in Insolvency
  - Which assets/liabilities may be offset
  - Contract Wording
  - Basis of determination – need a competent legal opinion !



# Step 3 – Evaluating a Response (where offset not enforceable)

- Prudent person response to a credit exposure
  - Capital/Solvency Margin allocation not possible
- Credit Exposure
  - Pricing the credit risk
  - Excessive concentration
- Directors
- Possible approach to valuing a “Haircut”
  - Cost of Capital Method
  - Cost of Capital \*  $\sum V^t$  \* Cap Charge \* Exposure (t)
  - Capital Factors Fn (Rating, Concentration)
  - Capital Factors either internal or external
  - Concentration Factor having regard to portfolio balance





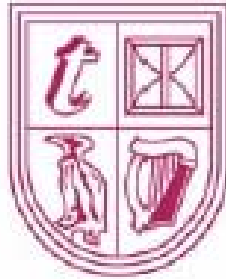
# Deferred Acquisition Cost

- Admissible subject to :
  - Recoverability
  - Spreading => Nature and Timing of underlying
  - Consistency with Reserving
  - Regular Review
- Admissibility to Cover Reserves and Solvency Margin
  - “all reasonably foreseeable circumstance”
  - May be interpreted as “consistent” with Reserves
- Residual issues regarding liquidity and concentration
- Prudential Person => haircut ?
- Implications for haircuts on negative reserves ?



# Intercompany Transactions

- Prudential Rules Pursuant to 26(5)
- Loans
  - Intercompany – broad range of connections
  - Prudent Valuation
  - Conditions
    - Ring Fenced/Solvency Protected
    - Legal opinion confirming the effectiveness of ring fencing
    - IFR issued letter of no objection
- Receivables
  - 90 Day Debtors Rule
  - Administered on an arms-length basis



# Solvency Margin

1. Classification
2. Bases
3. Special Cases (Mixed Business etc)



# Solvency Margin

- Available assets – application of Asset regulations
- Classification Level 1 – Traditional/Finite/Financial ?
- Classification Level 2 –Protection/Investment ?
- Classification Level 3 - Which life charges ?



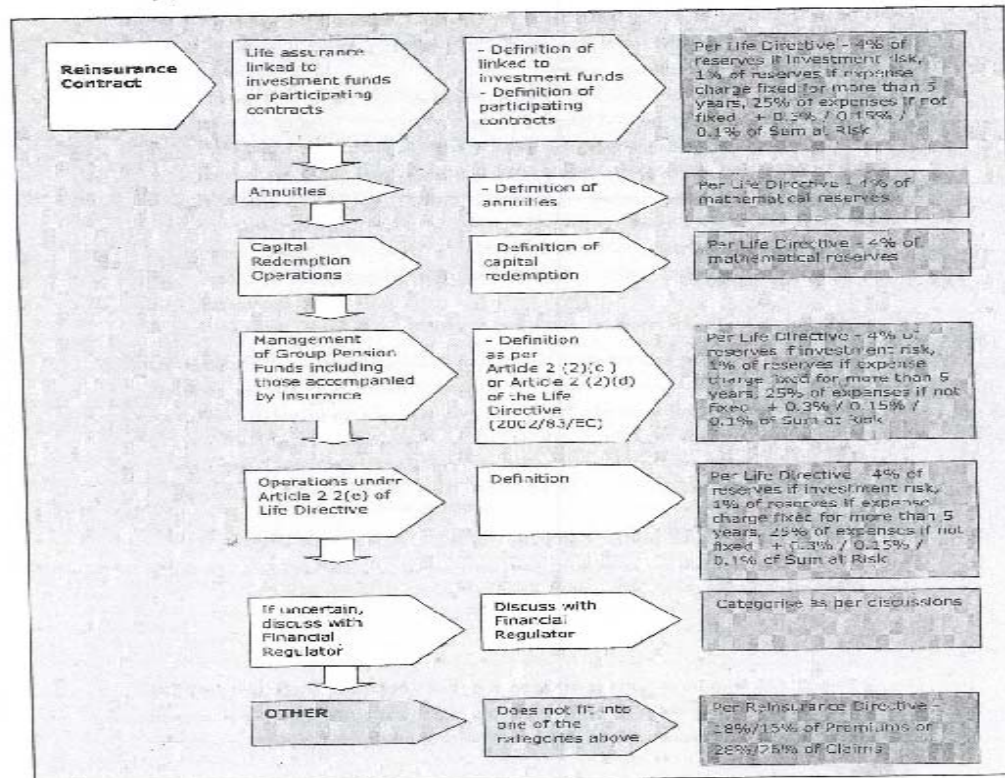
# Solvency Margin

	Protection	Mixed	Investment
Traditional	Non Life	Unbundle ←————→	Life
Finite	ASM + MGF	ASM + MGF	ASM + MGF
Financial	ASM	ASM	ASM



# Life Basis

Appendix 4: Methodology for determining solvency



Source: Watson Wyatt report 'Solvency margin and reserving requirements for life reinsurance business', February 2006, commissioned by the Financial Regulator (a copy of this report is available on the Financial Regulator's website [www.financialregulator.ie](http://www.financialregulator.ie).)



# Non Life Basis & Yearly Solvency Changes

## Premium

- Max ( $\sum$  Written,  $\sum$  Earned)
- Apply 18% below €50mn/16% above
- Adjust for R/I, Max(50%, Retained/Gross)

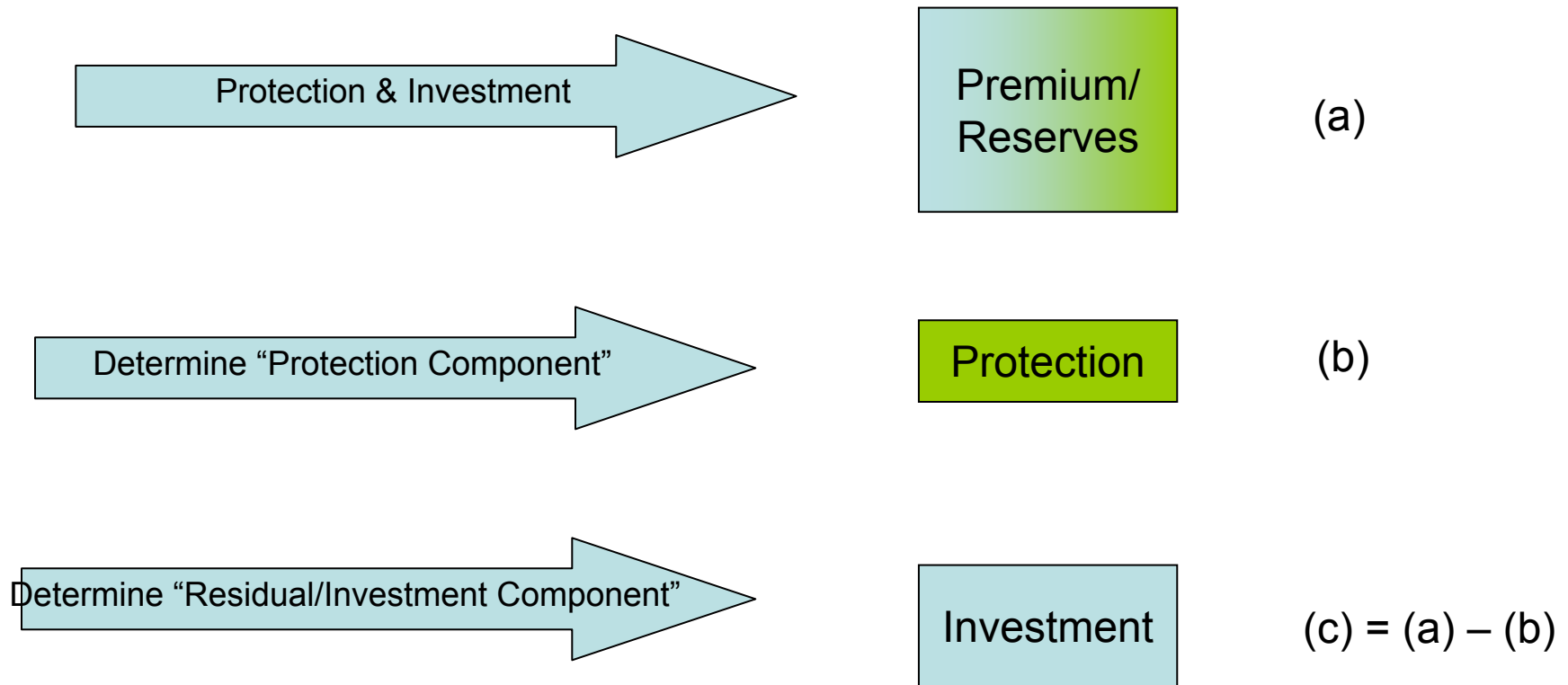
## Claims

- $\sum$  Claims – 3 years
- Adjust for Open/Close Reserves
- Divide by 3 years
- Apply 26% below €35mn/23% above
- Adjust for R/I, Max(50%, Retained/Gross)

- Max (  $\text{Premium}$  ,  $\text{Claims}$  )
- $S_{Mt} = \text{Max}(S_{Mt}, S_{Mt-1} * (\min(1, \text{Net TP } t / \text{Net TP } t-1)))$ 
  - Net TP = TP for claims outstanding on the relevant business net of retrocession
  - Implications for running off/deleveraging a portfolio



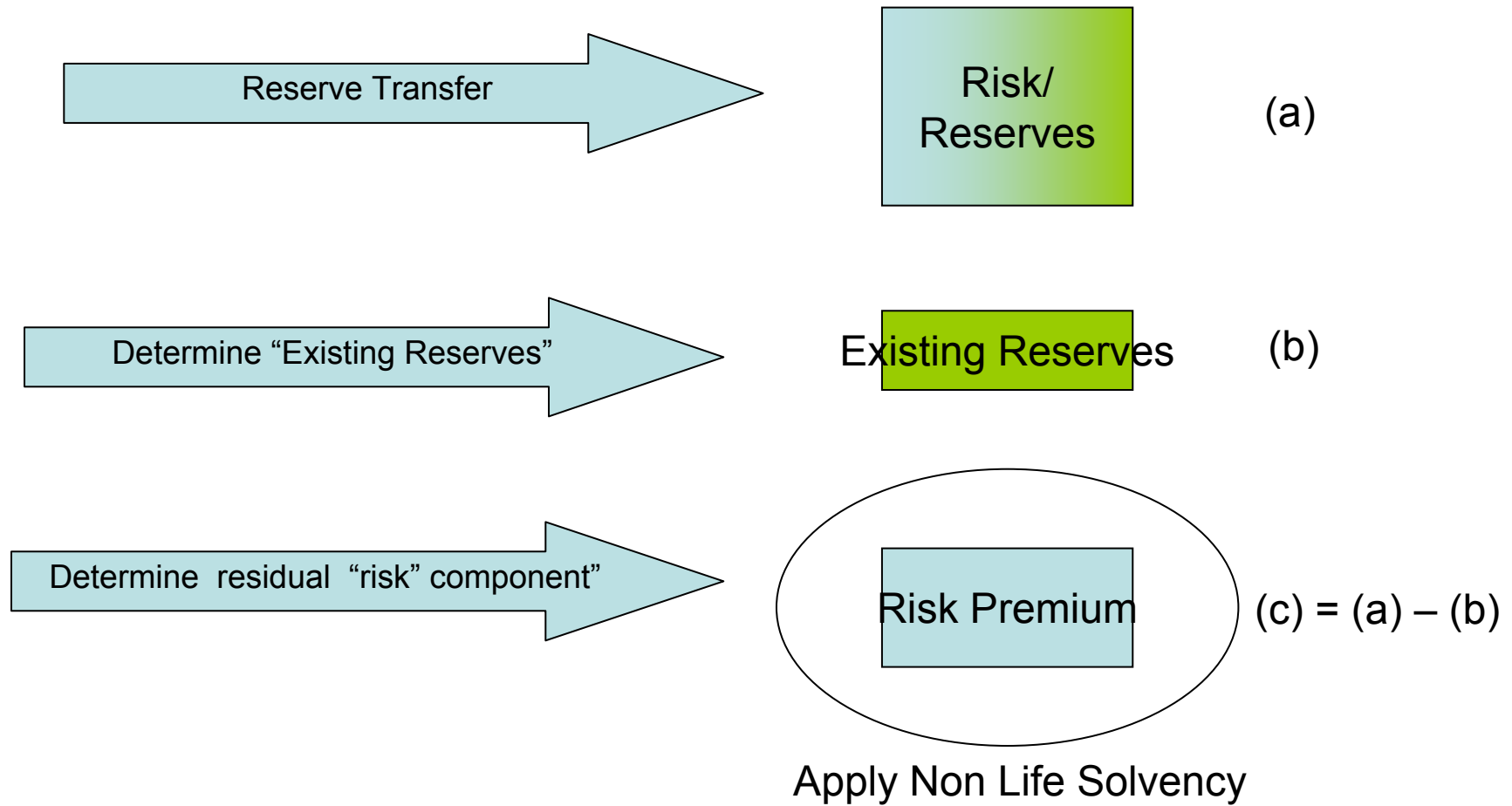
# Mixed Business





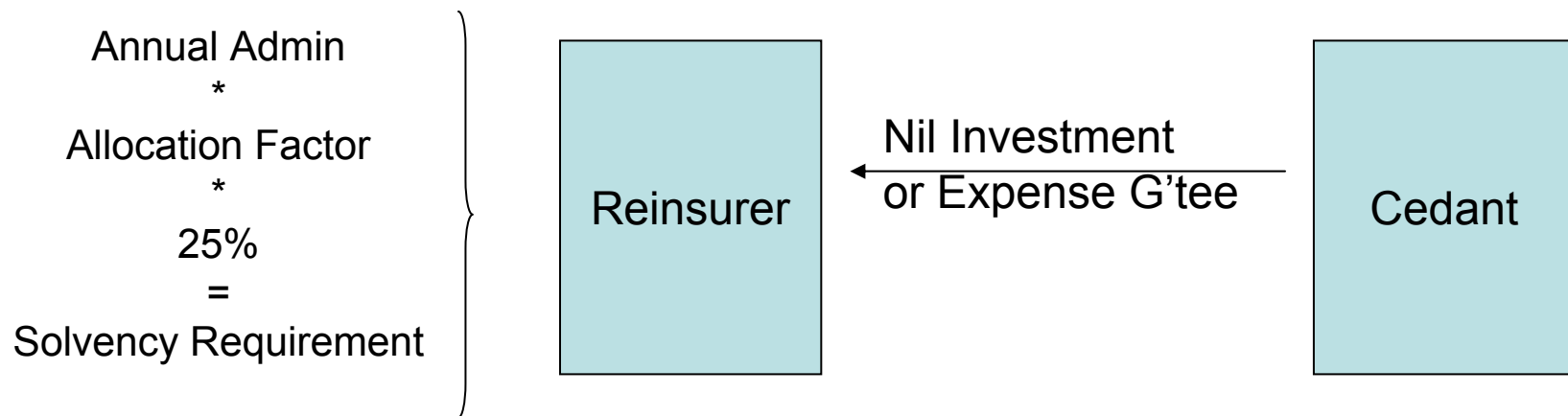
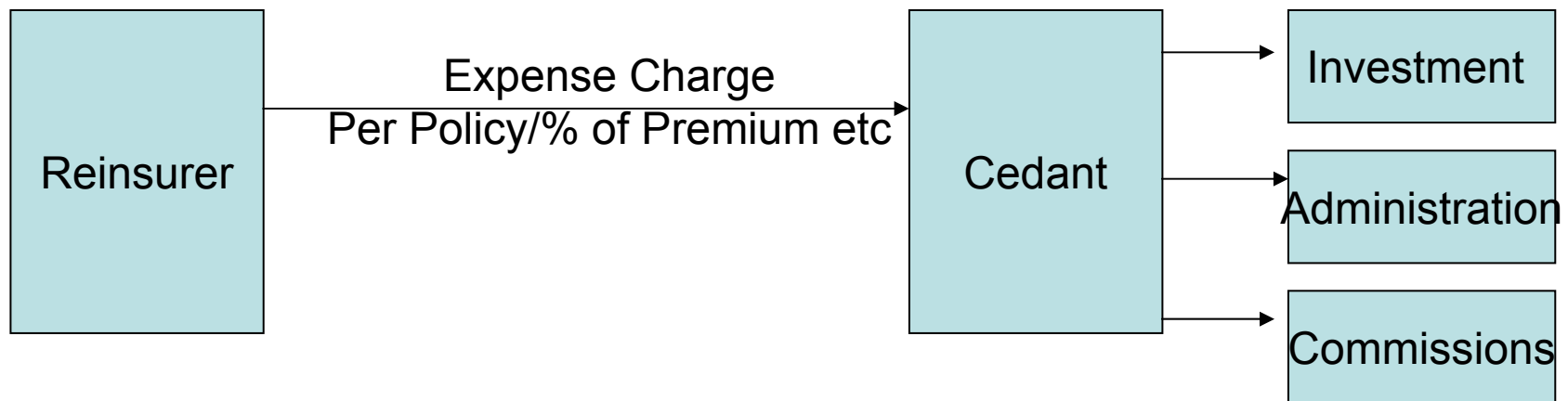


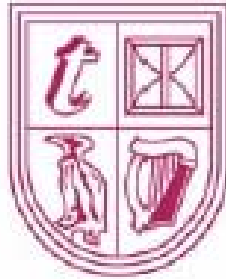
# Reserve Transfers





# Administrative Expenses





# Risk Transfer and Finite Reinsurance

Definitions

Risk Transfer Testing – Non Life

Risk Transfer Testing – Life

Financial V Finite Reinsurance



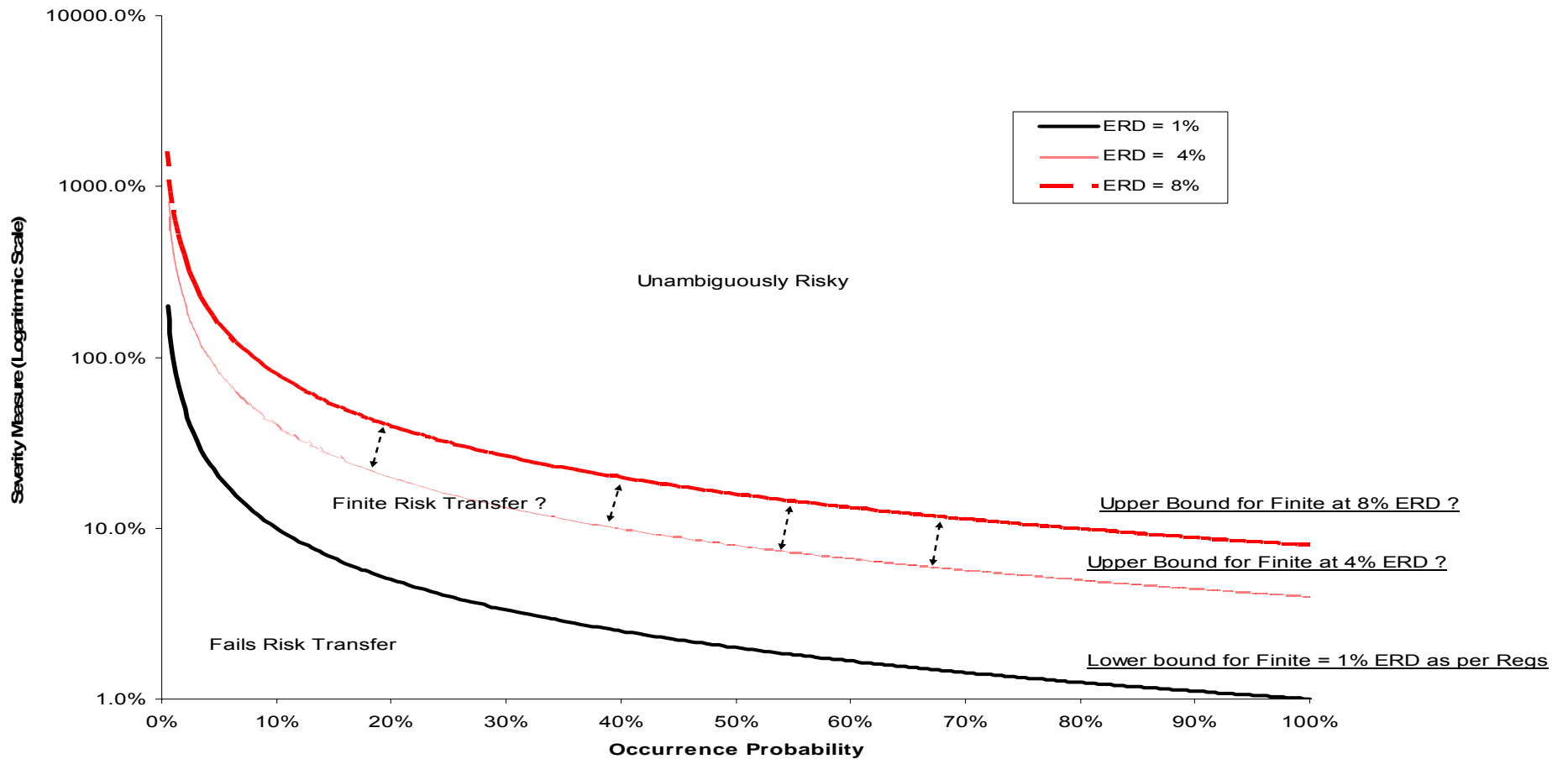
# Definition of Insurance/Reinsurance

- **Statutory/Regulatory Definition**
  - Cession of Risks – no requirement that the reinsurer is exposed to a loss – no risk transfer requirement
  - Finite Reinsurance – does require “significant” but “limited” risk transfer
- **Accounting Definition**
  - Classification and presentation – requirement of “significant” risk transfer
- **Legal Definition**
  - Case law
  - Requirement for indemnification, payment contingent on life, potential for a loss to arise, and the purpose must be to insure



# Risk Transfer Testing ?

$$\text{Expected Reinsurers Deficit} = [\text{Expected Claim} \mid \text{Loss}] * P(\text{Loss})$$





# Risk Transfer - Life

- Safe harbour definitions work (standing in the shoes, self evident risk transfer)
- Accounting Risk Transfer metrics not useful due to
  - lower frequency of life contingencies
  - implicit discounting in the business
  - Asset backed as opposed to liability backed transactions
- Regulatory Proposal for establishing existence of risk transfer
  - NPV Loss : NPV Profit
  - “possible and of commercial substance to the business of the cession undertaking”
  - Unweighted => No probability Assessments
  - Consistent with BaFin
- Calibration for distinguishing business ?
  - Lower Boundary and Upper Boundary ?
  - Upside V Downside range 1:2 ? 1:5 ? 1:10?



# Additional Guidance

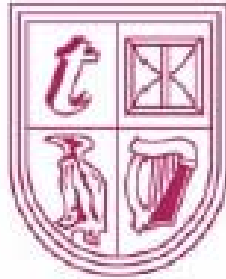
- IAIS Paper on Risk Transfer
- Structures
  - Risk Mitigants
  - Profit Sharing
  - If it looks like a duck and quacks like a duck its probably a duck
- No identifiable distinction between Finite and Financial for Life ?
- Implications – None save for the MGF requirement



# Life Risk Transfer – Pop Quiz

<b>Structure</b>	<b>Traditional</b>	<b>Finite</b>	<b>Financial</b>
Risk Premium/YRT			
Original Terms Financing			
Deficit Account Financing			
Reserve Relief			
Multi Year capped quota share with commission slide			
GMDB Riders			
GMAB Riders			
Longevity SWAP			





## Session 2

# Regulatory Returns and Actuarial Guidance

Presentation to Society of Actuaries in Ireland  
29 November 2007

Brian Morrissey



# Agenda

- Format of Regulatory Returns
- Actuarial Guidance for the Signing Actuary



# Agenda

- Format of Regulatory Returns
  - What is required to be submitted?
  - What this actually means?
  - Forms to be submitted
  - Some issues from the Compliance Process



# What is required to be submitted? Life Reinsurance

- Forms entitled “Annual Return for Life Reinsurance Undertakings”
- Most recently audited financial statements
- SAO prepared and signed by an actuary with a current practicing certificate.
- Management Report outlining:
  - Methodology, process used and derivation of key assumptions
  - Breakdown of the assets covering technical provisions by asset class
  - A quantitative impact assessment of the retrocession program on the technical provisions and solvency margin
  - Results of any stress tests carried out
  - Copy of actuarial and any other relevant professional advice taken in the course of preparing the submission
- Details of the strategic solvency target established by the Board
- Changes to retrocession strategy



# What is required to be submitted? Financial Reinsurance

- Augmented Solvency Models Calculations
  - Methodology and assumptions used
  - Disclosures relating to Credit risks and Liquidity risks
- Detailed breakdown of the financial reinsurance business by:
  - Geographical spread of business
  - Type of financial reinsurance contract
  - Underlying class of business
- Any other material information (for example, actuarial and other relevant reports)



# What is required to be submitted? Finite Reinsurance

- Augmented Solvency Model calculations:
  - Methodology and assumptions used
  - Disclosures
    - Credit, Liquidity, Treaty, Concentration and Operational Risks
  - Internal model disclosure if followed
- Copies of policy and procedures relating to classification of finite reinsurance contracts and contract documentation



# What is required to be submitted? Composite Reinsurance

- Must consider all the life issues plus address all the non-life requirements
- Additional non-life points to consider:
  - Use of Discounting: IFR must issue a letter of no objection, on application by undertaking, to permit explicit discounting or deductions subject to certain conditions being satisfied.
  - Equalisation Reserves on credit reinsurance: a reserve to offset any technical deficit or above average claims-ratio arising during a financial year
    - A letter of no objection is required from the IFR, subject to information requirements such as method used and support for this decision.



## What this actually means?

- Effectively reproduce Compliance Submission (for Sept 2007) with:
  - Statement of Actuarial Opinion
  - Updated Regulatory Forms (2007 information)
- Original 4 month deadline likely to be pushed out to 6 months
- Return certified by Directors





# Management Report

- Actuarial report supporting the SAO should form a subset of the Management Report
- Actuarial Report should cover:
  - Methodology and assumptions
  - A quantitative impact assessment of the retrocession program on the technical provisions and solvency margin
  - Results of stress tests carried out
- Additionally, management report comment on asset issues, financial/ finite disclosures and any other relevant aspects



# Life Reinsurance – Forms

- Form LR1: Underwriting Revenue Account Form
- Form R10: Balance Sheet Form
- Form R10a: Aged Debtor Analysis
- Form R11: Profit and Loss Account
- Form R11a: Cash Flow Analysis
- Form LR30: Solvency Margin Calculations (Life and total business)



# Composite Reinsurance – Forms

- Separate life/ non-life forms to be filled out for:
  - Form LR1: Underwriting Revenue Account Form
  - Form LR30: Solvency Margin Calculation
- Combined Forms to be filled out for:
  - Form R10: Balance Sheet Form
  - Form R10a: Aged Debtor Analysis
  - Form R11: Profit and Loss Account
  - Form R11a: Cash Flow Analysis



# Comments on transition process/ issues

- Feedback from IFR – in progress
- Funds withheld - Trusts/ right of offset
  - Getting legal opinions
- Sorting out the history of intercompany transactions
- Recoverability of DAC when covering more than technical provisions and solvency margin
- Prudent person approach to asset “haircuts”
- Augmented Solvency Model
  - Accessing necessary information from cedants
- Foreign exchange effects
- Many more....



# Agenda

- Actuarial Guidance
  - Statement of Actuarial Opinion
  - ASP LA-11 Statements of Actuarial Opinion on Life Reinsurance Business
  - ASP LA-12 Life Reinsurance Business: Actuarial Reports



# Statement of Actuarial Opinion

- Statement of Actuarial Opinion required for 2007 year ends:
  - Similar to existing requirements for non life insurance entities
  - Minimum competency requirements from Society for competencies of the Signing Actuary
- Actuarial sign off required in relation to:
  - Technical Provisions, net and gross of retrocession, incl credit for DAC
  - Solvency Margin
  - Opinion:
    - Reserves comply with Irish legislation and other relevant regulatory requirements
    - Solvency margin calculated based on applicable data in Returns and in accordance with Irish legislation and other relevant regulatory requirements
  - Consideration of the retrocession program
- Preparation of an actuarial report to accompany the SAO
- Data Accuracy Statement provided by the Company



# 1 - General

- Practising Certificate
- PCS
  - Sufficient knowledge & experience
  - Conflicts of interest
  - Override responsibilities as employee or consultant
- Report within 2 months of SAO



## 2 & 3 - Nature of:

- SAO
  - Scope
  - Qualification thereof
  - Modification thereof (to suit particular circumstances)
  - Allowance for retrocession bad debts not required
  - Volatility/Shape concerns may require specific comment
- Relationships with
  - Auditor (no reliance without specific agreement)
  - Own firm (PCS override)
  - Company's management, staff and work products (access)
  - Board (no formal communication required)
  - Reliance on others work (division of responsibilities must be clear or disclosed)
  - If Composite, Non-life Signing Actuary (appropriate liaison)





## 4.1 Data & Information: two sets

1. Data used for
  - the determination by the Signing Actuary of the Company's technical reserves and
  - the confirmation by the Signing Actuary of the calculation of the SMSM calculation
  
2. Summary financial information extracted from the statutory returns or published financial statements
  - must be verified



## 4.2 to 4.13 - Data: Considerations

- **Musts:**
  - Understand definition, accuracy, completeness & consistency
  - Consider nature of data risks and alternative sources
  - Obtain up-to-date Data Accuracy Statement (DAS)
  - Discuss material discrepancies and anomalies with the company
  - Understand effect on data of actual/anticipated recovery failures
  - Consider making allowances for inadequate data
  - **Decline to provide SAO** if appropriate allowances cannot be made
  - Consider amending / re-issuing SAO if “draft” statutory returns changed
  - Ensure that reserves make appropriate allowance for delays in reporting by ceding companies (S. 5.5.1)
  - **Ascertain material events i.r.o. reserves up to SAO signing date (S. 5.5.3)**
- Other
  - DAS does not remove need to consider if further investigation appropriate
  - Acknowledges imperfections in reinsurance data
  - May carry out some work as at a date prior to SAO date (S. 5.5.2)



## 4.9 to 4.12 - Data qualifications

SAO **must** be amended to comment on:

- Material concerns regarding Data
- Material allowances made for inadequate data
- SAO in relation to draft returns

SAO **may** need to be amended, if necessary, to comment on:

- The use of imperfect **but** appropriate Data



## 5.1.1 to 5.1.3 - Valuation Principles

- Key principles for all subsequent paragraphs in this section:
  - “**must** be satisfied that the reserves held by the company represent a margin over best estimate” (expected value of the liabilities) that is “adequate having regard to his or her own assessment of the [inherent risks]”
  - If relying on Company’s reserving processes, then **must** :
    - review reserving processes.
    - be familiar with systems and controls.
    - be satisfied with application of processes and adequacy of documentation.



## Sections 5.2 to 5.6 - Reserving

- Methodology
  - Mind the language: “use or rely on” ; “in deriving or reviewing”
  - **Must** be relevant to the contract being valued and any non-standard methods to be justified with reference to actuarial principles
  - Negative reserves and DAC are allowed but are subject to recoverability testing. Recognises possibility of total reserves being negative.
- Documentation
  - **Must** consider reviewing contract/treaty documentation, particularly as reinsurance contracts may have unusual features that require interpretation.
  - applies also to outwards reinsurance to ensure that appropriate allowance is taken for benefits arising
  - **Should normally** rely on professional advice relating to contracts that are subject to dispute or in arbitration



## 5.7 to 5.10 - Assumptions

- The direction of the margin adjustment **must** be considered where the reserves are negative.
- Interest rate assumption
  - Company responsible for placing the value on the assets, the Signing Actuary **must** have regard to that value and **must** take account of future reinvestment rates and, in determining an appropriate margin, **should** have regard to the possibility of asset default.
- Claims assumptions
  - consider both the trend development, and the extent to which claims arising from known diseases have been reflected within the current experience.
- Expense assumptions
  - must allow for any contractual obligations imposed on the company and the consequence of those arrangements ceasing, including TPA arrangements and service agreements within the company structure.
  - Particular attention should be paid to market information in determining future expenses in respect of collateral arrangements.
- Lapse assumptions
  - should consider both historic and likely future experience.

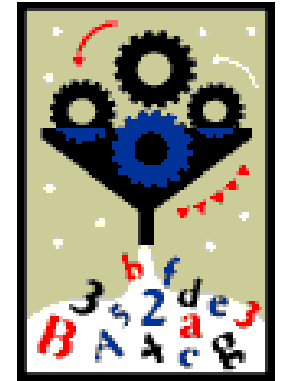


## 5.11 - Options & Guarantees

- “Must make appropriate allowance in reserves” (mind the language)
- Treat past experience with care particularly for
  - Policyholder options
  - “Out of money” options
- Consider cedant actions as well as policyholder actions
  - Cedant is likely to be more financially aware
  - May encourage policyholders to take up options
- **Should normally** use stochastic techniques or justify non stochastic techniques



# Stochastic Model Checklist (5.11.5 to 5.11.10)



- ✓ **Must** calibrate to market prices or nearest alternative
- ✓ Historical data used with care, in particular when considering correlations in stressed conditions
- ✓ If “Out of the money” then **must** ensure sufficient adverse scenarios, stress test
- ✓ **Must** allow for likely policyholder/cedant choices in each scenario
- ✓ **Must** ensure degree of prudence appropriate to data





## 6 - DAC

- 5 Principles in Transitional Requirements for Life Reinsurance
  - recoverability from future margins in the portfolio
  - must take into account the nature and timing of the margins
  - basis and methodology consistent with that used to calculate related reserves
  - must be regularly reviewed
  - when using DAC asset for purposes other than to cover liabilities on the portfolio to which it relates must ensure that the DAC asset is recoverable in all reasonably foreseeable circumstances, emphasis on discontinuance risk
- Further guidance in ASP LA-11
  - Avoid double-counting of margins
  - Grouping of Contracts: sufficient homogeneity? Currency, territory and contract terms
  - Potential effects of recapture provisions



## 7 – Solvency Margin

- Board responsible for classifying business in accordance with regulatory requirements
- **Must** be familiar with classifications
- The Actuary **must** ensure that the SMSM for each class of business is calculated in accordance with
  - Article 28 of Life Directive or
  - Schedule 1 of the Reinsurance Regulations (non-life rules for protection business) or
  - Augmented Solvency Model for Finite Reinsurance (yet to be introduced)
- If the SMSM is reduced for Retrocession, the Actuary must review retrocession program and consider that credit is appropriate.



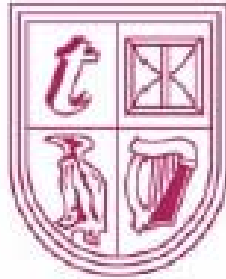
## 8 - Reports

- Comply with ASP LA-12 Actuarial Reports
  - Consistent with approach for General Insurance and Non-Life Reinsurance
  - Not such requirement for Life and Pension
- Report should be appropriate so readers able to understand basic assumptions, conclusions and recommendations
- Relevant data summaries and references should be included
  - Up to the Signing Actuary to decide in each circumstance
- Set out broad reasons for movement in net and gross of retrocession reserves (including DAC)
- Highlight areas where judgments made not supported by historic experience



# ASP LA 12: Actuarial Reports

- Best practice for formal reports
- Applies to life reinsurers only (not life insurers writing some reinsurance)
- Must consider whether work requires a formal report (proportionality etc.)
- Consistent style and content for actuarial reports
- Purpose/ scope defined clearly
- Specific areas that the report should make reference to:
  - Comment on data and in particular shortcomings (typically key aspect for life reinsurers)
  - Analysis required
    - variation/ change to key elements in the period
  - Comment on key methodology and assumptions
  - Results
    - Include interpretation of point estimates
    - Compliance with legislation etc
  - Comment on uncertainty



## Session 3

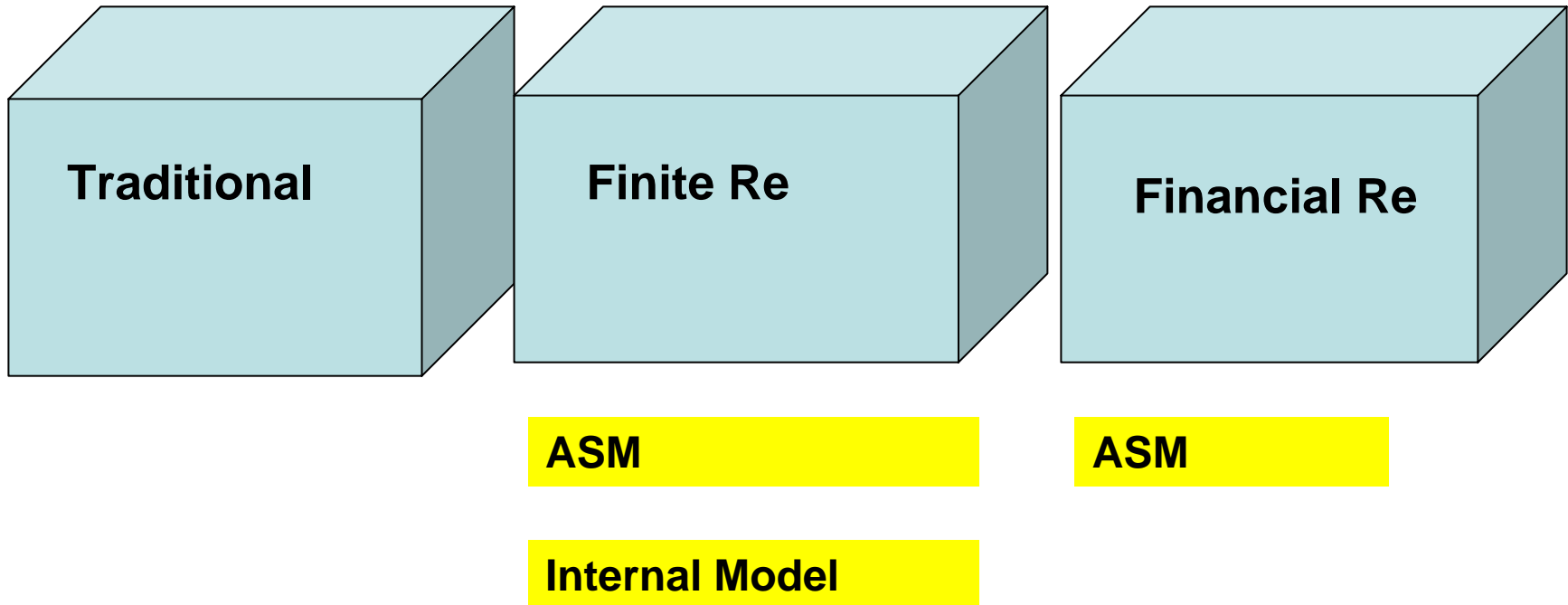
# Classification Systems and Internal Models

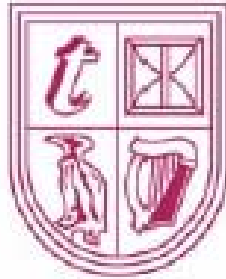
Presentation to Society of Actuaries in Ireland  
29 November 2007

Colin Murray



# Classification





# Augmented Solvency Models

Finite Reinsurance



# What are they?

- Series of stress tests to assets and liabilities of reinsurer
- Currently applicable to finite reinsurers and financial reinsurers
- Used to calculate solvency margin
- $S_x = \text{Max} (S_{\text{pre}} - S_{\text{post}}, 0)$  for each stress test
- Aggregated by the square root of sum of squares using correlations





# Stress Tests

- Assets
  - 40% fall in equities
  - 30% fall in property
  - +/- 150bps gilts
  - Rise in credit spreads
- Mortality risks
  - 30% increase in mortality rates (next year)
  - 2.5% p.a. improvement
  - Increase in 10% in reserving basis
  - 2 per mille shock



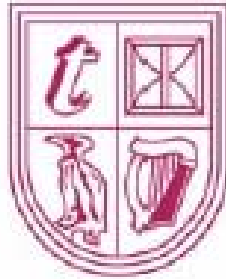
# Stress Tests

- Morbidity
  - 60% increase in males
  - 30% increase in females
- Lapses
  - 80% increase OR
  - 50% decrease
- Whichever is greater

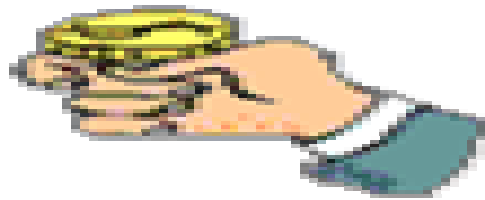


# Correlations

	Gilt	AAA	AA	A	BBB	Eq	Prop
Gilt	1						
AAA	0.3	1					
AA	0.2	0.6	1				
A	-0.1	0.4	0.6	1			
BBB	-0.3	0.1	0.4	0.7	1		
Eq	-0.1	-0.1	-0.1	-0.3	-0.5	1	
Prop	0.3	0.1	0.1	0.0	-0.2	0.1	1



# Internal Models





# Agenda

- What are they?
- Role played
- Benchmarking
- Practicalities
- Conclusion



# What are they?

- A tool for
  - Identification
  - Measurement
  - Modelling
- Of key risk components
- Used for solvency, economic capital, IFRS, business decisions etc.





# What are they?

- Desirable features
  - Modelling all risks including correlations
  - Allowing for risk mitigation
  - Allow for management/policyholder/cedant behaviour
  - Calculation of desired capital requirements (Var, TVar, confidence, time horizons)
  - Transparent, auditable and easily communicated
  - Integrated into the business!



# Why bother?

- External simplified models based on “one size fits all”
- Model more accurately
  - Non linearity
  - Risk mitigation
  - Operational risk
- Better decision making
- Partial/Full
- Capital efficiencies





# Benchmarking

- Use Test
  - Used for risk management decisions
  - Analysis of surplus
- Calibration Test
  - Calibrated using risk measure and calibration level defined by Regulator
  - Backtesting
  - Documentation
  - Sensitivity tests
- Statistical Test
  - Demonstrated that the model based on relevant data
  - Justify assumptions





# IAIS 10 Commandments

- Strategic and operational tool integrated into business
- Calibrated to mean operational and business goals
- Supervisor establish clear criteria
- Adopt modelling approaches appropriate to nature scale and complexity of business
- Regular validation and statistical quality tests
- Calibration testing
- Control with Board who should have sufficient understanding
- Supervisory approval “use”, “calibration” and “stat quality test”
- Supervisor access to appropriate skills
- Documentation for supervisor and public disclosure





# Holy Grail

**Link to Management  
Remuneration**





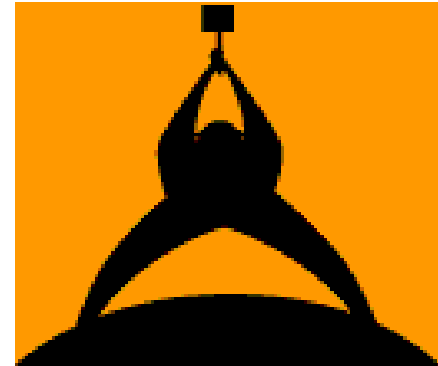
# Practicalities

- What on earth does all this mean?
- Means
  - Not easy
  - More difficult if no “culture” of economic modelling
  - Regulators won't be satisfied easily



# Practical Steps

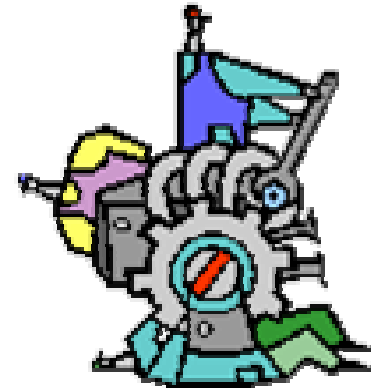
- Model Development
  - Specification of objectives
  - Identification of relevant model
  - Data collection
  - Model testing and selection
  - Documentation of model
  - Testing against internal guidelines
  - Testing against external guidelines





# Initial validation

- Qualitative analysis of
  - Transparency
  - Plausibility of outcomes
  - Reality of assumptions used
  - Modelling “shocks”
- Quantitative analysis of
  - Statistical analysis
  - Benchmarking against others
  - Integrity of data set
- Gap analysis
- Reporting outcome of validation





# Model approval

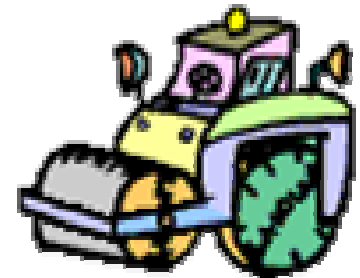
- Objective
  - Design fits risks of business
  - Model “does what it says on the tin”
  - Meets regulatory requirements
- Approved by
  - Business units
  - Risk management functions
  - Board of Directors





# Model Roll Out

- Define uses
- Organise data management
- Designing supporting IT systems
- Organising risk management process
- Training end users

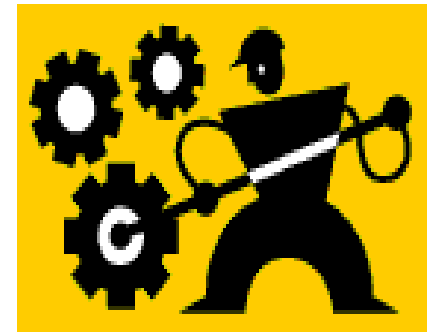






# Model maintenance

- Monitored by independent parties (internal audit)
- Monitor model performance
  - Analysis of outcomes across regions, portfolios etc.
  - Analysis of forecasts with outcomes
  - Analysis of overrides and appeals
  - Identification of segments giving poor results
  - New products and risks
  - Data availability
  - Degree to which model is being used or not used!





# Ongoing validation

- Independent
- Assess developments
- Benchmarking
- Analysis of outcomes (e.g. backtesting)
- Quantitative and qualitative elements



# Others

- Segregation
- Involvement of senior management
- Role of internal audit
- Role of external model validation



# Problems

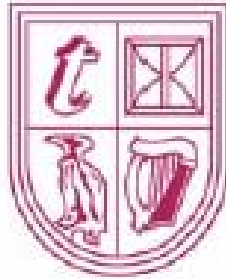
- Use test
  - Very regular runs – time/expense
  - Management buy in
  - Skills available
  - Consistent methodology business units
- Calibration
  - Judgement required
  - Lack of data
  - 99.5<sup>th</sup> percentile
- Statistical quality
  - Reliable data available
  - Correlations
  - Policyholder behaviour





# Future Issues

- “Herding” of models
- How much will supervisors accept?
- Will we ever get to full rather than partial?
- Increased volatility through use?
- Market consistent/real world?
- Conditional/non conditional models?
- Belief in the model?



## Session 4

# Actuarial Certification

Presentation to Society of Actuaries in Ireland  
29 November 2007

Stephen Devine



# Signing Actuary

- An appointment pursuant to a regulatory requirement
- That requires holding of a certificate
- PC Committee may decline if applicant:
  - not an appropriate person for appointment as a designated actuary (with grounds for inappropriateness listed), and/or
  - fails to meet prescribed criteria (next slides)
    - CPD
    - practical experience
    - prescribed course(s)
- Right of Appeal



# CPD Criteria

- Category 1 under ASP PA-1
- Twelve month period to the previous 30 June
- At least 15 hours of ‘verifiable activities’ (defined in ASP PA-1, but does not include informal discussions)
  - 5 of which must be substantively external
  - 10 of which must be relevant to role
  - 3 of which must be Irish relevant
  - 4 distinct entries, 2 in relation to technical skills
  - 2 of which must be outside specialism (may include professionalism and non-actuarial technical)





# Appropriate Practical Experience

- Subject always to overriding requirements of PCS
  - with particular attention to paragraph 3.2
- Fellow for 5 years or 8 years practical experience
- Recent appropriate practical experience including reserving experience:
  - can be business written in other jurisdictions
  - BUT appropriate knowledge of the Irish regulatory framework applicable to reserving for life reinsurance business
- Equiv of 3 years FT experience as Fellow in last 6 years carrying out appropriate work relating to life (re)insurance business at a senior level
- Unrestricted certificate - experience of reserving of wide range of life insurance risks and life reinsurance structures



# Application for Practising Cert'

- Application Form
  - List main elements of regulatory framework
- Certificate Type
  - Unrestricted
  - Company specific
  - Specified Class(es) of Business
- Update on-line CPD records!
- Two references (1 external, unless exception granted)
- Timeline