The Actuarial Profession
making financial sense of the future

General Insurance Reserving Seminar
Kendra Felisky & Jerome Kirk

Reserving for Solvency II

The Practical Aspects

June 2010

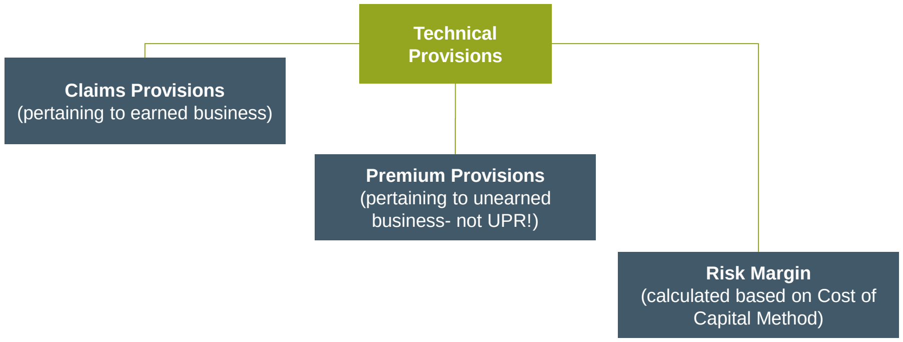
Solvency II and Technical Provisions
Why does it matter?

> Article 77 – “The value of the technical provisions shall be equal to the sum of a best estimate and a risk margin...The best estimate shall correspond to the probability-weighted average of future cash-flows, taking into account the time value of money...”

The Issue

- Reserving will change, in parts dramatically, under Solvency II
- No margins for prudence allowed
- This will affect calculations as well as how you need to think about your business
- And then there’s the risk margin...

What will "Reserving" look like under Solvency II?



Technical Provisions

Claims Provisions
(pertaining to earned business)

Premium Provisions
(pertaining to unearned business- not UPR!)

Risk Margin
(calculated based on Cost of Capital Method)

The starting point continues to be the actuarial estimate – probably with more accommodation for uncertainty including, but not limited to, 'binary events'

GI ROC Working Party
Reserving under Solvency II

Working party has a wide remit looking at practical implications of:

Risk Margins

Cashflows

Reinsurance

Process

Data

Provisions

TP governance

Reporting

Uncertainty

Validation

Communication

Expenses

Segmentation

Don’t just think about the numbers

Qualitative elements are required e.g.

- Governance
- Actuarial Function
- Communications

Quantitative elements are needed soon e.g.

- QIS5
- Lloyd’s dry run

Delivery in Q4 but work needs to start now

- Do not underestimate the scale of changes required

Contents

Cannot cover everything of working party in 60 minutes. Today we will focus on the following elements:

1. Provisions – incl. segmentation and unincepted business
2. Cashflows
3. Uncertainty – incl. binary events
4. Risk Margins
5. Reinsurance

Additional slides from W/P included in Appendix A for reference

Provisions
Introduction

Topics to cover:

- Claims Provisions
- Premium Provisions
- Unincepted Business
- Segmentation

Valuation – Claims Provisions

Deterministic Models	Expenses	Reinsurance
• Can still be used – but for how long? • Ref. CEIOPS DOC 21/09 (former CP26) • Use stochastic models for checking?	• Should be included • Both allocated and unallocated claims management expenses (ALAE & ULAE) • Going concern basis (unless run-off appropriate)	• Should be gross of reinsurance • Reinsurance provisions calculated separately with allowance for default

Valuation – Premium Provisions

What is included?	What is NOT included?	Future Premium Payments
- Contracts when legal obligation is established, NOT when policy incepts - Cash-flows resulting from future claims events - Cash-flows arising from allocated and unallocated claims management expenses - Cash-flows arising from ongoing administration of the in-force policies	- Load to delay the recognition of profit.	- Future premium payments, on a cash flow basis – reflect all future premium receipts from "existing liabilities" (regardless of the period these relate to and whether incepted or not) - What are these exactly?

These are not Unearned Premiums – see example in Appendix A

Valuation - Premium Provisions:

Recap of a simple cash-flow example (1)

- Assume 1st July 1-year policy with uniform risk
- Payments are paid in the month following the end of the quarter of occurrence
- No discounting / risk margins

- Claim ratio = 72%
- Total Premium = 100, payable by 40 on day 1 and 3 equal payments of 20 in the 1st month of the quarter

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Total
Premiums	(40)	0	0	(20)	0	0	(20)	0	0	(20)	0	0	0	(100)
Paid claims	0	0	0	18	0	0	18	0	0	18	0	0	18	72
Cash-flow	(40)	0	0	(2)	0	0	(2)	0	0	(2)	0	0	18	(28)
Premium Earning	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	0	(100)

Valuation - Premium Provisions:

Recap of a simple cash-flow example (2)

UK GAAP Approach

Assets	**82**	
Cash	42	
Receivables	40	
Liabilities	**68**	
OS claims	18	(on earned)
UPR	50	
Available Profit	**14**	

Solvency II Approach

Assets	**42**
Cash	42
Liabilities	**14**
Claim reserve	18
Premium provision	(4) = (40) + 36
Available Profit	**28**

Cash flows	Past	Future	**Total**
Premiums	(60)	(40)	(100)
Paid claims	18	54	72
Net cash-flow	(42)	14	(28)
Premium earning	(50)	(50)	(100)

Main observations

- Provisions reduce drastically
- All profit taken year 1
- Premium provision is negative
- No concept of non-monetary items

Unincepted Business

What contracts to include?

Extract from DOC 25/09

A reinsurance or insurance contract should be initially recognized by insurance or reinsurance undertakings as an existing contract when the undertaking becomes a party of the contract….. the undertaking becomes a party of the contract when the contract between undertaking and policyholder is legally formalized. In particular, the recognition may take place earlier than the inception of insurance cover, because from an economic point of view the obligation to provide cover already exists and has an economic value before the inception.

Move to a “legal obligations” basis

- big change
- will include 1/1 renewals for a 31/12 valuation
- need to consider notice periods on binders?

Data implications are significant

Future premiums means provisions for these will often be negative

Segmentation

Article 80 - Segmentation

Insurance and reinsurance undertakings shall segment their insurance and reinsurance obligations into homogeneous risk groups, and as a minimum by lines of business, when calculating their technical provisions.

- Level 2 Implementing Measures further introduce "…by currency"
- Emphasis remains on homogeneous risk groups
  - ensures calculations at the "right level"
  - need to consider credibility
- May be similar to current splits of business
- Results can be allocated or aggregated to higher or lower levels as appropriate
- Consider link with internal model classes for risk margin calculation

Cashflows

Introduction

Topics to cover:

- Creating deterministic cashflows
- Data
- Consistency
- Adding in volatility
- Validation
- Approaches for binary events / catastrophes

Cashflows

Creating deterministic cashflows

- Is this the best starting point?
- What if you don't use triangles/chain ladder for reserving?
- Can you just start with triangles?
- Large losses will need separate consideration
- Actuaries should take care to avoid over-smoothing in their analyses

Data

- Is suitable data available?
- What data should we be collecting now?
- Actuaries should consider the level of granularity they require to produce estimates that meet statistical quality standards of SII
- The actuary should be guided by the overriding ‘Use test’ requirements and also proportionality

Cashflows

Consistency

- What methods make it easiest to ensure consistency between point estimates and means of stochastic distributions?
- What are good approaches for capturing the relationship between paid and incurred losses?
- Actuaries will need to consider consistency in a number of different dimensions
- Use of stochastic distributions vs. practicality

Adding in volatility

- What are appropriate, suitable approaches?
- What distributions could be used?
- Consideration of correlations?

Cashflows

Validation

- How do we validate / justify initial approach?
- How do we monitor, validate and apply P&L attribution on an ongoing basis?
- What will be acceptable to the regulator, and how will this line up with model validation?

Approach for binary events / catastrophes

- What is the best approach?
- Should actuaries model date of loss and payment pattern separately?
- Links between gross and reinsurance
- Effect of counterparty default risk

Uncertainty

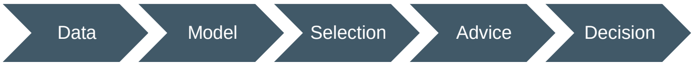
Introduction

Topics to cover:

- Sources
- Binary Events
- Possible methods

Sources of Uncertainty

Uncertainties arise in all stages of the reserving process:



Sources of error:

- Selection – in choice of data
- Specification – in defining model
- Parameterisation – in estimation
- Process – outcome of a random process

Prediction Error = Parameterisation + Process Error

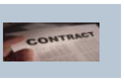
Failure of ”Law of Large Numbers”

- Events – catastrophes

Uncertainty - Considerations

- Binary events (more on later)
- Inflation
- Other changes in demographic, legal, medical, technological, social or economic development
- Uncertainty as to timing included, both in base estimate and cash flows
- Other – already included?
- Documentation of actuarial judgement
- Reinsurance
- Link to Capital Model

Binary Events

What are they?		
Health	Nanotechnology Aspartame Electro magnetic fields GM crops Nuclear waste	DANGER Toxic hazard
Events	Meteor strike Mega Volcanoes	
Social Environmental	Global warming Polluters	
Legislative/ Political	"Step change" in court rulings (e.g. Ogden) "the greater good" e.g. asbestos, US Healthcare	
Other	Contract wording etc	

Why bother?

- Best estimate = Probability weighted average of **all** possible future cash flows

- Current methods probably underestimate a "true" mean
  - Data / parameterisation
  - Unknown unknowns
  - "Margin" used for binary events

- Binary events fill **part of** the gap between the current approach and the requirements

- Premium provisions
- Cat & latent loadings – be consistent with pricing assumptions

- Claims provisions
- Latent loadings

Uncertainty – Binary Events

Process:

- Recognise bias introduced by incomplete information
- Deterministic projection
  - Standard actuarial projection (e.g. chainladder)
  - Make additional allowance for binary events
- Stochastic projection:
  - Discounted cashflows
    - Fixed discount rate / discount rate varies by term
  - Effect of reinsurance recoveries

Uncertainty – Binary Events

Methodology:

- Deterministic projection:
  - Estimate “mean” binary outcome
  - Explicitly adjust claims reserve
- Stochastic projection
  - Select distributions (frequency/severity) for binary loss and model cashflows
  - Model cashflows for standard losses in normal way (e.g. bootstrapping)
  - Combine cashflows from two projections

Uncertainty – Binary Events

Results:

- Deterministic projection:
  - Binary “allowance” can be reduced to simple percentage increase in reserves
- Stochastic projection
  - Required increase in reserve is clouded by effect of discounting / reinsurance
  - Investigations ongoing…

Risk Margins
Introduction

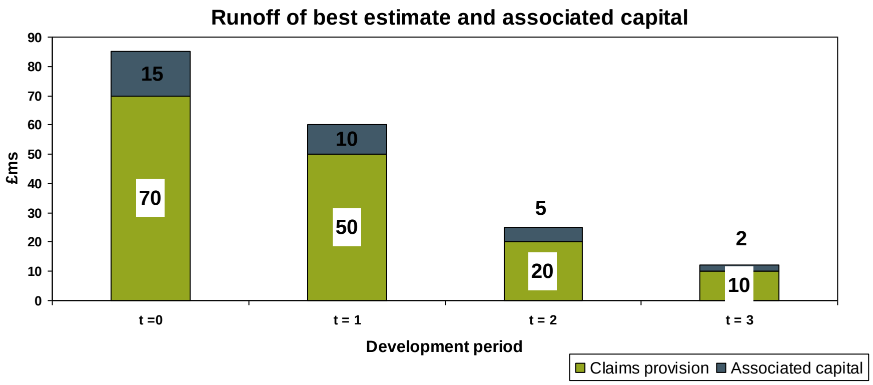
Topics to cover:

- What is a risk margin?
- SCR
- Current market thinking / Issues

Risk Margins
What is a risk margin (RM)?

- Amount required to ensure the value of the technical provisions is increased from the discounted best estimate to an amount equivalent to the theoretical level required to transfer the obligations to another insurance undertaking
- Where the best estimate and risk margins are calculated separately, risk margins should calculated using a cost of capital approach
- This is a new concept compared to current practice and it is envisaged that RM will be calculated to some extent using suitable simplifications
- Should not be calculated separately for premium and claim provisions
- Should be defined net of reinsurance only. For IM can be calc gross and RI separately
- Cost of Capital rate is a ‘long term’ rate above the risk free rate, not adjusted for market cycle – 6% appears the ‘magic number’

Risk margins



Risk margin = NPV (6% * (15 + 10 + 5 + 2))

Risk Margins
SCR

- 99.5% VaR of the ‘basic own funds’ of an (re)insurance undertaking over a 1 year time period
- Cost of capital method requires SCR figure for all periods until liabilities run off
- Calculation for all future time periods needs ‘re-reserving’
- Standard formula (SF) vs internal model (IM)
- Circular calculation of RM, depends on SCR which depends on RM, need to consider simplifications / proxies as a starting point for RM
- Who’s going to calculate SCR for RM?
- Non-life underwriting risk
    - Both reserve and premium (unearned and unincepted)

Risk Margins
Current Market Thinking / Issues

- Choice of methods for calculating the SCRs for risk margin (SF, IM)
- Companies may be analysing classes at a lower level than the SII LOBs
- Simplifications: A range from a complex to the simplest approach have been set out by CEIOPS
- Research papers – (EMB, E&Y, etc.)
- What are other companies doing? Interview Solvency II managers
- Look at the Standard Formula approach spreadsheets from QIS5
  - Expected to allow diversification over LOB
  - But still likely to require allocation back to LOB

Reinsurance
Introduction

Topics to cover:

- When to use net to gross techniques
- Timing of payments
- Impact on bad debt calculations
- Which contracts to include
- Allocation of RI recoveries

Reinsurance

When to use net to gross techniques

When net to gross techniques can be used:

- Net to gross techniques acceptable for most standard approaches (e.g. where triangles are used)
- Choice of netting down factors is subjective based on knowledge of the book and history and should be well within the actuarial function’s current ability range
- Problems may remain of checking on limiting or exhaustion issues
- Must distinguish between lines of business and be applied to claims and premium provisions separately

When net to gross techniques shouldn't be used:

- Exposure analyses
- Complex outwards RI
- When consistency with gross calculation is required
- For a frequency severity model, explicit modelling of reinsurance may be preferable

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Reinsurance

Timing of payments

See DOC 33/09

Where the timing of recoveries and direct payments are sufficiently similar, undertakings shall have the possibility of using the timing of direct payments in cash-flow projections

The following two slides illustrate a simple model to look at interaction between timing of payments and materiality of results.

The following should be noted:

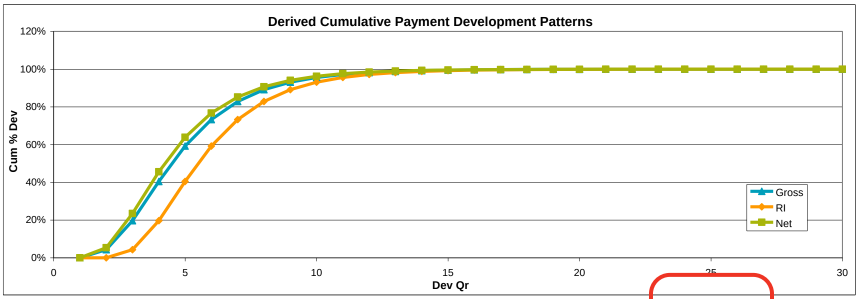
- Model used is for illustrative purposes only
- Model based on log normal gross pattern with
  - a fixed lag
  - a “stretch” on the payment pattern
- Model lets lags / stretch vary to simulate different timings relative to gross
- Model aim is to look at impact on net technical provisions

Reinsurance

Timing of payments

When are simplifications OK:

- Low reinsurance plus not much lag



Gross
Ultimate 1000

RI
Ultimate 200 *Assume constant proportion of Gross*

RI Payment Pattern
(shifted gross)
Shift 1
Scale 100%

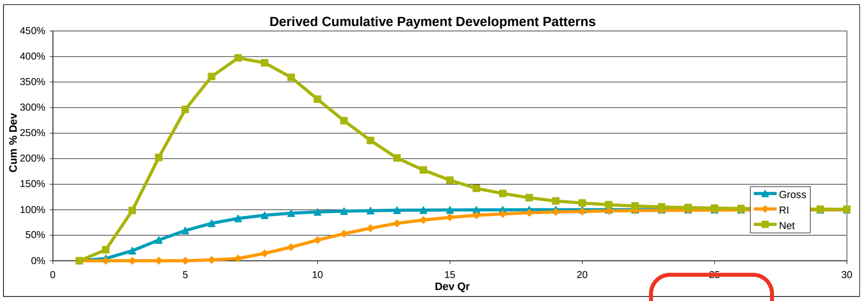
Let these vary stochastically

Reinsurance

Timing of payments

When there is less potential to apply a simple approach:

- High reinsurance plus large lag plus stretch



Gross
Ultimate 1000

RI
Ultimate 800 *Assume constant proportion of Gross*

RI Payment Pattern
(shifted gross)
Shift 4
Scale 150%

Let these vary stochastically

Reinsurance
Impact on bad debt calculations

Objectives:

- Similar approach was undertaken on timings of payments with use of an illustrative model
- Aim is to examine under which circumstances simplifications are “OK”
- OK here is defined as not having a material impact on the results

Approaches considered:

- Simple approach = credit related factors * expected recoveries (current approach)
- Less simple = link recoveries to timing of payments plus size of recoveries
  - May mean a stochastic approach should be taken
  - Link to capital model?

Reinsurance
Which contracts to include

Key Consideration:

- Principle of **correspondence** should underlie the calculations where possible
  - i.e. expected recoveries (and associated RI costs) for existing gross contracts should be included, but not for unincepted contracts
  - This may include assuming future RI purchases as future management actions
  - This is consistent with current approaches
- The following two slides illustrate a simple model to look at interaction between timing of payments and materiality of results.

Reinsurance

Which contracts to include: worked examples

Example 1:

- LOD cover incepting 1 April following a 31/12 valuation
- Net technical provisions could:
  - Exclude the reinsurance cover
  - Include the reinsurance cover in totality (unlikely to be realistic / acceptable)
  - Include the reinsurance cover using correspondence
- Recommended approach is to use correspondence
  - More realistic / accurate
  - Likely to increase technical provisions over those under exclusion

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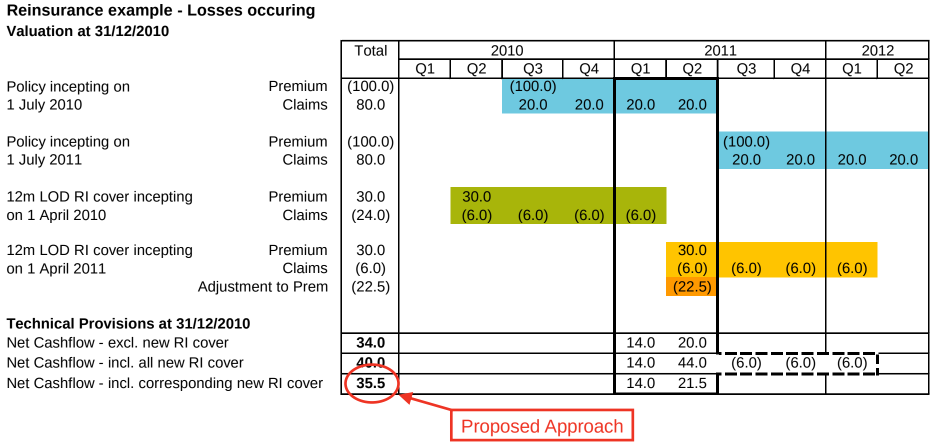
Reinsurance

Which contracts to include: worked examples

Example 1:



Reinsurance example - Losses occuring
Valuation at 31/12/2010

		Total	2010				2011				2012	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Policy incepting on 1 July 2010	Premium	(100.0)			(100.0)							
	Claims	80.0			20.0	20.0	20.0	20.0				
Policy incepting on 1 July 2011	Premium	(100.0)							(100.0)			
	Claims	80.0							20.0	20.0	20.0	20.0
12m LOD RI cover incepting on 1 April 2010	Premium	30.0		30.0								
	Claims	(24.0)		(6.0)	(6.0)	(6.0)	(6.0)					
12m LOD RI cover incepting on 1 April 2011	Premium	30.0						30.0				
	Claims	(6.0)						(6.0)	(6.0)	(6.0)	(6.0)	
	Adjustment to Prem	(22.5)						(22.5)				
Technical Provisions at 31/12/2010												
Net Cashflow - excl. new RI cover		**34.0**					14.0	20.0				
Net Cashflow - incl. all new RI cover		~~**40.0**~~					14.0	44.0	(6.0)	(6.0)	(6.0)	
Net Cashflow - incl. corresponding new RI cover		**35.5**					14.0	21.5				

Proposed Approach

Reinsurance
Which contracts to include: worked examples

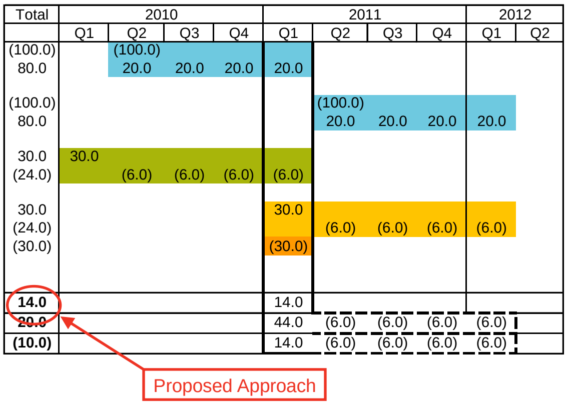
Example 2:

- 12 month RAD cover that will incept on 1 Jan following a 31/12 valuation but is “legally binding”
- Net technical provisions could:
  - Exclude recoveries in respect of future inwards policies and adjust RI premiums for correspondence
  - Include the RI recoveries and premiums in full (unrealistic)
  - Include the RI recoveries and adjust RI premiums
- Recommended approach is to exclude recoveries and adjust RI premiums
  - More realistic

Reinsurance
Which contracts to include: worked examples

Example 2:

Reinsurance example - Risks attaching
Valuation at 31/12/2010



		Total	2010				2011				2012	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Policy incepting on 1 April 2010	Premium	(100.0)		(100.0)								
	Claims	80.0		20.0	20.0	20.0	20.0					
Policy incepting on 1 April 2011	Premium	(100.0)						(100.0)				
	Claims	80.0						20.0	20.0	20.0	20.0	
12m RAD RI cover incepting on 1 Jan 2010	Premium	30.0	30.0									
	Claims	(24.0)		(6.0)	(6.0)	(6.0)	(6.0)					
12m RAD RI cover incepting on 1 Jan 2011	Premium	30.0					30.0					
	Claims	(24.0)						(6.0)	(6.0)	(6.0)	(6.0)	
	Adjustment to Premium	(30.0)					(30.0)					
Technical Provisions at 31/12/2010												
Excl. recoveries from future inwards policies (prem adjusted)		**14.0**					14.0					
Incl. recoveries from future inwards policies		**20.0**					44.0	(6.0)	(6.0)	(6.0)	(6.0)	
Incl. recoveries from future inwards policies (prem adjusted)		**(10.0)**					14.0	(6.0)	(6.0)	(6.0)	(6.0)	

Proposed Approach

Reinsurance

Allocation of RI recoveries

- Description of when RI recoveries may need to be allocated to lower levels (e.g. when calculated a whole account stop loss)
- Simple approach probably OK in most circumstances
- “Simple” means allocation based on an easy metric such as premium, incurred or reserves
- More complex methods may give indication of results by class
- Not expected to be controversial
- Consistency between premiums and claims is required

Don’t Forget the Others

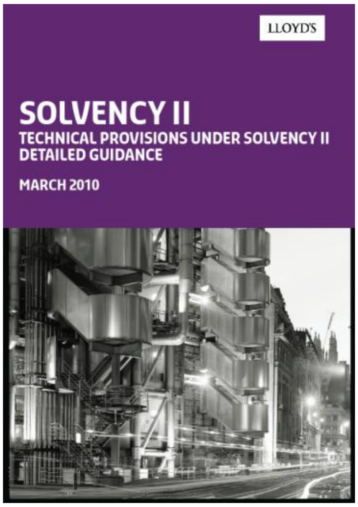
Items not covered today

All the following are important and should be considered:

- Reporting
- Expenses
- Communication
- Data
- Actuarial Function
- Validation

Next Steps

- Read QIS5 Specification
- Read Appendix A
- Look for GI ROC Working Party updates e.g. seminars / GIRO
- Consider reading Lloyd's guidance



LLOYD'S

SOLVENCY II

TECHNICAL PROVISIONS UNDER SOLVENCY II
DETAILED GUIDANCE

MARCH 2010

Conclusions

- Technical Provisions are changing significantly
  - Both quantitative and qualitative elements
  - Don't underestimate the work involved
- Dry run / QIS5 are fast approaching
  - Read the guidance & plan your work now
  - Remember it is an evolving area so be flexible
- Look out for updates from the WP whenever you can
  - There's more to come
  - And if you have ideas or comments then let us know

Top 10 - YOU will be doing differently

10. Reporting and professional standards
9. Increased frequency of calculation
8. Linking pricing, reserving & capital
7. Actuarial function
6. Processes
5. Methodology
4. Documentation
3. Reinsurance
2. Uncertainty/Latent claims
1. Payment patterns / Cashflows

Questions or comments?

Appendix A

Working Party slides not covered in today's presentation

Reporting

Introduction

Topics to cover:

- Key aspects of the directive
- Form of disclosure
- Confidentiality
- What will need to be disclosed
- Next steps

Reporting
Key aspects of the directive

According to Article 35, reporting will need to take place at:

- predefined periods
- predefined events

Article 51.1.d requires:

- "A description, separately for assets, technical provisions, and other liabilities, of the bases and methods used for their valuation, together with an explanation of any major differences in the bases and methods used for their valuation in financial statements"

Reporting
Issues to consider

Issues to consider:

- Form of disclosure
- Confidentiality
- What will need to be disclosed

Reporting
Next Steps

Determine fundamental principles of guidance

- High-level principles

Suggest Profession's involvement

- Ongoing development of professional guidance
- Consultations/seminars as a forum for discussion in the run-up to Solvency II

Communications
Introduction

Topics to cover:

- Communication plan
- Understanding stakeholders
- Next steps

Communications
Communication plan

Stage 1: high level communication

- This should start now
- General education of key changes to the TP under SII
- Consider the most effective methods of communication to get message across clearly
- Stakeholders - who needs to know?
- Highlight how it impacts them

Stage 2: general principles

- More detailed description of suggested approaches to take
- Highlight pitfalls, issues, things to consider
- Tailor for main stakeholders/situations
- Consider wider audience (not in detail)
- Simple worked examples of key common concepts that can be used as additional tools for communication (depending on outputs of other workstreams)

Communications
Communication plan

Scope - Areas to communicate:

- Change to overall approach
  - role to educate wider group of stakeholders
- Unwinding of discount
- Earnings patterns
- Uncertainty
- Cashflows
- Risk margin
- Data requirements

Communications
Understanding stakeholders

Scope - Areas to communicate:

- Who do we need to communicate to?
- What information is needed for each?
- What are the key issues for them?
- What decisions will they make as a result?
- Any impact from introduction of Actuarial function?

Communications
Next steps

References to consider:

- Lloyd’s guidance on technical provisions under SII
- TAS-R, TAS-M, TAS-I

Next Steps:

- Stage 1: write up section on general education
- Stage 2: following outputs from other subgroups
- Write more detailed guidance
- Consider possible worked examples