Best Estimate of the Technical Provisions

FSI Regional Seminar for Supervisors in Africa on Risk Based Supervision

Mombasa, Kenya, 14 - 17 September 2010

Leigh McMahon BA FIAA GAICD
Senior Manager, Diversified Institutions Division,
Australian Prudential Regulation Authority

Overview

- Nature of Technical provisions

- Methods of estimation

- Margins

- Role of Actuary

- Assets - investments and reinsurance recoveries

Simplified Balance sheet

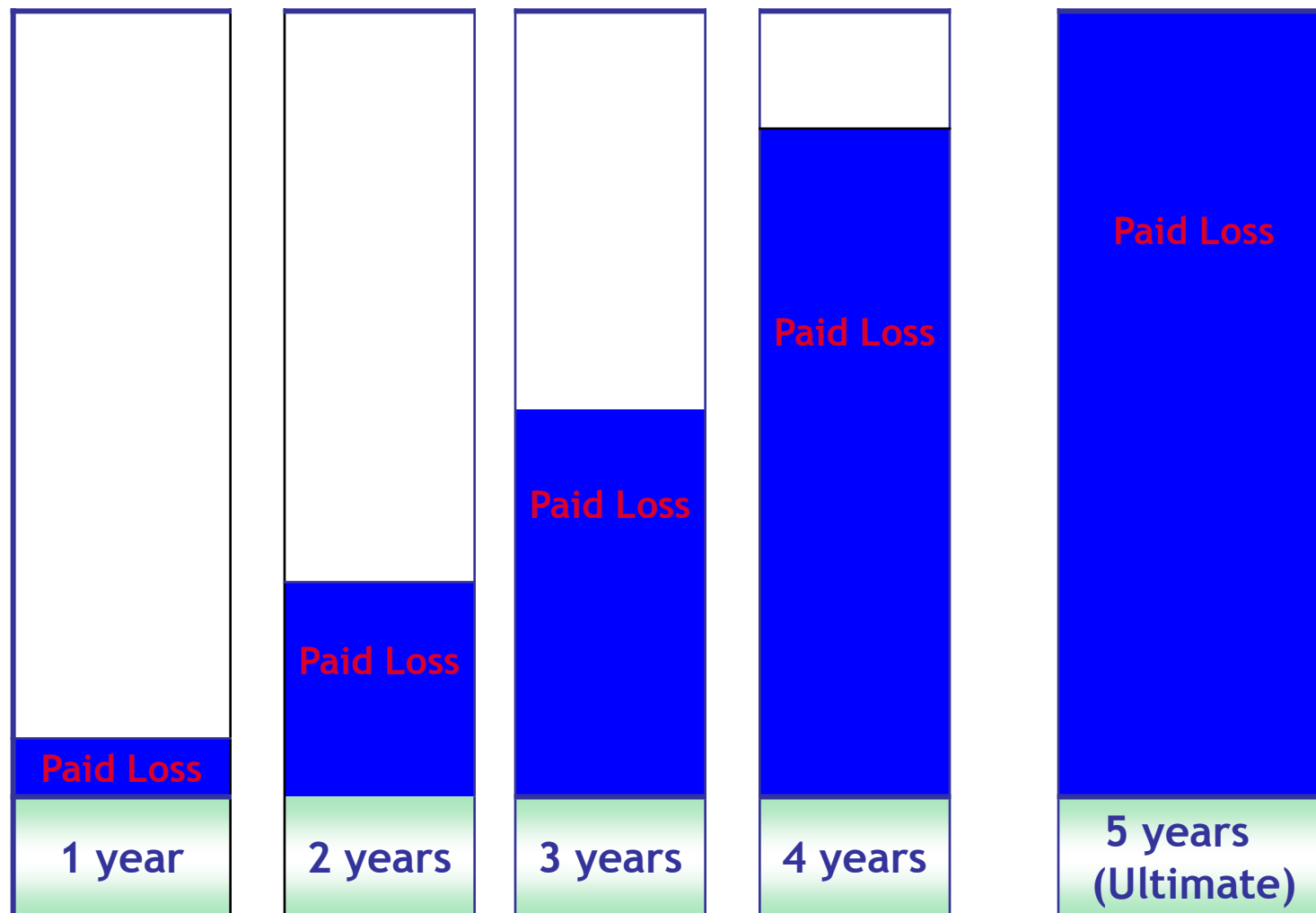| Assets	Liabilities
Investments	Technical provisions
Cash at Bank	
Premiums due	Reinsurance premiums due
Reinsurance recoveries	
Non reinsurance recoveries	Tax provision
Other assets	Other liabilities
Intangibles	Other debt and loan capital
	Capital & Retained Earnings

Simplified Balance sheet – all direct insurers

Assets		Liabilities	
Investments	57,137	Technical provisions	50,655
Cash at Bank	1,718		
Premiums due	7,493	Reinsurance premiums due	2,025
Reinsurance recoveries	11,165		
Non reinsurance recoveries	4,607	Tax provision	791
Other assets	4,181	Other liabilities	3,591
Intangibles	816	Other debt and loan capital	3,226
		Capital & Retained Earnings	26,898

Definition of technical provisions

- *Technical provisions represent the amount that an insurer requires to fulfil its insurance obligations and settle all expected commitments to policyholders and other beneficiaries arising over the lifetime of the insurer's portfolio of insurance contracts.*

Source : Summary of **IAIS** positions on the **valuation** of **technical provisions**, October 2007

Development of losses

A starting point

- Within a prudent insurer, management would record details of
  - Amount paid on each claim , both total paid and the history of payments
  - Amount and date of the case reserve or case estimate, being the difference between payments made and the estimated ultimate or final loss for each claim either
    - an estimate based of the judgement of an experienced person within the insurer , typically for medium and large claims,
    - an average claim amount, typically for smaller claims or as an initial amount until the claim is reviewed
- These case estimates or incurred loss (i.e. paid loss plus case estimate) made be used to prioritise or allocate resources
- However the total of the case estimates also represents an estimate of technical provisions in respect of claims notified.
- The importance of technical provisions to the maintenance of solvency has led to the development of other estimation methods.

Key features of technical provisions

From Summary of IAIS positions

- – comprise two components
    - – the current estimate of the costs of meeting the insurance obligations (Current Estimate)
    - – margin for risk (Margin over Current Estimate or MOCE)
- – undertaken on a market-consistent basis
- – any valuation or modelling assumptions should be based
    - – on current data
    - – on the most credible current assumptions

Source : Summary of **IAIS** positions on the **valuation** of **technical provisions**, October 2007

Key features technical provisions (cont'd)

From Summary of IAIS positions

- – Similar insurance obligations with similar risk profiles should result in the determination of similar values for technical provisions
- – The credit standing of an insurer should not be considered in the valuation of its insurance liabilities
- – The amount of the technical provisions should be consistent with an exit of the insurer, in the sense that any transfer of insurance obligations , based on the technical provisions, to another newly licenced insurer would result in the receiving insurer being capable of settling the obligations.
- – a prudent, reliable and objective manner to allow comparison across insurers worldwide

Current Estimate

- Whilst consistent with the IAIS principle , across a number of jurisdictions it is common to split the Current Estimate into 2 components

  - Reserving risk liability means *the value at the valuation date of Claim Payments and related Indirect Expenses, to be made after the valuation date, arising from events occurring on or before the valuation date.*

  - Premium risk liability means *the value of Claim Payments and related Indirect Expenses, to be made after the valuation date, arising from future events for which the Entity is liable under its insurance policies. Such events would not have been reported as at the valuation date.*

- Where a one year solvency horizon is used, premium risk may also include the business to be written during that year. Also premium risk may exclude catastrophic events (this being captured elsewhere in the capital framework)

An industry Balance sheet - direct insurers

Assets		Liabilities	
Investments	57,137	Technical provisions for reserving risk	35,251
Cash at Bank	1,718	Technical provisions for premium risk	15,404
Premiums due	7,493	Reinsurance premiums due	2,025
Reinsurance recoveries	11,165		
Non reinsurance recoveries	4,607	Tax provision	791
Other assets	4,181	Other liabilities	3,591
Intangibles	816	Other debt and loan capital	3,226
		Capital & Retained Earnings	26,898

Terminology

claims

Valuation Date

| Reserving risk liability	Premium risk liability
Unpaid claims reserve	Unearned premium / Unexpired risk reserve Premium deficiency reserve
Outstanding claims liability	Premium liability
Unpaid losses and loss expenses	
Claims liability	

Key features of Current Estimate

From different sources

- – IAIS ..should be determined as an unbiased estimate of the future cash flows that are expected to arise from each policy or contract, reflecting the time value of money. That is, the current estimate is the expected present value of probability weighted cash flows using current assumptions.

- – Solvency 2 - ..the best estimate shall correspond to the probability-weighted average of future cash-flows taking account of the time value of money

- – Institute of Actuaries of Australia .. is intended to be an unbiased estimate of the mean (statistical expectation) of the Outstanding Claims liability or the Future Claims Liability

- Consider the relative size of the technical provisions for reserving risk liability and premium risk liability for the following
    - Home property damage only insurer
    - New licensed motor third party liability insurer
    - Established, longstanding employers liability insurer
    - Reinsurer specialising in 1m xs 1m per event employers liability business

Another look at Paid Loss Development

Chain Ladder method
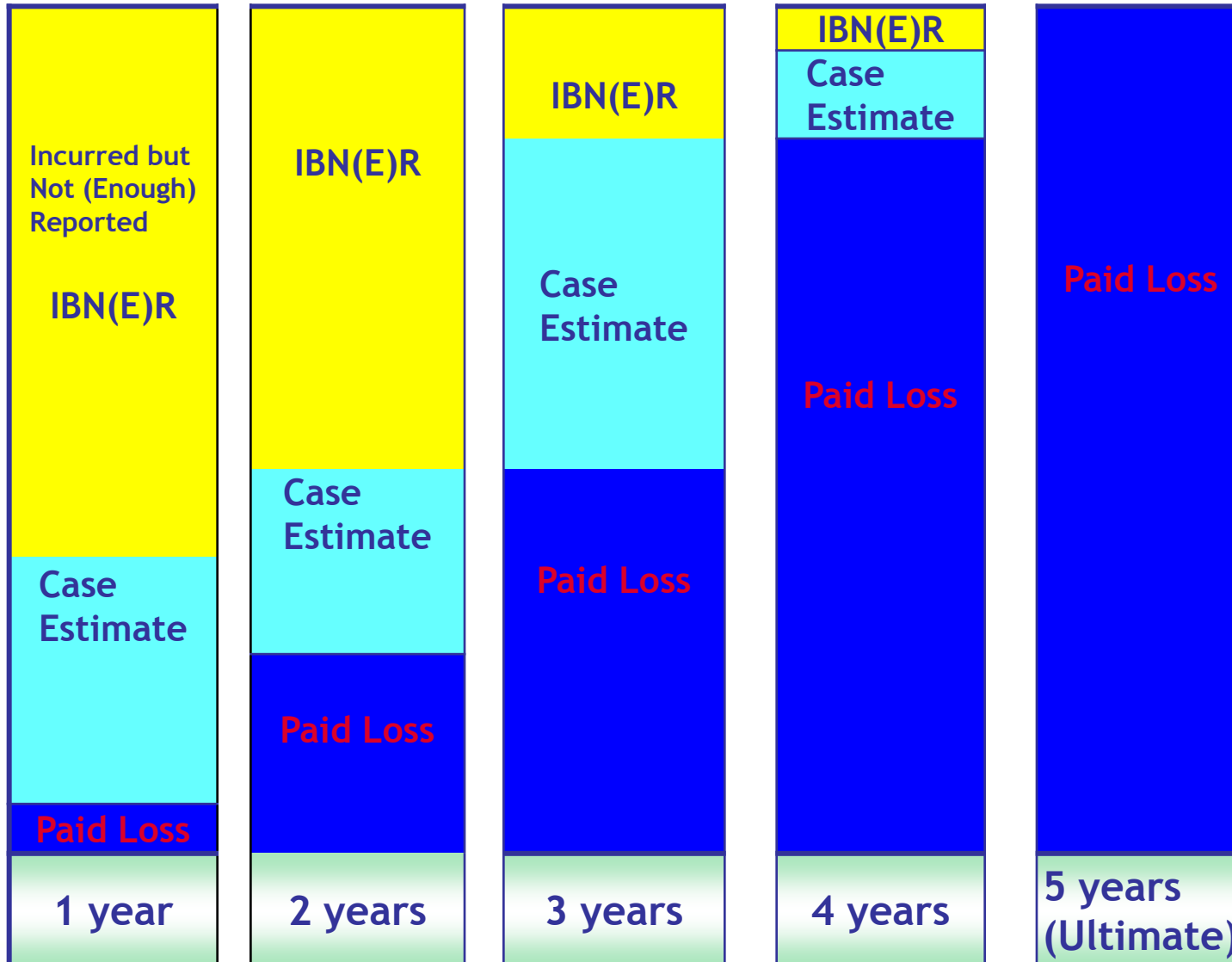
- Most common across the world

- Use triangular claims data or loss development table (LDT). These triangles typically show the cumulative payments or incurred amounts (i.e. payments plus case estimates) for each accident year

- Applies a Loss Development Factor (LDF) to the latest claims data for each year through to ultimate

Paid Loss Development in ,000s

Accident Year	1	2	3	4	5
2005	2,205	48,970	55,415	93,472	108,388
2006	1,478	61,470	100,793	120,153	
2007	3,895	31,798	74,091		
2008	4,675	48,724			
2009	8,486				

In this example we assume all claims are settled by the end of 5 years. For some classes a longer period is needed as the settlement may extend over 15 years

Paged Loss Development

Accident Year	1	2	3	4	5
2005	2,205	48,970	55,415	93,472	108,388
2006	1,478	61,470	100,793	120,153	=120153*1.31
2007	3,895	31,798	74,091	= 74091*1.35	
2008	4,675	48,724	= 48724*2.22		
2009	8,486	= 8486*10.66	= 8486*10.66*2.22		
Selected LDF		10.66	2.22	1.35	1.31

Selected LDF is year on year LDF. A year to ultimate LDF is often used.

Difference to obtain undiscounted reserve

Accident Year	1	2	3	4	5	Reserve
2005	2,205	48,970	55,415	93,472	108,388	0
2006	1,478	61,470	100,793	120,153	157,400	37,247
2007	3,895	31,798	74,091	100,023	131,030	56,939
2008	4,675	48,724	108,167	146,026	191,294	142,570
2009	8,486	90,461	200,823	271,111	355,155	346,669
Total						583,425

$157,400 - 120,513 = 37,247$

$355,155 - 8,486 \quad = 346,669$

Convert cumulative to annual payments

Accident Year	1	2	3	4	5	Reserve
2005	2,205	48,970	55,415	93,472	108,388	0
2006	1,478	61,470	100,793	120,153	157,400	37,247
2007	3,895	31,798	74,091	100,023	131,030	56,939
2008	4,675	48,724	108,167	146,026	191,294	142,570
2009	8,486	90,461	200,823	271,111	355,155	346,669
Total						583,425
Year of payment (these are the diagonals)		204,597	179,228	115,556	84,044	

Apply discount factor to each annual payment to obtain a discounted reserve

Application to Paid & incurred

- Chain ladder can be applied to both Paid losses or Incurred losses
- Claims data may be available by underwriting year only
- Can be adapted to other units for the development period e.g. months or quarters or an unequal set 1,2,3 to 6, 6 to 12,12 to 24 months
- In this example the emphasis is on showing the technique. In practice there is considerable professional judgement required.

- Assumed claims are homogenous
- Assuming same payment will apply across all years (i.e. no lags or speeding up in pattern)
- No adjustment for changes in exposure levels
- No other information used like pricing trends or economic trends or industry trends
- No explicit adjustment for time value of payments, but method implicitly assumes past inflation will be repeated. The method can be varied to make explicit future inflation assumption.
- No explicit allowance for reinsurance recoveries

- Justification of why incurred or paid loss method was chosen for a line of business
- Comparison of the actual development of claims to the expected development from the previous valuation
- Comments on the choice of loss development factors and how these changed from previous valuation.
- Comment on any change in pattern of loss development compared to previous years or wider industry trends
- Allowance made for the reinsurance and other recoveries
- Any adjustments or transformation made to the data in determining the reserve
- Statement of the recommended gross and net estimates for the line of business

Bornheutter-Ferguson method

- Common across the world

- Also uses triangular claims data or loss development table (LDT)

- Applies a selected Ultimate Loss ratio to Premiums for each underwriting year to obtain Ultimate Losses

- Apply a selected payment pattern to Ultimate Loss to obtain payments from latest claims year through to ultimate

Select a payment pattern

Development Year	1	2	3	4	5		
Selected LDF or LDF year to year (a)		10.66	2.22	1.35	1.31		
Cumulative LDF or LDF year to Ultimate (b) =Multiply remaining LDFs in (a)		41.85	3.93	1.77	1.31		
Paid as proportion of ultimate loss (c) = 1 / (b)		0.024	0.255	0.565	0.763		
Reserve as proportion of ultimate loss (d)=(a) –(c)		0.976	0.745	0.435	0.237		
Future Payment in each year as proportion of ultimate loss = difference between columns in (d)		0.231	0.311	0.198	0.237		

Note: the same development pattern as the Chain ladder have selected

Bornheutter-Ferguson example

Accident Year	Premiums '000s (1)	Selected Ultimate Loss Ratio (2)	Paid loss as proportion of ultimate loss (3)	Reserve '000s (1) * (2)* (1-(3))
2005	105,550	91%	1.00	0
2006	193,201	94%	0.763	42,976
2007	145,500	89%	0.565	56,079
2008	231,500	92%	0.255	158,732
2009	415,500	106%	0.024	429,906
Total				687,694

Method to determine annual payments

Accident Year	1	2	3	4	5	Reserve	Ultimate loss
2005						0	0
2006					=181,609 * 0.237	42,976	181,609
2007				=129050 * 0.198	=129,050 * 0.237	56,079	129,050
2008			=212,980 * 0.311			158,732	212,980
2009		=440,430 * 0.231				429,906	440,430
Total						687,694	
Selected LDF		10.66	2.22	1.35	1.31		
Future Payment in each year as proportion of ultimate loss		0.231	0.311	0.198	0.237		

Annual payments

Accident Year	1	2	3	4	5	Reserve
2005						0
2006					42,976	42,976
2007				25,540	30,539	56,079
2008			66,182	42,150	50,400	158,732
2009	101,657	136,861	87,165	104,224		429,906
Total						687,694
Year of payment (these are the diagonals)		236,356	209,550	137,564	104,224	

Apply discount factor to each annual payment to obtain a discounted reserve

- Bornheutter Ferguson can be applied to project both future Paid losses or future Incurred losses (in this case a weighting is given to the actual claim development)
- Is most useful for those classes where few or no claims occur in the early development years

- Assumed claims are homogenous
- Selected claims ratio is a key assumption. Pricing is often cyclic and so the selected ratio should reflect the expected claims ratio after considering any cyclic pricing discounts or pricing margins.
- Assuming same payment will apply across all years (i.e. no lags or speeding up in pattern)
- No direct allowance for reinsurance recoveries
- No other information used like pricing trends or economic trends or industry trends

Points for assessment by the supervisor

- Justification of why incurred or paid loss method was chosen
- Comments on the choice of loss ratio and how these changed from previous valuation.
- Comment on any change in projected loss ratio compared to previous years or wider industry trends
- Comparison of the actual development of claims to the expected development from the previous valuation
- Any adjustments or transformation made to the data in determining the reserve
- Statement of the recommended gross and net estimates for the line of business

- Using the same insurers as before
  - Home property damage only insurer
  - New licensed motor third party liability insurer
  - Established, longstanding employers liability insurer
  - Reinsurer of employers liability business with 1 major renewal date each year
- Discuss which method you would select to estimate reserving risk liability for the above insurers

Premium risk

- The premium risk is concerned just with the claims arising from the unearned premium
- A common method is based on an expected loss ratio and unearned premium with adjustment for commission , expenses and reinsurance costs
- A simplified formula , applied at a LoB level , is

    unearned premium (less commission) * Loss Ratio plus any reinsurance costs

- The methods outlined can be modified to include random outcomes. This could be based on some assumed distribution or a sampling technique such as bootstrapping

- The advantage of a stochastic process is shape of the reserve outcomes is revealed
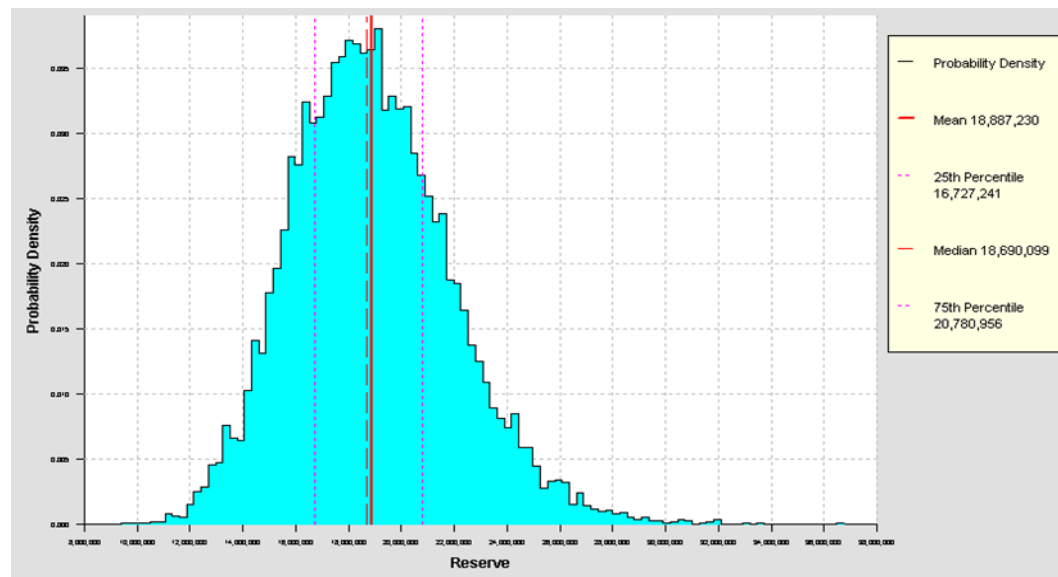
- Software is readily available to do stochastic reserving with a a variety of graphic outputs

Margin over Central Estimate (MOCE)

- The future claims cost is an uncertain amount. In addition to the central estimate , a prudential margin for uncertainty should be held.

- *Delays occur in the notification and settlement of claims and a substantial measure of experience and judgement is involved in assessing outstanding liabilities, the ultimate cost of which cannot be known with certainty at the statement of financial position date. The reserves for general insurance and health business are based on information currently available. However, it is inherent in the nature of the business written that the ultimate liabilities may vary as a result of subsequent developments.* Aviva Annual report, 2009

Approaches for MOCE

- Different jurisdictions have different approaches but these fall into three broad types.
  - A Cost of Capital approach , applying a CoC factor to claims outcomes at a chosen high percentile
  - A percentile or minimum based on standard deviation derived from the shape of the claims outcomes
  - Conditional Tail VaR , a measure of the mean claims within a band of 2 chosen percentiles in the tail

- The Cost of Capital approach is used in the Swiss Solvency Test and the European Union's Solvency 2.
- Australia , Singapore and other Asia Pacific have adopted varying approach based on the 75th percentile.
- All methods are considered by IFRS in its latest exposure draft on insurance contracts

Role of the Actuary

- The Appointed Actuary's primary role is to:
  - Provide advice on the insurer's insurance liability valuation (note that this includes discounting of insurance liabilities)
  - Provide an impartial assessment of the overall financial condition of the insurer

Governance

- The aim of regulation is to ensure that regulated institutions are managed in a sound and prudent manner by a competent Board of Directors.

- The decision on what technical provisions should be a decision for the Board , as for other balance sheet items.

- The Board should consider the advice and a recommendation of the Chief Actuary but legal or other advice may also be sought, particularly for large or contentious claims

- The Board as part of risk oversight should put in place review process and specify the frequency of review

Governance examples

- *Management's best estimate is developed from the actuarial central estimate after collaboration with actuaries, underwriting, claims, legal, and finance departments and culminates with the input of reserve committees. Each business unit reserve committee includes the participation of the relevant parties from actuarial, finance, claims, and unit senior management and has the responsibility for finalizing and approving the estimate to be used as management's best estimate. Reserves are further reviewed by ACE Limited's Chief Actuary and its senior management.* **ACE Limited annual report, 2009**

- *..Group Actuarial conducts a central process of reserve oversight. This process ensures that reserves are set at the local level in accordance with Group-wide standards of actuarial practice regarding methods, assumptions and data. The key components of this central oversight process are:*

  - *Minimum standards for actuarial loss reserving;*

  - *Regular central independent reviews by Group Actuarial of reserves of local operating entities and*

  - *Regular quantitative and qualitative reserve monitoring. **Allianz annual report 2009***

- Investments , recoveries and other assets will generally be valued following local accounting standards

- Important principle that investment are valued at market consistent amounts.

- The value of any doubtful reinsurance recovery or asset or investment or other recovery should be adjusted for any impairment

- An insurer must maintain a capital base in excess of its local regulatory minimum requirement. Capital base may require certain deductions to be made from the eligible capital (goodwill, intangibles, expected dividends)

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