LIFE INSURANCE & WEALTH MANAGEMENT PRACTICE COMMITTEE

Information Note: Asymmetric Risks

April 2008

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1 PURPOSE

1.1 This Information Note was prepared by the Life Financial Reporting Sub-committee (LFRSC) on behalf of the Life Insurance & Wealth Management Practice Committee (LIWMPC) of the Institute of Actuaries of Australia ("Institute"). This Information Note does not represent a Professional Standard or a Practice Guideline of the Institute. It has been prepared for the purposes of providing information and generating discussion on aspects of asymmetric risk that may lead to divergent practices (for financial reporting and other purposes) within the Institute's membership.

Feedback from Institute Members is encouraged and should be forwarded to the LFRSC.

This Information Note was issued in April 2008 and will be reviewed annually.

2 BACKGROUND

2.1 Asymmetric Risks

Asymmetric risks arise where cash flows and values have an asymmetrical statistical distribution or where the probabilities are weighted by a non-linear outcome function. Common examples include a skewed distribution where the dispersion of outcomes is greater for negative results than for positive ones and an embedded option which generates a "kinked" payoff.

Where the outcome function is non-linear, the outcome from a deterministic projection of the mean assumption values is likely to misstate the mean value of the outcome function. For example an out-of-the money option would often be valued at zero under this approach.

Understanding asymmetry is important when determining best estimate liabilities under the Valuation Standard (LPS1.04) and other calculations which require mean outcome values.

2.2 Embedded Options

As noted above, the embedded options that exist in certain types of life insurance products are a particular example of a possible asymmetric outcome (although sometimes the terms are used interchangeably). Some embedded options are "auto exercise" (such as a guaranteed minimum crediting rate for a non-par investment account product) whilst others are exercised by specific policyholder actions (such as a conversion option with guaranteed terms).

The assessment of asymmetric risks exercised by specific policyholder actions may be more complicated as the outcome function depends on whether policyholders exercise their options and whether they are exercised in an optimal manner.

3 NATURE OF ASYMMETRIC RISKS

3.1 Identifying and Understanding Asymmetric Risks

Asymmetric risks are common to many life insurance products and are a key consideration for Members when providing actuarial advice across a wide range of areas (e.g. determination of policy liabilities, economic valuation, product pricing, bonus philosophy/declaration, setting investment policy, evaluating reinsurance, prudential reserving and calculating economic capital). Not all of these areas are explicitly covered by the current Professional Standards, Guidance Notes and legislation discussed in Section 4.

To identify and develop an understanding of key asymmetric risks, the Member may need to consider:

- Options and guarantees granted to policyholders, either explicitly in the policy document or implicitly through policyholder reasonable expectations.
- The operation of participating contracts and other forms of profit sharing and rebating.
- Discretions available to the life insurer within policy design and legislative requirements. These might be constrained by policyholders reasonable benefit expectations.
- Guaranteed crediting rates in non-participating investment account business, unit price guarantees in investment-linked business and profit sharing arrangements.

The Member should be satisfied that they have sufficient information and have undertaken adequate analysis to identify and understand all asymmetric risks that are material within the context of the calculation or assignment being undertaken.

More examples of asymmetric risks are provided in Appendix 1.

3.2 Asymmetric Assumptions

Many assumptions are slightly asymmetric because the value cannot go below zero but may increase by more than 100% of the expected. Further, short term symmetry may be converted into long term asymmetry by compounding. Mortality, expenses and lapses fall into these categories. The asymmetry of the assumptions may be material, particularly in the tail of the probability distribution used in determining capital requirements.

To the extent that these risks are not seen to correlate strongly with investment markets, this asymmetry may have limited direct impacts on the economic valuation of cash flows associated with these risks.

4 EXISTING GUIDANCE & LEGISLATION

4.1 References to Asymmetric Risks

In certain instances such as policy liability calculations, economic valuations and regulatory prudential capital requirements, the requirement and/or the method for allowing for asymmetric risks is covered in Actuarial Standards, Accounting Standards, Professional Standards or Guidance Notes. A high level summary of these references is set out in the subsections below.

The following terminology (in respect of the prudential standard issued by APRA in November 2007) is used in the remainder of this information note:

- Valuation Standard ("LPS1.04")
- Solvency Standard ("LPS2.04")
- Capital Adequacy Standard ("LPS3.04")
- Management Capital Standard ("LPS6.03")

Similarly, we use the term "AASB1038" to refer to the Life Insurance Contracts accounting standard issued by the AASB in April 2007.

The contents of this information note may need to be revised if future successor standards contain different requirements for asymmetric risks compared to the standards listed above.

4.2 AS1.04 (Valuation of Policy Liabilities)

This standard sets out the basis for calculating policy liabilities in respect of Life Insurance Contracts, consistent with the objectives of realistic profit reporting, and provides for the release of profit over the life of the business. The overall policy liability comprises of two components: a Best Estimate Liability and a Profit Margin.

Under AS1.04 the Best Estimate Liability should be representative of the mean of the distribution of the potential liability outcomes. Members should undertake analysis to identify and understand instances where the input assumptions or outcome function for the Best Estimate Liability is asymmetric.

AS1.04 notes that allowances for asymmetry may be incorporated through adjustments to the assumptions or separate adjustments to the Best Estimate Liability.

Where embedded options exist these must also be allowed for in the calculation of the Best Estimate Liability. AS1.04 states:

> "Where the benefits contain options that may be exercised against the company, then either the value of those options must be determined (via a suitable option pricing model) and added to the Best Estimate Liability, or the Best Estimate Assumptions adjusted so as to appropriately capture the value of the options as part of the Best Estimate Liability." (Paragraph 5.3.4)

4.3 AS2.04 (Solvency), AS3.04 (Capital Adequacy) and AS6.04 (Management Capital)

AS2.04 and AS3.04 set out prudential regulatory capital requirements for statutory funds, and AS6.04 for the shareholders' fund.

Under these standards the impact of many common asymmetric risks is measured using a simple deterministic approach.

Nonetheless, an overarching principle applied in all of these standards is that the Member perform further analysis and calculate additional capital requirements for material risks that are considered to be not fully captured or measured by the methodology described in the standards.

For these risks the Member should broadly target a level of sufficiency consistent with that for the risks explicitly considered in the standards.

Where best estimate reporting under AS1.04 uses a simple approximation for an asymmetric outcome distribution (often a deterministic base projection with an allowance for asymmetric risk), a similar approximation that takes into account the circumstances considered in the prudential standards might be used. For calculations of the value of asymmetric risks within resilience reserves in AS2.04 and AS3.04, it may be reasonable to consider the market shocks as a scenario, and recalculate the value of the asymmetric risk as that which would be reported under AS1.04 if that scenario came to pass.

The need to calculate capital requirements for risks not explicitly considered in the standards may be particularly relevant for certain asymmetric risks and embedded options including where the company is exposed to unusual risks. The standards set out margins (or a range of margins) for the exercise of options.

4.4 AS5.02 (The Cost of Investment Performance Guarantees)

This standard is concerned with the asymmetric outcome from providing performance guarantees on unit linked business. It sets out a prescribed approach for measuring the cost of an embedded option for the purposes of determining whether it exceeds the limit for investment linked business as set out under Section 42 of the Life Insurance Act 1995.

Although the approach is prescribed, it refers to the principles and calculations under AS3.04, which, as noted in 4.3 above, require the Member to include a further margin for risks that are considered to be not fully captured or measured by the methodology prescribed in the standards.

4.5 PS 200 (Actuarial Advice to a Life Insurance Company or Friendly Society)

PS 200 applies to advice to a life insurance company or friendly society relating to premium rates and charges, financial condition investigations and the distribution of surplus. In particular, when analysing the financial condition of the company, the Appointed Actuary is required to comment on the relationship between the nature and term of the assets and the corresponding liabilities, including any guarantees and options available under the policies and the likely effect of the exercise of those options.

The liability valuation method should take into account any guaranteed benefits and options, and the Appointed Actuary should make appropriate provisions for reserves to meet specific adverse contingencies not already allowed for in the calculation of the valuation liabilities.

4.6 GN252 (Economic Valuations of Life Insurance Business) and GN552 (Economic Valuations)

These Guidance Notes set out the considerations that bear on the work involved in carrying out economic valuations. They describe general principles and procedures for carrying out and reporting on economic valuation. This includes economic valuations used to support a market valuation or a fair valuation.

The Guidance Notes expect that Members should make appropriate allowance for any material optionality or non-linear outcomes in the cash flows being modelled.

4.7 IFRS4 (Insurance contracts), IAS39 (Financial Instruments: Recognition and Measurement), IAS32 (Financial Instruments: Disclosure and Presentation) all deal with options and guarantees.

IAS39 generally requires derivatives on investment contracts to be separated from the host contract and valued as a derivative. This is not required if the host contract itself is a life insurance contract.

It would be normal to consider and quantify asymmetric risks for the purpose of the Liability Adequacy Tests under the new IFRS standards.

4.8 Guidance is continually evolving.

The International Accounting Standards Board (IASB), the International Actuarial Association (IAA), various regulators and other bodies are continuously issuing discussion papers and new standards that have a bearing on these matters. Members cannot be expected to keep abreast of all the debates outside of Australia.

5 VALUATION METHODOLOGIES

5.1 The Member should be satisfied that any method used is appropriate for the particular circumstance. The degree of detail and precision in an asymmetric risk calculation should be appropriate to the context in which it is being performed.

The model used will depend on the size and materiality of the asymmetric risk, the quality of the data available, the intended use of the analysis and the needs expressed by the key stakeholders.

Common valuation models which the Member is likely to consider using include:

- Stochastic
  - Risk neutral models
  - Real world models
- Scenario and stress testing
- Replicating portfolio
- Combination of the above

In applying these methods, the Member should be satisfied that the method is appropriate. Key aspects of these models are discussed in the following subsections.

5.2 Internal consistency

Whatever method is used, the member should ensure as far as possible that there is consistency between the valuation placed on the assets and the various components of the liability. There is some debate about the extent to which this is possible, which is discussed in Appendix 2.

5.3 Stochastic Models

This method involves multiple simulations of the liability/cash flow outcome using distributions for key assumptions regarding future experience.

The risks that life insurance companies are exposed to are complex and there may be many processes and outcomes that are correlated, while other processes may have limited correlation and may provide diversification benefits. These relationships can be incorporated in a stochastic model enabling the risks to be statistically analysed.

The Member should be satisfied that the underlying distributions assumed are reasonable, that a statistically sufficient number of simulations are used to produce stable results or convergence, particularly when uncertainty in the 'tail' of a distribution is being considered and that appropriate allowance for the impact of correlations in the tails of distributions are made.

5.3.1 Risk neutral methods

Risk neutral methods allow for market uncertainty in the probability distribution associated with cash flows. The discount rate used is a risk free rate and a "risk neutral" and notional probability distribution is established from the market price of relevant options. Risk neutral methods are particularly applicable where investment or market-related gearing exists. They may also be more appropriate to determine the impact of asymmetric risks on the best estimate liability, when it is discounted at the risk free rate.

These methods will not produce cash flow projections on a realistic basis. This means that projected cash flows will generally not be suitable for other purposes, such as business planning. It also means that the communication of the projection results to users and the validation of the risk neutral cash flows may be challenging, as they will not necessarily reconcile to real world cash flows.

In applying these methods, the Member should be satisfied that the degree to which each cash flow is market-related can be reasonably ascertained or approximated and that the risk neutral probabilities are appropriate.

Risk neutral probabilities would normally be determined from traded derivatives and are therefore seldom available for non-investment risks. There are some theoretical grounds for adjusting real world lapse and expense rates for pricing and valuation purposes, but these are often not applied on either materiality grounds or because of a lack of a reasonable basis for an adjustment.

5.3.2 Real World methods

"Real world" projections use distributions of values or cash flows based on expected future actual experience (i.e. realistic projections). They are appropriate for determining solvency and capital adequacy requirements, but require adaptation (via the use of state price deflators which adjust for the fact that market participants place different values on different outcomes) when used in the determination of market consistent present values.

5.3.3 Models should be market consistent and arbitrage free

Members should take care that their models are consistent with market prices. This not only means that assets should be valued at market prices, but that the liability assumptions as to discount rates and statistical distributions should be consistent with the market price of options, warrants and future contracts.

Members may have to use their judgement in this area as the price of derivative instruments are not always consistent with each other nor with historical volatilities. It is often inappropriate to extrapolate knowledge about short term probability densities near the mean to estimate longer term probability densities in the tail of the distribution.

The models should also not effectively assume that unrealistic arbitrage profits will arise in future. It is, for example, inappropriate to discount cash flows that assume an equity risk premium using a discount rate based on a lower amount of market risk or value far out-of-the-money options using volatilities unadjusted for the tail of the volatility surface.

5.4 Scenario and Stress Testing

A deterministic projection of a number of especially extreme scenarios can often add insight, aid communication and may provide essential information to management of the impacts that can be expected if the tail of a distribution occurred.

Historical events and market conditions are another source of possible stress test scenarios.

5.5 Replicating Portfolio

It is sometimes possible to construct a portfolio of simple financial instruments that replicates a more complex instrument. These simple instruments may include physical holdings of the underlying asset as well as derivatives including options. The price of these options can then be obtained from the market. This represents a non-stochastic solution in some cases, but can only be used where relevant market prices exist for the components of the complex instrument. As for risk neutral approaches, they tend to have less application in assessing capital requirements.

5.6 Combination of Above

A combination of approaches may sometimes be appropriate, particularly to help illustrate the impact of an alternative model.

6 BEST ESTIMATE VALUATIONS

6.1 Under a best estimate valuation, the focus will be on understanding the impact on the mean. While the whole probability and outcome distribution should be considered, the main focus may often be on the more probable outcomes

when determining a best estimate valuation, whether it is for profit reporting, economic valuations, pricing or other purposes requiring a best estimate view.

6.2 The remainder of this section of the information note focuses on the allowance for asymmetric risks in policy liability valuations under AS1.04.

6.3 As noted earlier, Section 5.3 of "AS1.04 (Valuation of Policy Liabilities)" outlines the main considerations in valuing asymmetric risks in a best estimate liability valuation. In particular, section 9.1 includes considerations for recalculating profit margins.

6.4 For profitable non-participating business, an increase in the best estimate liability due to assumptions other than investment fluctuations results in an offsetting decrease in the value of future profit margins. Hence as long as the product is not in capitalised loss, an increase in the best estimate liability due to non-economic assumptions within the allowance for asymmetric risk may not directly affect the policy liability or emerging profit.

6.5 For similar reasons, the allowance for asymmetric risk may have no impact on the policy liability for participating business, except via the deduction of current period profits. The appropriate adjustments to the components of policy liability are likely to be dependent on the particular method used to value the asymmetric risks in participating business.

6.6 For all business, the method used to value the asymmetric risk should therefore be considered in the context of the size of the product's overall best estimate liability and profit margins, along with its potential impact on the timing of profit emergence.

6.7 It is also important that any adjustment to the best estimate liability in respect of asymmetric risks is determined consistently with the best estimate liability calculation. For example the best estimate liability may include the intrinsic value of the risk and hence only a time value adjustment is required. Examples of possible inconsistencies that may arise can be found in Appendix 4.

6.8 The best estimate liability (BEL) for participating business will use similar considerations as for non-participating business, because the BEL is defined under AS1.04 as only applying to the existing guaranteed benefits. A simple investment mismatch for the assets backing the BEL is no more an asymmetric risk than an equivalent example for a non-participating product with guaranteed benefits.

6.9 The key asymmetric risk for typical participating business is that future bonuses cannot be declared to policyholders at rates which meet policyholders' reasonable expectations ("PRE"). Further comments in this regard are provided in Appendix 3. It would be usual to include this asymmetric risk in economic valuations.

6.10 AASB1038, which contains the requirements for measuring life insurance contract liabilities for the general purpose accounts, contains no explicit requirements regarding asymmetric risks. However, it does include a requirement to value embedded derivatives at fair value under some circumstances. It would also appear to be standard industry practice to make the same allowances for asymmetric risks when determining liabilities under AASB1038 and AS1.04.

7 CAPITAL & TAIL DISTRIBUTION VALUATIONS

7.1 Appropriate consideration of extreme events, at the tail of the probability distribution, is particularly important in capital adequacy reporting, as the focus of the analysis is on the likelihood and impact under adverse circumstances.

7.2 In some cases, a deterministic stress test may provide a simple substitute for a more technical stochastic approach. This is particularly the case when investigating the impact of events in the tail of the probability function as the parameters for the deterministic analysis can be based on observed events (although Members should also be aware that extreme events may be over or under represented in recent available data).

7.3 A stochastic approach requires a subjective estimate of future experience that may not be apparent to the users.

7.4 The value and capital requirements relating to asymmetric risks may be particularly affected by the distribution of variables in the tails, and correlations between parameters. In particular, correlations in the tails of distributions may be different to overall average correlations.

8 MANAGEMENT ACTIONS, DISCRETIONS & MITIGATION STRATEGIES

8.1 The impact of asymmetric risks may be significantly affected by the exercise of management actions and discretions. Examples include:

- Changes to declared bonus and crediting rates for both participating and discretionary non-participating business.
- Changes to surrender values.

- Discretions to alter fees and to change other policy terms and conditions.
- Alterations to premium rate scales.
- Changes to asset allocation strategies.
- Other mitigation strategies such as reinsurance and the ability to terminate or refuse to renew contracts.

There are various factors that Members should consider when assessing discretions, including how and when they can be exercised. Past actions or communications may create implied or constructive obligations that may constrain management actions. There may be limited flexibility to change bonus and crediting rate philosophies.

In addition, there may be delays before changes are approved and implemented and they may require policyholder notification. Members should also consider the impact of the exercise of management actions on policyholder actions, especially lapse rates.

Members should also be aware of the ability of reinsurers or other companies (including other companies within the same overall group as the life company) to exercise discretions against them, and the impact of this on their mitigation strategies – for example their reinsurers' ability to terminate cover or refuse to renew.

Factors that can provide comfort that proposed management actions will be followed in various scenarios include: any precedents created through previous company actions and industry practices, systems and processes being in place to monitor key drivers and react to changes in circumstances, and any pre-existing approval by the board to act in a certain way under certain conditions.

Rules for management actions and discretions can be included in scenarios or dynamic stochastic models, to enable a more realistic impact to be considered of a range of outcomes.

9 POLICYHOLDER BEHAVIOUR

9.1 The Member should be satisfied that they have considered likely policyholder actions in the scenarios being considered. Members should consider the additional variability in potential outcomes arising from the uncertainty of the policyholders' response.

9.2 Developing a probability distribution of policyholder behaviours may be appropriate with the mean outcome being used for best estimate reporting and the tail being used for capital reporting. Different correlations between policyholder behaviour and the other risks may however affect both the mean value and the required capital.

Any dynamic policyholder behaviours that serve to benefit the shareholder should be very carefully considered to ensure this is a reasonable outcome in the circumstances.

9.3 Presenting a range of possible outcomes may also be appropriate to indicate the impact of different policyholder behaviours.

10 COMMUNICATING ASYMMETRIC RISKS

10.1 The communication of asymmetric risks should be driven by the purpose of the exercise. In financial reporting, Accounting Standard AASB 7 Financial Instruments: Disclosures has certain requirements for sensitivities to be disclosed.

10.2 In other circumstances such as pricing or risk management it is generally not sufficient to put a single value on an asymmetric risk, particularly where the risk being quantified is subject to significant uncertainty. It is generally more appropriate to support any best estimate number produced with a number of scenarios to give an idea of the variability and importance of the risk being considered.

10.3 In a life insurance environment, it would be expected that material asymmetric risks would be discussed in the Financial Condition Report.

10.4 Consideration should be given to the audience that will be receiving the communication:

- Will they want detailed technical information or general information?
- Will they have an understanding of the full range of possible outcomes?
- Will they have an undue focus on recent good or bad experience when options and guarantees in contracts may apply for a considerable period?
- Are they aware of similar risks in different countries or industries, or at different time periods?

- Do they understand the uncertainties in any quantification, such as in the assumptions or simplified modelling?

- Do they know that the general starting point is that it is often possible to reduce or eliminate a risk through reinsurance or asset matching? If any other approach is proposed are they aware of why the matching approach was accepted or rejected?

10.5 Depending on the use of the report, it may be appropriate to describe risk mitigation strategies. Asymmetric risks can be reduced, transformed or transferred in a large number of ways, including through policy design before the risk is written, or through changing investment strategy and reinsurance afterwards.

10.6 The communication of risks that are quantified using stochastic techniques in particular needs care to balance the amount of information available and the amount of information being presented such that it is appropriate for the intended audience.

10.7 Spurious accuracy should be avoided when communicating results, and an appreciation of uncertainties and subjective elements of the calculations should be provided, whether numerically by sensitivity analysis or scenario testing, or qualitatively by description, or in some other manner.

APPENDIX 1 – EXAMPLES OF ASYMMETRIC RISKS

(a) Conventional Participating business and Investment Account business. All the upside is generally split using a certain profit participation percentage, while the downside may require the company to meet the underlying guarantees and take 100% of the loss after a certain point.

(b) Extra cost guarantees on investment linked products may also require the company to meet 100% of the loss after a certain point.

(c) Guaranteed annuity conversion options can create a large difference between market rates and guaranteed rates, leading to significant financial selection effects.

(d) Caps on fees and other inflation risks may provide losses in times of high inflation.

(e) Policyholder free look period is effectively a short option to the policyholder.

(f) Profit sharing formulae (reinsurance and group risk) may give away most of the upside but little of the downside. This occurs in par business as noted in (a) and non-par business with a specified profit sharing formula, particularly where losses are not carried forward.

(g) Tax is asymmetric as the company will always need to pay tax on profits but may not be able to claim tax losses in all adverse scenarios.

(h) Non-proportional forms of reinsurance such as stop loss and catastrophe insurance are asymmetric.

(i) Products such as term insurance, lifetime annuities and all mortality options may be asymmetric as there is always a minimum of 0 deaths, while the maximum number of deaths may be many times greater than the expected number of deaths.

(j) Disability income is also subject to the same considerations for both claims incidence rates and recovery rates. In both cases, the rates are sometimes considered to be linked to economic conditions, and a provision for this correlation could be considered.

APPENDIX 2 – POTENTIAL INCONSISTENCIES WHEN VALUING LIABILITIES WITH ASYMMETRIC RISKS

AS1.04 and AASB1038 were produced to reflect the limited changes under the Phase 1 IFRS Standard for insurance contracts. As such, both standards grandfathered many of the provisions of their predecessors.

Both standards require the use of discount rates that reflect the market risk inherent in the policyholder benefits. Hence liabilities in respect of products whose benefits are contractually linked to assets values (e.g. participating products) are normally valued using best estimate earning rates (ignoring liability adequacy testing) and liabilities in respect of other products (e.g. pure risk products) are valued using risk free discount rates.

As noted earlier, AASB1038 contains few provisions regarding asymmetric risks and we have proposed using the same methods for life insurance contracts with asymmetric risks under both AASB1038 and AS1.04.

AS1.04 states that the best estimate liability must include the value of any options that may be exercised against the company and that this value should be determined using a suitable option price method.

Option prices are normally determined using risk neutral valuation techniques. These entail the use of risk free discount rates and notional distribution (volatility) assumptions that produce values calibrated to current market levels.

There may be an inconsistency between option values determined using a risk neutral valuation and a best estimate liability that is based on real world distribution assumptions and discounted at either risk free discount rates or best estimate earning rates.

Because AS1.04 (and its predecessors) have not required the calculation of market consistent liabilities, two solutions suggest themselves:

- One possible solution would be to value the whole life insurance liability using market consistent techniques. This approach would seemingly be consistent with the fair value measurement approach required for financial instruments (including life investment contracts).

- An alternative solution would be to value the options using real world probabilities and the swap rate for discounting. It may however be difficult to find an appropriate distribution of real world outcomes.

This alternative applies if the liabilities are not linked to investment performance. If they are related to investment returns then the discount rate should be the same for both assets and liabilities. In such cases, the options can either be valued using risk neutral rates or real world deflator methods.

LFRSC is not aware of this inconsistency being a material issue for any practitioners. We note that either approach appears to be theoretically justifiable. As the increase in BEL (due to the inclusion of the value of options) will normally be offset against profit margins, this is only likely to be an issue when products are in or close to loss recognition.

In any event, LFRSC expects the problem to be resolved during Phase II of the Insurance IFRS.

LFRSC notes that capital reserving requirements under AS2.04, AS3.04 or AS6.03 are based on adverse real world scenarios. As discussed in Section 5.3.2, real world methods are required for determining the appropriate capital reserves in respect of asymmetric risks and so the inconsistency described above does not seem to arise in this case.

APPENDIX 3 – CONSIDERATIONS FOR PARTICIPATING BUSINESS

(a) The key asymmetric risk for typical participating business is that future bonuses cannot be declared to policyholders at rates which meet policyholders' reasonable expectations ("PRE"). In some cases, this implies that future bonuses cannot be negative, whereas in other cases, this might imply future bonuses cannot be less than a specified positive rate.

(b) Alternatively, this risk can be considered as an option for policyholders to receive benefits in excess of the total assets backing this business (i.e. those which are "earmarked" for policyholder benefits) in certain circumstances, requiring the shareholder to meet the shortfall.

(c) Industry practice may be divergent for reporting under AS1.04 for participating business, regarding the option described above. The standard is unclear whether this asymmetric risk need be taken into account, as it predominantly arises from an asset / liability mismatch. It is expected that most companies would allow for the value of this asymmetric risk within the BEL.

(d) AS1.04 is also unclear as to what amount of assets can be considered to be earmarked for participating policyholder benefits when assessing this risk and this could lead to divergent practices. In particular, it is unclear as to whether policyholder's retained profits ("PRP") can be assumed to back the participating business when assessing this asymmetric risk.

(e) In practice, PRP is normally available to fund future participating policyholder benefit payments and so it would generally be reasonable to allow for this amount when assessing this asymmetric risk under AS1.04. (This is not inconsistent with AASB1038's treatment of these amounts as an unvested policyholder benefits liability.)

(f) The inclusion of PRP effectively means that future shortfalls (which would be borne by the shareholder) will only arise if the BEL, policyholder profit margins and PRP are insufficient to meet PRE and this would normally be allowed for in determining liabilities under AS1.04, AS2.04 and AS3.04.

APPENDIX 4 – EXAMPLES OF POSSIBLE INCONSISTENCIES BETWEEN ASYMMETRIC RISK VALUTAIONS AND DETERMINISTIC BEST ESTIMATE LIABILITY VALUATIONS

Please note that this is a simple artificial example to demonstrate the principles and possible pitfalls.

Consider a profit share arrangement on a pure risk policy. We will ignore discounting and assume a 1 year time period only. The profit share terms are
Max {0, 60% * [75% Premiums – Claims]}.

The profit share represents an asymmetry as the policyholder shares in the upside only.

Example 1 – "Out-of-the-Money" Scenario

Assume claims have three possible scenarios:

Claim Scenario	Payment At t=1	Probability
A	1,000	40%
B	2,000	40%
C	3,000	20%
		100%

The premium charged is 2,000. The financial outcomes are shown in the table below.

Table 1 – Asymmetry Cost Based on Upside Paid Away

Claim Scenario	Premium at 0	Claims at 1	Profit Share at 1	BEL at 0	Probability
A	2,000	1,000	300	-700	40%
B	2,000	2,000	0	0	40%
C	2,000	3,000	0	1,000	20%
Mean outcome	2,000	1,800	120	-80	
Outcome using mean inputs	2,000	1,800	0	-200	

The cost of the profit share is estimated using two different methods in Table 1:

- As the mean of the cost estimated in each scenario (120).
- As the cost using the deterministic mean input assumption
  i.e. 60%* (75% * 2,000 – 1,800) = 0, which clearly understates the true cost.

The correct BEL at time 0 is -80 (calculated as the mean of the scenario outcomes for the BEL). The same result can be obtained by adding the cost of the profit share from the scenario analysis (120) to the BEL using deterministic mean inputs (-200).

The "intrinsic value" of the asymmetry (being the value using mean inputs) can be considered to be zero and the "time value" of the asymmetry value as 120.

The discussion so far has examined the value of the profit share by reference to the amount of upside profit given away to the policyholder in each scenario. An alternative approach is to consider the cost of the profit share as the amount of downside that is not able to be passed onto the policyholder in each scenario. The two approaches should provide the same answer (using the same logic as underlies put-call parity in option pricing). However care needs to be taken to ensure this outcome arises as shown below.

Table 2 – Asymmetry Cost Based on Downside NOT Shared

Outcome	Premium at 0	Claims at 1	Losses unable to be shared at 1	Probability
A	2,000	1,000	0	40%
B	2,000	2,000	300	40%
C	2,000	3,000	900	20%
Mean outcome	2,000	1,800	300	

Note: the "losses unable to be shared at 1" represent the losses under the profit share formula that the insurer would pass onto the policyholder if the profit share formula was not subject to a minimum payment of zero.

The cost of the profit share (300) is seemingly overstated in Table 2 compared to Table 1. However the cost under this approach represents the time value only and ignores the intrinsic value. The intrinsic value is -180 (= 60% * [75% * 2,000 – 1,800]). Hence the correct adjustment to the deterministic BEL (120) is only obtained once both components are taken into account.

Example 2 – "In-the-Money" Scenario

An example is now considered where the intrinsic value of the option is positive at time 0 (i.e. a profit share is expected to be paid under deterministic best estimate inputs).

The assumed claims distribution is revised to be:

Outcome	Payment At t=1	Probability
A	1,000	45%
B	2,000	35%
C	3,000	20%
		100%

The premium charged is now assumed to be 2,500 and the revised outcomes are below.

Table 3 - Asymmetry Cost Based on Upside Paid Away

Outcome	Premium at 0	Claims at 1	Profit Share at 1	BEL at 0	Probability
A	2,500	1,000	525	-975	45%
B	2,500	2,000	0	-500	35%
C	2,500	3,000	0	500	20%
Mean outcome	2,500	1,750	236	-514	
Outcome using mean inputs	2,500	1,750	75	-675	

The correct BEL at time 0 is now -514. However, it is noted that an incorrect result (of -439) can be obtained if the mean profit share cost (236) from the scenario analysis is added to the deterministic BEL of -675.

That is, the scenario analysis does not provide the correct adjustment to apply to the BEL using deterministic mean inputs. This is because the intrinsic value (75) is double counted (it is in both the deterministic cost and the scenario based cost). (The correct adjustment is 236 – 75 = 161).

The revised outcomes when the cost of the profit share is viewed as the amount of downside not able to be passed on are shown below.

Table 4 – Asymmetry Cost Based on Downside NOT Shared

Outcome	Premium at 0	Claims at 1	Losses unable to be shared at 1	Probability
A	2,500	1,000	0	45%
B	2,500	2,000	75	35%
C	2,500	3,000	675	20%
Mean outcome	2,500	1,750	161	

The cost using this approach (161) is now the correct adjustment to apply to the BEL using deterministic mean inputs to give the correct overall BEL.

Discussion

The above two examples are intended to illustrate some of the basic principles when allowing for asymmetric risks in liability valuations. In particular, the liability adjustment to allow for an asymmetric risk needs to be consistent with any existing allowances for this risk.