INSTITUTE OF ACTUARIES OF AUSTRALIA

C2B LIFE INSURANCE **APRIL 2009 EXAMINATIONS**

Marking Guide

Level of difficulty.

Question	Syllabus Aims	Units	Knowledge & Understanding	Straight-forward Judgement	Complex Judgement	Total Marks
1 (a)	1,2	1	3			3
1 (b)	1,2	1		4		4
1 (c)	5,10	3,5		5		5
1 (d)	1,5	1,3		2		2
1 (e)	1,5	1,3			5	5
2 (a)	4,5,12,13	3,6	4	4		8
2 (b)	5,13	1,6		3		3
2 (c)	3,4,5,12,13	2,3,6			8	8
3 (a)	4,9	2,5	3			3
3 (b)	4,7	2,4		3		3
3 (c)	4,7,9	2,4,5			4	4
3 (d)	4,7,9	2,4,5			6	6
4 (a)	4	2	6			6
4 (b)	4	2		6		6
4 (c)	4,10	2,5			4	4
5 (a)	2,4,7	1,2,4		8		8
5 (b)	4,9	2,5			4	4
6 (a)	8	4	5			5
6 (b)	2,4,10,11,13	1,2,5,6		5		5
6 (c)	2,5,8,9,13	1,3,4,5,6			8	8
TOTAL			**21**	**40**	**39**	**100**

Answer all 6 questions.

QUESTION 1 **(19 Marks)**

Superior Life is the Australian subsidiary of an international insurer which uses Independent Financial Advisors (IFAs) to distribute its products. It has been writing individual Yearly Renewable Term (YRT) business for the past 5 years and has a large profitable in-force block of business.

As part of its strategy to grow this business, a new product for higher sums insured was launched 12 months ago that includes "Superior" premium rates for lives that meet a series of stricter underwriting requirements. The "Standard" premium rates were set at the level of the previous product's aggregate premium rates. The marketing department is very pleased with the new product as new sales have exceeded planned sales.

You have recently taken on the role of appointed actuary at Superior Life.

a) List the possible sources of information you would use to set your valuation assumptions for the new product line, including the information you would obtain from each source (3 Marks)

b) What are the key issues you will need to consider in determining the policy liabilities for this new product line, and why? (4 Marks)

c) You have received the following draft profit results for both products for the current financial year on the proposed valuation basis (All numbers in $ 000's, the valuation basis for the existing product is unchanged).

	Expected $000s	Actual $000s
Premium (MOY)	9,582	9,582
Initial Expenses (MOY)	1,655	1,750
Renewal Expenses (EOY)	493	480
Claims (EOY)	5,048	5,300
Investment Income	289	340
Policy Liability (BOY)	-323	-323
Policy Liability (EOY)	601	253

	Expected	Actual
No. of policies in-force (BOY)	10,993	10,993
No. of policies in-force (EOY)	12,092	12,642

Where BOY = beginning of year, MOY = middle of year, EOY= end of year.

Calculate the expected and actual profit for the year for the YRT products and perform an analysis of profit. (5 marks)

d) Briefly discuss the possible causes of the unexplained amount. (2 marks)

e) Comment on the appropriateness of the current assumptions based on your analysis of surplus, and detail any further investigations you would perform before setting your new valuation assumptions for both products. (5 marks)

QUESTION 1: SOLUTIONS

a) Possible sources of information

- Pricing studies (e.g. LPS 310 Report: Actuarial advice regarding policies)– to provide basis for mortality, lapse, expense assumptions
- Reinsurers – information on mortality differential between "superior" and "standard" lives as a result of stricter underwriting standards
- Overseas experience (particularly the US which has many years of experience with preferred lives policies)
- Superior Life in-force portfolio experience analysis (particularly lapse and expense experience e.g. separating lapse, expense and mortality experience by sum insured bands)
- Claims department (new product experience) – talk to claims manager to understand early experience

Marking Guide
- **1 mark for pricing studies**
- **1 mark for reinsurers**
- **1 mark for overseas experience**
- **1 mark for existing experience**
- **1 mark for claims department**

(½ mark for mentioning source, ½ mark for how used)
To maximum 3 marks (KU)

b) Key issues

Incorporating new product into valuation system, to ensure correct reserves can be calculated
e.g. Flag to identify "superior" and "standard" lives

New mortality assumption for both classes of lives – allowing for lower expected mortality on "superior" lives, higher expected mortality on "standard" lives (assuming that "superior" lives are not an entirely new market).

New expense assumptions – allowing for additional underwriting expenses, new higher average sum insured size due to the correlation between health and wealth / insurance needs.
New lapse assumptions – possible better persistency given lower premium rates, possible lapse and re-entry risk on existing aggregate portfolio

Choice of profit carrier – as required by AS1.04 (most likely as for the existing line of business)

RPG - as required by AS1.04 (is sufficiently similar to include with current product line)

Marking Guide
- **½ mark for incorporating into valuation system**
- **1 mark for new mortality assumptions**
- **1 mark for new expense assumptions**
- **1 mark for new lapse assumptions**
- **1 mark for choice of profit carrier/RPG**

(½mark per point, ½ mark for reason required)
To maximum 4 marks (SJ)

c) Analysis of surplus

Expected profit = 9,582 – 1,655 – 493 - 5,048+289 +(-323) - 601 = 1,751
Actual profit = 9,582 – 1,750 – 480 – 5,300 + 340 + (- 323) - 253 = 1,816

Expected investment earnings = 289 / (9,582 / 2 – 1,655/2 - 323) = 7.938%

Actual investment earnings = 340 / (9,582 / 2 – 1,750/2 - 323) = 9.463%

Investment earnings = (9.463% - 7.938%) * (9,582 / 2 – 1,750/2 - 323) = 54.8

Initial expenses = - (1,750-1,655) * ((1+ 7.938%)^0.5) = -98.7

Renewal expenses = - (480-493) = 13

Claims = - (5,300-5,048) = - 252

Unexplained = - (253-601) = 348

Analysis of Profit:	
Investment	54.8
Initial Expenses	-98.7
Renewal Expenses	13.0
Claims	-252.0
Unexplained	347.9
Total	65.1
Rounding	-0.1

Marking guide:
- **1 mark for profit**
- **1 mark for earning rates (actual and expected);**
- **1 mark for investment result;**
- **1 mark for expense result;**
- **½ mark for claims result**
- **½ mark for unexplained**

Total 5 marks (SJ).

d)

Unexplained amount: change in reserve

The change in reserve is a result of lapse and mortality variation for the existing product, and also the variation in the reserve required for the new business.

Lapses - no surrender value is paid, although a release of reserves will occur for lapsed policies.

Mortality – reserve is only required for policies in force at the end of the year (higher than expected mortality reduced number of lives in-force at end of year)

New business – there is a variation (likely increase in negative reserve) in the reserve required for the new business as a result of higher sales than expected

We do not have sufficient information to separate these elements.

Marking guide:
- **1 mark for lapses**
- **½ mark for 2nd order mortality**
- **½ mark for new business reserve required**

Total 2 marks (SJ)

e)

Lapse assumption

The increase in initial expenses indicates that new business sales were up to 6% higher than expected assuming all initial costs are variable. Lapses appear to be higher than expected, as according to the marketing department new business volume rose, yet the total premium is unchanged.

A lapse investigation is warranted. One possibility is that healthy lives are applying for new policies with lower premium rates and cancelling their existing policy. The lapse and re-entry of policies could be traced by comparing details of lapsed policies with new business policy details.

If selective lapsation is occurring, this should be modelled, with the expected effect incorporated into the claims assumptions

Claims assumption (mortality/TPD/Trauma)

Claims are 105% of expected. Most likely to be the result of one or two large claims, or could be evidence of a trend.

Further investigation is required to understand the nature of the claims (i.e. is the experience a statistical deviation or the result of a rise in claim rates?). Analysis of claims experience by number of claims would provide a more credible indication of the level of claims incidence experience versus expected.

Renewal expense assumption

In the event that the increased claim and lapse rates are expected to continue, this would result in higher per policy maintenance expenses, and hence warrant a revision of the

renewal expense assumption.

Marking Guide

- **1 mark for lapse assumption and investigation**
- **1 mark for lapse and re-entry investigation**
- **1 mark for claims assumption and investigation**
- **1 mark for selective lapsation effect on claims**
- **1 mark for increased renewal expenses (½ mark for expense allocation/review)**

(½ mark for looking at each assumption, ½ mark for determining whether they may need to be adjusted)

- **½ mark for analysing both products separately**

To a maximum 5 marks (CJ)

QUESTION 2 **(19 Marks)**

You are the Appointed Actuary of Trad Life a large Asian life insurer with a significant block of Whole Life and Endowment Insurance business. Trad Life actively writes new business in a very competitive market. Distributions of profit to shareholders are limited to 25% of declared bonus. Valuation, solvency and capital adequacy standards are similar to the Australian standards.

The following net investment returns were achieved on the assets in the Traditional Business Statutory Fund:

Year	Asset mix	2004	2005	2006	2007	2008
Cash	10%	2.8%	3.9%	4.0%	3.5%	3.2%
Fixed Interest Investments	30%	5.3%	2.8%	2.1%	4.6%	7.4%
Local Equities	30%	15.4%	17.5%	17.5%	-8.4%	-19.6%
International Equities	15%	3.5%	14.0%	7.7%	-12.6%	-13.3%
Property	15%	7.0%	10.5%	11.2%	4.9%	-4.2%
Total return	100%	11.5%	14.5%	13.0%	-2.8%	-8.6%

The investment allocation has remained stable over the last 4 years due to an active rebalancing in line with the company's strategic asset allocation benchmark. The duration of the fixed interest investments is significantly shorter than that of the liabilities.

The following reversionary bonus rates have been declared over the last 4 years:

Year	2004	2005	2006	2007
Declared Reversionary Bonus rate	4.75%	5.25%	5.25%	5.00%

Terminal bonus rates increased significantly from 2004 to 2006, but were reduced slightly in 2007.

a) The average declared reversionary bonus rate over the last 5 years has been 5%, and the board would like to declare a similar level of reversionary bonus rate this year.

Prior to setting your proposed reversionary bonus rate and terminal bonus scale, outline the key considerations you will take into account. (8 Marks)

b) You have recommended a reversionary bonus rate of 4% to the board, and a further reduction in terminal bonus rates. After speaking to the head of marketing, the CEO has suggested following your recommendations and also declaring a "one off additional reversionary bonus" of 1%, in view of the level of excess assets which have been built up in the relevant statutory fund.

Outline the advantages and disadvantages of this approach. (3 Marks)

c) The CFO has contacted you for your opinion on the consequences of adopting a different approach. He has suggested changing the strategic asset allocation to the following, in order to reduce the chance of future strains on capital due to negative investment returns:

Cash	**40%**
Fixed Interest Investments	**50%**
Local Equities	**5%**
International Equities	**0%**
Property	**5%**

Draft your response to the CFO, highlighting the consequences of the approach, and also discussing possible alternative approaches. (8 Marks)

QUESTION 2: SOLUTIONS

a)

Recent investment returns:

The supportable bonus rate calculation is based on best estimate calculations. The significant proportion of growth assets would result in significant changes in the supportable bonus rate over time due to increased volatility in investment returns.

Given that the returns in 2003-2007 were significantly higher that the reversionary bonus rate, and assuming that Trad Life was well capitalised, one would expect a terminal bonus cushion had been built up during this period.

With continued falls in equity values the scope for terminal bonus would be declining, and the pressure for a reduction in regular bonus would increase.

It appears that interest rates have also reduced, resulting in a drop in cash returns and also an increase in fixed interest investment returns. Any mismatching of assets and liabilities will have a direct influence on the surplus arising over the previous year.

Smoothing of returns

With continued falls in equity values the scope for terminal bonus would be declining, and the pressure for a reduction in reversionary bonus would increase. This will be balanced against the level of the retained profits available to smooth returns.

Shareholders' expectations

A reduction in bonuses declared to policyholders will reduce the shareholder's dividend which can be distributed in that year. Hence there may resistance to conservative reversionary bonus distributions.

Policyholder expectations

Bonus policy should be in line with reasonable policyholder expectations, in terms on the variability of bonus declarations and also the form of the bonus (reversionary versus terminal).

Contractual requirements

Are there any linkages required between earnings and bonus rates? Are there specific situations where bonus rates can be adjusted? Are terminal bonus rates payable on maturity only, or death and maturity?

Source of profit

The reversionary bonus rates would more likely be aligned to the yields on the underlying assets, whilst the terminal bonus rate would be used to distribute capital appreciation along with expense, mortality and withdrawal surplus. Hence an analysis of profit is required.

Competition

The competitive situation needs to be considered as poor bonus rates may result in high surrenders and reduced new business.
Recent investment returns: have other key competitors experienced similar recent investment returns, and are therefore also expected to reduce bonus rates?

Capital considerations

What will be the effect of the proposed bonus rates on Trad Life's solvency, capital adequacy and target surplus requirements.
Recent investment returns: This is particularly relevant this year given the large losses on the equity and property portfolios.

Cost of guarantees

The recent changes in volatility and lower current interest rates will increase the cost of guarantees. The value of guarantees must be reserved for as part of the best estimate liability and therefore for Solvency and Capital Adequacy purposes.

Equity

Between policyholders of different terms, entry ages, policy types. A calculation of the asset shares for representative policies will indicate the share of the funds in hands between representative ages, durations and policy types. This can be compared to the prospective reserve which includes a provision for future bonus at the supportable bonus rate (i.e. absolute equity versus smoothness)

New business

The supportable bonus rate for new business would be considered. The recent reduction in interest rates (as shown by the reduction in the cash rate and the increase in the return on the fixed interest portfolio), may warrant a separate bonus scale for new business. The suitability of the current terminal bonus scale for new business, which is a result of a build-up in assets of existing policies, should also be reviewed.

Marking Guide

- **1 mark for recent investment returns**
- **½ mark for smooth returns**
- **1 mark for policyholder expectation**
- **½ mark for shareholder expectations**
- **1 mark for contractual requirements**
- **1 mark for sources of profit**
- **1 mark for competition**
- **1 mark for capital considerations**
- **1 mark for cost of guarantees**
- **1 mark for equity**
- **1 mark for new business**

To a maximum of 8 marks (4 KU: considerations+ 4 SJ: application to Trad life)

b)

Advantages

- Smoothness of returns (consistent with past rates)
- Rewards existing policyholders who contributed to the build up in surplus
- Indicates that the trend in bonus rates is down
- Reduces the risk of lapses / possible rise in new sales

Disadvantages

- creates expectation of a continued smooth bonus rate, which may not be sustainable if interest rates continue to drop
- increases risk of having to further cut terminal bonus rates
- reduces the retained earnings in the fund, thereby reducing the capacity of the fund to withstand further volatility in asset values and also reduced capacity to write new business
- equity: new policies versus long-time inforce
- possible increase in lapses after year 1
- add to administration complexity (risk of error, possible need for manual adjustments)

Marking Guide

- **up to 2 marks for advantages (0.5 marks each)**
- **up to 2 marks for disadvantages (0.5 marks each)**

Maximum 3 marks (SJ)

c)

To: CFO
From: Actuary
Date: 30 June 2009

Subject: Proposed change to strategic asset allocation

You have contacted me for an opinion on the consequences of adopting a new strategic allocation for the Traditional Business Statutory Fund in order to reduce the chance of future strains on capital due to negative investment returns. The key consequences are outlined below along with a description of possible alternative approaches.

Review policy documentation

A review of marketing material, and other material for policyholders which makes reference to assets backing the policies, is required to ensure that the proposed asset allocation is consistent with contractual obligations and accompanying policyholder expectations.

Balance between terminal and reversionary bonus

The proposed move in investment allocation strategy has a greater proportion of assets invested in fixed interest and a lower proportion of assets invested in equity-type investments. This may result in a shift towards a bonus allocation strategy with a greater emphasis on reversionary bonuses and with terminal bonuses making up a lower proportion of the overall return.

Lower expected long term investment returns

The expected long term investment returns of the new asset allocation will to be lower than the current investment policy which will impact bonus rates.

A reduction in bonus rates as a result of the change in asset allocation will not be reflected in competitor's bonus rates (unless they take similar measures) and hence there is potential for a significant increase in withdrawals, and also a reduction in the ability of the company to attract new business.

Capital requirements

The new investment allocation will result in a reduction in the capital requirements due to a significant reduction in the resilience reserve requirements for the equity investments. On the other hand the resilience reserve requirements will increase as a result of any increase in the unmatched fixed interest investments.

Shareholder expectations

Lower expected future investment returns will result in a reduction in expected shareholder's future profits, and hence will flow through to the embedded value and appraisal value of the company. The reduction in capital requirements will result in an increase in shareholder value as the increase in the Adjusted Net Worth will more than offset the reduction in the Value In force and Value of Future New Business.

The new expected return on shareholder capital will depend on the interaction of these two factors. For example if the capital support required from the shareholders is drastically reduced, then even a significantly lower stream of future profits could still provide a higher return on shareholder capital.

Policyholder reasonable expectations

Policyholders will have built up expectation over time based on existing investment practices and bonus policy. Reductions in bonus rates is a result in the change in asset allocation, may not be considerable acceptable by policyholders.

Tax and transaction costs

The change in asset portfolio may require realisation of capital gains tax, and may also result in significant transaction costs through the sale subsequent purchase of assets.

Liquidity issues

Not all assets will be readily realisable, in particular the property investments, and hence a reasonable timeframe will be required to change the investment asset mix. A rapid sale of assets may result in a significant reduction in sale proceeds.

Duration matching

A cash holding of 40% is very high given the long term nature of the liabilities and the

relatively low requirement for cash to meet short term outflows as a result of withdrawals and claim payments.

Also the fixed interest stocks are not matched to the duration of the guaranteed liabilities, and hence exposure to changes in fixed interest yields would remain, and perhaps even increase.

Hence although the proposed strategy will provide protection against falls in equity and property values, there is a significant interest rate risk given the level of mismatching between assets and liabilities.

Alternative strategies may be more effective, such as:

i) Reducing reversionary bonus rates and increasing the reliance on terminal bonus to distribute profits

The recommended change in investment strategy may have been partly driven by the concern that the existing bonus strategy is not sustainable if current trends in the investment markets continue. but would be sustainable under the new investment strategy. Hence a change in the bonus policy could result in a less drastic change to the company's investment policy.

ii) purchase derivatives to protect against equity and property downside risk

The company could attempt to purchase a derivative, or series of derivatives, that moves in line with the cost of guarantees or options when market conditions change.
However, the cost of guarantees and options depends on assumed future management actions, such as bonus rates, and changes in asset mix within the asset share. The company is therefore unlikely to be able to find a derivative that moves exactly in line with the cost of guarantees.

Also, tradeable and liquid equity derivatives are only available at relatively short terms. Property derivatives are not actively traded. The company could purchase a tailored OTC derivative, but this would most likely involve passing significant profit margin to the provider.

Given the recent increase in market volatility, the price of these options will have risen significantly over the past year. The issue of counterparty risk is also very relevant in a period of high volatility of returns, and may result in regulator review of transactions.

iii) Dynamic (delta) hedging

Another approach would be to develop a strategy of selling equities as market values fall. This can be done to attempt to replicate the impact of holding a put option. However, in practice, such sales may not be possible within the required timescales in a rapidly falling market. This will be particularly true for property, which can only be traded in discrete amounts unless it is held via unit trusts. Also, this approach would leave the company exposed to changes in the market implied volatility.

Regards
Actuary

Marking Guide

- **1 mark for reviewing policy documentation**
- **½ mark for balance between reversionary and terminal bonus rates**
- **1 mark for lower expected future investment returns**
- **1 mark for reduced capital requirements**
- **1 mark for shareholder expectations (return on capital)**
- **1 mark for policyholder expectations**
- **½ mark for tax and transaction costs**
- **½ mark for liquidity issues**
- **1 mark for duration matching**
- **2 marks maximum for alternative strategies (1 mark - reducing reversionary bonus rates/ 1 mark – derivatives / 1 mark - dynamic hedging / 1 mark - more balanced investment mix / 1 mark - better duration matching / 1 mark - other appropriate strategy / 0 marks – inject capital / reinsurance)**
- **1 mark for appropriate language & format**

To a maximum of 8 marks (CJ)

QUESTION 3 **(16 Marks)**

You are an actuary working for ABC, a rapidly growing medium sized proprietary Australian Life Insurer who has recently purchased a smaller competitor, DEF.

ABC has recently incorporated DEF's portfolio into its model office system, and is able to produce detailed profit and capital projections by product. It does not currently have stochastic projection capabilities.

ABC and DEF's reinsurance retention levels differ significantly for their retail risk business distributed through third party advisors (TPAs) and ABC's board would like to consider an increase in new business retentions taking into consideration the risk appetite of the merged entity. ABC's board has not formally articulated a risk appetite in a way which assists in formulating reinsurance retention levels.

The current reinsurance arrangements are:

	ABC	DEF
Term life	**Surplus, $250,000 per benefit retained**	**Surplus, $100,000 per life retained**
TPD rider	**Surplus, $150,000 per benefit retained**	**Surplus, $100,000 per life retained**
Trauma rider	**Surplus, $100,000 per benefit retained**	**Surplus, $100,000 per life retained**
Disability Income	**Surplus, $2,000 per month**	**50% quota share**

The reinsurance termination clause contains a recapture option for the in-force business with the recapture fee subject to mutual agreement.

a) What impact do you expect an increased retention to have on product profitability and capital requirements? (3 Marks)

b) Set out the other factors you would take into account in determining your recommended retention. (3 Marks)

c) The latest embedded value report on the combined entity contains the following information on reinsurance:

Value of In-force Business	Gross	Reinsurance	Net
	$m	$m	$m
Term Life	105	-25	80
TPD	40	-18	22
Trauma	50	-10	40
Disability Income	30	-15	15
Total	225	-68	157
Value of One Year's New Business	Gross	Reinsurance	Net
	$m	$m	$m
Term Life	3	-1.5	1.5
TPD	4	-2.5	1.5
Trauma	0.8	0.5	1.3
Disability Income	1.2	-1.3	-0.1
Total	9	-4.8	4.2

The CEO has expressed dismay that that over half the value added by new business was passed across to ABC's reinsurers. He has proposed introducing a $3,000,000 per life retention for lump sum business and a $10,000 per month surplus retention on the Disability Income business. Initial investigations on the impact of the proposal indicate that the proportion of business ceded to reinsurers will reduce by 90%.

Based on this information and the above embedded value report, the CEO has estimated a $61m increase in the value of in-force business and an increase in the value of one year's new business of $4.3m.

Comment on the suitability of the CEO's estimates in determining the expected financial effect of the proposed new retention. (4 Marks)

d) The Appointed Actuary has indicated that a more rigorous process is required to determine the most appropriate retention, taking into account all financial and other considerations. Outline to the Appointed Actuary the main steps you would take to arrive at your recommended retention, highlighting the issues you would take into account. (6 Marks)

QUESTION 3: SOLUTIONS

a) Profitability/capital requirements

- Increased total profitability, as less business and profit will be ceded to reinsurer (unless current arrangement for product cedes a loss to the reinsurer)
- Possible increased profit margin % (if reinsurer required return > insurer's)
- Increased volatility of profit
- Increased solvency and capital adequacy requirements as more capital is required for the retained portfolio
- Capital requirements of new business increased by any reduction in initial reinsurance commission
- Further possible increased capital adequacy requirements as the risk profile of the retained portfolio is increased by higher retention (actuary may increase margin applied to claims rates)

Marking Guide

- **½ mark for increased total profitability (+ ½ mark explanation)**
- **½ mark for increased profit margin (+ ½ mark explanation)**
- **½ mark for increased profit volatility (+ ½ mark explanation)**

To a maximum 2 marks for profitability

- **½ mark for increased capital required for new business**
- **½ mark for higher solv/capad for retained portfolio**
- **½ mark for increased capad margins**

To a maximum of 3 marks (KU)

b) factors

- Impact on economic value (VIF, VFNB, EV/AV, value of 1 year's sales)
- Current level of free capital (above minimum regulatory requirements)
- Risk appetite (risk tolerance) of board
- Relationship with reinsurer
- Business issues / constraints, for example, due to the lack of integration of customer details on the various administration systems, it may not be possible to manage the maximum retained sum insured on any one life from a system perspective. Also, the retention structure that can be supported by the admin system may pose a constraint.
- Consideration as to potential for adverse claims experience in the risk market / experience trends
- Assessment of whether the DII business is reinsured more or less heavily under ABC or DEF arrangement. Depending on the distribution of sums insured for NB, the $2,000/month retention could be lower or higher retention than the 50% quota share
- Level of recapture fee required by reinsurer to increase retention on in-force block & impact on economic value

Marking Guide

- **½ mark for economic value**
- **½ mark for current level of free capital**
- **½ mark for risk appetite**
- **½ mark for relationship with insurer**
- **½ mark for business issues**
- **½ mark for claims experience outlook/trends**
- **½ mark for DII assessment (surplus vs q/s)**
- **½ mark for level of recapture fee**

To a maximum of 3 marks (SJ)

c)

CEO's calculation does not explicitly take into account the following factors

Change in reinsurance rates based on new retention – on the one hand only highly underwritten risks are being ceded implying a lower expected mortality than the current ceded risks, but this will be offset by a significant increase in the reinsurers expense/capital loadings

Change in facultative reinsurance rates – reinsurers may be less willing to accept large sums given the significantly reduced treaty volumes, resulting in lost new business.

Increased capital requirements
Risk business is generally capital intensive with high first year costs as a result of high initial commissions and other acquisition expenses including underwriting expenses, hence a significant increase in capital will be required to support new business.
Increased capital will be required to support the recaptured in-force business which will need to come from the ANW or an external source.

This increase may result in the need to set up a new business reserve as part of the company's capital adequacy reserves, creating a further strain on capital.

Additional capital adequacy margins may also be required on the recaptured business given the lower credibility of experience of higher sums business.

Cost of capital
The shareholder cost of capital may change as a result of the new risk profile of the portfolio (increased volatility).

Recapture costs
A portfolio recapture would be required on the in-force block. The payment will capitalise the reinsurer's future profits. If the reinsurer's require more than $58million, this action will destroy shareholder value.

Business mix
The percentage recaptured will vary by product, hence it is incorrect to assume that the 90% applies across the board to all products.

Marking Guide

- **1 mark for change in reinsurance rates**
- **1 mark for change in facultative reinsurance terms**
- **1 mark for increased capital requirements / capad new business reserve / capad margins on assumptions**
- **1 mark for shareholder cost of capital**
- **1 mark for portfolio recapture costs**
- **½ mark for business mix / distribution of amount at risk**

To a maximum of 4 marks (CJ)

Note: answers suggesting that the CEO's estimate is appropriate indicates a serious misunderstanding, which should be noted in marker comments.

d) Main steps – 6 marks

1. Review reinsurance contracts to understand recapture terms and understand any impacts on average premium per policy

2. Understand Business issues / constraints, for example, due to the lack of integration of customer details on the various administration systems, it may be not possible to manage from a system perspective the maximum retained on any one life. Also, the retention structure that can be supported by the admin system may pose a constraint.

3. Understand board risk tolerance (including a review of the current target surplus policy) and time horizon

   Particularly with respect to profit volatility (e.g. acceptable volatility of profit within a single financial year) and reserve sufficiency / probability of ruin (e.g. probability of breach of solvency liability in a given financial year, over a given number of years).

   Translate risk tolerance into a series of criteria which can be modelled by the current model office system.

4. Perform market study of competitors retentions (particularly those with similar portfolios) – this information is not generally publicly available and hence a review of financial statements and prudential returns would be required to understand the proportion of business ceded by competitors.

5. Understand the influence of the potential retentions on expected decrements (mortality/morbidity) on retained portfolio

   In order to produce credible results an understanding of the influence of retention on best estimate mortality, morbidity and also lapse rates is required. Similarly any increased initial costs from underwriting should be considered.

6. Understand expected profitability implications of potential retentions over time horizon

   Run model office using potential retentions, allowing for the new best estimate decrements. Calculate expected profit over time horizon, allowing for all cashflows including changes in reserves.

7. Understand capital implications of potential retentions over time horizon

   Estimate capital consumption expectations from new business growth under each retention level.
   Project capital position (capital requirements, capital adequacy margins and target surplus)

8. Understand the economic value implications of potential retentions over time horizon

   Recalculate the embedded value of the in-force portfolio, allowing for the expected recapture fee, new decrements, and value of one year's new business.

9. Understand volatility implications of potential retentions

   As ABC does not have stochastic projection capability, a simplified decrement volatility model would be required, for example considering given confidence limits of potential claim profiles with varying retention limits.

   These scenarios can then be run through the model office to determine the profitability, capital and economic value implications.

10. Align volatility implications with board risk tolerance

    The results for each retention can then be compared with the board risk tolerance to determine whether it is acceptable.

11. Recommend retention which results in optimal profitability/volatility tradeoff in the context of board risk tolerance, and also results in access to required reinsurance services such as facultative underwriting support.

Marking Guide

- **½ mark for reinsurance contract conditions**
- **½ mark for business issues**
- **½ mark for board risk tolerance**
- **½ mark for competitor retentions**
- **½ mark for expected decrements**
- **1 mark for expected profit implications**
- **1 mark for expected capital implications**
- **1 mark for expected economic value implications**
- **1 mark for volatility implications**
- **1 mark for trade-offs in recommendation**

To a maximum of 6 marks (CJ)

QUESTION 4 **(16 Marks)**

You are the Appointed Actuary of XXY Insurance, a medium sized Australian life insurer, which is particularly strong in the Yearly Renewable Term (YRT) and Disability Income Insurance (DII) markets, and has a significant in-force portfolio of participating business. The holding company of XXY also owns two other Australian life insurers with significant unit-linked portfolios.

The current distribution of statutory fund assets is as follows:

Cash	**15%**
Fixed Interest Investments	**50%**
Equities	**25%**
Property	**10%**

The board has suggested setting the Target Surplus at a level to cover the reduction in free assets of the company following one year's adverse experience in line with the margins used in the calculation of the Capital Adequacy Requirement.

a) Explain how the proposed Target Surplus policy allows for asset risk, expense risk, mortality/morbidity risk, operational/unit pricing risk. **(6 Marks)**

b) The board has taken note of your observations that this Target Surplus policy is not consistent with current market best practice. Outline possible enhancements to the Target Surplus policy. **(6 Marks)**

c) The board unanimously accepts the proposed new Target Surplus policy above. The following day you receive an email from the CFO "… as our combined entity has a significant excess of capital above our targeted level, the board would like to release this excess capital through a special dividend to our shareholders as part of our capital management programme. As our Appointed Actuary, I would like you to outline the main points to consider before paying this special dividend. "

Draft your response to the CFO including comments on possible alternative uses of capital. **(4 Marks)**

QUESTION 4: SOLUTIONS

a)

The amount of target surplus covers the four significant risks as included in the Capital Adequacy Requirement:

- Asset risk i.e. changes in asset values compared to liability values.

  The target surplus level includes enough capital so that the company will remain capital adequate after the market shocks prescribed in the Capital Adequacy Standard (AS3.04). That is, the target surplus level provides protection against twice the market shock prescribed by the Capital Adequacy Requirement.

  i) Adverse market movements (unmatched) – resilience reserve (using prescribed yield changes by investment sector i.e. equities, property, interest bearing, Indexed Bonds, and adverse exchange movement)
  ii) Holdings in associated and subsidiary financial services entities – inadmissible assets reserve
  iii) Asset concentration – inadmissible assets reserve
  iv) Credit risks – Resilience reserve credit default factors (0-17% depending on counterparty grade) and credit risk yield movement factors
  v) Liquidity risks – general consideration in Capital Adequacy Requirement
  vi) Overall asset risks – actuarial judgement used in calculating Capital Adequacy Requirement

- Expense risk. The target surplus level includes enough capital so that the company will remain capital adequate after applying a margin to the servicing expenses of between 2.5% and 20%. In other words, the target surplus level provides protection against twice the increase in servicing expenses prescribed by the Capital Adequacy Requirement.

- Mortality/morbidity risk. The target surplus level includes enough capital so that the company will remain capital adequate after worsening mortality and morbidity experience, to the degree assumed in determining the Capital Adequacy Requirement. This includes a 10-40% worsening in mortality rates for lump sum business and a 40-80% worsening in claims costs for active lives and 20-35% of BEL for disabled live. As for the other risks, the target surplus level provides protection against twice the adverse claim risk as required by the capital adequacy standard.

- Operational/unit pricing risk, which implicitly allows for operational risk associated with investment-linked business (note that this does not apply to XXY itself as it does not write investment linked business, but would apply to other insurers owned by holding company). The risk margin is between 0.5% and 2.5% of Capital Adequacy Liability (allowing for CTV). Again, this level of target surplus provides coverage for twice the risk margin set out in the Capital Adequacy Standard.

The final Target Surplus requirement is based on the sum of the individual risks, hence effectively assuming they can all happen at the same time.

Marking Guide

- **3 marks for asset risk (0.5 marks per CAR factor)**
- **1 mark for expense risk**
- **1 mark for mortality/morbidity risk**
- **1 mark for operational risk**
- **1 mark for assumed dependency of risks**

Total at maximum of 6 marks (KU)

b)

Possible enhancements:

- Incorporate board risk tolerance into policy
- Extension of the unit pricing risk to include a broader allowance for operational risk, across all statutory funds, not just the unit linked funds.
- Consideration of the diversification benefits arising from being part of the holding group.
- Introducing a probability of ruin to the target surplus calculation, e.g. x% probability of meeting capital adequacy requirements over a one year period.
- A stochastic model should be investigated, at least in respect of market risk calculations. This model would improve understanding of the implied risks of ruin in both the Capital Adequacy Requirement and target surplus.
- If a stochastic model is not feasible, then the development of scenario testing to understand the resilience of the combination of factors chosen. For example, what different levels of factors would give rise to the same target surplus levels? From this, the different implied scenarios can be examined against each other to determine if the probability of each scenario could be considered as broadly similar. If one scenario seems to have a distinctly higher probability, then the target surplus parameters may need to be refined.
- Including the amount of capital required to support a specific financial strength rating (e.g. S&P AA)

Marking Guide

- **1 mark for board risk tolerance**
- **1 mark for extending operational risk allowance**
- **1 mark for diversification benefits**
- **1 mark for probability of ruin**
- **1 mark for stochastic model**
- **1 mark for scenario testing**
- **1 mark for strength rating**

To a maximum of 6 marks (SJ)

c)

To: CFO
From: Actuary
Date: 30 April 2009

Subject: Proposed distribution of capital in excess of target surplus through a special dividend

You have contacted me for an opinion on an immediate distribution of capital in excess of Target Surplus. The key consequences are outlined below.

Target surplus as target not maximum

Target surplus is a targeted amount and not an upper limit. APRA has indicated a need for an action plan in the event that target surplus is breached. If the full distribution is made, breaches of target surplus as a result of future adverse experience are more likely to occur with the subsequent need for management action.

Hence it is prudent, though not required, to retain a buffer to offset experience losses particularly as a result of unavoidable mismatching of assets and liabilities in the participating statutory fund.

Future capital requirements

XXY should understand its capital requirements over the short to medium term to avoid creating a need for a new for a capital injection from shareholders as a result of an immediate distribution of capital.

Such a capital management plan would include a projection of future capital requirements, allowing for future injections and withdrawals of capital. This would allow XXY to understand the effect of an immediate distribution of capital on its ability to fund new business strain, and other new business initiatives and also to internally fund expected planned future projects such as IT upgrades.

Earnings on excess assets (Capital adequacy new business reserve)

The reduction in earnings on excess assets may trigger a new business reserve requirement in the capital adequacy calculation. A recalculation of the capital adequacy reserve is required to determine whether such an additional reserve would be required.

Rating agencies

Rating agencies may downgrade the rating of the company as a result of the reduction in the level of capitalisation, increasing the cost of debt funding for the company

Special dividend is permitted

There are no regulatory requirements which restrict the company's ability to make this special dividend payment.

Alternative uses of excess capital

The company could look to use the excess capital to fund an increase in new business. This could be through new product launches or more competitive pricing and charging structures.

It could also use the capital to invest in other new ventures e.g new distribution channels, buying closed book of business.

In addition, the company may use the excess capital to increase the level of risk it operates with in order to enhance returns. It may change its investment strategy by increasing the credit risk taken its fixed interest portfolio backing the term assurance business and may invest its surplus assets more aggressively than before, for example into equities.

With a high level of excess assets the company may look to reduce its use of reassurance in order to retain a higher proportion of the total profits emerging from the business.

Regards
Actuary

Marking Guide

- **1 mark for Target surplus as target not maximum**
- **½ mark for future capital requirements**
- **½ mark for capital management plan**
- **1 mark for earnings on excess assets (capad new business reserve)**
- **½ mark for rating agencies**
- **1.5 marks for alternative uses of capital (½ mark each)**
- **½ mark for appropriate language & format**
- **To a maximum of 4 marks (CJ)**

QUESTION 5 (12 Marks)

A proprietary life insurance company (PLC) currently writes unit-linked business, personal risk business, and has a large in-force traditional with-profit portfolio.

PLC is considering purchasing a portfolio of ordinary (i.e. non-superannuation) unit-linked business from the ULC insurance company. This portfolio is currently managed in a separate statutory fund. You are a consulting actuary who has been asked to advise PLC on the potential purchase.

(a) Briefly describe the factors you would consider in determining the price to pay for this business. (8 Marks)

(b) PLC has completed the purchase of the portfolio of business. Although due diligence work highlighted some problems in the policy administration system, subsequent investigations have indicated more serious problems in this area.

Describe how these problems could affect the company's profitability and capital requirements. (4 Marks)

QUESTION 5: SOLUTIONS

a)

In determining a price for the portfolio, PLC should make an estimate of the value of the portfolio of business, adjusting for material risk factors.

Income will consist of predominantly of management charges and perhaps also entry/exit fees, and also premiums on any insurance covers offered under the policies.

Outgo will consist of administration expenses, investment management expenses, and claims on any covers offered.

i) Value of the in-force block

Determined from cashflow projection of income and outgo, with the following key characteristics:

Are management fees fixed, or is there scope to adjust fees?

Costs of administering the business
- Understanding the costs incurred by ULC, and how these will change on transferring the portfolio.
- Allowance for inflation

Investment management
- Are these charges passed on to unitholders, or are they wrapped up in a single management charge?
- Will this pass to internal PLC managers or stay with external managers (if so are similar charges expected with external managers?), and what is the expected level of fees?

Assumptions would be on a best estimate basis, allowing for any past experience studies/ financial results
Persistency – allowing for possible loss of business as a result of the transfer

Risk discount rate = discount rate representing the required rate of PLCs shareholders. Tax would be included explicitly in projection, unless a net risk discount rate is used.

All capital requirements generated by the portfolio would be included in the e.g. Capital Adequacy, Target Surplus requirements

Operating costs would be based on PLCs expected costs (may differ significantly from ULC's costs)

ii) Adjusted Net Worth (ANW)- Although it is unlikely that any free assets would be transferred, these should be added to the purchase price in the event that they exist.

iii) Value of new business (VNB) – cross selling. Although there is no new business attached to the portfolio, the portfolio offers new business opportunities through potential increase in regular payments and also single premium payments into the existing products, along with marketing opportunities to offer risk insurance to ex ULC unit-linked policyholders

iv) Other issues:

Unit pricing issues
- when was the last unit pricing review done?
- are there any known unit pricing issues?
- what is the unit pricing methodology - to assess if any issues likely?
- what flexibility exists within the unit pricing - how much of the method is prescribed by policyholder documentation?

Other legacy issues
- Mis-selling

Product design issues
- For example, whether there are any guarantees on the UL book, and how these are being managed

Lack of data issues
- Factored into price through direct adjustment to assumptions or through shareholder risk discount rate

One-off expenses
- Cost of purchase process (due diligence, legal, advisor fees etc)
- Cost of integrating portfolio with existing business (staff retraining/recruitment, systems integration)

Tax implications of sale (change in tax position)

Synergies (economy of scale as a result of the purchase - reduction in capital requirements, reduction in per policy expenses, reduction in future reinsurance cost)

Price requested by ULC
Reason for sale
Level of competition in the market for the purchase
Prices of any comparable deals
Availability of independent estimates of the value of the block

Marking guide

- **½ mark for reference to VIF**
- **½ mark for management fees**
- **½ mark for investment fees**
- **½ mark for administration expenses**
- **1 mark for best estimate assumptions (allowing for past experience studies/financial results)**
- **½ mark for withdrawals on transfer**
- **1 mark for capital requirements**
- **1 mark for risk discount rate**
- **½ mark for ANW – unlikely transferred**
- **½ mark for VNB - cross selling**
- **½ mark for lack of data issues**
- **1.5 marks for unit pricing issues**
- **½ mark for other legacy issues**
- **½ mark for product design issues**
- **½ mark for one-off expenses**
- **½ mark for tax position**
- **½ mark for synergies**
- **½ mark for price requested/level of competition**
- **½ mark for reason for sale/comparable deals/independent estimates**
- **½ mark for additional reasonable points not mentioned above**

To a maximum of 8 marks (SJ)

b)

If the conditions of the sale did not protect PLC against such an event arising, then PLC would be required set up additional reserves to cover future restitution amounts required through mispricing of units or overcharging of fees for existing unitholders, reducing profit.

Additional one-off expenses would also be expected, reducing profit as they occur

- increased staff costs involved in processing restitution payments and account adjustments and also in dealing with customer enquiries and complaints dealing
- cost of system upgrades
- additional audit costs
- additional regulatory requirements, and administrative costs including duplication of work across systems to meet compliance requirements

Additional servicing expenses may be required as a result of any changes in administration procedures, reducing future profits.

Any expected increase in servicing expenses as a result of the problems would increase both Solvency and Capital Adequacy requirements

Solvency Requirement (AS2.04 s 4.2.2) and Capital Adequacy Requirement (AS3.04 s4.4) states that the assumption for servicing expenses should be a margin that is applied to the greater of:

- Actual expenses in last 12 months adjusted for one-off expenses, and
- Best estimate assumption for next 12 months

Additional margins in the Capital Adequacy servicing expenses would also be required to reflect the level of risk for the Related Product Group (RPG) (AS3.04 s4.3)

Hence even if servicing expenses may not be expected to rise, and additional margin may be required given the additional uncertainty surrounding expense levels.

Additional management attention is required to rectify problem, creating a distraction from running the business, and a risk to profitability.

The effect on profitability and future capital requirements would be reduced by appropriate management action.

Shock lapse risk in the event of poor media coverage, could significantly reduce future profitability.

Marking guide

- **1 mark for dependent on conditions of sale**
- **1 mark for setting up appropriate reserves**
- **1 mark for one-off expenses**
- **1 mark for expected servicing expenses and influence on solvency/capad reserves**
- **½ mark for management attention**
- **½ mark for shock lapse risk**

To a maximum of 4 marks (CJ)

QUESTION 6 (18 Marks)

You are the senior actuary of ANOVA, a medium sized subsidiary of a European Life Office in the fictitious country of Ocealia. ANOVA writes group and individual death risk and disability income business in Statutory Fund No. 3, unit linked business in Statutory Fund No. 2 and has a significant conventional participating portfolio in Statutory Fund No. 1

The Shareholders' Fund is entitled to receive all the surplus distributed from Statutory Funds 2 and 3 together with a maximum of 25% of the cost of bonuses declared in respect of the conventional participating business.

The regulatory and financial reporting regime is similar to Australia's, with the following key differences:

- **Liabilities are valued using best estimate assumptions with provisions for adverse deviations (PADs)**
- **Profits and losses may emerge at the point of sale**
- **The effect of changes in liability valuation assumptions are capitalised**

ANOVA performs an annual analysis of the change in shareholder value. Shareholder value is defined as the adjusted net worth plus the present value of future distributable profits of business in-force at the valuation date.

a) Briefly explain the main components into which the change in shareholder value would be analysed. (5 Marks)

b) Over the past 12 months an unexpected change in the economic environment has occurred. There has been a significant reduction in inflation. Although the yields available on fixed interest securities have also dropped significantly across the yield curve, bond spreads have widened. Equities have dropped by 30%, and property values have dropped by 10%. Unemployment in Ocealia has started to rise and is expected to increase significantly over the next 12 months as a result of the general economic downturn.

The CEO has just reviewed the draft accounts and is surprised to find that distributable profit has increased this year, and has asked you to explain this result. Highlight possible causes of this unexpected result. (5 Marks)

c) The holding company is performing a review of its worldwide operations to understand the profitability, capital and economic value implications of the recent turmoil in the world financial markets as part of its "Duck and Cover" risk management project.

Explain the impacts that the changes in the economic environment might have on the components of the change in shareholder value over the year, considering each statutory fund separately. (8 Marks)

QUESTION 6: SOLUTIONS

a)

- Expected change in value

  The unwinding of the risk discount rate, i.e. growing the value of in-force business at the assumed risk discount rate

  The change in value of adjusted net worth (ANW) i.e. simplistically, involves growing the ANW at the assumed fund earning rate, and adjusting for expected dividends (including franking credits) and expected new capital

- Experience variations over period (i.e. actual business volumes, cash-flows and other items that were forecast in the previous shareholder value calculation do not occur as expected) affecting the transfers between the statutory fund and shareholder fund

- Effects of valuation assumption changes.

  Normally would include:
  - investment earnings rate and inflation
  - risk discount rate
  - decrement or claims rates (e.g. mortality, morbidity, lapses/surrender rates)
  - expenses (initial and renewal)
  - bonus rates
  - profit sharing

- The value of new business written during the year.

- Effect of changes in the valuation method & model. Could include changes in methods, model enhancements and corrections.

- Effect of changes in capital requirements

- Unexpected capital transfers in or out of business (including dividends)

Marking guide:
- 1 mark for expected change
- 1 mark for experience variations
- 1 mark for valuation assumption changes
- (½ mark for listing item, ½ mark for brief explanation)
- ½ mark for new business written
- ½ mark for changes in valuation method/model
- ½ mark for changes in capital requirements
- ½ mark for capital transfers

Total 5 marks (KU)

Note: Some students may have included the change in value of adjusted net worth

(excess assets) as a single item (i.e. not split between expected and unexpected) – no penalty

b) Possible causes include:

The reduction in interest rates may have resulted in unexpected increases in the value of fixed interest investments in the shareholder's fund. In the unlikely event that the duration of the fixed interest portfolio is longer than that of the liabilities, a similar profit may have been realised in the relevant non-par statutory funds.

Changes in the valuation assumptions – as the effect of such changes are capitalised in the year of the change

Good claims experience.

Reduction in volume of non profitable new business

Increase in the level of experience profit on surrenders. The economic downturn may result in decreased affordability of insurance and hence increased surrenders. Unexpected profits would arise on policies with a surrender value less than the valuation liability (or similarly lapses of policies with no surrender value, but a positive valuation liability)

Increase in the level of experience profits on expenses. Expense control measures may have resulted in lower expenses than expected.

Unexpected increase in the surplus distributed on the participating portfolio. For example the increase in the value of fixed interest investments may result in higher terminal bonus payments than expected (assuming these are not offset by losses on the equity and property investments). Equally if terminal bonuses are paid on surrenders, an increase in surrenders would result in an increase in the shareholders profit.

Marking guide:
- 1 mark for s/h fund profits on bond portfolio
- ½ mark for fixed interest mismatching profit
- 1 mark for valuation assumption changes
- 1 mark for good claims experience
- ½ mark for reduction in volume of unprofitable new business
- 1 mark for experience profit on surrenders
- ½ mark for experience profit on expenses
- 1 mark for increased par surplus distributed

To maximum of 5 marks (SJ)

c)

- Expected change in value

Unchanged.

- Experience variations over the period:

    - Adjusted Net Worth

As the fixed interest yields have fallen over the year yet bond yields have widened, the influence on bond capital values will depend on the fixed interest bond portfolio mix between Government bonds and Corporate Bonds. Any increase in bond capital values will be offset by decreases in the value of equities and property. The final experience variation on shareholder value may be positive or negative depending on the asset allocation mix of the assets backing the adjusted net worth.

    - Stat Fund No. 1 (traditional par business)

The transfer to shareholders during the year will exceed expected by any increase in bonus declared as a result of an increase in the fixed interest asset values, and also by any increased terminal bonus paid as a result of increased surrenders.

    - Stat Fund No. 2 (Unit Linked)

The unit linked business asset mix is generally weighted towards growth assets. Hence lower than expected returns will result in lower than expected Funds under Management (FuM), causing an unexpected reduction in management fees and hence a lower than expected transfer to shareholders.

Higher than expected surrenders will generate additional administration expenses reducing the transfer to shareholder unless offset by withdrawal penalties.

An increase in switching to lower volatility assets would be expected to generate additional administration expenses combined with potentially lower fee margins reducing the transfer to shareholder unless offset by switching

    - Stat Fund No. 3 (Lump sum risk and DII)

Surrender profit/loss on higher lapses. Higher than expected claims on DII (higher incidence rates and lower termination rates as a result of increased unemployment which increases moral hazard and the potential for fraudulent claims).

- Assumption changes (Value of In-force Profits):

    - Risk Discount Rate (ANW + all statutory funds)

The risk discount rate is based on the shareholder required rate of return. This consists of the return on risk-free assets, increased to reflect the extra risk involved in writing the particular business. Hence a reduction in expected long term interest rates returns may lead to a lower risk discount rate, and will result in an increase the present value of future profits.

In the event that there is a significant reduction in the risk discount rate, this would be the most significant positive impact on shareholder value of the change in investment conditions.

- Stat Fund No. 1 (traditional par business)

The reduction in yields and inflation is likely to lead to lower long term returns on the policies as the duration of the liabilities is generally longer than that of the assets. This is likely to lead to a reduction in future reversionary bonus levels and would act to reduce shareholder value.

The reduction in equity and property values will result in a reduction in terminal bonus rates, and possibly also reversionary bonus rates, and would also act to reduce shareholder value.

In the event that the capital adequacy ratio of the fund has decreased, this may also result in changes in the investment policy, and resulting in a lower expected future return on the statutory fund assets as a whole. This would result in a decrease in expected future bonus rates and hence a reduction in shareholder value.

The reduction in yields and equity and property value has implications for the cost of guarantees (as highlighted in PS200 and GN252), particularly with the reduction in policyholder retained profits.

The worsening economic environment may also result in increased expected surrender rates for financial reasons, eliminating the value in force of those policies that surrender offset by any release in excess reserves on surrender. This will be exacerbated by any additional expected increase in surrenders due to the expected future reduction in bonus rates.

- Stat Fund No. 2 (Unit Linked)

Expected future investment returns will reduce in line with interest rates and or the reduction in risk fee rate. If all asset class returns are measured as a margin above the risk free rate, than an across the board reduction in expected earning rates will occur. This will reduce the projected future value of fund under management (FuM) and hence result in a reduction in fees expressed as a percentage of FuM and hence a reduction in shareholder value.

However the renewal expenses inflation assumption will also be reduced, partly offsetting this reduction in shareholder value.

Lower investment returns, and increased volatility in asset values may result in more conservative investment policies from policyholders and hence a further reduction in expected future value of FuM. As more conservative funds usually have lower margins, and any assumption change with regard to the level of fees would be capitalized.

The less attractive investment outlook and also expected increase in unemployment, may result in an increase in expected lapses, eliminating the value in-force for those policies, less any surrender changes which are applied.

- Stat Fund No. 3 (Lump sum risk and DII)

The reduction in yields and inflation is likely to lead to lower long term returns on the policies as the duration of the liabilities is generally longer than that of the assets. This is likely to lead an increase in valuation reserves which is not offset by a corresponding increase in asset values would act to reduce shareholder value.

However the renewal expenses inflation assumption will also be reduced, partly offsetting this reduction in shareholder value.

The increase in unemployment rates may result in an expected increase in group and individual disability claims income claims incidence rates, and an expected reduction in termination rates as the risk of not having a job the return to increases. Both these factors will increase expected future claims and will reduce shareholder value to the extent that they cannot be offset by corresponding increases in premium rates.

The worsening economic environment may also result in increased expected lapse rates for all individual risk products, eliminating the value in force of those policies that lapse offset by any release in excess reserves on surrender.

- The value of new business written during the year.

Shareholder value may be reduced by the effect of any reduction in new business levels as a result of the changed economic environment. Any reduction in Unit Linked volumes may be offset at least partly by increases in risk business volumes. On the other hand any reduction in the discount rate would favorably impact the value of new business.

- Effect of changes in capital requirements

In the event that the Capital Adequacy New Business Requirement is not met as a result of the economic changes, an additional new business reserve would be required. The shareholder value would be reduced by the cost of holding this reserve.

Marking guide:
- 1 mark for Risk Discount Rate
- 1 mark for Adjusted Net Worth experience variations
- 1 mark for Stat Fund 1 Experience variations (higher bonuses)
- 1 mark for Stat Fund 2 Experience variations (lower FuM, lower fees, higher expenses) - ½ mark for each
- 1 mark for Stat Fund 3 Experience variations (higher surrenders, DII claims) (½ mark for each)
- 2 marks for Stat Fund 1 Assumption changes (investments, bonus, cost of guarantees, expenses, decrements) (½ mark for each)
- 1.5 marks for Stat Fund 2 Assumption changes (investments, expenses, decrements) (½ mark for each)
- 1.5 marks for Stat Fund 3 Assumption changes (investments, expenses, decrements) (½ mark for each)
- ½ mark for value of new business
- ½ mark for effect of changes in capital requirements

To maximum of 8 marks (CJ)

INSTITUTE OF ACTUARIES OF AUSTRALIA

C2B LIFE INSURANCE **APRIL 2009 EXAMINATIONS**

END OF PAPER