COURSE 2A LIFE INSURANCE | OCTOBER 2012 EXAMINATIONS

**Answer all two questions.**

**QUESTION 1** **(30 Marks)**

This question is set in a mythical country which is like Australia in every way except that risk insurances are sold mainly with a 5-year term and level premiums, and reserving and capital requirements are simplified as below.

The following averages have been derived from your company's existing large portfolio of death-only 5 year Level Premium Term insurances for the year to 30 June 2012.

| | |
|---|---|
| Average sum insured | $250,000 |
| Smoothed mortality rates, from company's own experience for non-smoker males aged 30 to 50 | 50% of attached Standard Table |
| Mortality rates used 2 years ago for rating this product | 60% of Standard Table |
| Reinsurer current recommended mortality rates | 59% of Standard table |
| Reinsurer mortality rates included in existing treaty | 59% of Standard Table |
| Per-policy annual expenses | $60.00 |
| Initial expenses not related to commission | 50% of new annual premium |
| Initial commission and commission overheads | 100% of new annual premium |
| Renewal commission and commission overheads | 10% of renewal annual premiums |
| Overhead expenses | 10% of all premium income |
| Investment return (near-cash asset backing) | 3% |
| Lapse rate year 1 | 20% |
| Lapse rate years 2+ | 10% pa |
| Policy liability to be reserved from start of each year<br><br>Safety margin of capital to be allocated at start of each year | Present value of future expected claims plus expenses less premiums, discounting at the expected earning rate<br><br>10% of the present value of future expected claims |

The company's required minimum pre-tax return on capital is 12% pa, but most risk products have been priced to include a pre-tax profit margin of 10% of gross premiums.

Your company has asked you to suggest a premium rate for a new 5-year level premium product to be used for nil-commission sales made by advisors charging a fee-for-service to the client. The Marketing Division is keen to have a very competitive rate for this new sales initiative. Using the data above and/or other assumptions that you specify, derive and justify a premium rate for non-smoker males age 35 at entry.

Your answer should be in the form of a note to the Chief Actuary, as a basis for your discussions with him. It can be informal, but must be clear and complete so that his formal advice can be based on it. Different assumptions and premium rates can be discussed, but a single recommendation must be given in each case. A clearly labelled spreadsheet calculating the premium rate should be included. The Chief Actuary has suggested you consider allowance for mortality selection, even though the company has not done that in the past.

**Attachments**

1. 2A_LAQ1_October_2012_Data - Standard_Mortality_Table.xlsx

## MARKING GUIDE: QUESTION 1

A bare pass will make some reasonable assumptions then use them in a projection spreadsheet of cash-flows designed to calculate a premium. A reasonableness check on the rate per mille should mention if the result does not look right. A copy of the spreadsheet must be included to “show working”.

Good answers will clearly justify the (reasonable!) assumptions, will deal with more of the assumptions, and will present a spreadsheet that is readily understood and does not have errors. Very good answers will illustrate the variability of rates caused by different major assumptions on mortality and expenses, and could mention the need to compare premium rates with competing products. (Approximate mark scale below.)

Assumptions should include:

- Commission & overheads excluded, but need to discuss and make an assumption of what “marketing” costs may still be needed (must be lower than the commission costs). This might even include some renewal costs as well as initial, and could be $ per policy or % premium.
- Inflation – can be dealt with by specifying a $60 policy fee plus indexation. Better answers will mention the mismatch between life expenses and the CPI. If automatic indexation of the sum insured is included, that should cater for the rest.
- Mortality - mention conflicting mortality rates, and credibility of results. Better answers will mention the apparently downward trend, population mortality improvements, and may include some allowance for future improvements related to the period until the rates are expected to be reviewed.
- Mortality selection – this is meant to refer to lighter mortality in the first couple of years, but better students could also mention selection by policy size (large SI better risks?). Avoid reducing early-years mortality without compensation by increasing it in later years – the experience is an average (presumably mature).
- Profit margin – it is unlikely that less than 12% return on capital would be acceptable. No more than 10% of premium. Probably barely above the 12%, to fit the Marketing desire. Better answers will discuss the concept of marginal profit, and mention channel conflict / product cannibalisation that could be caused by these lower premium rates. Note that the profit margin required to attain 12% is very low, so care will be needed with leverage and unnecessarily underpricing the market.
- Expenses – relate to business volumes which have been large in the past and will hopefully be large in the future for this product, ie note uncertainty. Premium %s will make life easy, but flat $ costs can be used if related to the previous (and assumed?) average policy size. Note that overhead expenses are also incurred in the first year, but that the $60 policy fee can be dealt with separately.
- Projection period of 5 years. Some answers may mention an option to rollover to a new policy at maturity, but that is really outside the scope of the question.
- Lapses – 20% & 10% are OK, but good answers will mention the unknowns of the new product, and even whether 20% / 10% had varied in prior years. Presumably model lapses at end of each year (and premiums annually in advance), but should at least specify what the assumption timing is.
- Investment earnings – 3% is historically low so a slightly higher rate could be assumed. Will apply for at least 6 years, depending on when rates are re-set. Suggest 2% to 5%.

- Reinsurance cost – is not mentioned in the question, but good answers could at least refer to a small cost for larger policies.

**APPROXIMATE MARKING SCALE (Assuming Pass Mark of 18/30)**

| MARKS | DESCRIPTION |
|---|---|
| **1 – 12** | The first 12 marks can be earned, 1 mark each, by justifying 6 assumptions and correctly constructing 6 columns of a pricing spreadsheet. |
| **13 – 17** | Allocated where they have also justified more assumptions, or produced a price, but have still not demonstrated understanding of the whole process, and particularly of the profit / price decision. |
| **18 – 21** | As above, and has also discussed the big-picture issue of profit, comparing to existing product price and profit. Assumption descriptions show an understanding of the real world. Clear recommendation of premium rate and of each assumption. |
| **22 – 27** | As above, plus a clearly set out spreadsheet correctly derives a reasonable price. Also discusses some of the small or implicit assumptions such as expense inflation. |
| **28+** | As above, and also discusses features of the 5-year Level premium product rather than YRT. No Surrender Value, so some profit on lapse to partially offset the initial expense strain. Mentions impact on profit of changes in assumptions for expenses, mortality and lapses. |

**QUESTION 2** **(30 Marks)**

You have managerial responsibility for the unit pricing backing the $10 billion of retail investment products at your large, diversified financial institution. As part of month-end reconciliation, you have discovered an error in the daily Australian Equities unit prices. These prices have also been used in setting prices for the Growth, Balanced and Stable units. It appears the Australian Equity prices have been overstated by approximately 1% for the past 2 to 3 weeks. The error affects unit trusts, plus Ordinary and Superannuation policies within the life insurance company.

Your Line Manager has convened a meeting 1 hour from now to discuss the problem. Document the full extent of the problem and your recommended solutions. Your document does not need to be formal, but it should be suitable to be used as a handout at the meeting, which will include some non-technical Managers. It should include a list, with explanations and justifications, of actions you suggest should be performed. It should cover the who, what, why and when for your proposals in respect of all affected business lines and all affected transaction types. It should illustrate the problems with some numerical examples.

In addition to correcting the problem, describe the further investigations and other actions you would take to reduce the risk of recurrence, as you will bring this up at the end of the meeting.

 

**MARKING GUIDE: QUESTION 2**

Good answers will start with an initial Summary of the important issues, before going on to a detailed list as requested.

A bare pass will describe the problems for inflows and outflows, and how to correct them via recalculations, cheques and/or capital injections. Better answers will refer to Standards, notification of APRA, ASIC, auditors, involvement of them and possibly independent consultants in designing, carrying out and confirming the corrections. Issues of documentation, accuracy, timeliness and communication (internal and external) should be mentioned, particularly the first urgent action of “stop transacting”.

Good answers will describe the legal differences between unit trust and Life business, and hence the different sources of additional funds. Communication with clients will also be mentioned. Consideration of consistency between Trust and Life business would also be mentioned in good answers. A sign-off /approval process for the corrections would be good.

Good answers will have a complete list of the affected transaction types, unit types and product types, with mention of the tax differences. Bare passes will list most types, but (for example) may miss a few less obvious transaction types such as fees and switches.

In order to pass, at least 2 numerical illustrations must be given, with coherent descriptions of units and dollars. They must include at least 1 inflow and 1 outflow transaction. Better answers will have more than 2 examples.

A practical cost/benefit argument should be introduced in relation to recovery of overpayments.

“Other suggestions” should focus on identifying exactly what has caused the problem, the period affected, and reducing the risk of something similar happening again.

**APPROXIMATE MARKING SCALE (Assuming Pass Mark of 18/30)**

| MARKS | DESCRIPTION |
|---|---|
| **0 – 4** | Shows little knowledge of the need to make corrections or the variety of affected transactions |
| **5 – 10** | Correctly lists some of the affected transactions, with recommendations for correcting them. Identifies the need to stop processing until correct prices have been agreed. |
| **11 – 17** | As above, plus coverage of most error types, with at least 1 numerical example. Correction recommendations are reasonably practical. |
| **18 – 22** | As above, but with at least 2 numerical examples, clearly and correctly explained. Full coverage of inwards and outwards transaction types. Mentions need to precisely identify the problem impact by cause, impact and dates. Discusses communication to clients, regulator, auditor, intermediaries. Timeline or specified order of events. Mentions review of processes to reduce chance of future errors. |

| | |
|---|---|
| **23 – 27** | As above, plus clear and orderly communication of all problems, with cost/benefit used to decide whether it is worth trying to recover overpayments. May illustrate with more than 2 examples. Appreciation of the different tax statuses. Suggests specific roles for project team people, and hence skills required on the team |
| **28+** | As above, and shows real-world understanding of the problem, clearly communicates logical and complete recommendations for timely corrections. Mentions possibly different source of compensation between Life and non-life unitised pools, but consideration of consistency and company reputation. |

## END OF PAPER