

EXAMINATION

2 June 2010 (am)

Subject F102 — Life Insurance Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all 9 questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

<p><i>In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.</i></p>
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QUESTION 1

In the context of unit-linked life insurance savings products:

- i. Describe briefly the difference between a bid pricing basis and an offer pricing basis. [2]
- ii. Explain why it may be advantageous, ignoring performance of individual investments, for a policyholder to invest through a unit-linked life insurance savings product instead of directly in the market. [3]

Total [5]

QUESTION 2

Company A and Company B are life insurance companies operating in the same market. Both companies sell with-profit endowment assurances with surplus distributed using the UK-style additions to benefits method.

The bonus philosophies of the two companies differ. Whereas Company A has tended to have lower and more stable reversionary bonuses than Company B, Company B has tended to have lower and more stable terminal bonuses than Company A.

- i. State, with a reason, whether the different bonus philosophies would have a direct effect on the asset shares for in-force policies of the two companies and describe how each company could use asset shares to assist in deciding on the level of bonuses to declare. [4]
- ii. Outline the arguments that each of the companies could use to support the claim that their chosen bonus philosophy is in the best interests of the policyholders. [3]
- iii. Describe the key characteristics of the revalorisation method of distributing surplus and state, with a reason, which of the two additions to benefits bonus philosophies described above is more similar to the revalorisation method. [3]

Total [10]

PLEASE TURN OVER

QUESTION 3

- i. State the principles a life insurance company should follow when establishing supervisory reserves. [6]
- ii. A life insurance company operating in a particular developed market intends moving away from its traditional approach to liability valuation to a market-consistent valuation based on a financial economic modelling approach. Explain the rationale behind this approach, and outline how such an approach could be applied to the valuation of the company's single premium level immediate annuities (which offer no surrender values), including how the key assumptions could be set. [7]
- iii. Outline briefly the reasons why supervisory reserves and solvency capital are normally included in a cashflow model when pricing or designing a life insurance product: [3]
- Total [16]

QUESTION 4

You are the statutory actuary of a small, new, life insurance company operating in a country with a developed life insurance market. Your company only writes conventional life insurance business. You are responsible for setting all of the assumptions for the valuation.

The Managing Director is concerned about protecting the future profitability of the business, and in particular is concerned about the risk associated with inaccurate valuation assumptions.

Explain what you may be able to do (other than through the use of reinsurance) to remove as much of the risk associated with the possibility of the company's actual experience differing from the valuation assumptions as possible, and what problems you might encounter in trying to do this.

[10]

PLEASE TURN OVER

QUESTION 5

You have recently taken over as the statutory actuary of a small life insurance company. The company has been in existence for 5 years and sells only mortality-related life insurance products.

You were surprised to find that the company only retains 5% of each risk, up to a maximum of R20 000, the rest being reinsured with one of the five reinsurance companies active in the market. You asked the CEO why this was the case and she said that it was because the company had little actuarial expertise when it started up, and its capital was limited. However, both of these factors have now changed and the CEO is happy for you to recommend a change in reinsurance strategy.

- i. Describe briefly how you could go about deciding what level of retention your company should have in future. [6]
- ii. Outline briefly the factors that you would consider in choosing which reinsurer to work with in future. [4]

Total [10]

QUESTION 6

- i. List the principles an insurance company should consider when determining how to calculate surrender values. [6]
- ii. List reasons why a policyholder might wish to make his/her policy paid-up, and reasons why an insurance company might prefer this to a surrender. [2]

Total [8]

QUESTION 7

The multinational life company for which you work has just released its financial year-end results. The analysis of change in the embedded value shows a substantial increase in the value of in-force business from the previous year.

Discuss possible reasons for this increase.

[4]

PLEASE TURN OVER

QUESTION 8

A subsidiary of the life insurance company for which you work is about to launch a “reverse mortgage” product. Retired home-owners with no mortgages can take out a loan which is secured against the equity in their homes. The loan will be issued for an initial period of 5 years, but may be extended at the end of this period to any maturity date selected by the home-owner.

The loan accrues interest at the (variable) bank prime overdraft loan rate plus 2% per annum. The loan does not need to be serviced (i.e. no payments of capital, interest or other charges are required) before the final maturity date (or the earlier death of the home-owner). At the final maturity date (or earlier death of the home-owner) the full outstanding amount of the loan (i.e. principal, rolled-up interest and any other charges) will be repaid, usually by means of selling the home.

The subsidiary has asked the life insurance company to underwrite a policy that will cover any shortfall, at the final maturity date (or earlier death of the home-owner), between:

1. the value of the house; and
2. the total outstanding amount of the loan (if greater than the value of the house).

The premium for this “non-negative equity guarantee” (NNEG) policy will be included as a level monthly charge on the loan for the initial 5-year term only – despite the fact that the guarantee will also apply (without further charge) to any extension of the original term of the loan.

- i. Describe briefly how each of the following items represent risks to the life office of providing the NNEG:
 - a. longevity
 - b. anti-selection after the initial 5-year term of the loan
 - c. prime overdraft loan rate relative to growth in house prices

[3]
- ii. Describe how the company may use stochastic modelling to calculate the premium for the guarantee.

[6]
- iii. You are considering investing in such loans to back the life company’s conventional life annuity business.

Outline the most important factors you need to consider in putting forward a proposal on the appropriateness of this strategy to the company’s investment committee.

[4]

Total [13]

PLEASE TURN OVER

QUESTION 9

In a particular developing country underground coal mining is a major industry. The coal mines in the country are situated well outside of the country's largest cities. The miners live in relatively isolated communities close to the coal mines. The high-density housing estates on which the miners live are owned by the mining company.

To date the insurance of mine-workers has been a largely untapped market in this country. The mining company has approached a major insurance company to provide its employees with level regular premium Term Assurance policies. The contracts to be offered to the employees will have a decreasing sum assured, commencing at three times annual salary and reducing to a level equal to the employees' annual salary at the time the contract was taken out, by the end of the policy term (i.e. the mine-workers' normal retirement age of 60).

The policies are to be sold through insurance agents employed by the insurance company, who will collect premiums on a weekly basis from the mining company employees (who are paid in cash on a weekly basis). The only evidence of health that will be required for the issuing of a policy is that the applicant should be "actively at work" at the time of application.

The mining company will provide the agents with opportunities to market the contracts to employees, and office space to meet with prospective clients.

- i. Outline briefly the various aspects of contract distribution or design which the country's insurance regulator may control. [4]
- ii. Explain why the contracts are unlikely to offer any withdrawal benefits. [2]
- iii. Outline the risk the insurance company would face in respect of the items below if it goes ahead with this proposal:
 - a. mortality;
 - b. expenses; and
 - c. withdrawals.[8]

The possibility of this new market is very attractive to the insurance company as it has been losing market share over the past few years in the term assurance market.

- iv. Outline reasons why the company may have been losing market share. [5]
- v. Outline the various actions the insurance company could take to reverse the trend of its falling market share in the term assurance market. [5]

Total [24]

END OF PAPER