

EXAMINATION

18 April 2007 (am)

Subject SA2 — Life Insurance Specialist Applications

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 both 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.</i></p>

1 A proprietary life insurance company currently sells a range of with profits products. It also sells without profits immediate annuities.

- (i) Discuss how the company can manage its longevity risk. [8]

The company is considering selling impaired life annuities where more favourable rates are offered to single life annuitants who either smoke or have a medical condition which shortens their life expectancy.

- (ii) Discuss the additional risks associated with offering impaired life annuities. [6]

The Finance Director has decided to utilise the company's experience in both the annuity and with profits markets by selling unitised with profits annuities. The new product will allow a customer to choose an anticipated bonus rate (ABR). The ABR will determine the initial guaranteed annuity, which will then decrease each year by $1/(1 + \text{ABR})$ and increase when bonuses are added. The company will allocate reversionary bonuses (RB) and terminal bonuses (TB) each year. Once declared, the RB becomes a guaranteed addition to the annuity for the rest of an annuitant's life.

The guaranteed annuity payable annually in arrear in any year t ($\text{ann}(t)$) will be determined by the following formula:

$$\text{ann}(t) = \text{ann}(0) * \prod_{r=1}^t [1 + \text{RB}(r)] / (1 + \text{ABR})^t$$

where $\text{ann}(0)$ is the initial guaranteed annuity;

$\text{RB}(r)$ is the RB declared in year r , which is applied to the annuity payable at the end of year r .

TB will be payable on top of this in each year that it is declared. TB can be zero but not negative.

- (iii) Discuss the main factors and the main risks to consider in designing the product, including whether any of these risks could be passed on to the policyholder. [23]
- (iv) Describe how the company could use a deterministic approach to set the initial annuity value for a given ABR and premium. [3]
- (v) Describe how the company could determine the level of bonus rates to set at each declaration. [10]

The With-Profits Actuary has decided to charge for both the cost of the investment guarantees and the cost of the capital support. The charge for the cost of guarantees will be fixed at the outset of the contract.

- (vi) Discuss how the company could calculate the cost of the investment guarantees (there is no need to discuss how this charge will be applied). [12]

The With-Profits Actuary would like the charge for capital support to be based on the ICA relating to this business on a standalone basis. Two methods for applying this charge are being considered:

- (a) The “asset share charging approach”, where the size of the charge applied is in proportion to the asset share, and
- (b) The “capital support charging approach”, where the size of the charge applied is in proportion to the capital support required.
- (vii) Discuss these two methods. [6]

[Total 68]

2 A well established UK mutual life insurance company has with profits liabilities of £650m and has written a variety of conventional with profits and without profits contracts for many years. The company is open to new business.

- (i) List the main duties of the Actuarial Function Holder relating to the company’s ability to meet liabilities to policyholders, as described in Guidance Note 40. [3]

The Actuarial Function Holder is to carry out the statutory valuation of the liabilities of the company, as required under the Integrated Prudential Source Book.

- (ii) Describe the key differences between the Peak 1 and Peak 2 liability calculations and assumptions under the Pillar 1 “twin peaks” approach. [10]
- (iii) Describe the differences between the Peak 1 and Peak 2 capital requirement calculations. [6]

The valuation under the twin peaks approach gives the following values:

Admissible assets less Peak 1 mathematical reserves = £65m

Peak 2 working capital = £60m

Long term insurance capital requirement = £2.3m

Resilience capital requirement = £1.8m

Risk capital margin = £5.5m

- (iv) Calculate the capital resources requirement for the company. [4]
- (v) Describe the practical difficulties, other than those which relate to investment returns and tax, that the company may face in calculating the asset shares used in the valuation. [9]

[Total 32]

END OF PAPER