EXAMINATION

5 April 2005 (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.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator.

1 A UK life insurance company sells mainly unit-linked contracts. The Board of this company has agreed a merger with another life insurance company that also sells mainly unit-linked contracts. Both companies operate a range of unit-linked funds including equity, fixed interest, property and balanced (or "managed") funds.

As an actuary employed by this insurance company, you have been asked to provide advice to the Board regarding the potential for mergers between the unit-linked funds of the two companies.

(i) Describe the key factors that should be taken into account when considering whether or not to merge the unit-linked funds. [6]

It has now been decided that the two sets of unit-linked funds should be merged.

(ii) Discuss the key considerations for the new combined company regarding the calculation of unit prices at the merger date. [8]

(iii) Discuss the key considerations for the management of the investments in the merged unit-linked funds, including guidelines on the portfolio of assets to be held in each fund. [18]

[Total 32]

2 Company A is a small UK mutual life insurance company that writes a range of conventional with profits and unitised with profits business. It has never offered unit-linked or without profits business.

One of its products is a unitised with profits single premium bond. 95% of the premium is used to purchase units and there are no other charges. The units increase in value at the annual bonus rate. There is no guaranteed bonus rate and there are no surrender penalties. Terminal bonus may, at the discretion of the company, be added to the benefit arising from a claim. A market value adjustment may be applied to a claim, except on surrender at the tenth policy anniversary or on death.

Following generally poor equity market returns for several years, the solvency position of Company A has weakened. In the last six months, the situation has worsened significantly, with the market value of equities having fallen by 30% over that period. The proportion of investments backing with profits business that is invested in equities is currently around 50%, with the remaining 50% in a mixed portfolio of fixed interest government bonds. Fixed interest yields have remained relatively stable over the past year.

A policyholder has written to Company A after requesting and receiving a surrender value quotation on the fifth anniversary of his policy. The surrender value calculation included the application of a market value adjustment of 10%. The policyholder has complained that the policy document stated clearly that there were no surrender penalties, and the application of a 10% penalty is therefore in breach of the contract. He has also pointed out that at the time he purchased the bond, around 70% of the fund was invested in equities. He suggests that Company A has acted improperly in reducing this proportion without his agreement.

The policyholder goes on to say that, in accordance with the "Unfair Terms in Consumer Contracts Regulations 1999", he is therefore demanding that the "10% penalty" be removed and that the proceeds from the bond be paid out to him immediately.

(i) Explain the points that Company A should take into account when preparing a response to the comments made by the policyholder on the following issues:

(a) The relevance of the "Unfair Terms in Consumer Contracts Regulations 1999". [5]

(b) The application of a market value adjustment to the surrender value. [11]

(c) The change in investment mix. [5]

To date, Company A has not made any charges to its policyholders for the cost of the ten year guarantee on these bonds. It wishes to test the sustainability of this approach by estimating the cost using the Black Scholes pricing formula for a put option:

Cost of option = $X \,.\, e^{-rT} \,.\, N[-d_2] - S \,.\, N[-d_1]$

where $d_1 = \{\ln(S / X) + (r + \sigma^2/2) \,.\, T\} \,/\, (\sigma \,.\, \sqrt{T})$

$d_2 = d_1 - \sigma \,.\, \sqrt{T}$

X = exercise (or "strike") price of option

r = continuous risk free rate

T = time to option exercise date

$N[.]$ = standard normal distribution function

S = initial value of underlying assets

σ = volatility of underlying assets (standard deviation)

The underlying price volatility of the equities backing with profits business is 20%, and of the fixed interest investments is 10%. There is some correlation between these two types of investment, resulting in an overall volatility of the portfolio of 16.58%. The continuous risk free rate is 5% per annum.

Asset shares are subject to total expense charges equivalent to 7.5% of the initial premium. Annual bonus rates are expected to be 4% per annum throughout the period. Tax, mortality and lapses should be ignored.

(ii) Calculate the cost of the ten year guarantee for a new bond with a premium of £20,000. (You should show all your workings.) [9]

A manager at Company A has commented that this calculated cost of guarantee appears to be very high. He has therefore suggested that the company should eliminate the cost by investing 100% rather than 50% in the fixed interest portfolio.

(iii) Discuss this suggestion. [12]

Company B is also a small UK mutual life insurance company. It writes similar products to those written by Company A other than unitised with profits bonds. However, Company B also offers a range of conventional without profits protection and annuity business.

Company B has approached Company A to discuss a merger, and it has been agreed that the synergies arising from expense savings would be of benefit to both companies. It has been suggested that the funds of each company are merged into a single long-term insurance fund in the new combined Company AB.

(iv) Discuss the potential implications of this merger for the different groups of policyholders involved, and hence the factors that the Boards of the two companies should take into account when agreeing principles for the management of these different groups of policies within Company AB. [26]

[Total 68]

END OF PAPER