

# EXAMINATION

15 April 2005 (am)

## Certificate in Practical Financial Economics

*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 8 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**
- (i) Describe three key assumptions underlying the validity of the CAPM. [3]
- (ii) In the context of the CAPM discuss the concept of systematic risk for a risky security. [3]

You are given the following historical information for a share in ABC company and for a portfolio of 100 shares:

	<i>Return (% p.a.)</i>	<i>Standard deviation (% p.a.) of return</i>	<i>beta</i>
Portfolio	10.5	16	1.1
ABC	8.5	20	0.7

- (iii) Show that these results are consistent with the CAPM. [3]

A student has commented that ABC's lower return and higher standard deviation, relative to the 100 share portfolio, contradicts the predictions of the CAPM.

- (iv) Discuss the student's comment. [3]
- [Total 12]

- 2**
- (i) Describe how management may not be acting in shareholders' best interests if management exhibits the following behaviours:
- empire building
  - avoidance of risk
- [3]

You work for a firm of consultants and have recommended that management incentives be based on the concept of residual income (equal to profit less cost of capital).

- (ii) Describe the rationale behind this recommendation. [2]

The shareholders of the firm are concerned that this idea may discourage investment in new technology.

- (iii) Set out the key points that you would make in your response. [3]
- [Total 8]

- 3 (i) Describe the three forms of market efficiency. [3]

At the quarterly meeting of the Auger Close Investment Club, four members are making proposals for new equity investment for the club.

Albert wants to buy shares in Armadillo Adventures, claiming that they have performed poorly in recent weeks and are due an upturn.

Brian wants to invest in Biscuits-R-Us. They have recruited a new head of marketing, who has had successes at other companies. Brian feels that this new appointment will have a positive effect on the firm.

Colin selects shares at random. This quarter he is recommending the club buy into Cash 4 Kidneys PLC.

Dennis wants the club to buy shares in Diamond Dentists (“DD”). His brother works for a major health insurer and has insider information that DD’s shares will rise sharply in the near future, when it is announced that his company has appointed DD as its “dentist of choice”.

- (ii) For each club member, describe how their share selection strategy would work in strongly efficient, semi-strongly efficient, weakly efficient and inefficient markets. [7]

[Total 10]

- 4** (i) (a) Sketch the graph of an individual investor's utility function in the case where the investor is:
- a risk lover
  - risk neutral
  - risk averse
- [3]

- (b) Explain the general shape of your graphs. [1]

An investor's utility function is of the form  $-100,000 / W$  ( $W > 0$ ), where  $W$  is the investor's wealth in pounds sterling.

- (ii) Show that the utility function is consistent with the principle of non-satiation. [1]
- (iii) Describe the investor's attitude to risk. [2]
- (iv) Explain the concept of expected utility in the context of this investor. [3]

The investor is considering insuring his house, currently worth £100,000, against the risk of fire. He assesses the probability of a loss of 50% of total value at 5% and that of a 20% loss at 10%. If a loss occurs due to fire then these are the only two possibilities.

- (v) Assuming that the investor has no other source of wealth nor any debt, calculate the maximum risk premium, in excess of the expected loss, that he would be prepared to pay to insure against this risk. [4]
- [Total 14]

- 5** A proprietary life company issues only non-profit guaranteed growth bonds. The company invests only in equities with an expected return of 10% p.a, the risk free rate being 5% p.a. At the balance sheet date there were £100m of equities and growth bonds with a maturity value of £80m, the bonds all maturing in exactly one year's time.

- (i) Assuming that the possibility of default by the insurance company may be ignored, calculate, using the result of Modigliani Miller for the cost of equity capital or otherwise, the appropriate risk discount rate to value the shareholder's interest in the portfolio of growth bonds. [5]
- (ii) Explain the theoretical impact on the risk discount rate of allowing for the default of part or all of policyholder benefits. [2]
- (iii) (a) Explain what is meant by "franchise value" in the context of a life company. [2]
- (b) Describe in general terms how the franchise value varies with the amount of capital on the life company balance sheet. [3]

[Total 12]

- 6** (i) For an investment trust describe:
- (a) the corporate structure
  - (b) the main parties involved
  - (c) how the price of shares is determined
- [3]

A work colleague states that he has heard that investment trusts often trade at a discount to their net present value. He is always looking for a good investment and believes that he should be able to make money through day trading in investment trusts. He has asked you as the resident finance expert whether his ideas have merit.

- (ii) Set out the points you would make. [4]
- [Total 7]

- 7** You work for a UK industrial company which manufactures and sells tyres worldwide. You source your raw materials from Brazil and have factories in your main regions of sale. Your company's profitability has recently been below par for the industry and rumours are abounding that this is due to poor implementation of sound strategic decisions.

You have been put in charge of a new project to analyse the risks that the company is taking on, in order to increase management's understanding.

Your first task is to produce a comprehensive risk register for your organisation.

- (i) Set out the steps you would take to achieve this, including comments on:
- what categories of risk you would use
  - what information is most relevant for each of the risks
  - how you might decide whether a risk should be included
- [12]

You find that three events stand out as having caused significant losses in the past. These are:

- exposure to US dollar exchange rate movements
- exposure to Brazilian political risk
- strikes in your manufacturing plants

- (ii) For each of these list two methods by which the company could mitigate the risk. [3]
- [Total 15]

- 8 Surreal Madrid are considering signing Salvador Dali. Dali has no footballing skills but is expected to generate funds from shirt sales.

The terms of Dali's contract offer are:

- expires in 3 years
- salary €0.5M per annum
- fixed bonus of €0.5M per annum dependent on contract not being cancelled
- after 1 and 2 years, Surreal Madrid have the option to cancel the contract, and would have to pay in full any outstanding salary (but not bonus)

Negotiations with Dali's agent are stalling, with the cancellation option being a problem. To aid their negotiations, the club have asked you, as their club economist, to place a value on the cancellation option.

In analysing the problem, you have assumed that salary and bonus are payable annually in advance and that shirt sale profits are generated at the start of each year, conditional upon Dali's contract not being cancelled.

You have constructed a Binomial tree (with figures in millions of Euros) for the possible levels of future yearly profits on shirts.

<i>Time 0</i>	<i>Time 1</i>	<i>Time 2</i>	<i>Time 3</i>
			0
		2.226	
	1.492		0
1		1	
	0.670		0
		0.449	
			0

To clarify the tree, the process at times 1 and 2 is as follows:

- The club identifies what the profit will be at that time if the contract is renewed (at time 1, this will be either 1.492 million Euros or 0.670 million Euros).
- The club decides whether to renew the contract.
- If the contract is renewed, then the club pays one year's salary and bonus in advance and receives the shirt profits at that node in the tree at the same time.
- If the contract is cancelled, the club pays in full any outstanding salary under the contract. No bonuses are paid and no shirt sales generated.

- (i) Calculate (to three decimal places) the risk-neutral probabilities at each node, by setting expected profit growth equal to the risk free rate. [2]
- (ii) Calculate the value of the Dali contract to the club at each node of the tree, just before and after the salary/bonus/profit cashflows payable at that node:
- without the cancellation option
  - with the cancellation option [16]
- (iii) State the value to the club of the cancellation option at the start of the contract. [1]
- (iv) Give examples of three other types of real option that Surreal Madrid should be considering in deciding whether to go ahead with the deal. [3]

The risk free rate of return is 6% p.a. annually compounded. Tax can be ignored.

[Total 22]

**END OF PAPER**