EXAMINATION

7 April 2006 (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.*

Graph paper is required for this paper.

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 Describe the Fama-French three-factor model and the empirical evidence against CAPM that it seeks directly to address. [5]

2 (i) Describe briefly the following terms found in research on behavioural finance:

(a) mental accounting
(b) recency effect
(c) myopic loss aversion
(d) framing
(e) confirmation bias [5]

At the quarterly meeting of the Auger Close Investment Club, the four members often discuss their views of the financial markets which influence the investment direction of the Club.

Albert regularly produces a chart showing a series of rolling 10-year equity and bond returns to support his arguments for investing 100% in equities rather than considering bond investment.

Brian produces buy/sell recommendations for the Club by considering the market's expectations of future profits and earnings adjusted by a margin for his own beliefs.

Colin was concerned at the end of the 1990s at the extraordinary increase in the value of technology stocks held by the Club. He often talked about the "irrational exuberance" of the market but never voted for a reduction in the Club's holdings of technology stocks.

Dennis was extremely disappointed at the end of 2002 as the value of his stake in the Club's equity portfolio had fallen by over 30% — a loss of around £10,000. Over the same year the estimated value of his house increased by over £40,000.

(ii) Describe how each club member's view is typical of a common behavioural finance theme. [4]

[Total 9]

3 The assets of the ABC pension fund consist of contributions from both ABC plc and the employees plus investment returns, less any payments made from the fund to cover costs and benefits. Currently 80% of the fund's assets are held in equities and 20% in long dated bonds.

The main benefit paid from the fund is a pension payable from age 65. The benefit is not dependent on the fund performance. ABC plc makes up the balance of cost if assets are insufficient to cover benefits and expenses (i.e. if there is a shortfall). ABC plc will take a refund if assets are excessive (i.e. if there is a surplus).

(i) Describe the role played by defined benefit pension schemes such as the ABC pension fund in the investment markets. [2]

(ii) Explain how any shortfall in the ABC pension fund could be considered as an option on the assets of ABC plc. [3]

(iii) The three main shareholders in ABC plc have all expressed an opinion about the fund's investment strategy. Their opinions are as follows:

(a) "The fund should invest fully in equities."
(b) "The fund should invest fully in bonds."
(c) "I don't care what the fund invests in."

List reasons why each of these views may be held. [5]

[Total 10]

4 (i) State Modigliani and Miller's ("MM") proposition I and explain briefly the implication for the interaction between a firm's financing and investment decisions. [2]

(ii) Historically airlines have relied heavily on debt whereas drug companies have been predominantly equity financed. Give reasons why, despite MM, capital structure is important and explain why airlines and drug companies have tended to structure their balance sheets in this way. [3]

(iii) In the perfect world of MM, the return on a company's assets, r_{assets}, can be decomposed into weighted returns on debt and equity, where the weighting reflects the level of gearing. Derive a formula from this, showing how the expected rate of return on the common stock of a leveraged firm depends on the debt-equity ratio. [2]

MM Airlines Inc is financed entirely by common stock. The Finance Director anticipates an income of 1,200 a year but this is uncertain. The table of outcomes below shows how the return on shares varies according to operating income in four possible scenarios. The Finance Director thinks scenario 3 is the most likely..

Data

Number of shares	1,000
Price per share	10
Market value of shares	10,000

Scenario	1	2	**3**	4
Operating income	400	800	**1,200**	1,600
Earnings per share	0.4	0.8	**1.2**	1.6
Return on shares	4.0%	8.0%	**12.0%**	16.0%

Based on expected operating income of 1,200 (scenario 3) the return to shareholders is calculated to be 12% per annum. MM Airlines has decided to repurchase half of its common stocks and substitute an equal value of debt. At these levels of debt, the Finance Director assumes that he can borrow at 8%. *(Ignore tax for the purpose of this question.)*

(iv) Calculate the equity earnings, earnings per share and return on shares (as a percentage) at each of the levels of operating income shown in the table above, allowing for payments to debt holders and assuming that the MM share price remains unchanged. [3]

The Finance Director of MM Airlines is thrilled that increasing the gearing of the company leads directly to greater returns for his shareholders at the assumed level of operating income. He has calculated that the return on shares (as a percentage) at the anticipated level of operating income (1,200) will increase from 12% to 16%.

(v) Describe a tactic a shareholder could follow without the restructuring to generate the additional return. (Assume the shareholder can borrow on the same terms as the company.) [2]

[Total 12]

5 A life insurer is writing a tranche of bonds, each of which pays at the end of five years:

- a return of the single premium if the FTSE (a market index in which dividends are not reinvested) finishes lower than its level on the date the bonds were written, or
- 175% of the single premium if the FTSE rises by more than 75% over the five year period, or
- the single premium, increased in proportion to the FTSE if it rises by 0–75% over the five year period

(i) Describe how the payoff on the bonds could be exactly matched with a combination of zero coupon bonds and FTSE call options. [3]

(ii) Sketch a graph showing the value of the policy one year before maturity against the level of the FTSE on that date and describe what happens to this value on that date as the FTSE tends towards zero or infinity. [4]

The insurer is considering a variety of possible strategies for investing the assets backing the bonds, including dynamic hedging strategies as well as the purchase of the matching assets referred to in part (i). You have been given the task of performing a stochastic analysis to determine an optimal strategy given the firm's risk appetite.

The firm has already built a stochastic asset model: one that is used to calculate market consistent values for the firm's with profits guarantees. One director has remarked that you could use this model in your investigation.

(iii) Outline the points you would make in your reply. [5]

[Total 12]

6 A large composite insurer has asked you to evaluate how it controls its credit risks.

(i) List the types of credit risk exposures that may cause losses to the insurer. [3]

(ii) List three key parameters that you would use in calculating expected credit losses for a single counterparty. [2]

(iii) Describe the controls on credit risk that you would expect to see in place, including any procedures that you would expect to be triggered if one of the controls indicated that corrective actions were necessary. [9]

[Total 14]

7 You have been newly appointed as the financial manager of a building firm and one of your main responsibilities is to evaluate proposals for investment in new projects. The firm's established practice (with which you have some concerns) is to calculate internal rates of return for projects and to proceed with projects whose IRR exceeds 20%.

Three proposals are currently awaiting your approval:

- Project A gives an immediate income of £1 million and an outgo of £1.5 million in one year's time.
- Project B gives an immediate income of £1 million, an outgo of £3 million in one year's time and an income of £2.5 million in two years' time.
- Project C relates to a site that can be developed in one of two ways. Project C1 costs £1 million at time 0 and returns £2 million at time 1; Project C2 costs £2 million at time 0 and returns £3.5 million at time 1.

Your assistant has already reviewed the proposals:

- He recommends that Project A be approved given that its internal rate of return exceeds 20%.
- Project B has been rejected without explanation.
- Project C1 is recommended for approval given that its IRR exceeds that for Project C2 and the 20% hurdle rate.

(i) (a) Describe the issues associated with the firm's practice of using IRR as a capital-budgeting tool for these three projects.

(b) Describe a better capital-budgeting tool and use this to decide which of the projects to approve. [9]

As well as being concerned about the project approval process, you are also worried that the financial information your department is given on a project proposal is restricted to a set of best estimate cashflows. You would like to understand more about how badly things could go wrong if actual experience were to be different to that which had been assumed.

(ii) Briefly describe how the following tools could be used to understand the risks involved in a new development of 60 executive houses and state why each tool is an improvement on the previous one:

(a) sensitivity testing
(b) scenario testing
(c) Monte Carlo simulation

[6]
[Total 15]

8 It is the first day of the football season and Dougie's Dreamers have already announced season ticket prices for the following season (in the first three cases payable at the start of that season, one year from today):

- If the Dreamers achieve promotion to the Premiership this year, season tickets will cost £2,000.
- This year's season ticket holders have the option to purchase season tickets for the following season at a price of £1,800 (upon presentation of the "Chairman's Stub" attached to this year's season tickets).
- If promotion is not achieved, season tickets will cost £1,000.

Alternatively, next year's season tickets can be purchased one year in advance (i.e. today) for £1,600.

The risk free rate of interest is 10% per annum, annually compounded.

Local media pundit Mr. M's opinion is that the Dreamers have a 50% chance of achieving promotion.

Some supporters are attempting to sell their Chairman's Stubs in private transactions on the internet.

(i) Show that the market-consistent price for a Chairman's Stub is $£\frac{1,520}{11}$ by constructing a replicating portfolio. [5]

(ii) Show how this price could be expressed as both:

(a) The discounted present value of the expected value of the Stub in one year's time using:

- an artificial probability of promotion being achieved (stating this probability), and
- the risk free rate for discounting

and

(b) The expected deflated value of the Stub in one year's time using:

- Mr. M's best estimate probability of promotion being achieved, and
- different discount factors (deflators) depending on whether or not promotion is achieved (stating the deflator to be applied to cashflows in the event of promotion)

[4]

(iii) Give two reasons why the price at which stubs are traded may differ from $£\frac{1,520}{11}$. [2]

Mr. M is a current season ticket holder at the Dreamers and has already decided to renew his season ticket for next season. He needs to choose between:

- selling his Stub for $£\frac{1,520}{11}$ and borrowing (over one year) the cash necessary to buy a ticket in advance today, or
- selling his Stub, earning interest on the cash and buying his season ticket in one year's time, or
- holding the stub and buying the ticket in one year's time

His utility function is $\ln(x)$ and he expects to have £5,000 of personal wealth in one year's time before allowing for any of the above transactions.

(iv) Assess which course of action will maximise his expected utility in one year's time. [7]

A local bookmaker offers even money odds on the Dreamers achieving promotion this season (i.e. a £100 stake on a successful bet will return £200 to the gambler, including the return of stake). No tax is payable on gambling bets or winnings.

(v) Explain why this might depress demand for advance season ticket sales. [1]

(vi) Calculate the price to which advance season tickets need to be reduced by the Dreamers to rectify this problem. [2]

(vii) Calculate the effect of such a price reduction on the market-consistent value of a Chairman's Stub. [2]

[Total 23]

END OF PAPER