

EXAMINATION

9 June 2010 (am)

Subject F105 — Finance and Investment Specialist Technical

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 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 South Africa, tax is levied on corporate profits at a rate of 28%, with a further 10% Secondary Tax on Companies (STC) levied on profits distributed by way of dividends (which are then received tax-free by shareholders). The Treasury has announced its intention to phase out STC and replace it with a tax of 10% on declared dividends in the hands of all shareholders, regardless of their marginal income tax rate.

- i. Outline the three principal systems of corporate taxation. [6]
 - ii. State, with reasons, which system(s) best describe(s) South Africa's current and intended practice. [2]
- [Total 8]

QUESTION 2

You are the product development actuary for a life office which is about to launch a retirement savings product for individuals. The product will allow policyholders to change their fund allocation between equities, bonds and cash at any time.

- i. Define the term 'equity risk premium', distinguishing between its historical and prospective forms. Comment on the classical finance view of the equity risk premium. Furthermore, explain the Behavioural Finance view that the equity risk premium reflects myopic loss aversion on the part of investors. [5]
 - ii. Assess the implications of the Behavioural Finance view for purchasers of the retirement savings product. Suggest product design or service features to minimise the risk of severely sub-optimal asset allocation. [5]
- [Total 10]

QUESTION 3

The Caribbean economy of Redstripia has, until recently, been dominated by state-owned institutions which are entirely domestically-focussed. Redstripia has just been liberalised, with the financial services sector now open to private sector participation as well as global participation. The government has asked you to advise them on the design and implementation of a regulation system for the financial services sector.

- i. State the principal aims of financial services regulation. [3]
 - ii. Outline the relative merits and drawbacks of allowing industry self-regulation for Redstripia, compared to a set of prescriptive regulations overseen by a government-appointed body. [6]
- [Total 9]

PLEASE TURN OVER

QUESTION 4

You are the investment advisor to a defined benefit pension fund, whose asset values and cashflows by asset sector (in millions of the local currency) over the past year have been as follows:

Asset class	Market value of assets 31/3/09	Contributions received	Benefits paid	Market value of assets 31/3/10
Domestic equities	420	30	80	440
Offshore equities	90	10	0	90
Domestic bonds	490	50	70	539

Contributions and benefits were paid steadily throughout the year.

The benchmark for the fund is 50% domestic equities, with benchmark return measured by the Offshore-adjusted Domestic All-Share Index (ODAI), 5% offshore equities (MSCI World Index) and 45% domestic bonds (All Domestic Bond Index, or ADBI). Sample total return index values over the year in question were as follows:

Index	Value 31/3/09	Value 30/9/09	Value 31/3/10
OADI	25,000	27,000	28,500
MSCI	12,000	11,000	11,400
ADBI	10,000	10,800	11,500

- i. Calculate the rate of return for the fund (in total, as well as separately for each asset class) over the year, stating any assumptions you make. [5]
- ii. Calculate the benchmark return (in total, as well as separately for each asset class) over the year, stating any assumptions you make. [5]
- iii. Attribute the overall out- or under-performance. Express this in percentage terms relative to the benchmark for sector and stock selection. Break down the stock selection out- or under-performance by asset class, and comment on your results over the year. [10]
- iv. One of the trustees argues that since all of its liabilities are denominated in the local currency, it is imprudent to invest offshore, and the benchmark allocations should reflect domestic assets only. Discuss the rationale for including offshore assets as part of the fund's benchmark allocation. [3]

[Total 23]

PLEASE TURN OVER

QUESTION 5

You are the investment manager for a life office's with-profits portfolio, which declares regular annual bonuses (which are vested once declared, and cannot be removed) as well as terminal bonuses on contract maturity. The fund is currently invested 40% in domestic equities, 40% in domestic bonds, 10% in offshore assets and 10% in cash.

You are of the opinion that domestic equities are due for a sharp correction in the short-term future, and consequently wish to minimise the portfolio's exposure to this asset class over the next six months.

- i. Outline a strategy which could be executed, using futures contracts to reduce the effective domestic equity exposure of the portfolio to 20% and to increase the domestic bond exposure to 60% for six months, at the end of which you intend to revert to the current asset allocation. [2]
- ii. Outline the advantages of this futures strategy over one based on transactions in the underlying markets. Discuss the strategy's primary risks. [4]
- iii. The life office's board declined to implement your proposed tactical asset reallocation. Your predictions proved to be accurate, and the resulting sharp dip in domestic equity values has led to a portfolio funding level of 96% (i.e. a 4% shortfall in asset market values relative to policyholder liabilities including vested bonuses and minimum expected future bonuses). The board now wish to protect the portfolio against further significant declines in the domestic equity market over the next six months.

Discuss the relative advantages and disadvantages of securing this protection via each of the following strategies:

- a. Put options on a market index representative of the underlying domestic equity investment, with protection at the level of 95% of the current market value.
- b. A zero-cost collar (i.e. the put options above financed by writing call options on the same market index). [4]

[Total 10]

PLEASE TURN OVER

QUESTION 6

You manage the derivatives desk at an investment bank in the Republic of Elbonia. You have been approached by your client, Elbonian Life, to structure a one-year interest swap which will involve your client paying annual interest on a notional principal of 100 million Elbonian Zrrrrbts at the three-month Elbonian Interbank Rate (EIR), and receiving interest payments from you at a fixed rate. The contract involves payments quarterly in arrears.

The current annual EIR spot rates (compounded over their respective effective periods) are as follows:

Three months	7.25%
Six months	7.20%
Nine months	7.10%
Twelve months	7.00%

- i. Calculate the theoretical fixed rate of the swap. [4]
- ii. State, with justification, whether you would set the fixed rate for the contract at a rate higher than, equal to or lower than the theoretical rate. [2]
- iii. You enter into an offsetting transaction with a large pension fund. Since these contracts now cancel each other out, your colleague argues that the bank has removed all risk from the transactions and consequently ought not to have to hold any regulatory capital in respect of these contracts.

State, with justification, whether you agree with your colleague or not. [2]
[Total 8]

PLEASE TURN OVER

QUESTION 7

Two long-only actively managed domestic equity funds, A and B, have, respectively, active returns r_A and r_B and tracking errors σ_A and σ_B . As investment advisor to a defined benefit pension fund, you are required to apportion the fund's domestic equity allocation between these two funds; you will invest a proportion x in Fund A and $(1-x)$ in Fund B.

- i. Define the terms 'active return', 'tracking error' and 'information ratio'. [3]
- ii. Let x_m be the value of x which will maximise the information ratio of the fund's domestic equity holdings. Derive a formula for x_m in terms of r_A , r_B , σ_A and σ_B . [7]
- iii. One of the fund's trustees notes that a large equity hedge fund boasts a Sharpe ratio which is considerably in excess of that offered by your proposed allocation between the two long-only equity funds under consideration, and argues that the fund ought to allocate its entire domestic equity target to this hedge fund.
 - a. Define the term 'Sharpe ratio'. [1]
 - b. Outline the factors that would mitigate against, or at least warrant further investigation before, implementing the trustee's proposal. [4]

[Total 15]

QUESTION 8

You are an equity analyst with a large asset management firm which bases its management style on fundamental analysis. You usually make use of discounted dividend and relative valuation (justified PE ratio) models to value stocks.

In the domestic economy, a new invention has led to the growth of an industry whose characteristics are sufficiently different from existing industries to merit the establishment of a new industry classification on the local exchange. You have been assigned to research firms in this new sector, none of which have yet begun to make profit or pay dividends.

- i. Outline the key features of the new industry which you would wish to investigate in order to value stocks in this sector. [8]
- ii. Describe the broad approach you would take to valuing stocks in the new sector, identifying general and company-specific factors to be assessed and likely key sources of information. [9]

[Total 17]

END OF PAPER