

# EXAMINATION

*30 October 2013 (am)*

## **Subject F105 — Finance and Investment Fellowship Principles**

*Time allowed: Three hours*

### **INSTRUCTIONS TO THE CANDIDATE**

1. *Use the instructions and password provided at the examination center to log in.*
2. *Submit your answers in Word format only using the template provided.*
3. *Save your work regularly throughout the examination on the supplied computers' hard drive.*
4. *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.*
5. *You must not start typing your answers until instructed to do so by the supervisor.*
6. *Mark allocations are shown in brackets on exam papers.*
7. *Attempt all six (6) questions, beginning your answer to each question on a new page.*
8. *Candidates should show calculations where this is appropriate.*

**Note: The Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.**

### *AT THE END OF THE EXAMINATION*

*Save your answers on the hard drive AND hand in 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>
--

## QUESTION 1

Bank A has a large book of assets comprising various types of loans that includes home loans. All home loans are amortising loans i.e. each instalment includes a capital and interest portion. The interest portion is linked to the bank's benchmark lending rate. Due to regulation changes that require the bank to increase its cash holdings, the bank is considering selling a portion of its home loan assets to interested investors. The assets to be sold will be transferred to a Special Purpose Vehicle (SPV). There will be only one type of asset-backed debt security issued by the SPV, with all cashflows received by the SPV being paid out half-yearly to investors in proportion to their holding of the pool of assets (a 'pass through' security). A rating agency will be employed to provide a credit rating on the debt issue.

- i. Explain the main reason for establishing a SPV for this purpose. [2]
  - ii. Explain prepayment risk and extension risk (caused by borrowers extending repayments) to investors who purchase the debt securities issued. [4]
  - iii. Outline how the approach to credit rating the asset-backed security by a rating agency might differ from the more general approach used to rate corporate debt issued by the bank. [5]
  - iv. Defining Collateralised Debt Obligation (CDO), outline why a CDO structure might be better for the bank than the pass-through security structure being considered by the bank. [2]
- [Total 13]

**PLEASE TURN OVER**

## QUESTION 2

You are the investment advisor to a general insurer with a closed book of business in run-off, which has an expected cash outflow of R100 million in three years' time. The insurer's current asset portfolio consists of a portfolio of three-year zero-coupon domestic government bonds with a maturity value of R100 million and current market value of R78.66275 million, but the Board wishes to consider moving 15% of the portfolio into Lower Mesopotamian government bonds of the same duration with a total maturity value of LMJ2.66076 million. They are however concerned about currency risk against the Lower Mesopotamian Jezirah (LMJ) and have approached you to advise them on how to manage this. The current exchange rate is ZAR5:LMJ1, while the domestic yield curve is flat in both countries, at 4% per annum in Lower Mesopotamia and 8% per annum in South Africa, continuously compounded.

- i. Outline the reasons which are likely to have prompted the Board to consider offshore investment. [2]
- ii. Explain the currency risk posed by the offshore investment. [1]
- iii. Outline a strategy using futures contracts which could be employed to hedge the currency risk. [3]
- iv. Calculate the arbitrage-free price of the futures contract (in ZAR per LMJ) required to effect this strategy. [1]
- v. Illustrate the effectiveness of the strategy assuming alternatively that the exchange rate in three years' time is ZAR4:LMJ1 and ZAR6:LMJ1. [4]
- vi. Briefly outline two alternatives to futures contracts which could be used to hedge the currency risk. [2]

It transpires after execution of the strategy that the liabilities and assets were in fact real rather than nominal, i.e. the maturity values of both in three years' time will be dependent on inflation in the interim. When the liability matures, it turns out that inflation has been 10% per annum effective in South Africa and 3% per annum effective in Lower Mesopotamia.

- vii. Establish the effectiveness of the hedge assuming that the exchange rate has adjusted in line with purchasing power parity, and comment on the results. [5]

[Total 18]

**PLEASE TURN OVER**

### QUESTION 3

An institutional client has approached you to advise them about a potential investment in a private equity fund for which the following information is made available:

#### FUND DETAILS

Name of fund:	Infrastructure fund
Size of fund:	R1 billion
Investments:	Unlisted infrastructure assets
Funds invested to date at cost:	R620 million (including undrawn commitments)
Sources of funds:	Leading South African and international institutional investors
Fund management fee:	2% of the fund value per annum

#### INVESTMENT PREFERENCES

Industry preference:	Economic infrastructure
Industries excluded:	Tobacco, alcohol, radioactive materials
Geographical preference:	Sub-Saharan Africa

In addition to the above fund, the private equity fund manager also manages two similar fully invested private equity funds with total assets invested amounting to R3 billion.

- i. Define infrastructure investment, providing examples of economic infrastructure investment. [4]
- ii. Within the context of private equity investing, explain the following terms:
  - a. “*undrawn commitments*”
  - b. “*carried interest*”

[5]

**PLEASE TURN OVER**

- iii. Outline taxation issues that need to be considered by a potential investor in the private equity fund. [5]
- iv. Explain the rationale for excluding the industries as indicated. [3]
- v. Upon enquiring about a suitable benchmark for measuring the investment performance of the private equity fund, you indicated that a suitable index for private equity investment is not available.
- a. Briefly outline the key advantages and disadvantages of assessing investment performance against a published index. [2]
- b. Outline the issues that need consideration in designing a suitable index. [5]
- [Total 24]

#### **QUESTION 4**

- i. Describe the application of trust law in the context of a pension fund organisation. [4]
- ii. In the context of financial regulation, explain the difference between statutory regulation and self-regulation. [2]
- iii. Explain how the trustees of a pension fund organisation can be regulated. [4]
- [Total 10]

**PLEASE TURN OVER**

## QUESTION 5

- i. State the definition of a hedge fund and state the main hedge fund classes, explaining why short selling is integral to the functioning of hedge funds.

[3]

A pure market-neutral long-short domestic equity hedge fund uses a combination of cash and forwards (to obtain its long and short market exposures). The following information is available:

- The force of interest on a one-year zero-coupon government bond is 7% per annum
- The continuous dividend yield is 2% per annum for all equity market sectors

- ii. Stating the key assumptions, show that the expected price of a one-year forward per R100 million notional is R105,127,109.64.

[2]

The hedge fund takes positions at the industry sector level, not at a stock level. The fund divides the equity market into three broad industry sectors. The market capitalisation split for the entire market, and the fund's investment positions in the sectors are given below:

Broad Industry Sector	Proportion of Total Equity Market	Fund's positions
Resources	50%	Long
Industrials	30%	Short
Financials	20%	No exposure

The fund's exposure to sectors (whether long or short) is the same as the above market capitalisation split (the Financials allocation being invested in cash).

Assume the industry sector capital indices over 2013 are as follows:

Broad Industry Sector	Index at Start of Year	Index at End of Year
Resources	100	90
Industrials	100	70
Financials	100	110

- iii. Stating the additional key assumptions, show that the investment values over 2013 (per R100 million total initial investment at the start of the year) are:

Broad Industry Sector	Investment Value at End of Year
Resources	R46,061,854.24
Industrials	R42,713,378.33
Cash	R21,450,163.63

[4]

**PLEASE TURN OVER**

The hedge fund is benchmarked against the average long-short domestic equity hedge fund. The average hedge fund allocates its investments equally across the broad industry sectors. Assume that the performance over 2013 of the fund's peers, per sector, are summarised by the following indices:

<b>Broad Industry Sector</b>	<b>Index at Start of Year</b>	<b>Index at End of Year</b>
Resources	100	120
Industrials	100	110
Financials	100	105

- iv. Calculate the overall performance of the hedge fund over 2013 relative to its benchmark (per R100 million initial investment), and show that the long/short positional and sector selection performances are:

<b>Broad Industry Sector</b>	<b>Long/Short Positional Performance</b>	<b>Sector Selection Performance</b>
Resources	(R13,938,145.76)	R20,000,000.00
Industrials	R9,713,378.33	(R3,666,666.67)
Financials	R450,163.63	(R14,000,000.00)

- v. Discuss the sector selection performance. [5]
- vi. Discuss the long/short positional performance. [3]
- vii. Briefly state the difference in taxation rates and allowances between income and capital gains. [4]
- viii. State which is the most likely type of taxation for the returns from the hedge fund, assuming that the hedge fund does not try to make its activities tax efficient. State one reason for your answer. [2]

[2]  
[Total 25]

**PLEASE TURN OVER**

## QUESTION 6

You are a member of a team at a life office which must determine investment strategy for different product lines, and your team is at present considering the strategy for a range of products for the domestic market with terms of less than ten years and reasonably predictable cashflows. Mr Black has proposed that you manage interest rate risk by matching the liabilities, while Ms White has dismissed this as impractical and suggested that a policy of immunisation be followed. Ms Green has however countered that immunisation offers protection only against a limited range of interest rate movements, and has proposed that a PV01 approach be adopted, whereby swaps are used to protect the portfolio against a 1 basis point movement in interest rates at a range of key rate durations.

- i. Define matching in this context, and outline and evaluate, in this specific context, the practical objection to matching levied by Ms White. [4]
  - ii. State the three requirements of immunisation, and identify the range of interest rate movements identified by Ms Green against which immunisation offers protection. [3]
  - iii. State two additional problems with immunisation in this context. [1]
  - iv. Identify the interest rate risks against which the PV01 approach outlined does, and does not, provide protection. [2]
- [Total 10]

**END OF PAPER**