

# EXAMINATION

*2 November 2011 (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.*

*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.*

## QUESTION 1

A South African gold mine expects to pay BRL10 million in 6 months' time. The price of a futures contract on Brazilian Real (BRL) for delivery in 6 months' time is ZAR4.60 per BRL.

- i. List the key items that are typically specified in the design of a futures contract. [3]
  - ii. Explain the margining process on futures contracts, and how margins may offer protection to the mine. [5]
  - iii. Explain how the exchange rate risk for the mine can be alternatively hedged using an option. [3]
  - iv. Give an equation for the payoff of the derivative strategy in (iii), defining all terms used, and illustrate on a graph the profit profile to the mine. [3]
- [Total 14]

## QUESTION 2

A large South African pension fund entered into a currency swap with a US-based asset manager which has an outstanding term of 15 months.

The swap involves exchanging interest at 14% p.a. effective on ZAR200 million for interest at 10% p.a. effective on US\$30 million once a year. You may assume that interest rates for the remainder of the term will be 8% p.a. for US\$ and 12% p.a. for ZAR. The current exchange rate is US\$1.00 = ZAR7.00.

- i. Outline possible disadvantages of using currency swaps. [4]
  - ii. Calculate the value of the swap, as a position in two bonds, to the party paying US dollars. [6]
  - iii. Corroborate the result obtained in (ii) by valuing the swap as a series of off-market forward rate arrangements. [5]
- [Total 15]

### QUESTION 3

In 2006 an investment bank issued, through a Special Purpose Vehicle (SPV), a Collateralised Bond Obligation (CBO), with unrated corporate bonds as collateral and with 3 tranches of debt as follows:

Tranche:	Credit rating:
Senior	AAA
Mezzanine	BB
Equity	Unrated

In 2009 the mezzanine tranche defaulted, and early in 2010 holders of the senior tranche were advised that the SPV had exhausted its funds following default of several of the underlying bonds, and that no further coupon payments could be made.

You are the Chief Actuary at the regulator whose remit includes both financial institutions and credit rating agencies. You have received a submission from a consortium of institutional investors who purchased the senior tranche of the CBO based on its AAA rating, which argues that the failure of this tranche suggests that tighter regulation of credit rating agencies is required.

- i. List the factors that the credit rating agency should have taken into account in assigning a credit rating to the senior tranche. [7]
- ii. Discuss the factors that you would investigate in your response to the consortium of institutions and your assessment of the need for tighter regulation of credit rating agencies. [4]

[Total 11]

### QUESTION 4

In order to promote transparency relating to the investment management of a pension fund, the trustees are contemplating drafting a Statement of Investment Principles.

- i. Outline the purpose of requiring a Statement of Investment Principles. [2]
- ii. State the items that should be included in a Statement of Investment Principles. [4]

[Total 6]

## QUESTION 5

A passive investment manager wants to launch an equity fund which aims to track the Top 80 Index which is made up of the top 80 quoted shares, by market capitalisation, in a highly developed country.

- i. Explain how the Efficient Markets Hypothesis justifies index tracking as opposed to active portfolio management. [2]
  - ii. Outline the different methods the manager could employ to track the Top 80 Index and state the key advantages and disadvantages of each method. [7]
- [Total 9]

## QUESTION 6

The bond exchange in a developing country has approached you for advice regarding the construction of a index to measure the performance of exchange-traded corporate bonds where currently no published index exists.

- i. Outline the possible uses of a corporate bond index. [5]
- ii. Outline the issues that should be considered in constructing the index. [5]

The following quarterly published data is in relation to the BBB-rated corporate bond price index (5 – 10 years) where dirty prices are used in the calculation:

Date	Index value	XD adjustment	Accrued interest
30 Jun 2010	78.0	5.7	2.3
30 Sep 2010	81.2	7.9	2.8
31 Dec 2010	90.6	9.3	2.7
31 Mar 2011	85.6	2.1	2.6
30 Jun 2011	87.5	4.8	2.9

- iii. State a formula to calculate the total return, net of tax, on the corporate bond index. Define all symbols used. [2]
- iv. Calculate the total return earned by an investor who is taxed on income at a rate of 35% and who was invested in the index for the 12-month period from 1 July 2010 to 30 June 2011. [3]

[Total 15]

## QUESTION 7

You are the asset consultant to a defined contribution pension fund in which all members' savings are invested in a single portfolio. Information relating to the market value of assets and net cash-flows over the past year, broken down by asset class, is as follows:

Asset class	Market values (R million)			Net cash flow (R million)
	30 Sep 2010	31 Mar 2011	30 Sep 2011	
Equities	650	661	730	0
Bonds	220	250	285	40
Cash	80	82	95	10
Fund of hedge funds	50	48	210	100
Total	1 000	1 041	1 280	150

- i. Calculate the money-weighted rate of return (MWRR) and linked internal rate of return (LIRR) for the equity portfolio and the fund of hedge funds for the year ending 30 September 2011. Assume that the net cash flow was received on 31 March 2011 and that the market value of assets on 31 March 2011 shown is prior to the net cash flow. You may use the approximation  $(1 + i)^{1/2} \cong (1 + 1/2i)$ . [4]
- ii. Comment on any difference between the two measures of performance for each portfolio, and state with reasons which you consider more reliable as a measure of investment manager skill. [3]

The risk-free rate of return for the year ending 30 September 2011 was constant at 5% p.a. The following additional market information is given:

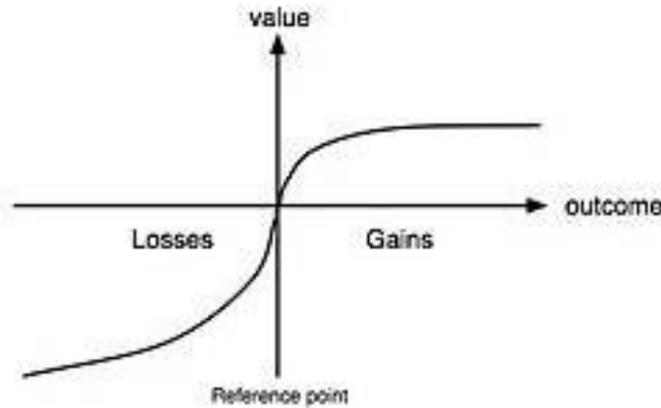
	Equity portfolio	Fund of hedge funds portfolio
Historic variance	0.0400	0.0169
$\beta$ (in terms of CAPM)	1.00	0.85

- iii. Calculate the values of the Sharpe and Treynor measures of risk-adjusted return for each of these two portfolios and motivate which measure is the most appropriate for assessing the risk-adjusted performance of the two portfolios. [5]
- iv. Explain why the measure identified in (iii) may still be inadequate for measurement of risk-adjusted return, particularly for the fund of hedge funds. [3]

[Total 15]

## QUESTION 8

The graph below was used by Kahneman and Tversky (1979) to illustrate some of the principal features of Prospect Theory.



- i. Discuss the key features of Prospect Theory, and how they distinguish it from Expected Utility Theory, in terms of features of the graph above. [5]
- ii. Describe the main features of an Equity-Linked Note (ELN). [4]
- iii. The following instruments are available in the market when the equity index value is 100: [4]

<i>Instrument</i>	<i>Market price</i>			
	5 year zero-coupon bond		68.00	Per R100 nominal
5 year bond with 5% coupons		88.10	Per R100 nominal	
5 yr European options/ on equity index	Strike price	K = 90	K = 100	K = 110
Call option		41.10	35.55	30.50
Put option		1.44	2.59	4.23

Index options are priced at R1 per index point.

From the available instruments, construct a 5-year ELN with a purchase price of R10 000 and state its profit profile and return to an investor assuming that the equity index is at (a) 85 and at (b) 185 respectively at the end of the term. [4]

- iv. Explain why an ELN may be attractive to an investor whose preferences are characterised by Prospect Theory. [2]

[Total 15]

**END OF PAPER**