

# INSTITUTE AND FACULTY OF ACTUARIES



## EXAMINATION

20 April 2018 (pm)

### Subject SA6 – Investment Specialist Applications

*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 must not start writing your answers in the booklet until instructed to do so by the supervisor.*
3. *You have 15 minutes of planning and reading time before the start of this examination. You may make separate notes or write on the exam paper but not in your answer booklet. Calculators are not to be used during the reading time. You will then have three hours to complete the paper.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all four questions, beginning your answer to each question on a new page.*
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.*

- 1 An internal investment team manages the endowment fund of a French technological university of currently €20bn.

The stated primary objective of the endowment fund is to ensure that the university will have the financial resources to maintain its leading position in Europe and contribute to society with first class teaching, research and innovation for future generations.

The university is a strong believer in the ability to increase investment returns through active management, promotion of good corporate governance and high social and environmental standards. The endowment uses a hybrid model of in-house and external fund managers.

The primary source of income for the fund is donations. The fund is growing in size due to donations and investment income being in excess of current expenditure.

- (i) Describe the influence of the cash flow position of the endowment fund on the investment strategy. [6]
- (ii) Discuss the characteristics of a benchmark which may be suitable for the endowment fund, given its primary objective. [8]
- (iii) Describe the active management styles “value” and “momentum”. [4]

The endowment fund is considering an investment in infrastructure equity. The Chief Investment Officer of the internal investment team has been asked to comment on the advantages and disadvantages of managing this in-house compared to using an external fund manager.

- (iv) Outline FIVE advantages and FIVE disadvantages of managing the infrastructure investments in-house. [10]

The Board of the university is considering potential agency issues between the university and the internal investment team.

- (v) Describe the agency issues between the university and the internal investment team. [8]
  - (vi) Suggest how these agency issues could be mitigated. [6]
- [Total 42]

- 2 A fiduciary manager's Absolute Equity Fund invests in global equity funds of various styles and its return objective is to outperform the MSCI World Index over rolling three year periods by 1% p.a. net of fees.

Its risk objective is to achieve a volatility of no more than 80% of the realised volatility of the MSCI World Index. There is no tracking error objective.

In the Fund's analysis for selecting and retaining managers the following measures are considered:

- skewness
- average and maximum monthly drawdowns over rolling three year periods

The Fund does NOT have access to position level data.

- (i) Explain why it is necessary for the Fund to employ multiple manager styles to achieve its objectives. [4]

The Fund has carried out an analysis of the last 5 years of returns, which shows the following:

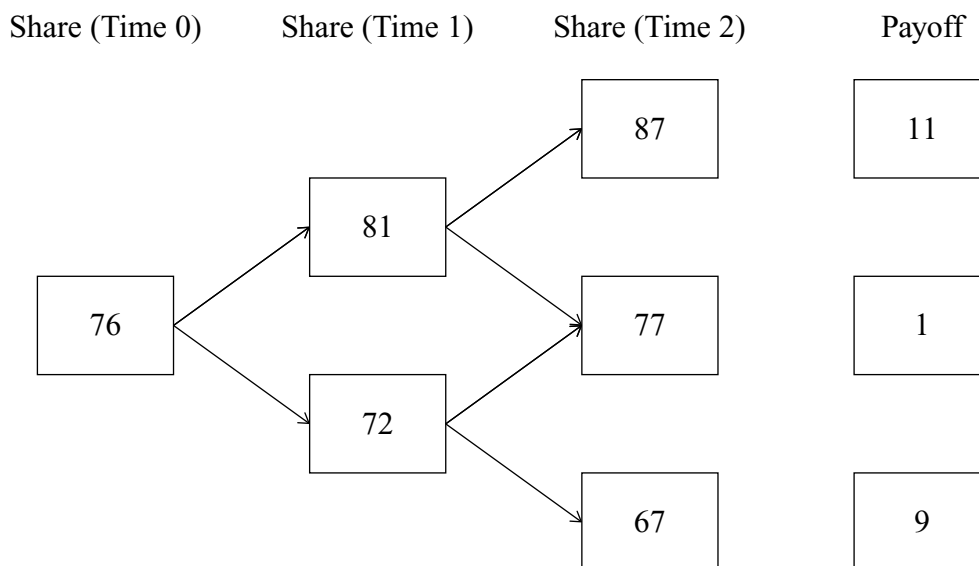
<i>Measure</i>	<i>Manager</i>					
	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Mean return	10.0%	8.0%	11.0%	9.0%	13.0%	11.0%
Volatility (% p.a.)	12.0%	13.0%	16.0%	15.0%	12.0%	14.0%
Return/Risk	0.83	0.62	0.69	0.60	1.08	0.79
Maximum monthly drawdown	−8.5%	−13.0%	−15.0%	−14.0%	−11.0%	−10.0%
Average monthly drawdown	−3.3%	−4.1%	−4.0%	−3.8%	−2.7%	−2.6%
Skewness	−0.1	−0.6	−0.9	−0.4	0.1	−0.1

Skewness is defined as the third moment around the mean. Average monthly drawdown is defined as the average of the monthly loss in loss-making months.

- (ii) (a) Describe the relevance of the above measures in forming a view as to whether a manager is adding value. [7]
- (b) State any other relevant analyses that can be carried out with monthly returns data.
- (iii) Comment on the characteristics of each of the six managers. Calculations are not required. [6]

- (iv) Explain which manager you would replace if the Fund is:
- (a) failing to meet its return objective, but is meeting its risk objective,
  - (b) meeting its return objective, but failing to meet its risk objective.
- [4]
- (v) Describe the limitations of using monthly returns data for an analysis of this type. [4]
- (vi) Describe two biases that using historic data can create for performance analysis for the purposes of manager selection. [4]
- [Total 29]

**3** Certain combinations of option trades can be accepted as a single order. These are known as recognised option strategies or combination orders. The diagram below shows the pay-off profile of a straddle under a two-step binomial tree. The option pay-off at time 2 is gross of the option premium paid at time 0.



- (i) Describe, using a combination of put and call options only, how the pay-off of this option strategy could be replicated. [2]

Assume that interest rates are 0% for each period and that there are no dividends.

- (ii) Show that the no-arbitrage price of this option strategy equals 5. [5]

A trader expects realised volatility to be lower than current implied volatility.

- (iii) Explain whether the trader should buy or sell the above option strategy, given his expectation. [3]

[Total 10]

**4** Issuing gilt-edged securities is the main way by which the UK government meets the gap between its financial commitments and its tax revenue.

(i) Describe the methods of issue of gilts in the UK. [8]

“Strips” is the acronym for Separate Trading of Registered Interest and Principal Securities. “Stripping” a gilt refers to breaking it down into its individual cash flows, which can be traded separately as zero-coupon gilts.

(ii) Determine the number of individual strips for a ten-year conventional gilt. [2]

A gilt strip has a gross redemption yield of 1% (semi-annual), with:

- 59 days from the settlement/issue date to the next quasi-coupon date
- 183 days in the quasi-coupon period in which the settlement date falls; and
- 39 remaining quasi-coupon periods after the current period to maturity.

(iii) Calculate the price per £100 nominal of the strip. [4]

An insurance company with long-dated real liabilities is considering using index-linked gilts to provide a hedge for the impact on its liabilities of changes in interest rates and inflation.

(iv) Describe the timing and calculation of the coupon and redemption cash flows of index-linked gilts. [5]

[Total 19]

**END OF PAPER**