



## EXAMINATION

5 June 2023 (am)

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

*Time allowed:* Three hours and twenty minutes (which includes five minutes for downloading and uploading your answer document)

*Total marks:* 100

#### INSTRUCTIONS TO THE CANDIDATE

1. Ensure that you are logged in and authenticated through Examiity before you attempt the examination.
2. The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.
3. Download the Word answer document template from the ASSA Exam Platform. Save this Word answer document on your desktop using your Candidate Number as filename. You are required to submit your answers in Word format ONLY using this document. No answers in any other format (e.g. handwritten) will be accepted. Save work regularly.
4. Ensure that your Candidate Number appears in the “header” of your Word answer document. [Double-click on the header at the top of the Word document, input your Candidate Number only in the header, then press “Esc” to close the header.] **Do not use your name or member number anywhere in your Word answer document.**
5. You may not access any file from your computer, use any other computer program (e.g., Email or Excel), or open any other browser during the examination.
6. You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you within the examination.
7. You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.
8. Mark allocations are shown in brackets.
9. Attempt all nine (9) questions, starting each on a new page (as provided for in the Word answer document).
10. Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the approved list only.
11. Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on **Finish Attempt** to save your document. You will still be allowed to go back and make changes (**Review Attempt**) if you have time.
12. Once you are satisfied with your uploaded document, click **Finish Attempt** and **Finish all and Submit**. Once you have submitted you will not be able to make any changes.
13. **You must submit your Word answer document BEFORE the end of the allotted examination time.** You should stop writing and start uploading during the last five minutes. Take this into account when planning your review and submission. There will be no time announcements.

**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.

**END OF INSTRUCTIONS**

## QUESTION 1

An investor trades the following two European options with the same expiry date at a cost of R5 per option:

- a. Buys a call option with strike price of R110
- b. Buys a put option with a strike price of R90

- i. State the four key uses of derivatives in finance and investment. [2]
  - ii. Express the payoff of the strategy as a function of the underlying price ( $S_T$ ) at expiry date  $T$ , and comment briefly on the circumstances under which the investor would implement this strategy. [4]
  - iii. Explain the benefits of a clearing house in the execution of options derivatives strategies. [2]
  - iv. Explain how a dividend payment on the underlying share during the contract will affect the difference between put and call prices. [3]
- [Total 11]

## QUESTION 2

Bluechip is an AA-rated company with annual sales of R1 billion and which uses a fixed-interest rate bank loan to finance its short-term working capital requirements. The interest rate on the loan is reviewable annually.

There are 10 months remaining before the loan rate review and as current short-term interest rates are at an all-time low, Bluechip is considering a short-term financing alternative to benefit from the lower rates.

- i. Other than corporates, list three main investor classes and state three elements affecting investment decisions in terms of which all of these investor classes will vary. [3]
  - ii. Suggest, and describe the characteristics of, a money market instrument that Bluechip can issue as an alternative to the bank loan for the remainder of the 10-month period. [3]
- [Total 6]

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### QUESTION 3

Numerous findings show that private individuals (households) may not act as fully rational economic agents attempting to maximise their utility. One of the most celebrated departures from conventional rationality is Prospect Theory.

- i. Outline the key principles underlying Prospect Theory.

[2]

As part of a survey conducted to analyse the lack of stock market participation by households, respondents were requested to provide reasons for not investing in the stock market.

- ii. For each of the following responses, state two behavioural biases exhibited by participants:

a. “I find the stock information presented on the investment platform confusing, and it makes me unsure of which stocks to invest in.”

b. “I have invested in crypto assets for the last 5 years and have consistently earned good returns. I prefer to stick to investing in these.”

c. “The stock market is too risky. I cannot imagine losing any money.”

[3]

- iii. List other factors that may influence the level of stock market participation of households.

[3]

[Total 8]

### QUESTION 4

An investment bank in a developing economy issued an unrated green bond, with a 3-year term, raising US\$1 billion that will be used to refinance existing solar and wind projects. The issue was 4.5 times oversubscribed.

- i. Suggest reasons why an investor would be interested in a credit rating for the green bond.

[3]

- ii. Suggest reasons why the green bond was not rated.

[3]

- iii. Discuss the investigations that a potential investor might consider in the absence of a rating to assess the creditworthiness of the green bond.

[5]

[Total 11]

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## QUESTION 5

A large institutional investor passively invests its domestic equity portfolio by tracking the JSE Top 40 index in an attempt to fully replicate the overall performance of the index. An analysis of the domestic equity portfolio's total returns over a number of years compared to that of the index reveals that the portfolio underperformed the index.

- i. Discuss why passive investment management through index tracking may be desirable. [4]
  - ii. Discuss likely reasons for the domestic equity portfolio's underperformance relative to the JSE Top 40 index. [6]
  - iii. Outline the relative merits of stratified sampling as an alternative to full replication. [3]
- [Total 13]

## QUESTION 6

A bank currently has unhedged interest rate exposure after lending money on which it receives a fixed interest rate.

- i. Outline the interest rate risk to the bank resulting from this transaction. [2]
- ii. Outline how the bank can hedge this risk with each of the following instruments, and comment on their effectiveness. [6]
  - a. Swaps
  - b. Interest rate caps
- iii. Calculate the price of an interest rate caplet based on quarterly payments, for the fifth payment, given following assumptions:
  - Notional: R100m
  - Interest rate volatility: 10% p.a.
  - 1-year effective interest rate: 6% p.a.
  - Forward effective JIBAR rates, compounded quarterly:
    - Year 1: 6% p.a.
    - Year 2: 7% p.a.
  - Strike rate: 7.5% p.a., compounded quarterly

You may use the approximation  $\Phi(z) \approx 1/(1 + e^{(-1.7 \times z)})$

[6]  
[Total 14]

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## QUESTION 7

A large local pension fund ringfenced part of its investments by transferring assets amounting to R4.8 billion into a multi-asset investment portfolio managed by a particular asset manager for a 12-month period ending 28 February 2023. No rebalancing was done during the period and investment income was reinvested in the investment class of origin. There were no other cash inflows or outflows during the year.

The market values of the portfolio per assets class are as follows:

Asset class	Market value (R'million) as at	
	28 February 2022	28 February 2023
Equities	2 400	2 190
Bonds	1 800	1 950
Cash	600	656
Total	4 800	4 796

The portfolio's benchmark weightings and the respective performances over the 12-month period are as follows:

Benchmark	Weight	Total Return Index (TRI) values as at	
		28 February 2022	28 February 2023
Equity Index	60%	155	138
Bond index	30%	1 600	1 740

The cash portfolio carried a 10% benchmark weight. Benchmark cash returns were 3% for the period 28 February to 31 August 2022 and 5.45% for the period 31 August 2022 to 28 February 2023.

- i. Calculate the return over the 12-month period for the overall fund and for the benchmark. [2]
- ii. Attribute the performance in terms of the following, showing all workings:
  - a. Overall stock selection, and per asset class.
  - b. Overall asset allocation decision.[4]

At the meeting where the results were presented, one of the trustees noted that a balanced fund managed by another asset management company returned 7% over the period. A proposal was hence put forward to terminate the appointment of the current asset manager.

- iii. Comment on the proposal taking the current asset manager's performance for the year into account.

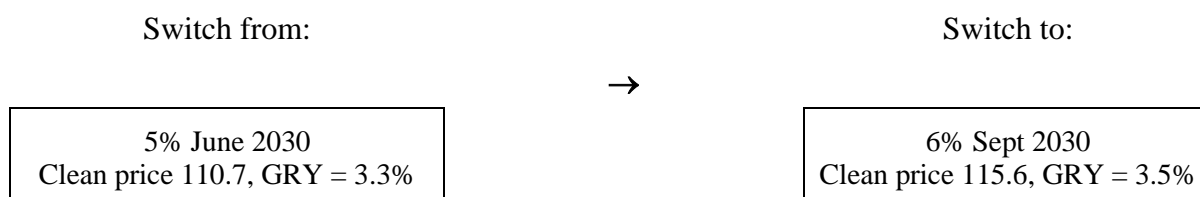
[6]

[Total 12]

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## QUESTION 8

The bond manager of a with-profits life insurance fund is considering a large switch between two local fixed-interest government bonds, where GRY represents the Gross Redemption Yield:



- i. Identify the type of switch under consideration and outline how the manager could investigate yield differences and price ratios to assess whether or not it is a profitable switching opportunity. [5]
  - ii. Outline additional factors that should be considered by the bond manager before proceeding with the switch. [4]
- [Total 9]

## QUESTION 9

The pensions-in-payment of a large defined benefit (DB) pension fund are linked to the local consumer price inflation (CPI) index. The fund has a Liability Driven Investment (LDI) strategy in place that makes use of inflation swaps consisting of real rate swaps and synthetic index-linked bonds.

- i. Define the following actuarial techniques as may be used to develop an appropriate investment strategy:
  - a. Liability hedging
  - b. Liability Driven Investment[2]
- ii. Distinguish between a real rate swap and a synthetic index-linked bond, and state two instances where a real rate swap would be more suitable for the fund. [4]
- iii. Discuss the relative merits of using synthetic index-linked bonds instead of government index-linked bonds in the LDI strategy. [4]

A local asset manager recently launched a pooled LDI fund that is mostly invested in long-dated bonds and swaps.

- iv. Outline the considerations in assessing the suitability of the pooled LDI fund for the pension fund. [6]
- [Total 16]

**END OF PAPER**