EXAMINATION

27 May 2016 (am)

Subject F105

Finance and Investment 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. You MAY NOT use any other computer program (e.g. Excel) during the examination.*

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 eight (8) questions, beginning your answer to each question <u>on a new page</u>.*

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.

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

You are a quantitative analyst employed at an asset manager that runs two equity funds, one actively managed and the other tracking a broad equity market index. You have calibrated a multifactor model which you believe reliably explains the cross-section of equity market returns in terms of a number of risk factors.

i. Explain what is meant by a multifactor model, giving an equation and defining all terms used.

[4]

ii. Describe how your multifactor model could be of use to the portfolio managers of both equity funds.

[6]

The passive portfolio has achieved the following returns over the past six months, with those of the index it is designed to track shown alongside:

	Portfolio return	Index return
Month 1	3.3%	3.1%
Month 2	1.2%	1.1%
Month 3	1.1%	0.9%
Month 4	-0.5%	-0.4%
Month 5	0.2%	0.1%
Month 6	2.0%	1.8%

iii. Calculate the annualised historical tracking error of the portfolio, and comment on whether or not investors are likely to be satisfied with this.

[4]
[Total 14]

QUESTION 2

A closed defined benefit pension fund domiciled in a very large developed country has ongoing benefit payments to annuitants with, on average, high rates of mortality. Benefit payments will continue for the remainder of the annuitants' lives, expected to be at most five years, after which the fund will be discontinued. There are no active members and no contributions. The pension fund wants to use liability hedging to select the assets.

Discuss the difficulties in applying liability hedging for this pension fund.

[6]

QUESTION 3

A life assurance company is contemplating an increase in its investment allocation to hedge funds based on an analysis that demonstrates the outperformance of a hedge fund index relative to other asset class indices over the last year. In the performance attribution, it was shown that securities lending was the largest contributor to the outperformance of the hedge fund index.

i. Explain the various data biases that should be considered before accepting the analysis.

[6]

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Securities lending is often employed by hedge funds, either as lenders or borrowers, to execute their investment strategies. Local regulations require that hedge fund deeds set a framework for engaging in securities lending that ensures that it is beneficial to all investors and that the associated risks are appropriately managed.

ii. Define securities lending.

[2]

iii. Briefly describe how and why a hedge fund could engage in securities lending as a borrower.

[2]

iv. Outline the limits and conditions that should be included in the hedge fund deed relating to participation in securities lending as a lender, in order to achieve the objectives listed above.

[6]
[Total 16]

QUESTION 4

A conglomerate merger is proposed between St. Zita's Cathedral Cleaning Inc. and St. Vitus Dance Music Ltd. In stock market news releases, two rationales for the merger are provided by the management of the firms: firstly, diversification of earnings to reduce risk for shareholders, and secondly, enhancement of earnings per share (EPS). Key financial statistics at 31 December 2015 were as follows:

	St. Zita's	St. Vitus
Share price	$120	$80
Earnings per share	$10	$8
Number of shares outstanding	500,000	1,200,000

You may assume that investors' valuations of the individual shares are unaffected by the transaction and that new shares in the acquiring firm will be issued to shareholders of the target firm on a proportional basis which reflects the current ratio of the two firms' share prices. Both parties recognise that the enhancement of EPS will depend on the direction of the acquisition, and have contracted you to advise them on which firm should be the acquirer in order to realise this objective.

i. Calculate the EPS of the merged entity, assuming that the objective of enhancing EPS has been achieved stating any further assumptions you make.

[4]

ii. Outline how both stated rationales might be criticised as inappropriate motives for a merger.

[4]

iii. Explain why an investor with risk preferences described by Prospect Theory might prefer the combined investment as opposed to holding the shares of the two individual companies.

[3]
[Total 11]
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QUESTION 5

An investor purchases a 15-year callable bond with a 3-year lockout period, which is the initial period during which the bond cannot be called.

    i.   Define the term "callable bond" and outline reasons why such a bond may be issued.

                                           [3]

    ii. Describe the key risks for the investor associated with the embedded option in the callable bond and outline how the investor may be compensated for these risks.

                                           [6]

                                    [Total 9]

QUESTION 6

A wealth advisory firm in a developed country that advises high net worth individuals on investment strategy wishes to create an art price index. Currently there is no such index in the country, despite a number of auction houses that collectively sell several thousand works each year, mostly by popular local artists. It is quite common in this country for wealthy local investors to allocate a significant portion of their portfolios to artworks.

    i.   Outline possible reasons for the firm wanting to establish an art price index.

                                         [2]

    ii. Discuss the difficulties faced by the firm in creating an art index

                                         [3]

The advisory firm wishes to construct an index on the following basis:

- A panel of local art experts creates a basket of representative pieces for each major type of art.
- Baskets to be created include contemporary oil paintings, modern oil paintings, sketches and sculptures.
- The price of each basket is assessed every three months. Where an art piece has not traded in the previous three months, the price will be estimated by the panel.
- An index will be calculated for each of the four art-types, with each index tracking the total price of the relevant basket.
- The overall index will track the price of all the baskets in aggregate.
- Chain linking will be used to overcome index changes due to basket constituent changes.

    iii. Discuss the limitations of the proposed index.

                                         [5]

                                    [Total 10]

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QUESTION 7

You are an actuary working as a credit specialist in a multinational organisation. A company managing small private equity portfolios is domiciled in a very large developed economy which uses the US dollar (USD) as its transactional currency. Derivatives are not traded on the local listed bond market.

The private equity manager has approached a number of very large organisations, including yours, to borrow USD100 million, in aggregate. Your organisation has been asked to lend them USD10 million repayable in full after five years and earning a conventional fixed coupon annually in arrears. The debt will not be listed and the borrower will not provide any covenants.

    i.   List the factors you would assess to gauge the financial strength of the borrower.

          [3]

In the absence of similar unlisted debt security issues to use as a benchmark, you have decided to use listed bond market data to inform your valuation of the debt. Your plan is to identify subsets of the listed bond market that share characteristics of the debt to a sufficient extent for them to be useful in this process.

    ii.   Outline the characteristics in terms of which you would assess which listed bonds are suitable for the purpose of valuation, and describe the process you would follow in the valuation.

          [11]

You determine that the coupon that should be paid is significantly greater than what the borrower is offering. On further investigation, you discover that the borrower has based the coupon payments purely on historical default rates of similar entities with similar credit standings.

    iii.   Discuss possible reasons for your required coupon being greater than what is offered by the borrower.

          [5]
          [Total 19]

QUESTION 8

The asset values over the last year for an insurer with a weak solvency position are shown below (in R millions):

	Market value of assets 31 Dec 2014	Market value of assets 30 Jun 2015	Market value of assets 31 Dec 2015
Equities	30	40	55
Bonds	130	140	145
Cash	40	45	47

The benchmark weights and total return indices for the fund against which actual fund performance is to be measured are shown below. The fund does not rebalance its assets during the year, and all cashflows during the year are invested/disinvested in line with the benchmark weights. Net cashflows for the year amounted to R15m.

	Benchmark weight	Index value at 31 Dec 2014	Index value at 30 Jun 2015	Index value at 31 Dec 2015
Equity TRI	10%	151.3	210.4	270.6
Bond TRI	70%	1050.1	1087.6	1112.6
Cash TRI	20%	55.4	56.6	57.9

i. Assuming premiums are received and claims are paid on start of day 1 July 2015, calculate the time-weighted rate of return for 2015, for the total fund and for the benchmark fund separately, stating any further assumptions you make.

[4]

ii. Show the split of the over/under-performance, in terms of time-weighted rate of returns, between the following components:

- Stock selection decision
- Asset allocation decision

[6]

iii. Comment on the results calculated in part (ii).

[3]

One of the directors states that fund returns should be compared to other similar insurers.

iv. Comment on the usefulness of the suggestion.

[2]

[Total 15]

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END OF PAPER