Institute of Actuaries of Australia

2008 PART III EXAMINATIONS

Subject Title: **Course 1 Investment**

Date: **Monday 28th April**

Time: **9:15 am to 12:30 pm**

Time allowed: Three (3) hours plus fifteen (15) minutes of reading time

Instructions: Each new question (but not each section of a question) must be commenced in a new answer book.

Number of Questions: Five (5)

Question	Marks
1	20
2	20
3	20
4	20
5	20
Total	**100**

Candidates are required to answer <u>ALL</u> questions.

This paper has 6 pages (excluding this page).

Answer all 5 questions.

QUESTION 1 **(20 Marks)**

Stock, commodity and futures exchanges (of which the ASX and SFE are examples) operate throughout the world to facilitate the operation of market economies. Trading on the exchanges is effected exclusively through brokers, who are members of the exchange.

In recent years, there has been a tendency for these exchanges to both amalgamate (e.g. Euronext/NYSE) and to demutualise (e.g. ASX/SFE). There has also been a strong trend to electronic trading.

You are the portfolio strategist for a global funds management organisation, responsible for implementation of all investment transactions. You are concerned with optimising how and where trading takes place.

(a) List the main ways in which exchanges facilitate trading activity and contribute to the efficiency of the economy, compared to direct transactions between buyers and sellers in goods and securities. (4 marks)

(b) What are the main types of regulation that you would expect exchanges to impose? (6 marks)

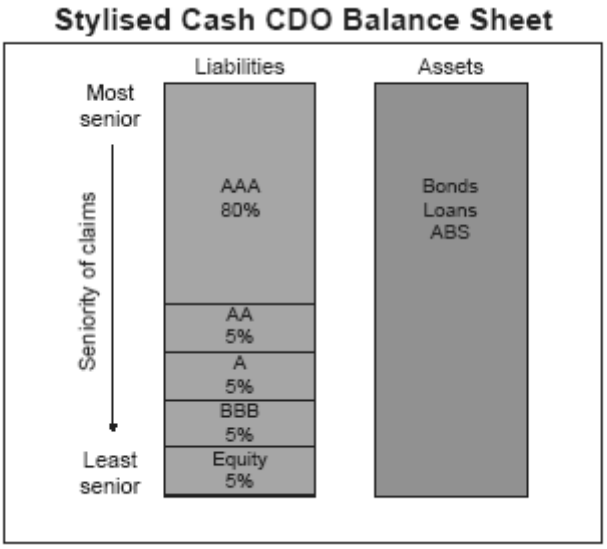
(c) What do you regard as the advantages and disadvantages of the amalgamation and demutualisation of exchanges from the perspective of their users? (4 marks)

(d) List the main benefits of electronic trading compared to floor trading, and the safeguards that you would expect to be provided by exchanges in relation to electronic trading. (4 marks)

(e) In recent decades, it has been observed that economic activity (i.e. GDP growth) for major world economies – such as the US, Europe, China and Japan - has become less correlated. However, the stockmarket performance (i.e. returns) in these countries have become more strongly correlated. Discuss the reasons for this phenomenon. (2 marks)

QUESTION 2 **(20 Marks)**

Collateralised Debt Obligations (CDOs) are securities that have become popular with investors in recent years. They are a special type of credit-risky investment, in that they provide a vehicle for transforming and transferring the credit risks associated with the underlying assets. This is achieved by dividing the ownership of the assets into 'tranches', as illustrated below.



The most junior tranche, the equity holders, must bear any losses in asset value of the CDO, up to 5% of the nominal asset value. The next tranche (rated BBB) must bear losses up to the next 5% of the nominal asset value, and so on. [The credit rating associated with a debt investment is a broad indication of the probability that the debt will be repaid.] The most senior tranche (rated AAA) suffers losses only if they exceed 20% of the nominal asset value.

The underlying assets may be equity or debt in the form of corporate bonds or asset-backed securities (ABS, eg mortgages). They may include investments in other CDOs.

As an investment consultant advising on credit exposures within a debt portfolio, you are concerned with modelling this new asset type, which promises to provide higher returns (and risks) for investors than traditional debt.

(a) Describe briefly how a credit-risky investment in general, such as a senior corporate bond, can be regarded as default-free debt, coupled with the grant of a put option on some underlying assets by the lender to the borrower. Explain how this applies (with modifications) to the tranches within a CDO structure. (3 marks)

(b) What information would you seek to assess the pricing of a credit-risky investment in general? (4 marks)

(c) Sub-prime mortgage lending, as practised in the US, is the lending at attractive interest rates to borrowers with poor credit histories. This has had unfortunate experience in the US. How can this experience be avoided in Australia? (2 marks)

(d) In the light of your answers to (a) and (b), suggest a general method for modelling credit-risky debt as an asset class, in relation to other asset classes. (4 marks)

(e) Discuss whether CDOs could be modelled under the method you propose in (d). (4 marks)

(f) What type of restrictions would you recommend for a client wishing to invest in CDOs? (3 marks)

QUESTION 3 **(20 marks)**

You are an investment consultant advising superannuation funds about communicating potential future investment outcomes to their members. Such outcomes are typically illustrated by projecting a range of benefit levels at various ages for a given investment choice by defined contribution members. The investment choices may include static asset allocations, and also dynamic strategies where the asset allocation becomes progressively more defensive as the member approaches retirement.

These projections are based on certain individual data specified by the member, such as contribution patterns and retirement ages, as well as on an asset model for investment returns. They are often provided as a decision-making tool on fund websites, and thus the financial basis for the assumptions must be precise and generally appropriate in a variety of circumstances.

You have been requested to advise on the asset model to be adopted.

(a) Discuss the key characteristics of asset classes that you would incorporate into an appropriate asset model. (4 marks)

(b) For each of the main types of asset, namely equity, debt and direct (i.e. unlisted) property, discuss how you would derive return expectations applicable to long term projections. (4 marks)

(c) Outline how you would calibrate (i.e. estimate) the risk aspects of your asset model to give effect to the key characteristics you have identified in (a). (5 marks)

(d) Outline, with formulas if appropriate, how you would apply your asset model in producing annual benefit projections, in either real or nominal terms, if no serial correlation of returns is assumed. (Note that benefit projections require both the mean and the standard deviation of benefit outcomes to be projected. You may assume that all cash flows occur at the start of a year.) What difference would it make to your modelling approach if serial correlation is a critical aspect of the model? (4 marks)

(e) Discuss what aspects of your asset model should be disclosed to members, and what qualifications you would include. (3 marks)

QUESTION 4 **(20 marks)**

With the ratification of the Kyoto Protocol by the Australian Government, it is likely that an Emissions Trading Scheme (ETS) will be established in some form to limit the production of greenhouse gases.

The ETS will assign certain permits for the production of emissions up to specified limits, and those permits can be traded on markets. The ETS may also assign additional permits to companies that operate carbon sinks (e.g. tree plantations that offset carbon emissions). As producers must procure permits sufficient to cover their emissions, an indirect cost on emissions will result.

As an investment consultant, you are concerned about the impact of an ETS on the performance of Australian equities, either through direct emissions costs on companies or through the higher costs of inputs.

(a) It has been suggested that, in the long term, an ETS should have no financial impact, as emission costs would eventually be reflected in companies' earnings, whether or not an ETS is established. State whether or not you agree with this suggestion, giving brief reasons for your answer. (2 marks)

(b) Suggest the factors that would have an impact on the cost of emission permits. (4 marks)

(c) Describe what information you would ideally seek of individual Australian companies to gauge the impact of an ETS on their financial performance. (5 marks)

(d) Discuss which of the following investment approaches would better exploit inefficiencies in pricing emissions:

- By treating emissions as a technological 'theme' that impacts particular industries more than others;
- By treating emission costs as a selection criterion in an active quantitative process. (6 marks)

(e) Would you expect value or growth managers to benefit more from an ETS? Why? (3 marks)

QUESTION 5 **(20 marks)**

You are the performance analyst for an international funds manager. Besides investing actively in regional equity and debt, the manager takes active positions in countries and currencies.

The performance benchmarks used by the manager are based on a static country allocation and assume currency positions are being hedged. You are considering the appropriateness of this basis.

(a) Show that the forward exchange rate F for a forward contract to buy foreign currency at time t, given the current spot rate is S, may be determined as:

$$F = \left(\frac{1+r_d}{1+r_f}\right)^t S$$

where r_d, r_f denote the annualised risk free rates in the domestic and foreign currency respectively. Hence show that the annualised rate of currency appreciation on a hedged holding of foreign exchange is approximately $r_d - r_f$, the difference between the domestic and foreign interest rates. (This is called the principle of "covered interest rate parity".) (2 marks)

(b) Suggest reasons why the actual rate of currency appreciation on an unhedged holding of foreign exchange may not be equal to the difference between the domestic and foreign interest rates, $r_d - r_f$.

(3 marks)

(c) On the basis of (a) and (b), or on any other basis, suggest why performance benchmarks for international debt portfolios are generally hedged.

(3 marks)

(d) Discuss whether performance benchmarks for international equity should also be hedged. (3 marks)

(e) Design a general method of attributing overall portfolio performance within a single period to: regional stock selection; country allocation; and currency. How would you apply this method to attribution of performance over multiple periods? (5 marks)

(f) For the specific case of an international debt portfolio, discuss broadly how you would attribute portfolio performance to duration and convexity decisions taken within a given region. State all assumptions.

(4 marks)

END OF PAPER