Institute of Actuaries of Australia

2008 PART III EXAMINATIONS

Subject Title: **C1**
Investments

Date: **Monday 20th October 2008**

Time**: 9:15 am – 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**

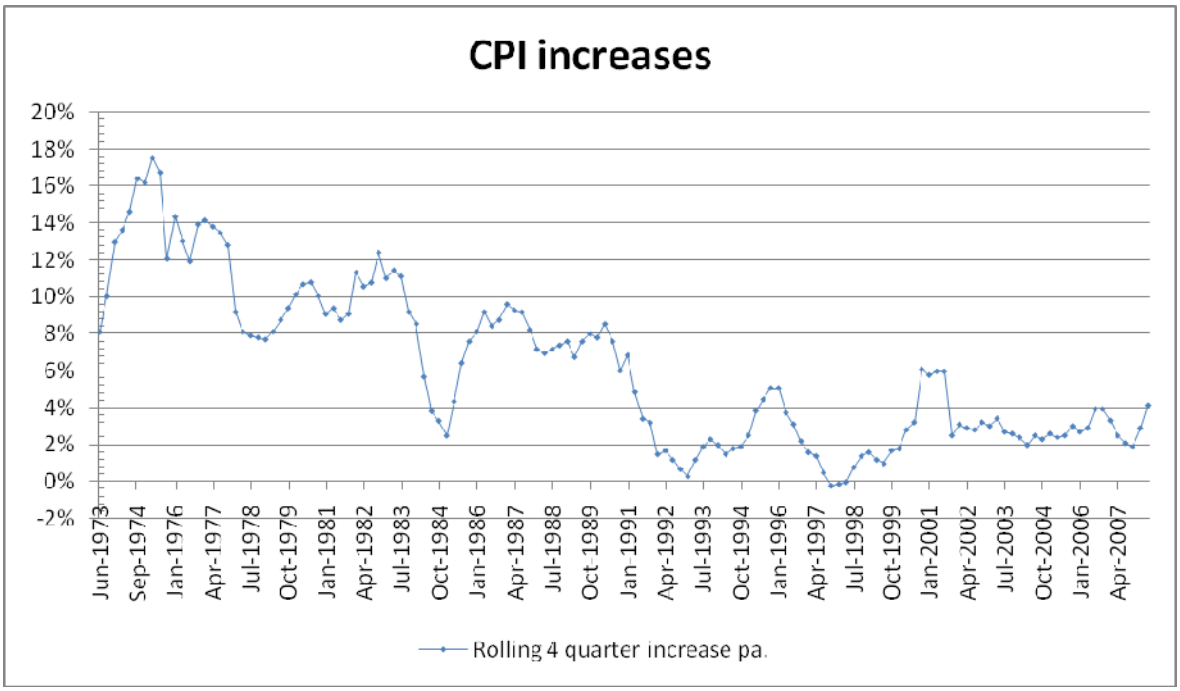
Candidates are required to answer <u>ALL</u> questions.

This paper has 7 pages (excluding this page and the blank back page).

Answer all 5 questions.

QUESTION 1 **(20 Marks)**

The monetary policy of the Reserve Bank (RBA) is based on a target for price inflation of 2%-3% p.a. Whilst this target has been generally achieved since it was introduced in 1996, recent CPI increases have exceeded the target range, as shown below:



Source: ABS

(a) **Suggest reasons why an inflation target is a suitable objective for monetary policy.** **(3 marks)**

(b) **Suggest possible causes of inflation in Australia.** **(3 marks)**

(c) **Suggest reasons why the inflation target was *not* achieved at particular times since 1996.** **(3 marks)**

(d) **Explain how the RBA attempts to achieve its inflation target, and the role of interest rate management in this objective.** **(2 marks)**

(e) **Discuss the limitations of monetary policy in controlling inflation.** **(3 marks)**

(f) **Suggest other approaches to controlling inflation.** **(3 marks)**

(g) **Discuss how actual price inflation affects expectations of *future* inflation. Do inflationary expectations matter when assessing the *value* of inflation-linked liabilities?** **(3 marks)**

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QUESTION 2 **(20 Marks)**

An asset is said to be *liquid* when it can be sold quickly and with minimal price impact. Several asset classes are regarded as generally illiquid, and most of them are *unlisted*. A *liquidity crisis* is a situation in which an investor has difficulty in liquidating assets.

On the other, a *credit crisis* is a situation in which credit is difficult, or expensive, to obtain for financing a firm's operations. The 2007 subprime mortgage crisis is an example of such a crisis for banks worldwide.

(a) Describe the differences between a liquidity crisis and a credit crisis for an institutional investor. Do the crises result from the type of assets held by the investor or from the type of the investor's liabilities? (3 marks)

(b) Discuss how liquidity and credit risks could be modelled in an asset/liability study. (4 marks)

(c) Give examples of asset classes that are typically regarded as illiquid, including at least one *listed* asset class, and describe the features that inhibit liquidity. (3 marks)

(d) Illiquid asset classes are difficult to model, because their asset values are often subjectively assessed, on an 'appraisal' basis, by a professional valuer. Various approaches have been suggested for modelling illiquid asset classes:

- **Use a listed and liquid proxy;**
- **Use a very long data period for analysing returns for an illiquid asset class;**
- **Use only transaction values of illiquid assets in assessing performance;**
- **Attempt to 'desmooth' appraisal-based performance by assuming that actual transaction values are a known function of appraisal values.**

Discuss the merits and limitations of each approach for constructing an asset model. (10 marks)

QUESTION 3 **(20 marks)**

You are an investment consultant advising retail superannuation funds on asset allocation. However you are considering whether an alternative approach to asset modelling is justified, in the light of increasing globalisation of investment markets.

Your alternative approach is to abandon the conventional model of asset markets, classified into broad equity, debt, real estate and alternative markets, with each assumed to be operating more or less efficiently. You favour a model where business activity plays the central role. You propose to model the major business sectors as 'asset classes' in their own right:

- **Energy**
- **Materials**
- **Capital Goods**
- **Commercial Services & Supplies**
- **Transportation**
- **Automobiles & Components**
- **Consumer Durables & Apparel**
- **Hotels, Restaurants & Leisure**
- **Media**
- **Retailing**
- **Food & Staples Retailing**
- **Food, Beverage & Tobacco**
- **Household & Personal Products**
- **Health Care Equipment & Services**
- **Pharmaceuticals & Biotechnology**
- **Banks**
- **Diversified Financials**
- **Insurance**
- **Real Estate**
- **Software & Services**
- **Technology Hardware & Equipment**
- **Semiconductors & Semiconductor Equipment**
- **Telecommunication Services**
- **Utilities**
- **Government**

Both equity and debt securities would be modelled according to the business sector from which they are issued.

(a) Suggest a justification for your proposed approach based on economic or financial theory. **(4 marks)**

(b) The Capital Asset Pricing Model (CAPM) assumes that securities (and business sectors) are always appropriately priced relative to each other, on the basis of their known risk and return characteristics. Explain how using the CAPM for implementing your alternative approach will work. **(2 marks)**

(c) Critique the CAPM and suggest, with reasons, what technical modification(s) you would make to CAPM for modelling both equity and debt according to business sector under your alternative approach. **(4 marks)**

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(d) Discuss possible economic or financial factors that you would consider in deriving return expectations for the model you construct in (c). (4 marks)

(e) Outline how you would apply your alternative asset model in assessing asset allocations for a superannuation fund with an inflation-linked investment objective. (4 marks)

(f) Suggest ways in which your recommended asset allocations could be implemented in practice. (2 marks)

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QUESTION 4 **(20 marks)**

Equity managers are often classified by style with a view to achieving diversification across different styles of managers. The style relates to the process by which a manager selects stocks in the light of current conditions.

You are the Chief Investment Officer of a large trustee organisation, responsible for management of equity investments and the appointment of equity managers. You are sceptical about whether a manager's true style can be readily ascertained from the available information on managers, and are interested in objective methods for identifying style. One such method is cluster analysis, which has been applied for classifying US mutual fund managers.

Though there are several analytical techniques available, the broad aim of cluster analysis is to identify managers whose performance is similar across time – these managers are classified as a single 'cluster'. Similarity of performance could be measured in terms of a performance distance metric such as:

$$d(A,B)=\sqrt{\sum_t \left(r_t^A - r_t^B\right)^2}$$

where r_t^A, r_t^B **are the returns in period** t **for managers** A, B **respectively.**

Thus where the metric $d(A,B)$ **is small, the managers perform in a consistent way across time.**

(a) **Outline the theory underlying value and growth management styles, and explain how managers may be classified by style under conventional methods.** **(5 marks)**

(b) **Discuss whether the metric proposed would be a suitable measure of performance differentiation for the purpose of style classification.** **(3 marks)**

(c) **Discuss the merits and limitations of cluster analysis, relative to conventional methods of style classification. Your answer should address:**

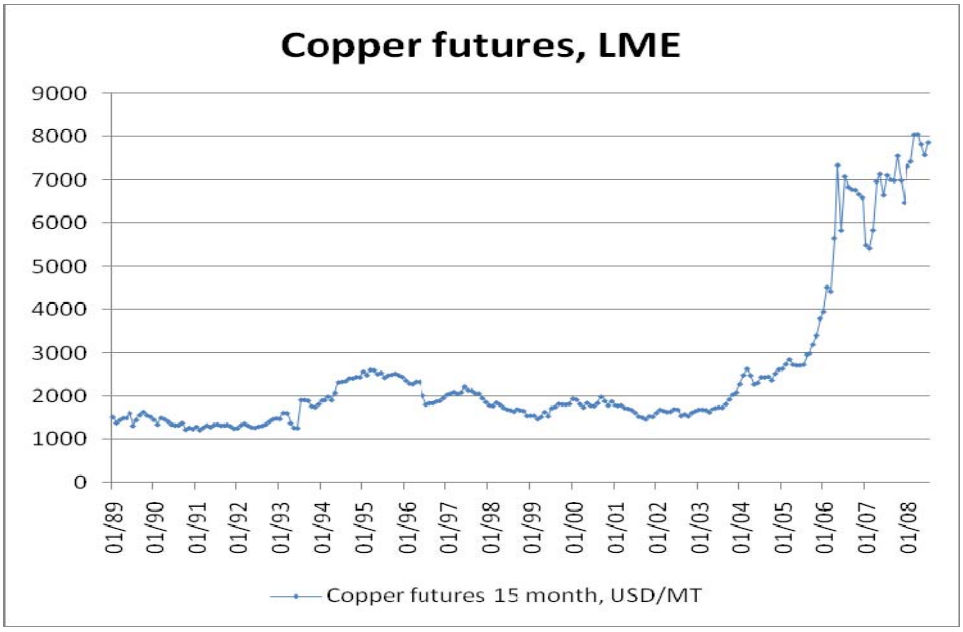
- **Data requirements**
- **Stability of classification**
- **Interpretation of clusters as styles.**

(8 marks)

(d) **Discuss the extent to which cluster analysis might be applied for manager selection, reservations you have regarding its use for this purpose and any additional information you might need in making a decision about selecting managers.** **(4 marks)**

QUESTION 5 **(20 marks)**

You are the Chief Financial Officer of an Australian manufacturer of electronic devices and integrated circuit boards. The metal copper is a significant input in your production. Unfortunately the worldwide demand for copper has increased dramatically in recent years, leading to large increases in price, as shown below.



Source: Datastream

You are responsible for managing the effect of the copper price on your firm's profitability. Though Australia is a significant producer of copper ore, there are no exchanges for trading copper or its derivatives in this country.

The London Metal Exchange (LME) provides trading on the futures and options associated with copper, with almost 95% of all futures trading conducted there. Though copper itself may be delivered on these contracts, the LME maintains only a few warehouses for such purposes. Trading is based on the USD price of copper and, generally, on cash settlement.

(a) Explain conceptually how copper futures and options can help to manage the effect of volatility in the copper price. (3 marks)

(b) Apart from simply holding copper futures or options, what other ways are there to hedge the effect of the copper price, and what are their limitations? (2 marks)

(c) Explain the advantages to the LME in having an options contract on copper futures, rather than an options contract on copper metal. (4 marks)

(d) **Explain how you would define your firm's exposure to the copper price, and outline the factors that determine it. (4 marks)**

(e) **Discuss how you could deal with the currency risks introduced in USD denominated trading in copper futures or options. (4 marks)**

(f) **Discuss the factors that would lead you to use copper options, in preference to copper futures. (3 marks)**

END OF PAPER

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