Institute of Actuaries of Australia

2009 PART III EXAMINATIONS

Subject Title: **C1**
Investments

Date: **Monday 19th October 2009**

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: **Six** (6)

Question	Marks
1	17
2	15
3	17
4	17
5	20
6	14
Total	**100**

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

This paper has twelve (12) pages (excluding this page and the blank back page).

INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 1 INVESTMENTS **OCTOBER 2009 EXAMINATIONS**

Answer all 6 questions

QUESTION 1 **(17 Marks)**

The Equity Principle is a boutique funds manager that specialises in the active management of Australian shares. Its investment process seeks to find companies with above average, sustainable returns on equity (RoE). (Sustainable in this context refers to an ability to maintain RoEs over time rather than environmental sustainability, though it may include the latter as a source of RoE sustainability.) It only holds stocks that meet these criteria.

As part of its continuous improvement program one of the firm's senior members has suggested that its investment process means it must wait for companies that embark on RoE improvement programs to demonstrate that the improvement is well established before investing in such a company. He has suggested, therefore, that the firm seek a balance in portfolio construction between companies with sustainable RoE (termed 'core' holdings) and companies undergoing expected changes in RoE (termed 'developing' holdings).

Core holdings will reflect companies with sustainable RoE and developing holdings will reflect favourable or expected favourable changes in RoE. Developing holdings will be sourced in new companies or in higher weightings than exists in the core portfolio where the firm perceives RoE changes to be underway.

The Executive Committee (ExCo) of the Equity Principle has decided that it should construct a shadow portfolio of both 'core' and 'developing' holdings that embraces this suggestion to test its viability.

Once ExCo has determined selection criteria for developing holdings, ExCo will conduct back-testing of the performance of the shadow portfolio by:

- **building a shadow portfolio through the application of these selection criteria in the conditions that applied over the relevant past periods, and**
- **will monitor the performance of proposed shadow portfolio holdings recommended by its fund managers at their regular meetings over the next 6-9 months.**

If satisfied with the results of the back-testing and monitoring, The Equity Principle will then implement these changes into its live portfolios.

(a) How would you characterise the firm's investment beliefs in terms of the Efficient Markets Hypothesis? Why?

(2 marks)

(b) How do you calculate RoE? You may provide a formula or describe the measure in words. Whichever you choose, your formula or description should be specific enough to enable the reader to calculate RoE provided he or she has the requisite information from a company's accounts.

(2 marks)

(c) **What characteristics would The Equity Principle look for in a company that would indicate the likelihood of a sustainable RoE?**

(4 marks)

(d) **What factors contribute to changes in RoE over time? Use your answer to (c) to frame your answer and provide examples to illustrate the points you make.**

(2 marks)

(e) **Assuming that investing in companies where the firm perceives favourable RoE changes to be underway is proven to be a successful investment strategy, and that the portfolio may now invest in companies fitting this criteria, how would you expect the part of the portfolio made up of developing holdings to differ from the part of the portfolio made up of core holdings?**
(Things you may wish to consider might include investment style, market capitalisation etc.)

(4 marks)

(f) **What precautions should The Equity Principle exercise when interpreting the results of the back-testing?**

(3 marks)

QUESTION 2 **(15 Marks)**

You have been hired as a consultant to a small family trust. At 1 October 2009 the trust has cash of $650,000. The money is being held in trust to pay cash amounts of $275,000 to each of three children when they turn eighteen on 1 October 2010, 1 November 2012 and 1 June 2014, respectively. Should a child have died beforehand, the amount is payable to his/her estate on the date at which the child would have turned eighteen if the child had not died beforehand. (An estate is a deceased person's pool of assets that is to be distributed to the beneficiaries of that deceased person's will).
The trust has asked for your advice regarding the meeting of its objectives, in nominal terms and real dollar terms.

(a) **Explain what is meant by the "term structure of interest rates"? What are two theories that attempt to explain the term structure of interest rates?**

(2 marks)

(b) **Comment on the proposition that the term structure of real interest rates is formed by the term structure of nominal interest rates less a deduction for inflation.**

(3 marks)

(c) **The trust has requested that you make a quick assessment of whether it has sufficient funds to meet its obligations as stated above. How would you perform this assessment? (Ignore the effects of inflation).**

(2 marks)

(d) **Comment on whether zero coupon bonds would be a suitable or practical type of asset for the trust. Note that the trust would require a return of approximately 8.75% p.a. to meet its objectives. (Ignore the effects of inflation and tax).**

(2 marks)

(e) **Discuss the key issues in using each of the other possible asset classes or investment strategies in light of the trust's required rate of return, and what you understand about general characteristics of various assets and market conditions to be in Australia at the current time. (Ignore the effects of inflation and tax).**

(5 marks)

(f) **Based on your answer to 2 (e), what other courses of action, that are outside of the investment strategy process, could be recommended to the trust? (Ignore the effects of tax).**

(1 mark)

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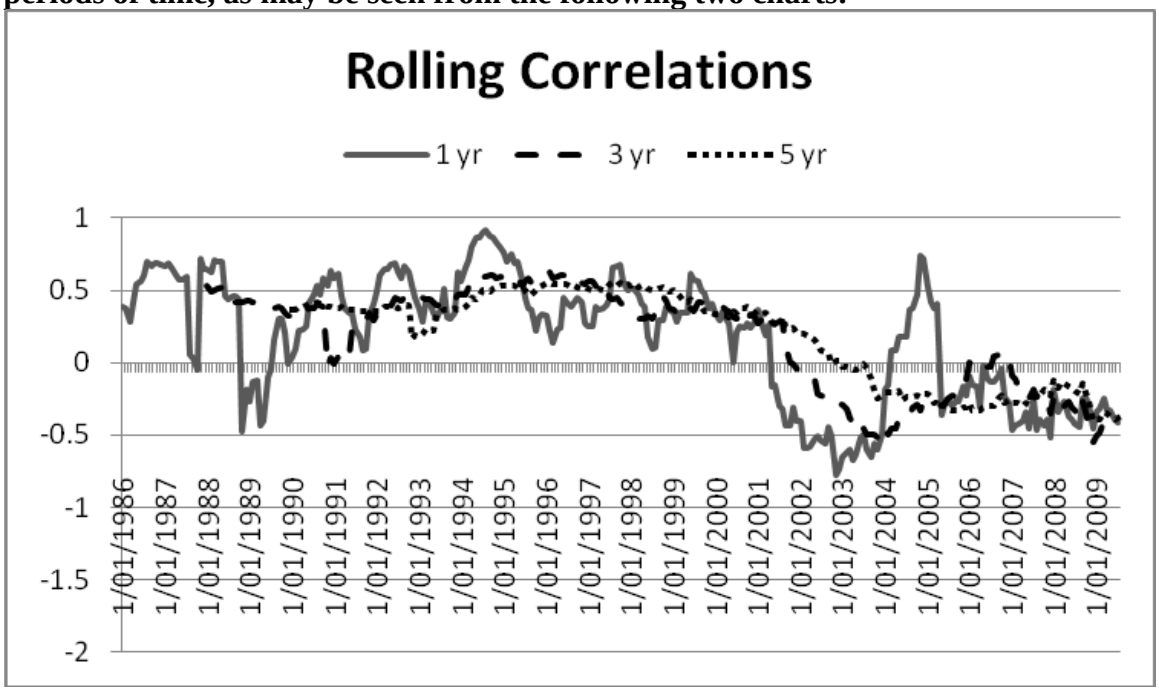
QUESTION 3 **(17 Marks)**

When developing asset assumptions for use in asset modelling it is common to base assumptions regarding the covariance structure of returns on the history of the covariance structure. Assumptions for use in long term asset modelling may make use of, say, the last 20 years' experience to derive the covariance structure. It is however the case that the correlations between asset class returns are not stable over shorter periods of time, as may be seen from the following two charts:



The above chart shows rolling correlations between the ASX All Ordinaries (equity) and the Citigroup WGBI Australian Government Bonds (bonds) total return indices.

Is the correlation in international equity returns constant?: F Longin and B Solnik

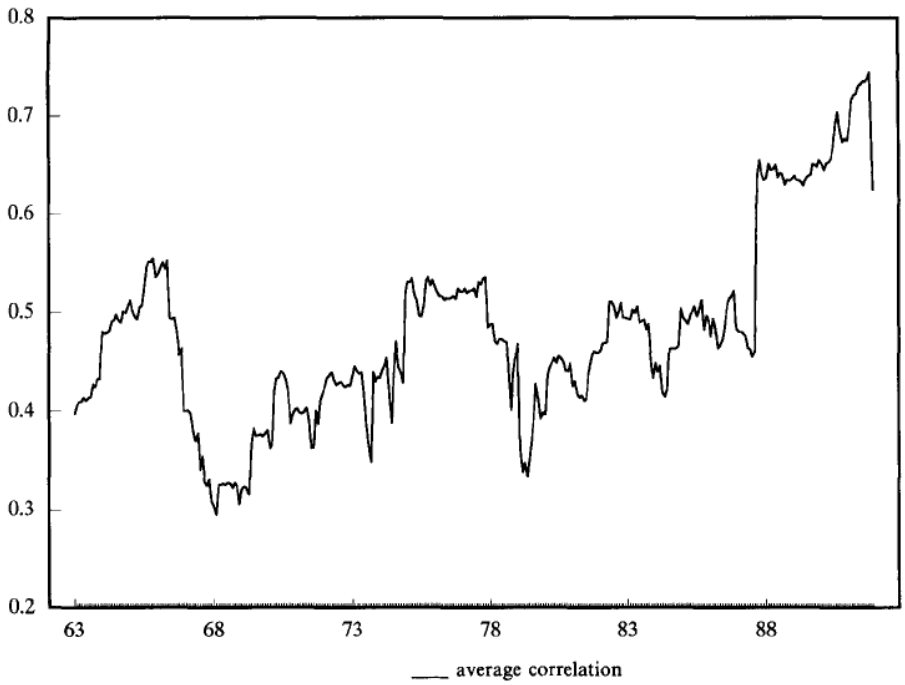


FIGURE 1. Correlation of the US stock market. This figure reports the (unweighted) average correlation of the US stock market with the other seven stock markets. The correlation is computed over sliding windows of four years, using local currency monthly total returns. The period is December 1959–91.

Source: Journal of International Money and Finance 1995 Vol 14 No 1

The above chart illustrates changing correlation between different equity markets.

Deviations from the historical correlation structure have caused difficulties in the past for long/short hedge fund strategies (strategies where the manager buys one asset which he expects to go up and sells another which he expects to go down). Long-Term Capital Management and Sowood Capital illustrate these strategies, and their failings.

In the context of a hedge fund manager considering the introduction of a new long/short investment strategy:

(a) Comment on the significance of non-stationary covariance structures for the practical application of classical mean-variance models in portfolio construction.

(4 marks)

(b) In the context of current market conditions:

- **describe how scenario testing can be used in asset modelling to explore the effects of changes in market conditions;**
- **list two examples of some changes in market conditions that are plausible; and**
- **describe any corrective actions that the hedge fund manager may utilise as a result of a scenario test.**

(5 marks)

(c) Suggest an alternative approach to asset modelling which does not require the assumption of a fixed covariance structure.

(2 marks)

(d) What other approaches could be used by a hedge fund manager to quantify their potential losses from an unexpected change in market conditions?

(2 marks)

(e) Describe the factors that a hedge fund manager could assess in seeking to manage non-stationary correlation between asset classes?

(4 marks)

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QUESTION 4 **(17 Marks)**

You are developing investment assumptions for two clients:

- **The funds held by an Australian (tax exempt) charity to fund its future operations.**
- **The funds held by a large complying Australian superannuation fund.**

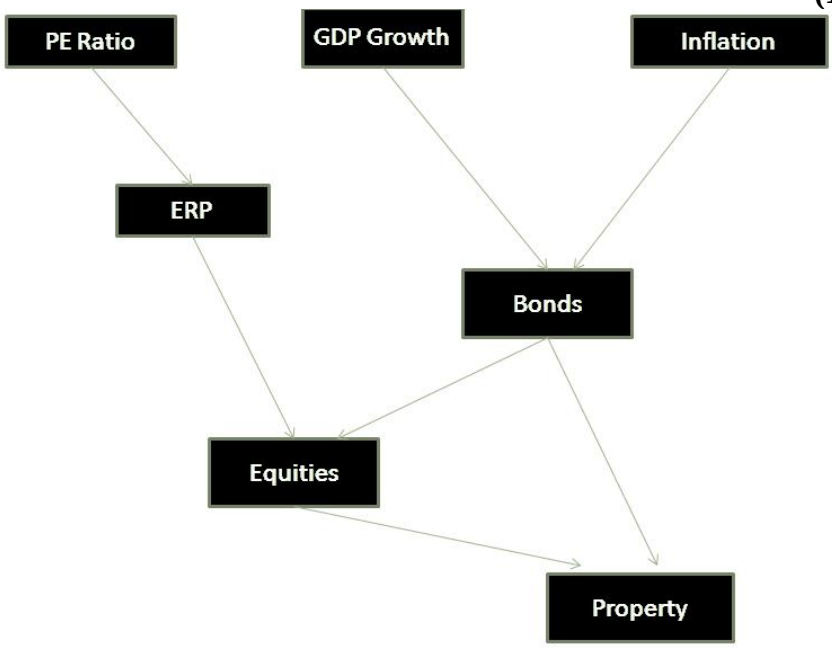
For the purposes of this question, the taxable income, including realised capital gains, of a complying superannuation fund is taxed at the rate of 15 per cent. Investment income is taxed on an 'as received' basis, while capital growth is taxed as a capital gain upon realisation of the profit from sale. If the asset sold has been held for 12 months or more the gain is discounted by a third.

Franking credits on dividends paid by Australian equities are fully recoverable both by the charity and by the superannuation fund.

(a) Using the 'cascade' method (refer to the chart below), develop reasonable pre-tax assumptions in the context of the current economic conditions for the returns on:
- **Australian bonds;**
- **Hedged international bonds;**
- **Australian equities;**
- **Unhedged international equities; and**
- **Australian listed property trusts.**

Ensure that your answer includes both the assumed pre-tax return and the reasoning utilised in choosing the assumed pre-tax return for each of the five asset classes.

(10 marks)



(b) Adjust your pre-tax assumptions to arrive at appropriate after tax assumptions for:

- **The charity;**
- **The superannuation fund.**

Assume a dividend yield on both Australian and international shares of 3% and that 75% of Australian share dividends are franked. Assume a distribution yield on Australian listed property trusts of 5%. Assume also that assets are held on average for 7 years before being sold. Note that only 2/3rds of capital gains made by superannuation funds on assets held for more than one year are included in assessable income.

(5 marks)

(c) What practical difficulties might be encountered by the charity if it uses a pooled investment vehicle with respect to whether the charity is investing its funds efficiently?

(2 marks)

QUESTION 5 **(20 Marks)**

You have been appointed as the Portfolio Manager for a diversified Australian infrastructure fund. The fund's core assets include partial ownership of two domestic airports (book value of $450 million), full ownership of a port facility (book value of $250 million) and partial ownership of three coal power generators (book value of $1.6 billion). The fund currently holds $120 million in cash. It has no other significant assets.

The fund is significantly leveraged. At present, the assets are funded by $1.6 billion of debt. $400 million in the form of a syndicated bank loan is due in nine months time. The other debt obligations are not due for the next twelve months. It has no other significant liabilities.

Based on the most recent closing market price, this fund has a market capitalisation of $620 million. The lenders have a right to request early repayment if the market capitalisation falls below $300 million.

Given the current climate, you are aware of the difficulties of trying to sell your assets at a reasonable price.

You are now preparing your investment plan for the coming twelve months for the Board of Directors.

(a) **The Board of Directors has asked you to set your two primary investment objectives for the coming twelve months. State your two investment objectives, and give a relevant quantitative measure for assessing performance in meeting each of the two objectives.**

(4 marks)

(b) **Your first step in managing this fund's assets is to arrange these assets into an investment portfolio. Explain why you would not simply classify the non-cash assets under the "infrastructure" asset class. Describe two other methods of classifying the assets that you would consider instead with reasons for choice of the methods.**

(3 marks)

(c) **Identify four potential major risks faced by the fund in the coming twelve months. Your answer should relate to the objectives described in (a) but consider also the broader environment.**

(4 marks)

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(d) **Two years ago, you purchased a put option on the port facility to sell it to a finance company (not one of your lenders) for $300 million.**

What are two common models used to value a put option?

Explain the key difficulties in determining the fairness of the put option purchase price paid, and the implication for the level of the put option price paid two years ago.

You are not required to give any parameter estimates nor calculate the put option price.

(5 marks)

(e) **One of your potential strategies is to conduct a rights issue to raise $250 million equity capital from existing unit-holders.**

From the perspective of a <u>current investor</u> of the infrastructure fund, discuss what types of portfolio management factors the investor would consider before deciding whether to take up the rights entitlements.

(4 marks)

QUESTION 6 **(14 Marks)**

You are an external adviser for an established unlisted buyout firm, Conquest Securities. The firm is structured as an unlisted unit trust that accepts investment monies from wholesale investors. The management of Conquest Securities is conducting a portfolio review to ensure they are positioned well for the volatile times ahead. They have sought your services in advising them on this assignment.

Conquest Securities aims to purchase controlling stakes of underpriced companies in different sectors in the Australian market. Some companies are fully bought out, after which they are delisted from the stock exchange. The acquired companies are then managed by key personnel appointed by Conquest Securities with a view to rebuilding these companies to their fair value. Conquest Securities then exits these companies through an IPO (initial public offer), trade sale, spin-off or selling off the majority stake. This process may mean the rewards are realised several years later.

The market value of "Assets Under Management" is $7.2 billion. The breakdown of the sector exposures is given below:

SECTOR	MARKET VALUE OF COMMITTED FUNDS
Financial	$1.2 billion
Industrials	$1.5 billion
Materials/Resources	$0.6 billion
Healthcare/Biotechnology	$0.3 billion
Consumer Discretionary	$1.1 billion

Conquest Securities currently also holds $1.5 billion in cash; and $1.0 billion in fixed income securities (consisting of short-term bank bills and 5 year government bonds only). Conquest Securities does not have any debt obligations.

Over the past 18 months, Australian listed companies have raised over $50 billion of capital in rights issues to repay debt and replenish their balance sheets. A number of companies are lining up for a second round of issues. Conquest Securities have indicated in the case this happens, they will contribute capital to retain their controlling stakes.

(a) Evaluate Conquest's investment portfolio's risk profile by considering the three different asset classes forming this portfolio. Ensure your answer discusses significant features of the portfolio's investments within an asset class which will affect Conquest's investment performance and financial position.

(6 marks)

(b) Describe the investment style that you think is appropriate for Conquest to use.
What analytical steps should be taken for considering whether a new company investment should be included into the portfolio (the analytical steps are with reference to the portfolio's investment attributes only). **(4 marks)**

(c) Conquest Securities is considering charging an annual performance-based fee to their wholesale investors (investment houses, superannuation funds, university endowment funds) for the services they provide. Give two key challenges you anticipate in formulating a fair performance-based fee structure for Conquest Securities.

(4 marks)

END OF PAPER