2012 PART III EXAMINATIONS

Subject Title: **C1 Investments**

Date: **Monday, 15 October 2012**

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 **ALL** questions.
This paper has **eight** (8) pages (excluding this page).

COURSE 1 INVESTMENTS **OCTOBER 2012 EXAMINATIONS**

Answer all 5 questions.

QUESTION 1 **(20 Marks)**

You are an asset consultant advising a number of different investment funds, and you are planning to construct asset models to assist with asset allocation strategy for these funds. The asset classes you wish to include in the models are Australian equities, international equities (hedged and unhedged as distinct classes), Australian listed property, Australian fixed interest, international fixed interest (hedged) and Australian cash. International fixed interest may be subdivided into sovereign and non-sovereign (credit) debt.

Four possible types of asset return model are under consideration:

i) Multivariate normal (MVN) with iid returns (i.e. independent and identically distributed returns);

ii) MVN model with iid returns, with the returns for equities, listed property and credit modified by a mixture of normals to produce return distributions strongly skewed to the left, to allow for the large negative returns observed in major stock market downturns;

iii) Multivariate GARCH model;

iv) Vector autoregressive (VAR) model with iid multivariate normal innovation terms.

a) Compare the four classes of model in terms of their advantages and/or disadvantages in representing each of the following distributional properties of returns observed in practice:

- Form of marginal return distributions,
- Stability of the joint distribution over time, especially the stability of variances and covariances,
- Serial independence or dependence, and
- Comprehensive description of interaction between returns, past and present.

(8 Marks)

b) Why is the MVN still widely used in practice when it could be considered as a special case of each of the other three? (1 Mark)

Three investment funds for which you require asset return models are:

i) A closed pension fund where all members are pensioners aged 65 or older. The fund makes a fixed monthly payment to each pensioner.

ii) A defined contribution superannuation fund with active members only, most of whom are aged under 40.

iii) A savings fund for retail investors. The fund guarantees an annual return of 2% after tax. The trustees declare an annual crediting rate, which may be less than the actual earnings rate to pay for the guarantee, and an undistributed reserve fund may be maintained. Individual accounts are at call, although experience has indicated that very few investors redeem any of their account before age 65.

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c) For each of the three funds, outline the financial requirements for the fund and hence the characteristics of an asset return model to evaluate alternative asset allocations. Note that part (d) requires you to relate your answer to specific model types. (6 Marks)

d) For each of the three funds, which of the four model types discussed above would be an appropriate choice given the requirements outlined in part (c)? Explain briefly the reason for your choice in each case. You may nominate more than one model for any or all of your funds. (5 Marks)

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QUESTION 2 **(20 Marks)**

A new charitable trust in perpetuity has been created with the proceeds from the sale of a community asset. The purpose of the trust is to make grants on the basis of applications for financial assistance from community groups.

The amount realised from the sale was $300 million, compared with a book value of $250 million. The trustees view the book value of $250 million as the capital of the fund, and the remaining $50 million as retained earnings.

The trust deed requires the trustees to consider the competing claims of current and future generations in making grants from the trust fund. Trustees are appointed for a term of five years, and the current board has expressed a desire to pass on the fund to the next board in a similar financial position as it is now. Subject to these requirements, the trustees wish to maximise the total amount of grants provided by the fund.

The trustees have set out accordingly the following general objectives:

1. Maintain the real value of the capital of the trust with regard to inflation.
2. Maintain equity between present and future generations in terms of the amounts available for distribution on an annual basis.
3. Maximise the total amount of income that can be provided by the investments of the trust over the long term subject to a prudent level of portfolio risk.

a) What limitations would you face in meeting the first objective (maintain the real value of the capital of the trust with regard to inflation) if the entire sale proceeds of $300 million were regarded as capital? (2 Marks)

b) At the initial meeting, one of the trustees has pointed out that the community is growing, and so maintaining the value of the fund in real terms will not adequately balance the claims of future against the current generation because the size of the fund per capita in real terms will diminish. How would you respond to this comment? (3 Marks)

Two approaches to setting a funding strategy are to be examined. For either approach, the annual grant will be set at a fixed percentage (G%) of the capital, regardless of investment earnings and paid out of the notional capital fund.

First approach: The retained earnings (currently $50 million, or 20% of the capital) would be regarded as a reserve fund. Provided the reserve fund remains above 10% of capital, an amount would be transferred to capital each year to maintain its real value. If the reserve fund drops below 10%, the required transfer to capital would be deferred, and the annual grant reduced as necessary.

Second approach: The capital would be invested using a conservative asset allocation to provide an income stream with low volatility. The reserve fund would be invested in a higher return-higher volatility portfolio. Provided the reserve fund is at least 10% of capital, transfers will be made to capital to maintain its real value. If the reserve fund drops below 10% of capital, no transfer will be made.

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c) How should the fixed grant percentage G% be determined for each funding approach? (4 Marks)

d) Outline and compare the long-term dynamics you would expect for the two approaches. (8 Marks)

e) Briefly, what features should an asset return model have to compare the two funding approaches? (3 Marks)

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QUESTION 3 **(20 Marks)**

You have been contracted by a financial planning firm to develop a series of model portfolios consisting of managed funds for use by their advisers.

A model portfolio sets out strategic asset allocations (SAAs) for a stated risk profile and the managed funds recommended for use within a sector specified for SAA.

In answering the questions below think not only of the technical investment issues you might encounter but also practical concerns, where appropriate, either the firm or its advisers might face in using the models you develop.

a) Set out the information you would need for developing the SAAs both from the financial planning firm and sourced from your own resources. Why would you need this information? (8 Marks)

b) Describe the process you would undertake to determine the SAAs. (8 Marks)

c) What general principles should guide the choice of managed funds to populate the various sectors and/portfolios? (Do not repeat manager information you may have itemised under part (a) above and do not include a checklist of manager attributes or manager/fund specific requirements.) (4 Marks)

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QUESTION 4 **(20 Marks)**

a) Explain any relationship between the price volatility and duration of a bond. If you believe there is no relationship, provide your reason/s. (3 Marks)

b) Are there any other bond attributes that might be useful in managing bond portfolios in volatile or changing markets? Give reasoning for your answer. (4 Marks)

c) A colleague has informed you that he pursues a trading strategy for his bond portfolio that adjusts portfolio duration by small, frequent, selective amounts after movements in yields. On what would such a strategy be premised? Describe three ways in which you could implement this strategy. (Note: you are not required to indicate shortcomings on the approach relative to attributes you might have mentioned in part (b) above.) (8 Marks)

d) Another colleague tells you she is developing a strategy that will benefit or protect a fund from volatility that uses options. What feature/s of options, if any, make/s them amenable to such a strategy? How might that/those features be built into such a strategy? If you believe there are no strategies, provide your reason/s. (5 Marks)

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QUESTION 5 **(20 Marks)**

a) You wish to analyse the performance of a managed equity portfolio. The fund has 2 active management styles. Individual Stock Selection where stocks are actively weighted in the portfolio and Sector Selection where industry sectors are actively weighted in the portfolio. The equity fund has 3 industry sectors and 20 stocks. The monthly returns for the portfolio and benchmark of the 3 sectors are tabulated below in Table 1. Perform a Brinson arithmetic attribution to calculate the Sector Selection active return and the Stock Selection active return. (2 Marks)

Table 1.

Sector	Benchmark		Portfolio	
	Weight	Return	Weight	Return
1	20%	2%	10%	2%
2	30%	3%	30%	4%
3	50%	4%	60%	9%
Total	100%	3.3%	100%	6.8%

b) Assume that both portfolio managers have equal investment skill (information coefficients) and update their portfolios once a month. What is the expected *ratio* of the information ratios of Stock Selection over the Sector Selection active investment style? (2 Marks)

c) The Unit Prices of the managed equity portfolio are priced daily and investors can buy and sell investment units at the daily unit price. Portfolio returns are calculated using the Internal Rate of Return (IRR) with daily cash flows. Give one advantage and one disadvantage of this monthly portfolio performance calculation. (2 Marks)

d) We record 5 years of monthly returns from the Stock Selection and Sector Selection management styles. The standard deviation of Stock Selection returns is 3% annualised and the standard deviation Sector Selection returns is 5% annualised. Both active management styles have an average annual return of 1.5% over the 5 year period. Can we be 95% confident that the active managers achieved these returns through investment skill rather than luck? Show all formulae and working.

[Hint: Use the Normal distribution approximation to the t distribution. Normal cdf values are given below in Table 2.] (4 Marks)

Table 2.

x	Pr(X<x) where X~N(0,1)
0	0.5000
0.5	0.6915
1	0.8413
1.5	0.9332
2	0.9772

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e) Assume the active returns of the Stock Selection and Sector Selection management styles are uncorrelated and that the ex-ante (forward) risk and return of the active styles will be the same as the previous 5 years risk and return (part d). You wish to maximise the information ratio of combined active styles by assigning a proportion $0 \leq \delta \leq 1$ of the value of the underlying equity fund to Sector Selection and a proportion $1 - \delta$ of the value of the underlying equity fund to Stock Selection. Find the value of the optimal proportion $0 \leq \delta \leq 1$.

[Hint: Minimise the variance of the combined active returns.] (7 Marks)

f) Eugene Fama and Kenneth French (1992) found that over the long term (1926-1992) a well-diversified equity portfolio of stocks with a current high price to book ratio (the ratio of the market price of equity to the book/accounting value of equity) has significantly lower returns than a well-diversified portfolio of stocks with a current low price to book ratio. What specific implications does this have for each of the categories of market efficiency in the Efficient Markets Hypothesis? (3 Marks)

END OF PAPER

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