2012 PART III EXAMINATIONS

Subject Title: **C1 Investments**

Date: **Monday 23 April 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	17
5	23
Total	**100**

Candidates are required to answer **ALL** questions.
This paper has **eleven** (11) pages (excluding this page).

COURSE 1 INVESTMENTS **APRIL 2012 EXAMINATIONS**

Answer all 5 questions.

QUESTION 1 **(20 Marks)**

MakeMore Super is a small to medium sized defined contribution superannuation fund. It is about to embark on a merger with another small to medium sized fund in which MakeMore will be the larger merger partner and will retain its identity. The membership of the Investment Committee will change as a result of the merger. You advise the Investment Committee.

MakeMore Super has only had one investment choice for its members and is predisposed for efficiency reasons to continue this practice after the merger. This fund is a typical "balanced" fund – some 60-70% of its assets are Australian and international listed equities; the rest is a mix of Australian and international sovereign bonds, corporate credit exposures, cash and a small parcel of hedge funds.

Its merger partner also has a single fund and the asset allocation of the fund is similar.

Both partners have used a range of active managers to manage all their exposures.

Some members of the soon-to-be-merged Investment Committee have begun to question this latter practice after several years of indifferent manager performance. You have been asked to comment on several statements that were made at a recent meeting of the new Committee:

- "The case for active management is increasingly suspect. In any event, in aggregate, the clients of active managers must underperform the market."
- "I couldn't in all conscience sign global bonds over to a passive manager given the state of sovereign balance sheets at the moment."

a) How would you define passive management in the context of the comments reported above? Include within your definition examples of how such passive portfolios are managed. (3 Marks)

b) Outline the cases for and against passive and active management for a fund like MakeMore Super. Give two points for and against each of active and passive management. Also include any theoretical considerations that might be relevant and consider the role of alternative beta strategies such as fundamental indexation within your answer. In your answer assume securities management is outsourced by the fund. (10 Marks)

c) Do you agree with the assertion that, in aggregate, clients of active managers must underperform the market? Give reasons for the position you take. (3 Marks)

d) What factors might be motivating the comment about the passive management of sovereign bonds? (2 Marks)

Question 1 continues over the next page.

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e) For a bond investor who wishes to maintain traditional passive investment in sovereign bonds, comment on the relative merits of the following indices as market proxies in current market circumstances:

Country/Region	Barclay's Global Treasury Index (%*)	PIMCO Global Advantage Government Bond Index (%*)
United States	23.6	25.9
Eurozone	27.1	21.7
Japan	32.7	8.7
Other Industrial Countries	11.2	11.8
Emerging Markets	5.4	31.9
Total	100.0	100.0

*At July 2011.

(2 Marks)

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QUESTION 2 **(20 Marks)**

The Investment team of a superannuation pension issuer have shortlisted two active managers of listed Australian equities for a portion of the portfolios that back the pensions.

The pensions are of various types – account-based pensions, pensions that are fully or partially guaranteed, pensions that are fully or partially indexed for inflation. The investment income of the pension portfolios are tax-free both to the issuer and to the pensioners; moreover, Australian franking credits are claimable for cash.

The two managers operate in the following manners:

	Manager A	**Manager B**
Approach	Select high dividend shares within a valuation context	Aim for total return, quality companies, diversification and value orientation
Universe	All listed shares	All listed shares
Process	Stocks are ranked by: – Sustainable dividend yield, and – price to manager valuation A decision tree process selects the 30 stocks with the best combined rankings, which are weighted within a 2-5% range according to their rankings.	Stocks must satisfy a series of quality filters. All stocks which satisfy these filters will be held in the portfolio. Those which do are then subjected to the manager's proprietary valuation process to determine the relative weighting - the best value stocks receive the highest weights; low value stocks will be held lower than index weights.
Additional analysis	The portfolio is scanned for obvious "no's" that are based on the team's knowledge of the stock or understanding of current market dynamics. Such stocks are eliminated and the process is repeated. The portfolio is then optimised.	The portfolio is optimised.

a) What are some reasons for including Australian listed equities within pension portfolios? What problems do you foresee using equities for the purpose/s suggested? If necessary, differentiate between types of pensions and take into account any prudential matters the issuer should be concerned with. (5 Marks)

b) Do you see potential overlaps between the approaches and processes of the two managers or the outcomes their approaches and processes are likely to produce? Argue your case. (5 Marks)

c) What is the role of an optimiser in the context of the equity processes outlined above? What factors would you expect to find within the optimisation processes the managers use? (4 Marks)

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d) Comment on a proposal to use listed emerging market equities within any overall equity allocation within these funds. Make reference to arguments you may have made in (a) and any other matters you consider relevant. (6 Marks)

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QUESTION 3 **(20 Marks)**

You are an investment consultant providing advice on asset allocation to the board of trustees of a fund supporting a government employee superannuation scheme.

The scheme pays pension benefits based on the member's average salary over the five years prior to retirement. As the scheme has been closed to new members for some years, most of the liabilities are for pensioners and past service liabilities for remaining active members.

Back when the scheme was open to new members, member contributions were collected and placed in the fund on which you are providing advice. However, no employer contributions were made into the fund. The current amount of the fund is considerably less than any reasonable valuation of liabilities.

The government has now settled on the following arrangements:

- The net liability (PV of benefits *less* PV of member contributions *less* amount of fund) is reported on the government's balance sheet.
- The government pays benefits on a pay-as-you-go basis, with a partial contribution from the fund. For the current year these amounts are given by:

  Government payment = Total benefits current year– fund contribution

  Fund contribution = Total benefits current year × funded ratio

  Funded ratio = Amount of fund start of year / PV future benefits

  The funded ratio currently stands at 30%.

Under the legislation governing the scheme, the board is charged with maximising the return on the fund without incurring "unreasonable risk", this being undefined. You are considering how to formulate a static investment strategy for the fund.

a) List six main factors considered in constructing an asset-liability model for the fund. (3 Marks)

b) Two criteria have been suggested as a basis for formalising the investment objectives:

   (i) the net liability reported in the government's balance sheet;
   (ii) the annual amounts paid by the government to provide the benefits.

   Discuss the ways that investment objectives might be formulated for each of these criteria. (3 Marks)

c) Suppose that the government decides to set the actuarial valuation rate of interest equal to the projected yield on long term government bonds at the end of each year. How will this affect the asset-liability model? Assume that the investment objectives are based on the balance sheet net liability. (2 Marks)

d) A simple model of long-term government bond yields is that the <u>*change*</u> in yield over one year has a standard deviation of 0.7%. If the duration of the net cash flows (benefit payments – member contributions) is 10 years, what is the approximate standard deviation of the <u>*percentage change*</u> in net present value of liabilities arising from volatility in the change of valuation rate? (2 Marks)

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e) Write the change ΔB in balance sheet liability in terms of the change ΔV in the value of net cash flows and the change, ΔF in the value of the fund. Noting that the current funded ratio is 30%, obtain an approximate expression for the percentage change, $\Delta B / B$ in terms of the percentage changes $\Delta V / V$ and $\Delta F / F$. Denote the volatility of the fund return by s, and assume for the moment that the returns on the fund are uncorrelated with yield changes on government bonds. Under the model outlined in (d) above obtain an approximate expression in terms of s for the standard deviation of $\Delta B / B$. Using this result for a range of values of s, comment on the effect of asset allocation strategy on the volatility of the change in balance sheet liability. (5 Marks)

f) Suppose that the duration of long term government bonds is 5 years, the duration of net cash flows is 10 years as in (d), and assume that the investment objective is to stabilise the changes in the reported balance sheet liability (that is, a steady rate of change is more desirable than a fluctuating rate of change). By relating the changes in the value of the net cash flows and in the fund to the change in the bond yield, and again noting that the current fund ratio is 30%, express the percentage change $\Delta B / B$ in the balance sheet liability in terms of the change in the bond yield. Under the bond yield model from (d) above, to what extent will the objective be furthered by investing 100% in long term government bonds? (5 Marks)

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QUESTION 4 **(17 Marks)**

As the newly appointed investment strategist for a large Australian superannuation fund, you have inherited responsibility for maintaining the asset return model on which asset allocation decisions are based. The model is a classical mean-variance model covering the following asset classes:

- Australian equities
- International equities hedged
- Australian fixed interest
- International fixed interest hedged
- Australian listed property trusts
- Australian cash

One area that needs investigation and possible revision is the treatment of foreign currency and the implications for the hedging decisions for international asset classes. Focussing on just international equities for the present, write

R_H = return on international equities hedged 100%

R_U = return on international equities unhedged

Then the hedging return R_C is given by:

$$R_C = \frac{1 + R_H}{1 + R_U} - 1 \approx R_H - R_U$$

Now define

R_H^α = return on international equities hedged at proportion α $(0 < \alpha < 1)$

To get R_H^α we have to "unhedge" a proportion $(1 - \alpha)$, so that

$$R_H^\alpha \approx R_H - (1 - \alpha) R_C$$

These equations allow us to handle hedged, unhedged or partially hedged international equities within the mean-variance structure by including R_C in the model.

Table 1 shows averages and standard deviations for R_H, R_U and R_C. Table 2 shows correlations between the hedging return R_C and the asset classes currently in the model. Figure 1 shows how three-year rolling correlations of R_C with return on Australian and hedged international equities vary appreciably over time.

Figure 2 shows three-year average hedge return, R_C.

Table 1 – Performance over Last 10 Years

Asset Class	Return (%)	Std Dev (%)
International equities hedged	3.6%	15.7%
International equities unhedged	-2.3%	12.2%
Hedging return	6.1%	11.3%

Table 2 – Correlations with Hedging Return Over Last 10 Years

Asset Class	Correlation
Australian equities	0.54
International equities hedged	0.63
Australian fixed interest	-0.57
Australian listed property trusts	0.25
Australian Cash	-0.19

Figure 1--Rolling 3-year Correlations with Hedging Return

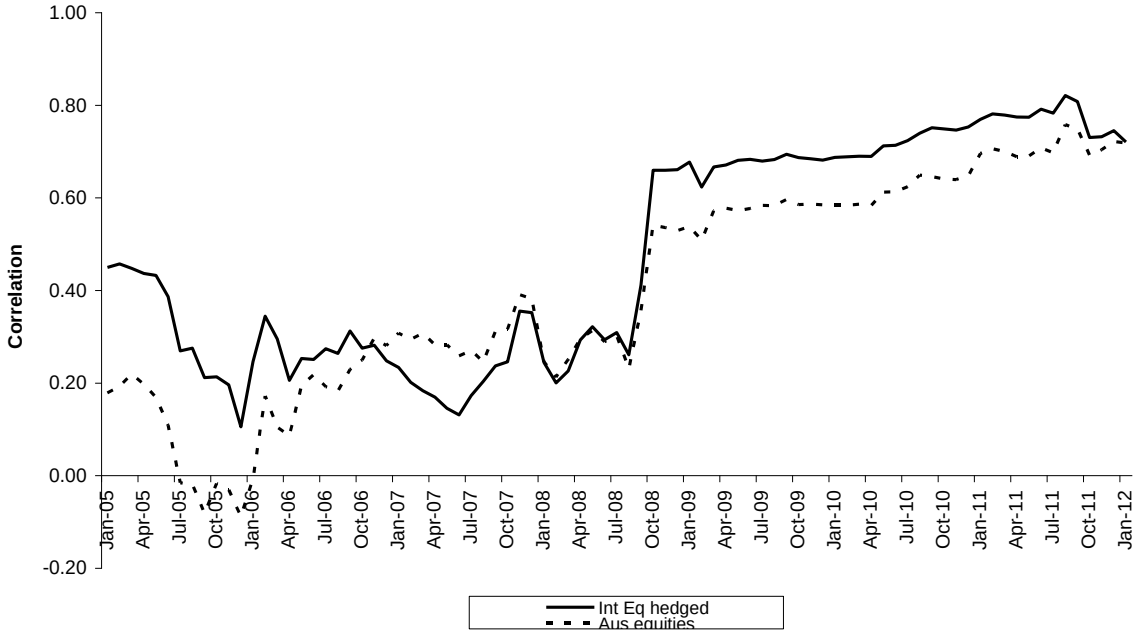

Figure 2--Rolling 3-yr Average Hedge Return

a) Discuss the issues arising from the variation in correlations over time that will have to be dealt with when the model is expanded to include the hedging return. (3 Marks)

b) Based on the information given above, what conclusion on hedged international equities is likely for a typical balanced portfolio, assuming the model is based on long term statistics? Do you have any reservations with this conclusion? (5 Marks)

c) What are three other modelling approaches using historical data that might be used to avoid dependence on a fixed covariance structure? Give brief reasons supporting these alternatives. (5 Marks)

d) Acknowledging that a hedging model with stationary parameters might not explain historical returns satisfactorily, list four factors which might affect nonstationarity in the means and covariance structure. (2 Marks)

e) If a satisfactory model cannot be found to explain hedging returns alongside other asset returns, list two reasonable ways to manage currency hedging policy. (2 Marks)

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QUESTION 5 **(23 Marks)**

a) You are asked to calculate the annualised monthly performance of 2 portfolios. Portfolio 'A' is an equity portfolio where investors can freely buy and sell investment units priced daily. Portfolio 'B' is a 5 year fixed term private equity investment closed to further investment where existing investors can only redeem their investment at the conclusion of the 5 year investment period.

Which monthly portfolio performance calculation methodology would you use for portfolio 'A' and portfolio 'B'? Give brief reasons for your answer. (2 Marks)

b) The Unit Price (net asset value) of an investment portfolio is calculated daily for a month. Assume that the unit price was U_0 at the beginning of the month and U_{31} at the end of the month. Show the formula used to calculate the geometric portfolio return for the month. (1 Mark)

c) 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. Describe (no formula required) the technique you would use to separately calculate the performance of these active management styles in the equity portfolio. (2 Marks)

d) One of the following risks is not necessarily classified as an operational risk that could occur to an investment manager. Identify which risk is not necessarily an operational risk and give a brief reason for your selection.

1. Information technology failure.
2. Internal and external fraud, money laundering.
3. Back office transaction processing errors, unit pricing errors.
4. Poor investment performance resulting in an outflow of funds under management.
5. Unauthorised activities, unauthorised trading, insider trading, fund trader/broker collusion.
6. Flawed valuation and risk models for derivatives and complex financial products.

(2 Marks)

e) Carhart (1997) showed that stock price momentum, the continuation of stock price trends over short to intermediate time horizons, is an important factor in stock returns. What are the implications of this research with reference to the Efficient Market Hypothesis (EMH)? (2 Marks)

f) Grinold and Kahn propose the following conceptual model of the information ratio of a managed investment portfolio, $IR = IC\sqrt{BR}$, where *IR* is the Information Ratio, *IC* is the Information Coefficient and is a proxy for manager skill and *BR* is the Breadth or number of independent investment decisions in the portfolio. With reference to the formula above; what are the expected relative information ratios of an Industry Sector Rotation fund manager and a Stock Selection equity fund manager? Assume both fund managers have equal investment skill. What is a common criticism of the Grinold and Kahn conceptual information ratio formula? (3 Marks)

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g) Eugene Fama and Kenneth French (1992) found that over the long term (1926-1992) a well-diversified equity portfolio of small capitalisation stocks has higher returns than a well-diversified portfolio of large capitalisation stocks. With reference to the fact that market capitalisation and market turnover (volume) have a high positive correlation, suggest a reason for the higher return of the well-diversified portfolio of small capitalisation stocks. (3 Marks)

h) An actuarial consultant is engaged to review the ex-ante (future) performance of an active investment fund manager. The consultant's report focuses on a qualitative analysis of the managers' investment processes and personnel. The report does not perform a quantitative analysis of the managers' ex-post (previous) investment performance. Enumerate reasons why. [Hint: You should include a discussion of t-statistics in your answer.] (5 Marks)

i)

Table 1

Asset Class	Active Risk (ex ante)	Active Return (ex ante)	Management Expense Ratio	Portfolio Weight
Australian Equities	2%	0.8%	0.25%	35%
International Equities	2.5%	1%	0.4%	20%
Listed Property	2%	0.25%	0.25%	15%
Bonds	1%	0.1%	0.1%	20%
Cash	0.1%	0%	0.1%	10%

Table 1 above details the composition and expected performance of a multi-asset class portfolio. Each asset class is actively managed by an external asset class manager and the Management Expense Ratios (MER) of each of the external managers are also tabulated. Assuming that asset class active management styles are uncorrelated, calculate the ex-ante (future) information ratio after fees for each asset class and the information ratio of the combined portfolio. How would you increase the ex-ante information ratio of the portfolio without increasing portfolio active risk by re-allocating the active risk of the existing external managers? (3 Marks)

END OF PAPER

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