THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT MARKING GUIDE & SOLUTIONS
PAPER ONE 2000 EXAMINATIONS

The purpose of this document is to assist candidates in their preparation for future examinations. It is emphasised, however, that the solutions herein are not necessarily the only solutions or the best solutions, especially for those questions testing judgement. They should be regarded as illustrative only. However, a candidate who covered all the points in the specimen solution in the examination would have scored a very comfortable pass. This document should be used in conjunction with the 2000 Examiner's Report which is on the IAAust web site.

Marking Guide: Paper 1, Question 1

Syllabus Coverage:
Aim 8(a) – Describe the principal derivative instruments used in institutional management in Australia
Aim 8(b) – Calculate economic exposures for each of the main derivative instruments

The aim of this question is to test whether students are able to demonstrate an understanding of put-call parity, a basic relationship between put & call options. This question is straightforward, although it had the additional twist of not including an interest rate for present value calc & for rolling forward the sold stock; but the calls were so cheap relative to the puts that it didn't matter.

Students that cannot specify the required strategies to hedge absolutely fail this question. Those who cannot show that these calls are cheap relative to puts either through specifying the payoff at expiry or through put-call parity should not pass this question. Better students will argue that put-call parity should hold and in the question it does not, ie. there is a mispricing.

Level of Difficulty

	A	B	C
Question 1	4		

QUESTION 1 (4 Marks)

You are a fund manager holding a portfolio that is overweight in BHP shares. You are concerned that falling oil prices may adverse impact your portfolio returns and want to limit your downside exposure from holding BHP shares. Based on the following market, what trade (s) would you implement and why. Assume no further dividends will be paid this year.

BHP share price:	$16.50
December $16.50 calls:	55 cents
December $16.50 puts:	85 cents
Days to expiry:	72

Solution

The fund manager can use 2 strategies to reduce the downside exposure from BHP shares:
1. Sell BHP shares and buy calls; or
2. Hold BHP shares and buy puts (synthetic call). (0.5 marks each)

The value of these positions at expiry is as follows:

Hold Stock, Buy Puts: SP + max(16.50-SP,0) – 0.85 = max(16.50, SP) – 0.85
Sell Stock, Buy Calls: 16.50 + I + max (SP–16.50,0) – 0.55 = I + max (SP, 16.50) – 0.55
where I is interest for 72 days on the value of the stock sold (ie 16.50) and SP is the stock price.
(0.5 mark each formula.)

Stock Price (SP)	Hold Stock,[i] Buy puts($)	Sell stock,[ii] Buy calls ($)
14.50	15.65	15.95 + I
15.00	15.65	15.95 + I
15.50	15.65	15.95 + I
16.00	15.65	15.95 + I
16.50	15.65	15.95 + I
17.00	16.15	16.45 + I
17.50	16.65	16.95 + I
18.00	17.15	17.45 + I

(0.5 mark each correct column.)

As can be seen, the synthetic call position has a lower pay-off in all cases due to the availability of relatively cheap call option. (0.5 mark)

Therefore, most efficient way to protect against downside exposure in BHP is to sell BHP shares and buy call options. (0.5 mark)

Alternatively, the student may have used put-call parity to infer that the calls were clearly cheap compared to the puts. In this case:

1 mark for the hedging strategies as noted above.

Put Call Parity:
Call Value less Put Value equals the Stock Price less the Present Value of the Exercise Price (1 mark))

For "at the money" options, a positive interest rate implies that the present value of the exercise price must be below the exercise price. (0.5 mark)
Therefore put-call parity implies the call option must have a higher fair price than put options. (0.5 mark)
Therefore the calls shown are cheap. (0.5 mark)
Therefore, most efficient way to protect against downside exposure in BHP is to sell BHP shares and buy call options. (0.5 mark)

*For these last two marks, alternatively the student might show some calculations of this kind, possibly using continuously compounding interest rates instead {ie (1+r*72/365) is replaced by exp(r*72/365)}:*

*Hence Call Value - 0.85 = 16.50 – 16.50/(1+r*72/365) where an annual simple interest rate*
*Ie. (Call Value – 0.85) * (1+r*72/365) = 16.50* r*72/365*

Hence Call Value should be $0.85 + 16.50 * \frac{r*72/365}{1+r*72/365} > 0.55$ *(1 mark for calc of this type)*

Calls are therefore relatively cheap; hence the trade is to buy calls and sell stock. (1/2 mark per comment)

Marking Guide: Paper 1, Question 2

Syllabus Coverage:
Aim 13(a) – Analyse alternative configurations of investment managers including the number of and type of investment managers.

The aim of this question is to test whether students are able to demonstrate a basic understanding of selecting and combining investment managers to achieve a desired investment objective.

Students that cannot identify the issue at hand fail this question. Those who cannot suggest with reasons a specific solution should not pass this question. Better students would demonstrate practical knowledge in their answer, and would earn the bonus marks on offer.

Level of Difficulty

	A	B	C
Question 2		6	

QUESTION 2 (6 Marks)

You have just been appointed as the asset consultant to the ABC Superannuation Fund. The Fund has a total of $100m invested in Australian equities with a single manager. Some of the trustees of the Fund are not happy with the performance of their Australian equity manager. Their comment was "the manager's performance in the last twelve months has been in the bottom quartile of a survey of Australian equity managers."

Your initial inquiry revealed that the manager has a philosophy of investing in shares that are deemed to be undervalued, with a focus on smaller capitalisation shares. The manager consistently takes meaningful active bets relative to a broad market benchmark.

Further investigation revealed that the Trustees have found their Australian equity manager's performance to be too volatile for their liking.

They are seeking your advice on how to reduce the active risk of the Australian equity portfolio. Suggest a possible solution to this problem using:

a) a one-manager configuration for the Australian equity portfolio.

b) a two-manager configuration for the Australian equity portfolio. Assume that the incumbent manager will be retained as part of the portfolio.

In each case, clearly identify the characteristics of the manager you would recommend and explain why this should achieve the objective of reducing the portfolio's active risk.

Suggested Solution

Question implies that the Fund is exposed to "style risk" in Australian equities by having a "small cap value" manager (quite apart from the possibility of having a dog of a manager).

To reduce risk:

(a)

Use a "lower risk" manager.
Eg.

- indexed
- index-enhanced
- a market-oriented manager so as to remove the style bias (ie, a manager that has broader capitalisation coverage and no strong value or growth style bias).

Any of these choices are fine.

Candidates should identify a manager that takes smaller bets and with no persistent bias against certain segments of the market (eg, cap size, value/growth). Indexing is the extreme.

Which choice will depend on the Fund's tolerance – candidates should mention that they need to determine the Trustee's tolerance for risk.

(b)

Two possible solutions:

Appoint a manager that complements the incumbent one in terms of portfolio characteristics – ie, large cap growth-oriented manager. This can provide diversification (lower active risk) by removing portfolio biases at the <u>total</u> portfolio level.

Or,

Appoint an indexed or index-enhanced manager to act as an "anchor" ("core") for the portfolio. The lower risk profile of this core portfolio will reduce the active risk of the <u>total</u> portfolio (but incumbent manager on its own still has high risk).

Marking:
For each part, the candidate is asked to suggest a possible solution to the Trustee, ie.

- *Clearly identify the characteristics of the manager they would recommend*
- *Explain why this should achieve the objective of reducing the portfolio's active risk.)*

For part a, 1 mark to recommend specific manager type & characteristics, 1 mark for explaining how active risk is reduced, 1 mark for noting that you need to determine the

Trustee's tolerance for risk in determining your suggested solution (to determine how much active risk the Trustee wants from the single manager)
.

For part b, either solution is worth 2 marks; 1 mark to recommend specific manager type & why, and 1mark for explaining how active risk is reduced.

Generally :
1 mark is to be given for identifying the specific issue the Trustee is looking to solve, ie from what exactly are we looking to reduce active risk?. For example, "the incumbent manager has a value/small-cap style and takes significant positions away from benchmark." This 1 mark is to be given once, whether expressed in part a or b.

Marks are to be given for other relevant points suggested by the candidate.

For example, ½mark bonus for correctly noting some of the following:
The additional manager's active risk either:

- *Must be below the incumbent's to ensure the combined portfolio's active risk will be lower than the incumbent's portfolio*
- *Can be above the incumbent's active risk only to the extent that imperfect correlation of each manager's positioning can reduce the combined portfolio's active risk down below the incumbent's active risk.*

(Overall Maximum 6 marks)

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Marking Guide: Paper 1, Question 3

Syllabus Coverage:
Aim 11(a) – Describe the distinctive features of investing in international equity and fixed interest markets.

The aim of this question is to test whether students are able to demonstrate an understanding of the issues involved global investing as opposed to domestic investing. Part (a) is a reasonably standard "why global" question, but requires an understanding of the finer points, namely that correlations can vary in the short term, but over time the diversification should still reduce portfolio risk. Part (b) goes to the heart of selecting or setting up a global equity portfolio management firm; should you go for a global outlook organised into sector specialists, or for regional/country specialists? There is no clear "right" answer for part b), but an understanding of the issues is key.

Good students would show a clear understanding of Part (a)'s "why global" question, and have some understanding of Part b).
Better students would be able to state their view for Part (b) and explain why in clear language, showing an understanding of both sides of the argument.

Question 3	**Level of Difficulty**		
Part	**A**	**B**	**C**
(a)	6		
(b)		6	
Total = 12 marks	**6**	**6**	

QUESTION 3 (12 Marks)

The ABC defined benefit superannuation fund currently has the following asset allocation:

Asset Allocation	
Australian Shares	60%
Listed Property	10%
Australian Bonds	25%
Cash	5%

The board of Trustees is considering diversifying into international shares and international bonds hedged into Australian currency.

a) One of the Trustees states that "there is no point buying international shares to reduce volatility as when there is a market crash, like in 1987, all major markets fall". This Trustee is also concerned that moving to international bonds "is just a move from one set of bonds denominated in Australian currency, to another set of bonds denominated (effectively) in Australian currency. Where then is the diversification benefit?"

Draft a reply to the Trustees addressing these concerns. (6 marks)

Solution

The question asks the student to draft a response. Therefore 1 mark should be allocated for the form and clarity of the response, bearing in mind the audience that it is addressing (a board of Trustees). *(1 mark)*

Issues relating to the first comment (re: stocks)

- As markets are not perfectly correlated there is an expected reduction in overall volatility when a portion of the assets are invested overseas;
- Whilst in the short term markets may be highly correlated if there is a market correction, over longer time periods the correlation is not as strong;
- An investment in international equities provides access to industries not well represented (or not represented at all) in Australia;
- Economic cycles are not perfectly correlated, hence diversification benefits are available;
- International investment provides access to larger and more liquid markets overseas;
- Investment in non-AUD denominated assets can help to reduce volatility as (for example) if the Australian sharemarket is falling and the Australian dollar is also falling then some of the losses incurred on the domestic assets can be offset by currency gains;

Therefore allocating a portion of the Fund's equity exposure to international equities can reduce expected long term volatility without reducing expected long term returns.

Issues relating to the second comment (re: bonds)

- As returns on Australian and international bonds are not perfectly correlated there is expected to be a reduction in overall volatility
- Investment in international bonds provides access to forms of debt not well represented in the Australian market – eg. High-yield corporate bonds, deeper markets for corporate bonds & mortgage backed securities, emerging market debt etc.

Therefore allocating a portion of the Fund's bond exposure to international bonds can reduce expected long term volatility without reducing expected long term returns.

(Each correct point worth 1 mark, to a maximum of 5 marks)
(Total of 6 marks)

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b) Two of the factors influencing the performance of an actively managed international equity portfolio are the sector and country positions taken by the manager. Historically country risk was the more important of the two. Discuss your view of the likely relative importance of each of these factors in the future. (6 marks)

Solution

Arguments for sector becoming more important than country:

- The trend of globalisation of industries implies that the fortunes of particular stocks may be governed more by the performance of the sector they are in than the economy of their home country. Specifically the performance of multinationals (eg. Nokia) is likely to be more dependent on the market for the goods and services they provide around the world than the performance of the economy of their home country (eg. Finland). *(max 2 marks)*

- Monetary union among the European Union nations would be expected to contribute further to the synchronisation of the economies of the nations in the EU and therefore it can be argued that economic growth in the region will become more correlated. The Asian economic crisis highlighted the interdependence of the economies in that region also. As economies become more correlated, the impact of the country decision will become lower and the impact of the sector decision will be greater. *(max 2 marks)*

- Many companies are listed on more than one nation's stock exchange (eg. News Corp in Australia). "Country" is becoming increasingly less relevant for these companies. *(1 mark)*

Arguments why country will remain important or may remain more important than sector:

- For companies that derive a significant proportion of their revenue in their home country the economic fortunes of their home country will remain important. (This should still represent a sizeable proportion of companies) *(1 mark)*
- Domestic interest rates play an important part in equity valuation within each market *(1 mark)*
- In the short term sentiment within a particular nation's market can be an important determinant of share prices *(1 mark)*

Students could also argue that market prices will, to some extent, be dictated by the collective view taken by market participants. If you argue that the majority of investors when looking at (eg. Australian equities) make their decisions as to whether to buy/sell stocks by reference to other Australian companies this could be an argument that country will remain the more important factor. Alternatively students could argue that fund managers will "globalise" further and will assess (for example) Telstra in Australia with telecommunications companies overseas (& not with Australian companies in unrelated industries – eg. BHP) then sector may become more important. *(1 mark)*

Logical conclusion consistent with arguments raised. *(1 mark)*
(Maximum of 6 marks to count)

Marking Guide: Paper 1, Question 4

Syllabus Coverage:
Aim 8(b) – Calculate economic exposures for each of the main derivative instruments

The aim of this question is to test whether students are able to demonstrate a basic understanding of how to calculate economic exposures for futures. This question is straightforward, although it had the additional twist of involving commodity futures, which are not as well known as equity futures.

Students that can calculate the economic exposures, trades required and profits earned should not pass this question.

Students should earn some marks for correct methodology, particularly if they have erred in a previous part and are using that result in the next part of the question.

Question 4	**Level of Difficulty**		
Part	**A**	**B**	**C**
(a)		4	
(b)	3		
(c)	3		
(d)		2	
Total = 12 marks	**6**	**6**	

QUESTION 4 (12 Marks)

An Australian soybean producer (SoyCo) has asked for your advice on how to hedge against a possible down turn in soybean prices when their crop matures.
Today is 5 May 2000 and the current spot of soybeans is $4.52/bushel. SoyCo are looking to sell 5 million bushels on 21 August 2000. They would like to hedge against a major downturn in soybean prices but you make them aware that unfortunately the derivatives market for soybeans is thin and lacks the liquidity to close out a position early if needed. Notwithstanding this however, they insist on implementing some form of hedge and you observe the following liquid futures contracts in the market:

Contract:	**Cotton**	**Wool**
Units:	**Cents/lbs**	**Cents/kg**
Contract size:	**50,000lbs**	**2,500kg**
Spot	60.7	600
Jun00	61.0	630
Jul00	61.8	619
Aug00	62.3	644
Sep00	63.3	659
Oct00	64.4	635

Assume delivery for the above contacts occurs once in the middle of the delivery month.

a) Select a contract to hedge SoyCo's economic exposure. Justify your selection and explain the risks of using this contract.

(4 marks)

Solution

Use Sep.00 cotton futures contract (1 mark)

Why?

- Sep.00 futures as this expires as soon as possible after the hedge termination date.
- It would not be advisable to use the Aug. 00 futures contract as:
  - Unused price movements are typically observed in the expiration month
  - Would not be able to deliver on contract and would need to roll over position

(1/2 mark per point, max 1)

- Cotton futures are preferable as you would expect that it is more correlated to price involvement in soy beans than wool i.e. grown in similar regions in Australia, are plants, exposed to similar climate risks.

(1/2 mark)

Risks

- Price of cotton and soybean may not move together, and more importantly, if they move in opposite directions reasons may be due to:
  - Disease specific to cotton and not soybean
  - Overseas supply influences
  - Substitute commodities

(1/2 mark per point, max 1)

- Quantity risk, where SoyCo hedges in advance for an expected economic exposure but doesn't know whether it can produce that amount.

(1/2 mark)

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b) Using the contract identified in part a) above, detail the trades (including the number of futures contracts) you would advise SoyCo to undertake to reduce their economic exposure from a possible downturn in soybean prices when their soybean crop matures.

(3 marks)

Solution

Implement short hedge by shorting Sep.00 contracts under the expectation that cotton prices are highly correlated to soybean prices.

(1/2 mark)

Total Economic Exposure
($4.52 is only the spot price; the forward price is needed, hence the time value of money as shown in the cotton futures contract needs to be included)

$= \$4.52 * 5m * \frac{63.3}{60.7}$

= $23.57m

Sell $23.57m of Sept.00 cotton futures contracts.

(1 mark)

Number of Contracts

$= \frac{23.57m}{0.633*50000}$

= 744.6, ie. 745 contracts

(1 mark)

Therefore trades would be to short 745 Sep.00 cotton futures contracts.

(1/2 mark)

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c) Assume SoyCo decide to close their position one month later and the spot price for soybeans is $4.44/bushel. Using the trades in part b), and ignoring transaction costs, what would be SoyCo's profit or loss from your hedging strategy assuming the following market quotes:

Contract:	**Cotton**	**Wool**
Units:	**Cents/lbs**	**Cents/kg**
Contract size:	**50,000lbs**	**2,500kg**
Spot	60.2	625
Jul01	61.1	620
Aug01	59.3	615
Sep01	61.8	630
Oct01	63.2	635

(3 marks)

Solution

If soybeans were sold in the market, profit would be

= 5m x ($4.44 - $4.52)
= - $400,000 (1 mark)

If 745 Sep.00 cotton futures contracts are shorted and are now closed out at 61.8, profit on futures position is

= -745 x 50,000 x ($0.618 – 0.633)
= + $558,750 (1 mark)

Net gain from short hedge

= +$558,750 + (-$400,000)
= + $158,750 (1 mark)

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d) Why are some of the quoted futures prices of wool in May not above the spot price? Is this phenomenon common with commodity futures?

(2 marks)

Solution

Phenomenon is known as backwardation. (1/2 mark)

Reasons:

- There is a "convenience yield" at holding as asset when it is short in supply. In the case of wool futures, there may be an expectation that surplus wool will be supplied to the market in July/August thereby reducing the price. (1 mark)
- There may be an inability to sell wool short, and a reluctance on the part of the holders of wool to sell it when its price is higher than it should be, and replace it with an underpriced long futures contract. (1 mark)

This is common with commodity futures. (1/2 mark)

(Max 2 marks)

Marking Guide: Paper 1, Question 5

Syllabus Coverage:
Aim 7(a) – Determine the key needs and circumstances of the client/stakeholder. In particular, ascertain their investment time horizon and disposition to risk.
Aim 7(b) – Decide what variables and assumptions should be taken into account to design an appropriate personal financial plan.
Aim 7(c) – Apply the investment management cycle to the design of financial plans.
Aim 18(b) – Identify other situations where other expertise is required and reconcile when the Code of Conduct is applicable.
Aim 18(c) – Explain the implication of the main sections of the Corporations Law, which relate to professionalism or ethics generally within the investment management industry, in particular the requirements of Dealers and Advisers Licenses

The aim of this question is to test whether students are able to demonstrate an understanding of how to design personal financial plans, and of their legal obligations in doing so.

Students who have difficulties with parts (c) and (d) would be expected to have difficulty in passing this question.

Question 5	**Level of Difficulty**		
Part	**A**	**B**	**C**
(a)	3		
(b)	3		
(c)		3	
(d)		3	
Total = 12 marks	**6**	**6**	

QUESTION 5 (12 Marks)

You are an actuary working in a consulting firm. A client aged 45 has been referred to you for a second opinion on a financial plan that she has been discussing with an advisory firm which holds a dealers licence. The client recently received a damages award of $500,000 and arranged a loan of $300,000 against the value of her house to provide a total of $800,000 to be invested in a shares portfolio selected by the advisory firm. The financial planning report only refers to the total $800,000 amount and includes a list of shares the adviser would be considering for investment.

a) Draft five (5) questions you would ask the client at the initial interview. (3 marks)

Solution

This question tests application of knowledge of financial planning questionaire and the "know you client" principle

Questions to ask are:

1. What is your family situation eg dependants, spouse earning power

2. What are your future earning prospects and any disability relating to the damages case(to estimate investment time horizon)
3. What are your assets and liabilities?
4. Do you have any life insurance?
5. Have you done a projection of your income needs year by year from investing the $500,000?
6. Do you have any experience with investing in shares or geared investment situations?

(Marking guide: ½mark per valid point plus ½mark for either question 2 or 3. Candidates will likely have other questions which may be valid.)

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b) Draw a diagram that could be used to explain to the client the steps involved in designing and implementing a financial plan. Indicate those steps that are most closely associated with the questions you have used in part (a).

(3 marks)

Solution

This question tests knowledge of diagram in notes for the financial planning cycle. This is bookwork (ref Subject Guide, Volume 2, Aim 9, p.4).

Diagram should refer:

- at the top to the client's situation (ref Q's 1,3,4,6 from part (a) solution)
- with steps leading to the bottom covering determining required cash flows and time horizon (ref Q's 2,5 from part (a) solution)
- which leads to asset allocation and finally investment portfolio at the bottom
- with feedback loops on one side monitoring cash flow against needs and on the other side monitoring investment performance against a relevant benchmark.

(Marking guide: ½mark per point plus ½mark for referring questions correctly to each of the two points.

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c) State with reasons three (3) obligations on an adviser under Corporations Law which you would suspect may have been overlooked in the financial planning advice the client has already received.

(3 marks)

Solution

This question requires clear application of points made in the course re ASIC compliance issues to this real world problem.

Suggested reasons are:

1. Recommended advice must be appropriate to client situation (may have not asked any reasons why the share portfolio was required)
2. Detailed analysis of client affairs must be done (may have just focused on how good the share portfolio is rather than the total effect on the client of the volatility of a geared sharemarket investment)
3. Disclosure of commission (plan is based on significnat share brokerage because of gearing up the amount)
4. Capacity for the client to manage the investment after purchase

(Marking guide: 1 mark per valid point, maximum 3 marks. Students may raise other valid points.)

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d) Under what circumstances would you expect the intended strategy to be appropriate for the client? Explain your reasoning.

(3 marks)

Solution

A range of possibilities may be given such as:

"The damages award may not have related to disability (ie may have been damage to reputation of a high earning client who has long life expectancy). The proposed arrangement of a geared share portfolio may be the best solution if client has excess income and can make use of negative gearing."

(Suggested Marking guide: 1 mark per valid circumstance, 1 mark per valid reason related to client circumstance, maximum 3 marks. The candidate needs to show some awareness that there may be innovative and higher risk strategies which may well be appropriate in particular client situations. This is to counter the possibility of overly conservative solutions driven by a greater focus on regulation and compliance then on client needs and objectives.)

Marking Guide: Paper 1, Question 6

Syllabus Coverage:
Aim 12(a) – Describe the various types of property investment and their characteristics.
Aim 12(b) – Discuss the alternative ways of constructing a property portfolio by direct purchase and by listed or unlisted vehicles

The aim of this question is to test whether students are able to demonstrate a basic understanding of the issues surrounding property investment for an institutional investor in the current market environment. This question tackles both the issue of concentration in Australia's listed property trust sector and the "unlisted vs listed" question.

The unlisted vs listed question was covered explicitly in the notes; although this is an applied situation, good students should be able to get most of the marks here. The listed property question requires more market knowledge, but good students should still be getting at least half marks.

Question 6	**Level of Difficulty**		
Part	**A**	**B**	**C**
(a)		3	
(b)			9
Total = 12 marks		**3**	**9**

QUESTION 6 (12 Marks)

The property asset manager has been given an allocation to acquire $100 million of property as a result of a substantial restructure of the portfolio's asset allocation. This doubles the funds under management allocated to property, increasing the allocation to property from 5% to 10% of the total fund. Currently the portfolio has been invested entirely in listed property trusts. Over the past six months there has been considerable merger activity in the listed property trust marketplace with a resultant situation where the property funds under management are now invested in three listed vehicles instead of a previous six.

It has been suggested that the mergers in the listed property trust marketplace create too limited a choice of funds managers. It is also suggested by some in the industry that there is doubt as to whether the very large listed property trusts now on offer provide sufficient return differentiation.

a) Discuss the implications of the mergers in the listed property trust industry for your fund's current investment strategy.

(6 marks)

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Solution

MARKS	Key Factors which should be covered:
1	1 Consolidation of the property trust sector has severely limited product choice. 1.1 Institutions had previously sought sector specific investments (eg retail) but the amalgamation has resulted in very limited sector choice. 1.2 Amalgamations have resulted in a number of large diversified funds which effectively match the index. There is little or no difference between investing in these funds and attempting to contrast a crossfield index investment. 1.3 The larger funds have placed pressure on the properties securities funds which for the reasons in 3 cannot outperform the index and hence justify their fees. This is likely to further reduce choice over time.
1	2 The size of the funds has moved them further away from reflecting a true property style return. They behave more as a fixed interest investment the larger the fund. Capital Gains are not included in the yield expectation of the market pricing hence the reinforcement of a fixed interest style of investment.
2	3 With fewer large funds there is little benefit in trading the portfolio. Costs are prohibitive given that cash fund is likely to perform at a similar level. Hence it is difficult to adopt an active investment strategy to outperform the index.
1	4 The stock exchange listing rules and the magnitude of the larger funds results in great difficulty for smaller listed funds being established and supported by institutions. Hence a barrier to entry has been established.
1	5 Pressure will be for the large funds to maintain distribution yield over capital growth. Investment philosophy should be for the long term. Liquidity benefits usually result from the ability to take and make a profit. If active trading is unlikely to generate profit then is liquidity of benefit? Consider alternative investments.
	5.1 Liquidity enables liquidation of the holding quickly but at 5% allocation it is reasonable to assume that the portfolio will never reduce below that level.
	<u>Suggest:</u> Invest the 5% extra in a less liquid combination which allows capital growth potential. Existing 5% provides the necessary liquidity to meet the requirements of any change in asset allocation/revaluation issues.

b) In investing the additional $100 million it has been suggested that consideration be given to some unlisted property trust stock. An offering is currently available for $ 40 million of stock in a commercial office building located in Sydney. The building is a good quality investment according to your property consultants and the tenant profile provides good quality covenants for on average seven years. Discuss the factors which should be taken into account in considering this suggestion relative to continuing a policy of investing exclusively in listed property trust stock.

(6 marks)

Solution

Institutional investors have avoided unlisted stock on the basis that liquidity is essential.

MARKS	Factors which must be considered in contemplating an unlisted investment:
	1 Does the portfolio need to have the flexibility to completely liquidate its property holdings at short notice? 1.1 <u>The experience of the funds managers during the 1987 stock market crash appears to drive the approach to liquidity for funds managers.</u> 1.1.1 <u>When the equity stocks reduced dramatically in value funds had to be realised from the then illiquid property holdings in order to meet redemptions.</u> 1.1.2 <u>The asset allocation of the funds was severely restructured as a result of the stock market crash resulting in funds being over weight in property. Hence to rebalance the asset allocation mix illiquid properties were sold.</u>
1	2 Conventional wisdom would anticipate that there is a minimum property allocation (5% in this case). It is not unreasonable to assume that this minimum allocation amount could be substantially illiquid. The desire for liquidity has been partially driven by the desire to trade in and out of stock across the sector. Given the increasingly homogeneous nature of the listed property trust sector the opportunity to trade profitably between stocks has been severely depleted. This adds weight to the need to consider alternative investments to listed property trusts for at least some of the portfolio.
2	3 The unlisted investment will represent a total return investment rather than an income yield investment. This is a diversification of risk for the portfolio.
2	4 The investment in a single asset illiquid in nature needs to be limited in terms of exposure both as a percentage of the total portfolio and also as a percentage of the individual asset. An approach would need to be adopted similar to say the maximum investment in a stock of this nature being he lower of 5% of the portfolio

	and 10% of the individual offering. In this case a maximum investment of $4 million would result.
	5 Consolidations in the marketplace are also taking place in the unlisted stocks. Consideration needs to be given to the possibility that the asset manager will be acquired by a larger fund and the implications upon the investment.
1	6 Unlisted investment in a single asset stock requires more rigorous monitoring. The credentials of the asset manager and the single responsible entity must be examined closely. In terms of the individual property the following key factors should be considered and covered in the property consultants reports: 6.1 The proposed offering is in Sydney that is the deepest market for CBD office. 6.1.1 Reliance needs to be placed in the property advice that has been received but a view needs to be formed as to the validity of the advice particularly with respect to the marketability of the property in 5 to 7 years time. 6.1.2 Regard therefore must be paid to the lease expire in 7 years and advice sought as to the ability to re-lease at that time. 6.1.3 Advice should be sought on the quality of the building structure and the possibility of capital works on the building over a 5-7 year time period.

Marking Guide: Paper 1, Question 7

Syllabus Coverage:
Aim 9 – Demonstrate an understanding of the principles and techniques in investing in fixed interest securities

The aim of this question is to test students' ability to satisfy Aim 9. This question is applied but definitely made straightforward for exam conditions.

Students who pass this question should find parts (a) to (d) straightforward and make a reasonable effort (1/2 marks)at part (e). The calculations in part (e) are considerably reduced by the hint given (again for exam conditions).

Good students will recognise that the holding period return if pure expectations holds will be the spot rate, and will be the rolling yield {f(n-1,n)} if spot rates are unchanged. They will recognise that a 4 to 7 year duration constraint does not limit individual bonds to that constraint, merely the average.

Better students will recognise that Joe's forecasts are important relative to the f(1,n) curve priced into the current spot curve, not the spot curve itself. In part e they will observe that the barbell works best and take full advantage of the hint provided.

Students who do not understand the relationship between interest rates and duration should fail this question.

Question 7	**Level of Difficulty**		
Part	**A**	**B**	**C**
(a)	2		
(b)	2		
(c)		3	
(d)		2	
(e)			9
Total = 18 marks	**4**	**5**	**9**

QUESTION 7 (18 Marks)

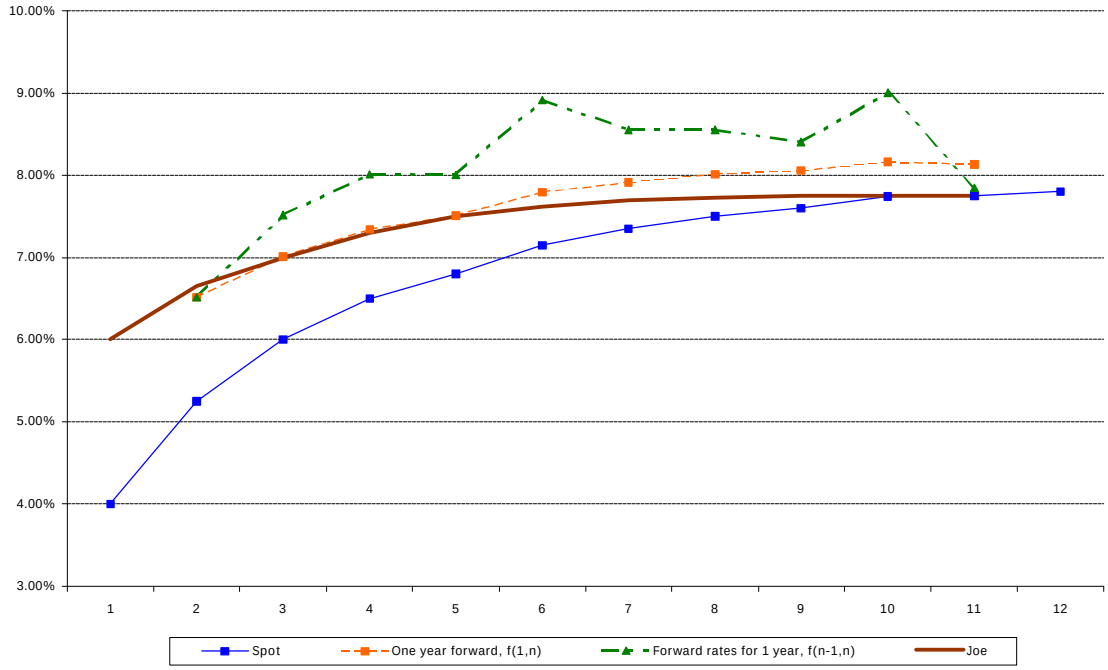
In the land of Simplicity, the government issues Zero Coupon Bonds (ZCBs) once a year only, as it simultaneously redeems a maturing issue. A new issue has just been made. The current spot rates and implied forward rates are shown below:

Term (n)	s(n)	f(1,n)	f(n-1,n)	Joe's forecast
1	4.00%			6.00%
2	5.25%	6.52%	6.52%	6.65%
3	6.00%	7.01%	7.52%	7.00%
4	6.50%	7.35%	8.01%	7.30%
5	6.80%	7.51%	8.01%	7.50%
6	7.15%	7.79%	8.92%	7.62%
7	7.35%	7.92%	8.56%	7.70%
8	7.50%	8.01%	8.56%	7.73%
9	7.60%	8.06%	8.40%	7.75%
10	7.74%	8.16%	9.01%	7.75%
11	7.75%	8.13%	7.85%	7.75%
12	7.80%			

where:

s(n) represents the spot rate of interest on a zero coupon bond maturing in n years.
f(m,n) represents the forward rate of interest for a term of n-m years, commencing in m years.
"Joe's forecast" are forecasts by Joe the economist as referred in parts d & e.
All rates are effective per annum rates.

These rates have graphed below:



Question 7 continued

You are the fixed interest strategist for a major fund manager in this country. The only instruments available to you are the government's ZCBs. Your mandate restricts you to maintain the duration of the portfolio between 4 and 7 years at all times. Otherwise,

you have complete flexibility in how you structure your portfolio. Your investment horizon is one year, implying you set your portfolio now and do not change it for a year if circumstances do not change.

a) Some values from the table are missing. Calculate f(1,12) and f(11,12) to the nearest basis point, showing all working (2 marks)

Solution

Using the equation

$$(1+s(m))^{m}\,(1+f(m,n))^{n-m} = (1+s(n))^{n}$$

students should be able to derive the following

$$f(m,n) = \left[\frac{(1+s(n))^{n}}{(1+s(m))^{m}}\right]^{\frac{1}{n-m}} - 1$$

and hence

$$f(1,12) = \left[\frac{(1+0.078)^{12}}{(1+0.04)^{1}}\right]^{\frac{1}{11}} - 1$$

$$= 8.15\%$$

$$f(11,12) = \left[\frac{(1+0.078)^{12}}{(1+0.0775)^{11}}\right]^{\frac{1}{1}} - 1$$

$$= 8.35\%$$

Marking – 1 mark for each correct answer with working.

---

b) If the pure expectations hypothesis holds, what will the spot rate curve look like in one year's time? As such, what will be the return on each ZCB over the coming year? (2 marks)

Solution

If the pure expectations hypothesis holds, the spot rate curve in one year will be the forward rates commencing in one year ie the f(1,n) rates. (1 mark)

This implies that the return on each ZCB over the coming year will be the same ie 4.00% pa. (1 mark)

(Explanatory Note: If the pure expectations hypothesis holds, s(n-1) next year is equal to f(1,n) now. Therefore a ZCB's value next year is $(1+f(1,n))^{-(n-1)}$, and its value is = $(1+s(n))^{-n}$ now. Hence the return for next year is:

$$\left[\frac{(1+f(1,n))^{-(n-1)}}{(1+s(n))^{-n}}\right] - 1 = \left[\frac{(1+s(n))^{n}}{(1+f(1,n))^{n-1}}\right] - 1 = (1+s(1)) -1 = s(1) = 4.00\%\text{pa.})$$

---

c) If your view is that spot rates will be unchanged in one year's time, which segments of the spot curve will you be currently under or overweight the index in order to maximise returns over the coming year (without giving actual weights)? Why?

(3 marks)

Solution

Under this scenario, a ZCB's value next year is $(1+s(n-1))^{-(n-1)}$, and its value is = $(1+s(n))^{-n}$ now. Hence the return over the next year is:

$$\left[\frac{(1+s(n-1))^{-(n-1)}}{(1+s(n))^{-n}}\right] - 1 = \left[\frac{(1+s(n))^{n}}{(1+s(n-1))^{n-1}}\right] - 1 = (1+f(n-1,n)) -1 = f(n-1,n).$$

You will be overweight those bonds where f(n-1,n) is high and underweight those bonds where f(n-1,n) is low. The former is a signal of relative cheapness and the latter bonds are relatively expensive. f(n-1,n) represents the rolling yield. More specifically, you will be overweight the 6 and 10 year bonds, underweight the 1-5 year bonds and 11 year bond, and at about index weight for the 7-9 year bonds and 12 year bond.

(1.5 marks for correct over, under or neutral weightings – award in increments of ½a mark if students get some of them right. 1.5 marks for explaining how these choices were made and what they represent)

Joe the economist is your in-house economics researcher, and he has an uncanny ability for predicting future interest rates (he is known in the industry as "Smokin' Joe"). He has provided you with his forecasts of where the spot rate curve will be in one year's time, as provided in column 5 of the table above.

d) Based on Joe's forecasts, should you shorten or lengthen the duration of your portfolio? Why? (2 marks)

Solution

You will lengthen the duration. Joe's forecast spot rates do not rise as high as the breakeven rates ie f(1,n). The fact that rates have risen does not mean that you should be bearish. The capital loss from rising rates is not large enough to totally erode the rolling yield on longer dated bonds.

(1 mark for correctly identifying to lengthen. 1 mark for explaining that it is because forecast rates do not rise as high as the breakeven rates)

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e) Based on Joe's forecasts, and the constraints on your portfolio structure given above, suggest a strategy and recommend weights for each bond to try to maximise the return on the fund over the coming year, assuming Joe's predictions prove true once again. What is the maximum return you can calculate? Show your working.

(Hint: Use some logic to limit the combinations you try. When trying barbell combinations, limit the combinations to 50% weight in one bond, 50% in another)

(9 marks)

Solution

The following observations should be made regarding the yield curves:

- the yield curve is very smooth to start with ie there are no significant kinks
- the curve pivots up (ie the long end is fixed and the short end rises)

The student should first calculate the holding period return for each bond, as shown in the table below

Term (n)	s(n)	Joe	Holding period return
1	4.00%		
2	5.25%	6.00%	4.51%
3	6.00%	6.65%	4.71%
4	6.50%	7.00%	5.01%
5	6.80%	7.30%	4.82%
6	7.15%	7.50%	5.42%
7	7.35%	7.62%	5.74%
8	7.50%	7.70%	6.11%
9	7.60%	7.73%	6.57%
10	7.74%	7.75%	7.65%
11	7.75%	7.75%	7.75%
12	7.80%	7.75%	8.35%

It is apparent that the longer bonds have a greater holding period return due to their superior rolling yield and smaller capital losses. Thus we want the longest duration position that is possible. This will be 7 years, the maximum the mandate allows. As the year passes this will shorten towards 6 years, assuming no change in portfolio structure – ie no breach of mandate.

Now, all that remains is to decide on a yield curve trade – barbell, bullet or ladder. Given the smooth curve and horizon return pattern, there is no need to test the ladder as it will lie somewhere between the barbell and the bullet. Thus we test a bullet of 7 years (returning 5.74%) against a few barbells.

In the question, students were instructed to limit the barbell combinations to 50/50 mixes. This makes the choices quite easy, as we are targetting a duration of 7 years. The combinations are:

Barbell combination	Weighted return (%)
50% of 2 year bond, 50% of 12 year bond	6.43
50% of 3 year bond, 50% of 11 year bond	6.23
50% of 4 year bond, 50% of 10 year bond	6.33
50% of 5 year bond, 50% of 9 year bond	5.69
50% of 6 year bond, 50% of 8 year bond	5.77

Thus the ideal strategy, under the constraints given, is a barbell with 50% of the portfolio in the 2 year ZCB and 50% of the portfolio in the 12 year ZCB.

(Marking:
3 marks for calculating holding period returns for each individual bond. The holding period returns shown are exact, eg. 4.51%= ((1.0525)^2)/1.06. If the candidate chooses to calculate this using a modified duration approximation or that plus convexity, the numbers will be slightly different, but if done correctly this should also get full marks.

1 mark for recognising that duration had to be lengthened as much as possible

1 mark for calculating and testing the bullet

1 mark for recognising that the ladder did not need to be tested

2 marks for calculating the return on each 50/50 barbell strategy

1 mark for the correct, final conclusion

Marks may be awarded if different strategies were tested and the correct conclusions reached based on the calculated holding period bond returns, even if the bond returns calculated were wrong.)

Marking Guide: Paper 1, Question 8

Syllabus Coverage:
Aim 10(a) – Describe the main approaches to managing equity portfolios
Aim 10(f) – Demonstrate how to take risk into account when constructing a portfolio
Aim 14(f) – Interpret performance calculations within a qualitative assessment framework

The aim of this question is to test :

- *Differences in investment styles, what the value style involves, and what has happened in the Australian share market over the last couple of years.*
- *the concept of tracking error (a rudimentary risk measure), and to be able to measure an ex-post figure.*
- *Knowledge of portfolio risk control from both a quantitative implementation perspective and a real-life pragmatic situation.*

Part (a) focuses on the disparity of performance between value and growth styles over the last couple of years. In addition, it requires the justification of a pursuit of a style despite the environment being unfavourable for it at the time.

Part (b) covers the measurement of basic risk figures.

Part (c) requires an understanding of the tools available to measure and control portfolio risk. It also confronts the student with a very practical (non-quant) problem regarding the largest stock in the ASX, namely how to deal with it with regards to portfolio risk minimisation, but at the same time that holding it may be considered to be contrary to the manager's style, especially given its aggressive nature. This question is asked from the perspective of an investment manager, as opposed to an asset consultant.

Good students must show knowledge of:

- *The dynamics that affected the Australian share market over the last couple of years and a clear understanding of how badly the value style fared during that time period regardless of skill.*
- *Tracking error, and its concept for the measurement of likely outcomes with respect to active returns.*
- *How to control active risk in portfolios and the tools that are used.*
- *A practical understanding of risk control e.g. how to handle NCP, and how this might conflict with how a product has been marketed.*

Better students would consider:

- *The impact a more aggressive value style would have over that time period and possibly suggest that they would look into refining their process after this experience. Mention how anomalous that period was including a discussion of the TMT speculative bubble & old economy stock sell down.*
- *The inappropriateness of using only six months data to calculate a statistic.*

Students that do not display any knowledge of the performance disparity between the value and growth style during that time period, cannot explain the value style, or show no knowledge of how to control portfolio risk should not pass this question.

Question 8	Level of Difficulty		
Part	**A**	**B**	**C**
(a)		9	
(b)(i)	2		
(b)(ii)	2		
(b)(iii)	2		
(c)(i)	1		
(c)(ii)			6
(c)(iii)			2
Total = 24 marks	**7**	**9**	**8**

QUESTION 8 (24 Marks)

a) You are the Head of Australian equities of a boutique funds management company, Bargain Asset Management (BAM), that espouses a value investment philosophy.

You manage a mandate which is a satellite component of the Australian equity portfolio of a major industry fund. The performance of your Australian equity portfolios have featured in the bottom quartile in the performance league tables for periods of 1 year and 2 years to the end of 30 June 2000. Being a boutique, BAM felt that they would differentiate by taking aggressive positions and seek to obtain large alphas.

The trustees of that industry fund, have expressed major concern about the performance over the last two years of the Australian equity mandate that you manage for them. They have asked you to explain why you have performed so badly, and why they should not terminate your services.

The trustees of this industry fund are not investment market professionals and are unlikely to be aware of the dynamics that have affected the Australian equity market over the period in question.

Draft your response to the trustees. (9 marks)

Solution

Discussion of Recent Market Dynamics:

- That the value style significantly underperformed during that time period as initially investors shunned value stocks and in particular the cyclical stocks and chased stocks with earnings certainty and those growth stocks with pricing power.
  (1 mark)

- Then later investors chased the new economy stocks (TMT – Telco Media Tech) stocks to stratospheric levels that resembled a speculative bubble while selling down the old economy stocks which included the value stocks and even some of the growth stocks that were not in the TMT sector.
  (1 mark)

  <u>Need to mention both above points to get full marks (max 2 marks)</u>

Discussion of Anomalous Nature of Recent Returns:

- Need to stress that the time period in question was anomalous and this short term significant underperformance should therefore be seen as being unusual.
  (1 mark)

  <u>Need to mention above point to get full marks (max 1 mark)</u>

Justification of Pursuit of Value Approach:

- As a value manager, BAM could not find any merit in participating in the speculative TMT bubble as these companies were massively overvalued and in many cases producing negative earnings (losses) from their operations, and it was BAM's view that eventually that the bubble will burst (like it did in April) and those left holding TMT stocks will get their hands burnt badly.
  (1 mark)

- Reiterate that BAM as a value manager seeks to purchase undervalued stocks and that this will lead to long term superior performance as the inherent value in these stocks will eventually be realised.
  (½mark)

- Argue that over a long period of time, most empirical studies show that value stocks produces superior returns to growth stocks. **(1 mark)**

  <u>Maximum 2 marks</u>

Justification of the Pursuit of BAM's Aggressive Approach:

- Mention, that it is only a satellite component of their portfolio and as such they are structured so that each satellite manager will take on aggressive positions. **(½mark)**
- This is what BAM is doing, and the overall Industry Fund's Australian share portfolio structure should be able to absorb underperformance from one of their managers, as it would be expected that some of the other satellite managers would be outperforming. **(½mark)**

- The more aggressive positions held by BAM would accentuate this underperformance. However, in the long run this more aggressive position would lead to greater outperformance (assuming BAM is a skillful manager!).
  (1 mark)

  Need to mention all three above points to get full marks (max 2 marks)

General Marketing Comments

- State that BAM's long term track record was still good and that the trustees need to maintain a long term view with their investments, and that BAM is confident they will deliver the goods in the long term.
  (1 mark)

- From time to time, regardless of the manager's skill, they will underperform. This may be due to their style being out of favour, or just bad luck. However, in the long run, BAM's skill will prevail. **(½mark)**

- Now is not the time to rotate out of value stocks and to invest in a growth manager or whatever is the latest flavour of the month. **(½mark)**

  Maximum 1 mark

Maximum of 8 marks for the above points.

1 mark for format (i.e. needs to have Address of writer and receiver, "Dear Trustees", and a sign off).

This gives a maximum of 9 points.

(Note: Students may have other valid points to this; the important thing is that marks are limited by heading. For example, justifying the value approach alone should not deliver the student the maximum 8 marks.)

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b) BAM's historic performance would suggest that they had a significant tracking error. While they measured that their ex-ante tracking error to be about 9%pa, their ex-post tracking error for the year ending 30 June 2000 came in at a much higher figure.

i. Explain what the difference is between an ex-ante and ex-post tracking error. Give the most likely key reason for the large discrepancy between these two figures for the period in question. (2 marks)

Solution

Ex-ante tracking error is the forecasted/expected tracking error . Ex-post tracking is the actual tracking error that eventuated. Tracking error being the standard deviation of excess returns. **(1 mark) deduct ½mark for omitting any one of the three points.**

The disparity between the two would have been caused by the signficantly larger than normal disparity of returns between the value style and the index, and with this disparity being subject to significant volatility during that time period. **(½mark)**
This anomalous behaviour would not have been captured by the risk model which would have been based on historical figures. **(½mark)**

---

ii. Given the figures below, measure the ex-post tracking error of BAM's equity portfolio over the 6 months ending 30 June 2000. The figure quoted must be annualised. (2 marks)

Monthly Gross Returns

	BAM's Equity Portfolio	ASX All Ordinaries /ASX 200 Accum.
Jan 2000	-0.62%	-1.76%
Feb 2000	-10.64%	+1.60%
Mar 2000	+1.82%	+0.53%
Apr 2000	+3.24%	-0.52%
May 2000	-0.87%	-0.98%
Jun 2000	+11.58%	+8.01%

Solution

Tracking error is the standard deviation of the active (excess) returns. (**½mark**)

- First step is to calculate the monthly active returns (**½mark** if the arithmetic is right)

Month	Active Returns
Jan-00	1.24%
Feb-00	-12.18%
Mar-00	1.32%
Apr-00	4.06%
May-00	0.12%
Jun-00	3.57%

- Second step is to calculate the standard deviation = 6.00% per month (**½mark – needs to be the sample standard deviation)**

- Final step is to annualise = 6.00% x sqrt(12) = 20.80%pa. **(½mark)**

- The student should comment on the inappropriateness of using only six data points for the calculation of a statistic. **(½mark)**

The student can still get full marks for the second and final step, if it is done correctly based on an incorrect answer in a previous step.
(Max 2 marks)

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iii. If BAM had an ex-ante tracking error of 9%pa, and an ex-ante alpha (outperformance) of 9%pa, calculate the ex-ante information ratio (IR), and explain what this means from a practical perspective with respect to likely actual outcomes. (2 marks)

Solution

- information ratio = excess return (alpha) / tracking error ()
  IR = 9% / 9% = 1.0 **(½mark for definition, ½mark for stated answer)**

- Assuming a normal distribution, the ex-ante alpha and ex-ante tracking error would suggest that there is a 68% chance that the actual alpha will lie within 0% and 18% after one year. (or can quote other confidence intervals e.g. 95% chance +/- 1.96 standard deviations which means actual alpha will lie within –9% and +27% after one year) **(1 mark)**

---

c) Your appointment as the Head of Equities at BAM, has only been recent. One of your tasks is to refine the risk management of their Australian equities portfolios. In the context of this question, risk refers to active risk or "tracking error". It has been well known that BAM's aggressive positions were predominantly in "cyclicals" over the last couple of years, as their analysts felt that this part of the market was the most undervalued.

i. Explain what "cyclical" stocks are (do not give any examples of such stocks, but focus on their key characteristics). (1 mark)

Solution

Cyclical stocks – industrial stocks whose earnings (and as a result its share price) are tied to the economic/business cycle (usually domestic). **(½mark)**

When the domestic economy is performing strongly, the company is usually highly profitable and the share price generally rises. When the domestic economy is in decline, the company's earnings and its share price usually falls. **(½mark)**

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ii. How would you refine BAM's portfolio construction process to significantly reduce risk without sacrificing too much of their expected alpha? (6 marks)

Solution

Which Quantitative Tools
(Focus here is on something that measures ex-ante tracking error and shows the portfolio biases to various factors.)

- Can use off-the-shelf risk software such as BARRA Aegis Australian Equity Model, QUANTEC, and APT (Advanced Portfolio Technologies) which use structural risk models.
- Can develop a proprietary risk model – based on a covariance matrix for each stock (but cumbersome for where the universe of stocks gets large).
- Develop a proprietary structural risk model - based on each stock being modelled using factors, sensitivity to each of these factors, and residual unique risk.
- A proprietary risk model may be preferred as it can be modified to suit your own needs or where you feel the off-the-shelf software have some shortcomings (e.g. has not modelled some stocks……..especially for small caps).

(**½mark** for each point subject to a maximum of **1 mark**)

How would you use it?

- Factors may be a combination of industry groupings and "Risk Indices" as shown in Grinold & Kahn, or other factors which you may find has strong explanatory power (e.g. the price of crude oil). Use factors that make sense.
- Factor modelling also has the advantage of showing the portfolio biases (relative to index) to each key factor. Therefore, can reduce active risk by reducing any unintentional factor biases.

- As a value manager, you will naturally need to be biased to "value" factors. This may include the "value" risk index as described in Grinold & Kahn or may be others such as "price to book" etc.

(**½mark** for each point subject to a **maximum of 1.5 marks**)

- MCARs (marginal contribution to active risk) are used if the ex-ante tracking error (active risk) of the portfolio is too high or too low. Of course, if you are going to increase tracking error, you would want to be compensated with extra alpha.

- The MCAR's of each stock position is ranked (whether by adding or reducing). They may use the term "most diversifying" and "least diversifying".

- If tracking error is too high, then one of the most efficient ways to reduce tracking error is to increase exposure to the "most diversifying" stock and reduce exposure to the "least diversifying" stock. (For too low, vice versa).

- After these adjustments, when the portfolio has an acceptable forecasted tracking error, we need to check the factor exposures again and ensure the biases as still acceptable, and also need to ensure that not too much ex-ante alpha has been sacrificed. (For too low…need to ensure that we have commensurate gain in ex-ante alpha for the extra active risk taken).

- Similarly, the above can be automated using an optimisation process, but the process needs to be described.

(**½mark** for each point subject to a **maximum of 1.5 marks**)

- As a final check, we need to use some judgement, and have a look at the resulting active positions in each stock, and decide whether we feel comfortable with it. If not, adjustments can be made. This is a must!

(1 mark for the above point**)**

Comments on Past Overweight Cyclical Position

- Obviously, not prudent, as even a value manager does not have to have most of their position in cyclicals (i.e. have all their eggs in the one basket). Although cyclicals are comprised of industrial stocks in a few different industry groups (e.g. chemicals, paper&packaging, building materials, engineering), as a group they are still highly correlated to each other. Cyclicals are not the only segment of the market considered to be "value" stocks. Other sectors considered to be value at the time included banks, and resources. From a pragmatic perspective, without the use of any quantitative risk tools, BAM could have diversified their "value" bets by spreading their portfolio in the other value sectors as well.

- If a risk model was used, the unacceptable ex-ante tracking error would have been measured and it would have tempered BAM's massive overweighting in cyclicals. This would have reduced the extent of underperformance. Going forward, this adoption of a formal risk management process will ensure that BAM is protected (to at least some extent) from underperforming as badly as they have in the past.

(**½mark** for each point subject to a **maximum of 1 mark**)

(Note: Again, students may have other valid points to this; the important thing is that marks are limited by topic. For example, "which quantitative tools" alone should not deliver the student full marks.)

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iii. The managing director has said to you, "I suggest that to minimise portfolio risk, we should hold a permanent position in News Corporation which is close to index weight". Comment on this suggestion.

(2 marks)

Solution

- The Managing Director would have said that so as to help to minimise the portfolio tracking error, so as to control business risk.
  (½mark)

- NCP (News Corporation) is the largest stock in the ASX and by a significant margin.
- Not only is it the largest stock but it also happens to be a very volatile stock compared to its large cap peers.
- At times, NCP can account for a very large chunk of the movements in the index for any one day.
- Therefore, being underweight NCP by any significant amount would mean taking on significant active risk.

(¼ mark for any of the above 4 points subject to maximum of ½mark**)**

- In addition, during that time period in question, managers who were underweight NCP suffered significant underperformance as it rallied incredibly strongly on the back of the announcement of the AOL/ Time Warner merger, as investors re-evaluated the value of media content and its distribution. As such, it may have been a knee jerk reaction by the Managing Director, and this strong performance will not necessarily continue going forward.
  (½mark)

- However, NCP, by any measure is considered to be a growth stock, which is the antithesis of value. Therefore, it would be very difficult for a value manager to justify not being significantly underweight NCP, especially for one as aggressive as BAM.
  (½mark)

END SOLUTIONS PAPER 1