

# ASSET LIABILITY MANAGEMENT

EXAM MARKING GUIDE SEMESTER 1 2023



### Marking Guide

This exam represents 80% of the available marks for the Asset Liability Management subject. The remaining 20% comes from the assignment.

Question	Syllabus Learning Objective	Total Marks	SA	A	H
1	6.1, 6.3, 6.4, 6.5, 6.8	22	4	14	4
2	3.1, 3.2, 5.1, 5.2, 6.3	22	4	12	6
3	3.1, 3.2, 5.1, 6.3, 6.5	17	2	9	6
4	2.4, 4.1, 4.3, 3.2	19	6	13	0
<b>Exam</b>		<b>80</b>	<b>16</b>	<b>48</b>	<b>16</b>
Assignment		20	13	6	1
Total		100	29	54	17
Target		100	30	50	20

**SA** – Simple Application 30%

**A** – Application 50%

**H** – Higher order/ Judgement/Evaluation 20%

For each question, the Marking Guide has the Question, Commentary and a Sample Solution. Commentary is for the markers' benefit and may not be provided in the student feedback.



### Note to Markers:

An overarching principle is that marks should be awarded for necessary work undertaken by a student to arrive at an answer to a question. You may think of this as telling a story to answer the question that is asked. **In respect of marking, please award marks for defining terms, describing background and context which is relevant to 'telling a story' to answer the question.**

We give guidance to students that copying and pasting is allowed but they need to address the specified scenario to pass the examination. The marking guide for each question generally states whether marks can be awarded for generic points or whether the points given must be linked to the given problem context. If the marking guide does not specify otherwise, marks **SHOULD** be awarded for relevant comments that may appear to have been copy pasted from either the modules or another resource, such as a prudential or professional standard.

**Marks may also be awarded for any other relevant point not included in the marking guide.**

Where any such marks are awarded, the relevant point should be reported to the Chief Examiner so that they can confirm the validity, include it into the final version of the marking guide and ensure any other marker(s) for that question are aware of the change and award the mark to all candidates making the additional point.

**As a rule, a complete sentence should be awarded 1 mark.**

**A complete sentence includes a clause and a connecting clause. An example sentence is 'The insurer pays a benefit on death' (½ mark for the clause) provided the premiums are paid (½ mark for connecting clause).'**

The exam questions each start with a 'command verb' that provides information to students and markers about what is expected in an answer to the question. Please watch the following short video for information about the learning levels and command verbs used by the Institute: [https://www.youtube.com/watch?v=g1Oyv\\_RpfU4](https://www.youtube.com/watch?v=g1Oyv_RpfU4). Definitions of each of these command verbs is also provided within this marking guide.

**Please note that many of the answers in this marking guide go well beyond what is required to gain full marks in the question. This is done deliberately to give students and markers a sense of the wide range of acceptable answers that students might give to a question.**



### QUESTION 1: MARKING GUIDE

(22 marks)

#### Question

A defined contribution retirement savings and pension fund offers a range of four multi-asset class investment options to its members:

Investment option	Recommended minimum investment term
Conservative	3 years
Balanced Growth	7 years
Growth	12 years
High Growth	20 years

The fund competes with other similar funds in the marketplace. The members generally need to achieve long-term returns above inflation, to preserve their purchasing power, but their tolerance of shorter-term volatility of returns is varied.

Each of the investment options has a stated investment objective and an investment strategy that has been formulated by the trustee board of the fund.

Members may contribute to or withdraw from the fund at any time, so the fund maintains daily unit pricing for each of its investment options.

The investment strategy for each investment option has an allocation to unlisted assets such as property and private equity.

- Describe the liabilities that are being provided for by the investment options of the fund. **(4 marks)**
- Explain the five steps that the trustee board should have taken in determining the investment strategy for the investment options of the fund. **(10 marks)**
- Propose an investment return and risk objective for the Balanced Growth investment option, with reference to the liabilities being funded. **(4 marks)**
- Explain the uncertainties and timing of reporting in the valuation of the unlisted private equity assets and how they may affect the unit pricing of the investment options. **(4 marks)**



### Commentary

Question	Syllabus Learning Objective	Reference in Course Notes	Total Marks	SA	A	H
1	6.1, 6.3, 6.4, 6.5, 6.8		22	4	14	4
A	6.1	M11	4	4		
B	6.5	M11	10		10	
C	6.3, 6.4, 6.5	M11 11.3, 11.4, 11.5, 11.6, 11.7	4			4
D	6.8	M11	4		4	

### Sample Solution

- a) Describe the liabilities that are being provided for by the investment options of the fund. (4 marks)

**Command verb:** *Describe (Level 2 – Understand): Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.*

The fund is a defined contribution retirement savings fund. Therefore, the liability is the retirement savings of the members (0.5 mark).

The duration of the liabilities will be varied, depending on the age of the member (0.5 mark). Generally speaking, retirement savings have a longer term duration, often 20 years or more (0.5 mark).

The liabilities that are being provided for by each investment option are:

- Retirement incomes which may not commence for many years (in the case of younger contributing members) (0.5 mark) and may be paid for a long period in retirement (0.5 mark).
- Lump sum cash outflows if members choose to switch to a different investment option within the fund (0.5 mark) or move to a competitor fund (0.5 mark) noting that outflows may be offset by contribution inflows (0.5 mark).
- The timing of commencing a retirement income may be decided by the member (0.5 mark) and the time of cessation of retirement income will depend on decisions to withdraw or the date of death, both of which are uncertain for individual members (0.5 mark).
- Retirement Income payments will be in domestic currency (0.5 mark).  
The cash outflows are uncertain as the member may choose to move to another fund anytime (0.5).



Maximum 4 marks.

- b) Explain the five steps that the trustee board should have taken in determining the investment strategy for the investment options of the fund. (10 marks)

*Command verb: Explain (Level 4 – Analyse) Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey ‘why’ or ‘how’ or ‘so what’. A connection is expected between the item(s) and something else.)*

An explanation of the five steps that the trustee board should have taken in determining the investment strategy for the investment options of the fund is as follows:

1. Identify the nature of the liabilities (0.5 mark for naming the step):
  - a. Size and uncertainty of the size of the lump sum and retirement income payments (0.5 mark). The lower the certainty of the amount and timing of payments, the higher the requirement for investments in more marketable or liquid assets (0.5 mark).
  - b. The timing of the payments (the term of the liabilities) (0.5 mark). Investing longer than the term of the liabilities or in assets that are not liquid means that the assets may need to be sold early, at depressed prices (0.5 mark). Investing assets shorter than the term of the liabilities introduces reinvestment risk (0.5 mark).
  - c. The currency in which the liabilities need to be provided for (0.5 mark). This often means maintaining a significant domestic currency exposure but not necessarily a domestic asset exposure (0.5 mark). Foreign asset exposures may be hedged back into the domestic currency (0.5 mark).
  - d. The risk appetite of the members in each investment option (0.5 mark). The trustee board would need to do some work to find out the risk appetites of members using each of the investment options (0.5 mark).
2. Define the investment objective and describe the investment philosophy (0.5 mark for naming the step):

The investment objective should be unambiguous and clearly quantified as far as practically possible (0.5 mark). It should:

- i. be specific about the return being sought and the degree of risk that can be tolerated (0.5 mark). The allowable degree of risk for each investment option should be defined in terms of the member’s risk appetite, together with the required return (0.5 mark).



- ii. incorporate liquidity objectives related such as meeting cash flow requirements for a lump sum or pension payments (0.5 mark).
- iii. be measurable so that the success of the investment strategy in meeting the objectives can be determined (0.5 mark).
- iv. be realistic and achievable given how investment markets behave (0.5 mark).
- v. incorporate a timeframe; (0.5 mark).

The board of trustees also needs to outline a set of beliefs and principles, sometimes referred to as its investment philosophy, about how investment markets for various asset classes behave (0.5 mark) to guide its investment decision-making process and setting the investment strategy and selecting assets (0.5 mark).

Once the trustee board has confirmed its investment philosophy and set investment objectives for each investment option of the fund, it can then determine the investment strategy for each investment option (0.5 mark).

3. Determine the investment strategies (0.5 mark for naming the step):

- Investment strategy refers to the process used to select the investment portfolios for each investment option (0.5 mark). For a multi-asset class investment option, it will usually incorporate a description of the process for asset allocation between asset classes and the selection of assets within each asset class (0.5 mark). Investment strategies are set with consideration given to issues such as:
  - the risk profile of the liabilities i.e., the level of uncertainty about the amount and timing of future benefit payments or transfers to competitor funds; (0.5 mark)
  - the investment objective (return and risk) of the investment option; (0.5 mark)
  - any regulatory requirements or restrictions, such as on the valuation of unlisted property or equity assets; (0.5 mark)
  - any fund restrictions on certain asset classes or types of assets for example there may be a desire to invest taking into account ESG criteria; (0.5 mark)
  - the need for diversification to moderate the volatility of returns; (0.5 mark)
  - tax considerations and implications; (0.5 mark)
  - cost of implementation such as investment management fees for outsourced investment; (0.5 mark) and



- the strategies of competitors (0.5 mark).

4. Assess the impact of the strategy (0.5 mark for naming the step):

This step comprises evaluating the impact of the proposed investment strategy for the investment option on the risk and return outcomes for the members who choose the option (0.5 mark). Several alternative strategies may be assessed and compared for each investment option (0.5 mark) often using scenario analysis (or stress testing) regarding future investment market conditions before the most appropriate strategy can be selected (0.5 mark). It is unlikely that any of the strategies will provide a perfect fit for the achievement of objectives under many scenarios. The trustee board will need to exercise judgment to prioritise objectives (0.5 mark) and assess whether there is a 'best available' solution that will be appropriate for each investment option (0.5 mark).

5. Document and operationalise the strategy (0.5 mark for naming the step):

The final step is for the trustee board to document the chosen strategy for each investment option (objectives, constraints, and asset allocation), operational parameters, performance objectives (0.5 mark) and the process for future monitoring and reassessment of the strategy (0.5 mark).

The documented investment strategy can then be given to the investment managers to implement (0.5 mark). The trustee board will then monitor results against objectives (0.5 mark) and update or amend the strategy in response to experience (0.5 mark).

***Note to markers: the candidate must identify all five steps and provide some explanation of each step in order to obtain full marks.***

***Maximum marks for Question 1 part b: 10 marks***





- c) Propose an investment return and risk objective for the Balanced Growth investment option, with clear reference to the liabilities being funded.  
(4 marks)

*Command verb: Propose (Level 6 – Create): Select and communicate a solution, action, or range of possible solutions/actions. Rationale, reasons, or justification must be included.*

A sample solution with reference to one of the Balanced Growth investment option is as follows:

An appropriate investment return and risk objective for the Balanced Growth investment option with a recommended minimum investment term of 7 years and a strategic asset allocation of 60% in growth assets (listed equities, private equity, and unlisted property) and 40% in what are called defensive assets (fixed interest, private debt, and cash) would be (1 mark for statement of the likely strategic asset allocation between growth and defensive assets, given the minimum 7 year investment term – could be anywhere from 50 growth /50 defensive to 70 growth/30 defensive) :

Return objective: preserving the purchasing power of accumulating assets and pensions in payment against inflation and also maximising future returns within the risk constraint are both important (1 mark) so a return objective of CPI plus 3% per annum over a rolling ten-year time frame would provide for this with a safety margin (1 mark) (i.e., 1 mark for background reasoning and 1 mark for any return objective that is reasonable and supported by the reasoning and likely to be achieved by the strategic asset allocation nominated by the candidate).

Risk objective: capital protection is important to many members to maintain their confidence in the investment strategy (1 mark) so a risk objective of "a negative return over 12-month periods should occur no more frequently than once per five years (1 mark) (i.e., 1 mark for background reasoning and 1 mark for any risk objective that is reasonable and supported by the reasoning and likely to be achieved by the strategic asset allocation nominated by the candidate).

**Note to markers: candidates must cover both return and risk objectives of the investment option and provide a rationale for each to obtain full marks).**

**Maximum 4 marks.**

- d) Explain the uncertainties and timing of reporting in the valuation of the unlisted private equity assets held by each of the investment options of the fund and how they may affect the unit pricing of the investment options.  
(4 marks)



**Command verb: Explain (Level 4 – Analyse) Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey ‘why’ or ‘how’ or ‘so what’. A connection is expected between the item(s) and something else.)**

The Fund may invest in private equity assets by:

- investing in shares of private companies which are not listed on a securities exchange in which case there is a need to value the shares; (0.5 mark) or
- investing in a pooled private equity investment vehicle (such as a fund or a limited partnership) which invests in a portfolio of private companies, in which case there is a need to value the holding in the private equity pooled vehicle (0.5 mark).

The following characteristics of private equity assets lead to uncertainties in the valuation:

- Private equity assets held directly or via a pooled investment vehicle may be valued either by independent external valuers or internal processes (0.5 mark). The valuations are typically based on the financial and cashflow statements prepared by the private companies, as well as an allowance for any significant changes in the market conditions after the reporting date (0.5 mark). It can take some time to produce accounts after the end of a financial year (0.5 mark).
- The valuations are often months old (0.5 mark): Private company shares that are not listed on a securities exchange will not have continual price discovery that arises from the frequent trading of public market assets such as listed equities (0.5 mark). The lack of continual pricing leads to the risk of inappropriate valuation of unlisted assets based on much less frequent transactions which can be very dated (0.5 mark);
- They are more difficult to value using a DCF approach (0.5 mark): Private equity assets tend to be much less homogeneous than listed equities and may have very idiosyncratic characteristics (possibly early stage e.g., start-ups or venture capital) that affect their revenue and expenses (0.5 mark) and so it may be difficult to formulate the assumptions needed in a discounted cash flow analysis (0.5 mark). The valuation may rely on assumptions that prove to be incorrect (0.5 mark) so the valuation will be incorrect (0.5 mark);
- Lack of widespread independent comparable research and analysis (0.5 mark): the lack of continual trading in private equity assets may mean that there is a lack of incentive for many of the analysts with the knowledge and skills to evaluate such assets (such as those employed by investment banks and brokers) to publish research and analysis relating to private equity assets (0.5 mark). The analytical skills related to private equity assets often tend to reside in the private equity fund or partnership management firms (0.5 mark).
- Where the private equity investment is held via a private equity fund managed by a private equity fund manager, the valuation of the assets is essentially carried out



by the fund manager which is responsible for the selection of the private equity assets (0.5 mark). They are generally remunerated partly by performance fees and this gives rise to the possibility of a conflict of interest in relation to the valuation of assets which leads to the performance upon which performance fees are based (0.5 mark), but it should be noted that private equity investment managers have a longer-term interest in building their business and will be careful not to damage their reputation (0.5 mark).

- The private equity pooled investment vehicles may also provide valuations infrequently (often quarterly) and with a time lag of a further month or two due to concerns by the private equity investment managers about keeping information confidential from their competitors (0.5 mark).
  - Unlisted private equity assets are not actively traded on any market (0.5 mark).
  - They are therefore not frequently or regularly priced, as is the case with listed equities (usually priced daily) (0.5 mark).
  - They may only get priced either when they are bought or sold, or at some fixed interval (e.g., quarterly) by a valuer (0.5 mark).
  - Due to the limited availability of comparable sales however, their valuations are not only infrequent, but often highly subjective (0.5 mark).
  - Given this, investing in unlisted equities causes difficulty for unit pricing (0.5 mark).
  - Any scenario where an asset is priced less frequently than the investment will difficulties (0.5 mark). For example members who exit prior to a valuation, may lose out on gains, if the valuation is increased (0.5 mark).
- There are therefore significant uncertainties in the valuation of the assets and time lags in the provision of the asset values which feed into the daily unit pricing process of the investment options of the retirement savings and pension fund. **(1 mark for this point which must be made to obtain full marks for Q1 part d.)**

### **An alternative way of answering this question part is:**

The uncertainties and timing of reporting in the valuation of the unlisted private equity assets are caused by the fact that these assets are not traded in public markets (0.5 mark). This means that there is no indication of valuation changes in real or near-real time (0.5 mark). Therefore, such assets need to be valued by another method on a periodic basis (0.5 mark) and such valuations can be complex and highly subjective (0.5 mark) as the valuations have to be derived based on a set of assumptions, some of which might not be directly observable in the market (0.5 mark).



This affects the unit pricing of the investment option as the pricing for unlisted assets cannot be updated on a daily basis (0.5 mark). This means that there will be a lag between changes in the price or valuation of the unlisted assets and the unit price of the investment option (0.5 mark). For example, if a significant event that materially changes the valuation of the asset occurs, it will not flow through into the unit prices until the next valuation (0.5 mark). Further, due to periodical valuation updates and potential for large changes in valuation between the revaluations, unit prices might significantly move on the days when the valuation is updated (0.5 mark). This might not be expected by the members of the fund (0.5 mark).

**4 marks maximum.**

### END OF QUESTION 1: MARKING GUIDE



### QUESTION 2: MARKING GUIDE

(22 marks)

#### Question

A general insurance company operates in a single currency and offers its customers home insurance and motor vehicle insurance policies which are renewed annually. Its policy liabilities are supported by an asset portfolio that comprises only domestic money market and domestic fixed-interest securities, such as floating rate notes, government bonds and investment-grade corporate bonds.

- a) Explain the key assumptions of three of the theories about the behaviour of the yield curve. **(6 marks)**
- b) Describe the return and risk characteristics of domestic investment-grade corporate bonds and how they vary over time. **(4 marks)**
- c) Explain, with reference to the liabilities being provided for:
  - i. Two advantages and two disadvantages of a significant allocation to domestic investment-grade corporate bonds in the asset portfolio supporting the policy liabilities. **(4 marks)**
  - ii. Two restrictions that could be placed on the portfolio of corporate bonds to assist in the management of risk **(2 marks)**

**Total 6 marks for the question part c).**

- d) Prepare a set of notes for the board of the insurance company on the factors that may affect the returns on a portfolio of corporate bonds in the next year. **(6 marks)**

#### Commentary

Question	Syllabus Learning Objective	Reference in Course Notes	Total Marks	SA	A	H
2	3.1, 3.2, 5.1,5.2,6.3		22	4	12	6
A	3.2,5.1,5.2	M5 M9	6		6	
B	3.1,3.2	M5	4	4		
C	5.3,6.3	M9 M11	6		6	
D	3.2	M5	6			6



### Sample Solution

- a) Explain the key assumptions of three of the theories about the behaviour of the yield curve. (6 marks)

**Command verb: Explain (Level 4 – Analyse)** Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey 'why' or 'how' or 'so what'. A connection is expected between the item(s) and something else.)

Economic theories generally indicate that prices (and yields, which are a version of the price of a bond) are determined by supply and demand (0.5 mark).

The key assumption of market segmentation theory is that different types of bond market investors restrict their purchases and sales to certain maturity ranges or segments of the yield curve such as short-term, medium-term, and long-term (1 mark).

This means that bonds of different maturities effectively trade in different markets, each with its own supply-and-demand forces that produce bond yields in that segment (1 mark).

The key assumption of liquidity preference theory is that investors prefer access to their capital through liquid investments rather than having restricted access and need to be compensated differently for investing their capital for different periods (1 mark).

This means that a positive bond liquidity risk premium exists so that investors in longer-duration bonds require a higher expected return as compensation for investing for longer (1 mark).

The shape of the yield curve is expected to be upward-sloping (0.5 mark).

The key assumption of the inflation risk premium theory is that Inflation risk, which is the risk that the purchasing power of capital is reduced if returns are lower than inflation, is more likely to occur over longer periods (1 mark).

Therefore, inflation risk premium theory implies that the yield curve should slope upwards as investors will need to be compensated for longer-term investments, which are more susceptible to inflation risk than shorter-term investments (1 mark).

The key assumption in expectations theory is that long-term interest rates are driven only by expectations of future economic factors (1 mark).

There is no bond liquidity risk premium. Therefore, forward rates equal the future spot rates (1 mark).



This is a more generalised form of the inflation risk premium theory (0.5 mark).

**Maximum 6 marks for q2 a)**

**b) Describe the return and risk characteristics of domestic investment-grade corporate bonds and how they vary over time. (4 marks)**

*Command verb: Describe (Level 2 – Understand): Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.*

The returns on corporate bonds comprise:

- the rate of income received while holding the bond; and (0.5 mark)
- the capital gain due to the change in price or yield during the holding period (0.5 mark).

The rate of income can be reduced by default on payments of interest (0.5 mark).

The capital gain can be reduced by the default on repayment of the principal at maturity or the reduction in the price of the bond between its purchase and sale (0.5 mark).

There may be a capital gain (or loss) due to an improvement (or decline) of the credit rating of the issuer, which leads to a reduction (or increase) in the credit spread of the bond (0.5 mark).

The credit default premium (or credit spread) compensates the investor for the expected rate of default on payments (0.5 mark).

The credit spread is a measure of the risk as perceived by the market (0.5 mark) and often shifts over time due to:

- events specific to the issuer such as the deterioration of its revenue or profitability and therefore its capacity to repay (0.5 mark).
- a deterioration in the overall economy such as in the 2020 COVID recession, when credit spreads rose sharply (0.5 mark).
- a supportive response from fiscal or monetary policy such as in 2020 when major central banks announced that they would assist corporate credit markets by buying large volumes of corporate bonds leading to a sharp fall in credit spreads (0.5 mark).

**Maximum 4 marks for this question part q2 b)**

**c) Explain, with reference to the liabilities being provided for:**



- i. Two advantages and two disadvantages of a significant allocation to domestic investment-grade corporate bonds in the asset portfolio supporting the policy liabilities. (4 marks)
- ii. Two restrictions that could be placed on the portfolio of corporate bonds to assist in the management of risk (2 marks)

Total 6 marks for the question part c).

**Command verb: Explain (Level 4 – Analyse)** Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey ‘why’ or ‘how’ or ‘so what’. A connection is expected between the item(s) and something else.)

Two advantages of a significant allocation to domestic investment grade corporate bonds in the asset portfolio supporting the insurance policies are:

- the additional return derived from the credit spreads which will assist the profitability of the company (1 mark).
- the relatively short duration of most corporate bonds compared with government bonds which means that they have limited exposure to interest rate risk (losses derived from falling prices when bond yields rise. This is particularly the case where the bonds are floating rate where the coupon is linked to the yield on very short-term money market instruments (1 mark).

Disadvantages may include two of the following:

- the default risk on corporate bonds which may not be fully compensated for by the additional return from the credit spread; (1 mark)
- credit transition risk (the credit rating may change) which can impact adversely on the credit spread value of the bond (1 mark).
- the risk that liquidity becomes significantly reduced when it is most needed during times when defaults and credit spreads are rising (1 mark).

**Maximum 4 marks for this subpart Q2 c) Candidates need to explain two advantages and two disadvantages to obtain full 4 marks.**

Two restrictions that could be placed on the portfolio of corporate bonds to assist in the management of risk are:

- placing a maximum percentage on the allocation to corporate bonds within the asset portfolio
- placing a maximum percentage on the allocation to corporate bonds within the





asset portfolio which are issued in foreign currency

- setting a minimum average credit rating for the portfolio that is above the level needed for investment grade
- setting a minimum credit spread for bonds purchased by or held in the portfolio
- placing a maximum limit on bonds issued by any single issuer (borrower)
- placing a maximum limit on corporate bonds issued by companies in certain industry sectors that may be expected to be under economic stress
- limiting investment to bond issues that meet minimum size requirements, to reduce the impact of illiquidity when trading in secondary markets

*(1.0 mark for any of the above, maximum of 2 marks for this subpart Q2 c) ii)*

**Maximum 6 marks for this question**

- d) Prepare a set of notes for the board of the insurance company on the factors that may affect the returns on a portfolio of corporate bonds in the next year. (6 marks)

**Command verb: Prepare (Level 6 – Create): Make or get ready for use with a specific intention)**

The returns on a portfolio of corporate bonds over the next year will be affected by:

- the shape and the level of the government bond yield curve and how it moves over the next year; and (1 mark)
- shifts in the credit spreads between corporate bonds and government bonds of similar maturities over the next year (1 mark).

These in turn will be affected by a range of economic and political factors which comprise the following:

- continued high rates of inflation in excess of those experienced over most of the last 15 years, which may lead to a rise in yields for government and corporate bonds; (1 mark)
- the risk of central banks continuing to tighten or at least not loosen their monetary policies until a recession is well underway, leading to an increased risk of default by corporate bond issuers, more downgrades in credit ratings of issuers by rating agencies and an increase in credit spreads as bond market participants seek greater compensation from yield for greater perceived risk of capital loss (1 mark).



- continued disruptions to the economic growth and reopening in many countries due to persistent and changing COVID (0.5 mark).
- the risk of recession in the United States, Europe and elsewhere globally leading to higher defaults and credit spreads (0.5 mark).
- political factors such as:
  - continuation of the war in Ukraine which will continue to disrupt major commodities in energy and food and contribute to a level of inflation that is higher than it would otherwise be (1 mark).
  - the risk of a U.S. Treasury default on payments on its bonds as a result of the debt ceiling legislated by Congress not being increased in time to forestall such an event (1 mark).

*Maximum 6 marks for Q2 part d)*

### END OF QUESTION 2: MARKING GUIDE



### QUESTION 3: MARKING GUIDE

(17 marks)

#### Question

A global equity fund which is managed by an active equity fund management firm whose portfolio managers believe that equity market inefficiencies can be exploited. The fund has the investment objective of achieving a total return after fees of at least 3% p.a. above the fund's benchmark, the MSCI World Index with Net Dividends Reinvested, in USD, over rolling five-year periods whilst avoiding significant underperformance in any single year.

- a) Explain the main assumptions upon which two major theories of equity investment market behaviour depend. **(4 marks)**
- b) Describe the equity risk premium. **(2 marks)**
- c) Explain why the equity risk premium exists and how it may vary over time **(5 marks)**
- d) Propose examples of statements, for inclusion in an investment policy for the fund, that are appropriate to its investment objective, covering the following:

the investment philosophy of the active investment management firm: **(2 marks)** and  
four examples of portfolio risk management limits that improve the probability of meeting the investment objective **(4 marks)**

**(Total of 6 marks for q 3, part d )**



### Commentary

Question	Syllabus Learning Objective	Reference in Course Notes	Total Marks	SA	A	H
3	3.1, 3.2, 5.1, 6.3, 6.5		17	2	9	6
A	5.1	M9	4		4	
B	3.1, 3.2	M9	3	2		
C	3.2	M9	4		5	
D	6.3, 6.5	M9	6			6

### Sample Solution

- a) Explain the main assumptions upon which two major theories of equity investment market behaviour depend. (4 marks).

*Command verb: Explain (Level 4 – Analyse) Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey ‘why’ or ‘how’ or ‘so what’. A connection is expected between the item(s) and something else.)*

(Note to markers: there are potentially three main theories of which two should be selected for the explanation of their key assumptions.)

The main assumption of technical analysis is that patterns in price and volume within an investment market can be perceived, analysed, and used to forecast future prices in the market (1 mark). This means that all possible information available is incorporated into past market prices, there is no other relevant information, and that history is a guide to the future (1 mark).

The main assumptions of fundamental analysis are that:

- the intrinsic or true value of a security can be calculated by the analysis of financial and accounting information published by companies, along with other public information that the analysts can collect (0.5 mark).
- the market will eventually recognise the intrinsic value and the market price will converge to the intrinsic value over time, leading to excess returns (0.5 mark).
- markets are not perfectly efficient (0.5 mark), and that some information is not available to (or not used by) all market participants (0.5 mark).
- the users of fundamental analysis can beat the market by earning excess returns from investment decisions that are made earlier than other market participants (0.5 mark).



The main assumptions of Modern Portfolio Theory (MPT) are:

1. there are sufficient investors who are rational maximisers of the expected utility of wealth to make the investment market for an asset rational (1 mark).
2. all information is rapidly incorporated into prices so that the market is efficient (the Efficient Market Hypothesis or EMH) (1 mark).

b) Describe the equity risk premium. (2 marks)

**Command verb: Describe (Level 2 – Understand): Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.**

The equity risk premium is the observed difference (usually an excess) between the total return (capital gain and income reinvested) on equities and the total return of either fixed interest or cash over a defined period (1 mark).

The equity risk premium is the reward for the additional risk of investing in equities instead of fixed interest or cash. (1 mark)

c) Explain why the equity risk premium exists and how it may vary over time (5 marks)

**Command verb: Explain (Level 4 – Analyse) Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey 'why' or 'how' or 'so what'. A connection is expected between the item(s) and something else.)**

The equity risk premium exists because investors require higher returns to take on the additional risks compared with risk-free securities (1 mark). Given the existence of additional risks, rational, risk-averse investors would not invest in equities if the expected return did not exceed that of risk-free assets (1 mark).

An explanation for the observed equity premium is that it reflects the difference in the level of risk associated with equities, such as the variability of income and capital gain, compared with the more stable income and capital of fixed interest or cash (money market securities) (1 mark). The assumption is that more volatile equity securities require higher returns to attract investors (1 mark). It is assumed that a market dominated by rational risk-averse investors will price equities such that the return exceeds the 'risk-free' rate by a risk margin sufficient to compensate them for the risk taken (1 mark).



It has been observed that investors are more concerned by losses than they are pleased with gains of an equivalent size (0.5 mark). Since equity prices are typically more volatile than bond prices in the short run, this may dissuade investors from buying equities unless the return premium is sufficiently high to compensate for this loss aversion (1 mark). The substantial equity premia observed in the data across the world are so high because they take into account this aversion to short-term losses (1 mark).

When measured over very long periods, there is substantial evidence that the equity risk premium is significant and persistent (1 mark). For example, it has been estimated (Mehta 2008) that over the preceding 116 years, the average return on US equities has been approximately 7.67% per annum, while the return on Treasury bills has been only 1.31% per annum — implying an equity premium of 6.36% per annum, with similar patterns observed in other countries around the world (0.5 mark for quoting this from the Module).

The size of the equity risk premium has been observed to vary significantly over time (0.5 mark), particularly over shorter periods such as 5 years or 10 years as indicated in the Barclays Equity Gilt study (0.5 mark).

The equity risk premium can vary over time to reflect:

- The economic cycle: This is because movements in the economy generally will be reflected in the valuation and growth of companies within the economy (1 mark).
- Investors' confidence level: The additional premium required may change as the investors' expectations and confidence in particular equities, or in the asset class in general change to reflect changed views of their risk and return profiles (1 mark).
- Perceived risk levels: If investors perceive equities as higher risk, their perceptions may change over time due to company performance or performance of similar companies, so that the required equity risk premium may change (1 mark).

**d) Propose examples of statements, for inclusion in an investment policy for the fund, that are appropriate to its investment objective, covering the following:**

- **the investment philosophy of the active investment management firm: (2 marks) and**
- **four examples of portfolio risk management limits that improve the probability of meeting the investment objective (4 marks)**

**(Total of 6 marks for q 3 part d )**



**Command verb: Propose (Level 6 – Create): Select and communicate a solution, action, or range of possible solutions/actions. Rationale, reasons, or justification must be included.**

- a clearly stated investment philosophy such as “we believe that using active stock selection and fundamental analysis it is possible to identify and invest in a portfolio equity securities that will, more often than not, substantially outperform the chosen benchmark index ( MSCI World Index with Net Dividends Reinvested, in USD) over most rolling five year periods, via a process of buying them at a discount to their intrinsic or true value which eventually the market will recognise by bidding up the price.” **(2 marks for a statement of an investment philosophy that is similarly clear, complete, and concise)**
- portfolio risk management limits that improve the probability of achieving the stated objective, such as:
  - Minimum number of stocks to achieve adequate diversification while allowing scope for the outperformance of the benchmark index by 3% p.a.: e.g. 50 stocks
  - Maximum holding in any single stock: e.g. 8% of the portfolio or 3% above the stock's weight in the benchmark index, whichever is less;
  - Maximum holding in any single industry (GICS) sector: e.g. 25% of the portfolio or 10% above the sector's weight in the benchmark index, whichever is less
  - Minimum number of industry (GICS) sectors in the portfolio to avoid over-concentration in too few sectors: e.g. minimum 5 GICS sectors
  - Maximum cash: e.g., 5% of the portfolio
  - The maximum ex-post tracking error of 4 % pa over any rolling three-year period
  - An upper limit on the portfolio turnover of 25% p.a. to limit the effect of transaction costs on the return to investors

**(1 mark for each statement up to a maximum of 4)**

**Maximum 6 marks for q 3 part d**

### END OF QUESTION 3: MARKING GUIDE



### QUESTION 4: MARKING GUIDE

(19 marks)

#### Question

Some investment practitioners have claimed that equities and property/real estate have return characteristics that provide a hedge against inflation.

- a) Explain how you would investigate the claim that equities provide a hedge against inflation. (4 marks)
- b) Explain how inflation can be allowed for in a discounted cash flow valuation method used to value individual listed equity securities. (5 marks)
- c) Describe six factors that need to be taken into account in a discounted cash flow valuation of a commercial office property, indicating whether or not they may be affected by inflation or uncertainty in the rate of inflation. (6 marks)
- d) Analyse four factors which are likely to affect the rate of inflation. (4 marks)

#### Commentary

Question	Syllabus Learning Objective	Reference in Course Notes	Total Marks	SA	A	H
4	2.4, 4.1, 4.3, 3.2,		19	6	13	0
A	3.1, 3.2, 3.4	M6, M10	4		4	
B	3.3	M6	5		5	
C	2.1,2.3,2.5	M3	6	6		
D	2.1	M3, M10	4		4	

#### Sample Solution

- a) Explain how you would investigate the claim that equities provide a hedge against inflation. (4 marks)

*Command verb: Explain (Level 4 – Analyse) Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey ‘why’ or ‘how’ or ‘so what’. A connection is expected between the item(s) and something else.)*





Use historical data (monthly or annual) on equity returns and inflation rates to estimate the correlation between them for various periods and whether there is some degree of linear or other relationship between equity returns and inflation rates (1 mark).

The period for the data would need to be long enough to cover economic cycles of high and low inflation. For example, the 10 years to 2022 had low inflation and so would be a poor indicator (1 mark).

Note the degree of stability in the correlation coefficients and also periods when they have shifted (1 mark).

Identify historical events which may be associated with shifts in the correlation (such as the oil shocks of the 1970s, the 2009 global financial crisis, or the 2020 COVID recession and recovery (1 mark).

Try to describe a cause-and-effect relationship between inflation and other quantities such as (i) corporate revenues and profits, (ii) earnings per share, (iii) bond yields (iv) price-earnings ratio (1 mark).

Make a judgment about whether the historical events coincide with shifts in correlations and if there is any likely causal relationship (1 mark).

**Maximum 4 marks**

- b) Explain how inflation can be allowed for in a discounted cash flow valuation method used to value individual listed equity securities (5 marks)

**Command verb: Explain (Level 4 – Analyse)** Give an account of something with the goal of clarifying it to someone or making something easier to understand. Calls for even more information than describe, showing that you can convey 'why' or 'how' or 'so what'. A connection is expected between the item(s) and something else.)

Discounted cash flow valuations of equity securities require forecasts of revenue and expenses, often broken down into categories (1 mark). The effect of inflation on each category of revenue and expense may be different. Differential rates of inflation need to be allowed for in the DCF valuation (for example the effect of inflation on inputs such as wages, energy supplies, and raw materials such as food products or metals) (1 mark).

There also needs to be a separate assumption made about the effect of very long-term inflation on the terminal growth rates assumed for revenues and expenses (1 mark).



The DCF valuation of free cash flow also requires assumptions to be made about the components of the discount rate such as the cost of debt and equity (1 mark) which may also vary over time (1 mark). Both the cost of debt and equity will be influenced by the rate of inflation (1 mark).

**If the candidate is using a Dividend Discount Model, then the following type of answer could be given:**

Assuming the valuation of the individual listed equity security is valued using a dividend discount model, inflation can be allowed for in the risk adjusted discount rate (1 mark).

The discount rate could be set as the risk free discount rate, plus the expected rate of inflation. This would produce a valuation that allows for inflation (1 mark).

Dividends could be assumed to grow at a rate relative to inflation (1 mark). This assumed growth in dividends will offset the future reduction in purchase power caused by inflation (1 mark).

**If the candidate is using the Gordon Growth Model (a type of Dividend Discount Model), then the following type of answer could be given:**

A discounted cash flow valuation method involves estimating and projecting the future expected cash flows from an equity security and discounting these cash flows back to determine a present value. These cash flows may be the dividends received from the equity and one example model is the Gordon Growth model.

The Gordon Growth model assumes that the value of an equity can be determined as  $V = D / (k - g)$ . Where  $V$  is the value of the equity,  $D$  is the value of the next expected dividend,  $k$  is the constant risk-adjusted discount rate, and  $g$  is the annual dividend growth rate.

Inflation may be allowed for through the annual dividend growth rate (1 mark). If one believes that dividends grow in line with inflation, then  $g$  may simply be set to expected future inflation (1 mark). Other more detailed projections of the dividend growth rate may have separate assumptions about growth in various types of revenue and expenses (0.5 mark) which are each influenced to a greater or lesser extent by inflation (0.5 mark).

Inflation may also be allowed for through the risk-adjusted discount rate so that the valuation is determined based on a real discount rate (1 mark).

**Maximum 5 marks**

- c) Describe six factors that need to be taken into account in a discounted cash flow valuation of a commercial office property, indicating whether or not they may be affected by inflation or uncertainty in the rate of inflation (6 marks)



**Command verb Describe (Level 2 – Understand):** Provide information about specific items, showing that you understand what those items mean. A description is not a list; each item needs supporting information.

The factors that are taken into account in a discounted cash flow valuation of a commercial office property, which may be affected by inflation or uncertainty in the rate of inflation, are:

- Gross rental income of each of the leases to tenants (1 mark) and whether or not the rental rate is explicitly linked to inflation (1 mark).
- Expenses of operating the building such as electricity, water, insurance, security services, cleaning services, all of which may rise in price (1 mark).
- The term of the leases, which will not be affected by inflation (1 mark).
- The level of vacancies in the building which will not be directly affected by inflation (1 mark) but may be indirectly affected if rental rates are increasing rapidly (1 mark).
- The discount rate applied to the cash flows which will be influenced by estimates of future inflation and the degree of uncertainty in inflation (1 mark).

**An alternative way of answering is:**

The six factors are:

1. **Occupancy rates.** Occupancy rates should be considered in a DCF model as they influence the level of rent income that can be expected from a given property. Commercial properties tend to generally have relatively long occupancy contracts (5-10 years); therefore, inflation may not be a large driver of occupancy rates in a shorter term. In the longer term, persistent high inflation may mean lower affordability of such real estate and therefore lower occupancy rates (1 mark).
2. **Rental income.** Rental income assumptions (such as \$ per sq.m. of occupied commercial real estate) should be considered to derive the revenues associated with rents. Commercial lease agreements often have rents indexed to inflation, therefore the inflation rate may not significantly affect the valuation. However, if there is no such clause inflation will have a detrimental impact on valuation (1 mark).
3. **Costs associated with the property.** Costs should be projected together with revenue to calculate the net rental income of the property. Costs may rise with inflation therefore inflation may have an impact on this factor (1 mark).
4. **Discount rate.** The discount rate should be the required return of the investor to compensate for risks of investing in the property. It is usually set in nominal rather than real terms. Nominal discount rates are impacted inflation rate as higher inflation rates will lead to higher nominal required returns (assuming the real rate of expected return is unchanged) (1 mark).



5. **Tax.** Income earned by the real estate is usually taxable therefore tax rates should be considered in the DCF model. Tax rates are unlikely to change due to change in inflation rates, therefore they are generally not affected by inflation (1 mark).
6. **Appreciation in real estate value.** Commercial property's tends to change over time as demography, urban planning, specific property features and aggregate demand changes. Therefore, increase (or decrease) in property value over time should be considered in the valuation. This can be incorporated as the terminal value. It is often that real estate value increases are correlated with inflation; however, the relationship between the two may not be clear for a specific property (1 mark).

*Candidates may use distinct points from either of the above lists.*

*1 mark for each substantive point made with a maximum of 6 marks.*

- d) Analyse four factors which are likely to affect the rate of inflation. (4 marks)

**Command verb: Analyse (Level 4 – Analyse): Separate information into components and identify their characteristics.**

Factors that are likely to affect the rate of inflation are:

Monetary policy such as interest rates or quantitative easing (or tightening) which will influence consumer spending, business investment and unemployment, slower wage growth and lower inflation (1 mark).

Fiscal policy which will directly influence the demand for goods and services through government spending and taxation (1 mark).

The level of unemployment which will affect the rate of increase in wages, a major component of the costs of many businesses (1 mark).

Unexpected disruptions to the supply of goods (such as energy and food) and services, due to factors such as COVID or war (1 mark).

Expectations of the rate of inflation by consumers and businesses (1 mark).

*1 mark for each factor with a maximum of 4 marks*

**END OF QUESTION 4: MARKING GUIDE**

**END OF MARKING GUIDE**