Group Assignment: Balancing Risk and Return for Equity Fund

Objective

To design and analyze a robo advisor portfolio optimization model using 50 ACE market stocks from Bursa Malaysia. Students will apply quantitative methods to construct both a minimum-volatility portfolio and an optimal return portfolio under a risk cap, evaluate performance using return, volatility, Sharpe ratio, and Value-at-Risk, and interpret the financial implications of algorithmic asset allocation within the Malaysian equity context.

Mandate

An institutional client has sent a query regarding the proposed development of an equity portfolio composed of the potential stocks listed in the ACE market. Nonetheless, they have outlined a few requirements to be observed by your team:

i. The selected stock must record at least 0.25% average daily return for the past five (5) years.

ii. The FBMKLCI is used as the benchmark index.

iii. Malaysia 10-Year Government Bond yield.

iv. Sharpe ratio must be not less than 2.0.

v. Daily Value-at-Risk (VaR) must be capped at -1.5% maximum.

vi. A scenario analysis of the performance summary based on the annual volatility capped at 5%, 10% and 20%

vii. A scenario analysis of the performance summary based on the maximum component weights of 10%, 20% and 30%.

viii. A final recommendation of the best equity portfolio.

Your team must present a comprehensive portfolio analysis that complies with the mandate, compares scenario outcomes, and concludes with a justified recommendation of the optimal equity portfolio configuration. The final deliverable must include a written report with a data summary, methodology, results, and interpretation.

Required:

Using the constrained Mean-Variance Optimization (MVO), your group must:

1. Identify 50 ACE Market stocks from Bursa Malaysia.
2. Prepare a clean price dataset of:
    - the daily closing prices for the 50 selected ACE Market stocks,
    - the FBMKLCI as the benchmark,
    - and the Malaysia 10-Year Government Bond yield.

    The dataset must cover at least six (6) years of historical daily data.
3. Arrange and organise the data chronologically to ensure a consistent time series for all assets.
4. Integrate the provided Python script into your analysis environment and explain the purpose of each function in financial terms.
5. Formulate the portfolio scenarios by altering parameters such as the volatility cap and per-asset cap.
6. Compare and balance the outcomes for return, volatility, Sharpe ratio, and Value-at-Risk across the three scenarios.
7. Combine findings to synthesise insights on diversification, portfolio efficiency, and the effect of constraints.
8. Relate the optimised portfolios to market conditions and generalise their implications for Robo-Advisory investment strategies.
9. Defend your interpretations with sound financial reasoning supported by quantitative evidence.
10. Organise all outputs, tables, and figures clearly within a structured group report.
11. Complete the submission by ensuring that the report adheres to academic formatting and referencing standards.

Submission requirements

1. **Report Structure and Formatting**
   a) **Organise** the final report with a professional layout and consistent formatting.
   b) Use clearly **labelled tables, figures, and sections**.
   c) Apply **APA 7th edition citation style** for all references.
   d) The report must include:
      - **Python code** (clean and clearly labelled for each section)
      - **Raw and cleaned datasets** used in the analysis
      - **Graphs and charts**, where relevant (e.g., Sharpe ratio comparison, risk–return plots, allocation visuals)
      - **Summary reflections** interpreting each model output
2. **Final Group Report**
   a) Length: approximately **2,000 words (±10%)**
   b) Limit: **Maximum 10 pages**, excluding the table of contents, abstract, list of figures, references, and appendices
   c) Format: **PDF (.pdf)**
3. **Python Code Files**
   a) Submit the full **.ipynb notebook(s)** used in the analysis.
   b) Ensure that code sections are **labelled consistently** with the corresponding report sections.
4. **Datasets**
   a) Submit both the **raw dataset** and the **cleaned dataset** in **.csv** or **.xlsx** format.
   b) Datasets must include the **40 ACE Market stocks**, **FBMKLCI benchmark**, and **Malaysia 10-Year Government Bond Yield** covering at least **six years of daily data**.
5. **Referencing**
   - Cite a **minimum of five credible academic or professional sources** using **APA 7th edition** formatting.
6. **Cover Page Details**
   - Include **student names, ID numbers, group ID, module code, and title** on the cover page.

Important Notes

1. All portfolio analysis and interpretation must be based on your **own selected dataset and simulation outputs**. Using or copying interpretations from reference examples or any external content without proper citation will result in mark deductions.
2. Your written discussion must be **clear, well-reasoned, and supported by your group's actual results**. Avoid generic commentary that does not align with your outputs.
3. Your submission must include all **calculations, portfolio weights, performance metrics, and relevant evidence** to support your analysis.
4. Maintain a **professional yet readable tone**. Write as if you are explaining your findings to an informed investor or decision-maker.
5. A **similarity index above 20%** (as flagged by Turnitin or any institutional plagiarism detection system) will result in a **minimum penalty of 10% deduction** from the total marks, subject to further review.
6. Submissions with **AI content scores exceeding 20%** will also be flagged. If content appears to lack genuine student analysis or critical thinking, additional marks may be deducted at the discretion of the module lecturer.

[Grand Total: 100 marks]

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Section	Marks	Band 5 Excellent	Band 4 Strong	Band 3 Competent	Band 2 Limited	Band 1 Deficient
A. Introduction & Mandate Interpretation	**10**	Demonstrates full comprehension of client brief and portfolio objective; clearly contextualises ACE Market selection, benchmark, and risk-free rate; sets a coherent analytical direction.	Interprets mandate accurately with some lack of depth or conciseness.	Describes mandate but lacks precision or connection to portfolio goals.	Limited awareness of client objectives or weak linkage to methodology.	Misinterprets mandate or omits key parameters.
B. Data Integrity & Coding Implementation	**20**	Six-year dataset complete (40 ACE stocks, FBMKLCI, 10-year MGS); data cleaning fully transparent; Python code modular, annotated, reproducible; outputs consistent with financial logic.	Minor data or code inconsistencies; good structure and reproducibility.	Adequate dataset; basic code without full labeling or traceability.	Incomplete dataset or inconsistent output; weak annotation.	Data invalid or code non-functional.
C. Analytical Modelling & Quantitative Rigor	**30**	Executes full scenario analysis across volatility (5%, 10%, 20%) and weight (10%, 20%, 30%) caps; computes returns, volatilities, Sharpe ratios, and VaR precisely; interprets results through risk–return optimization logic; identifies feasible frontier portfolios.	All scenarios attempted; correct calculations with partial financial interpretation.	Some scenarios missing or superficial interpretation; metrics mostly correct.	Limited or inconsistent analysis; errors in calculations or logic.	No valid computation or conceptual error throughout.
D. Financial Insight & Theoretical Application	**30**	Demonstrates deep understanding of portfolio theory, diversification, and constraint effects; synthesises quantitative findings into robust financial arguments; provides a justified, risk-aware final recommendation.	Sound understanding; good reasoning though lacking synthesis or nuance.	Basic theoretical grounding; interpretation somewhat mechanical.	Weak conceptual application; unclear reasoning or unsupported recommendation.	No theoretical linkage; analysis disconnected from finance principles.
E. Report Structure, Visualisation & Referencing	**10**	Professional presentation; coherent flow; visuals enhance analysis (Sharpe, VaR, allocation); precise APA 7 citations with ≥ 5 credible sources; language clear and academic.	Well-formatted with minor citation or structural issues.	Adequate layout; limited visuals or inconsistent referencing.	Disorganised, poor clarity, few sources.	Non-compliant formatting or missing references.
Total	**100**					

END OF QUESTION PAPER