

Business Modelling and Analysis (FIN60003) Assignment

Semester 2, 2023

Objectives

In this assignment, you are expected to develop a business report that will be presented to a senior manager of investment management company. The report should be informative but concise and follows a specific structure that allows the document to be easily read and understood. For this purpose, please ensure that you have studied supplementary material about the academic report writing, available under Assignment Resources of Lecture 6 before you start your assignment. This assignment is worth 40% (35% + 5% video presentation) of your final mark. Students are expected to deliver a face-to-face presentation. Without the face-to-face presentation no mark will be allocated to either assignment or presentation.

This assignment provides students with the opportunity to:

- combine statistical analysis and report writing skills to prepare a concise, non-technical business report,
- Collect relevant data to complete statistical analysis,
- develop and enhance computing skills, specifically the use of the built-in functions in Microsoft Excel, Microsoft Power BI, and Python,
- apply statistical techniques to a data set, and
- reinforce taught concepts including descriptive statistics, sampling, and estimation, hypothesis testing, correlation, and regression.

Background

Margaret is the CFO of a private investment firm in Melbourne. She is currently seeking a recent business graduate with expertise in statistics. Margaret was informed by the convenor of FIN60003 that you have studied statistics this semester. Consequently, she has reached out to you with a request to conduct statistical analyses on the daily returns of stocks listed on the Australian Securities Exchange (ASX). You have been provided with four stocks from two different industries under the assumption that these sample stocks are representative of their respective industries.

Presentation of a business report

You have been requested to prepare an analysis report. Since Margaret is not very familiar with statistical terms, try to not just quote statistics or analysis results, but explain what they mean. In general, do not include formulae, calculations, definitions of statistical terms, or discussions on how graphs are constructed in the report. Where appropriate, these may be included in the appendices. Follow the APA referencing style (available on Assignment Resources of Lecture 6) for all in-text references, reference lists, and bibliographies.

The values that have been calculated must be correctly analysed, discussed, and interpreted. A written description of the main features of the tables and graphs should be presented. The emphasis will be on the computation of statistics and construction of graphs, as well as on the

interpretation of the analysis. The assessment should be in one single Microsoft Word compatible document and should be written in 12-point font. It is expected that all work submitted, will have been edited for spelling, grammar, and clarity.

Tasks

A. Section I

A.1. You will receive a sample of four stocks from two different industries.

Your sample includes:

Industry 1	Industry 2
Stock 1	Stock 1
Stock 2	Stock 2

Each student will have a unique set of samples. For example:

Industry 1: Basic material	Industry 2: Healthcare
Stock 1: BHP	Stock 1: CSL
Stock 2: RIO	Stock 2: RHC

In the second stage, you need to visit the Yahoo Finance website (<https://au.finance.yahoo.com/>) and download daily price data for your selected four companies in two selected industries.

To do so, in the Quote lookup, search for your company stock symbol. The Australian companies are identified by **.AX**.

Next, you need to go to the historical data ribbon.

Adjust the period to 01/01/2023 to 31/3/2023 and the data frequency to daily and download

data. You only need to keep and use Adj.close (price) values from this dataset. Calculated the daily return using the below formula:

Return on day $i = 100 * (\text{adj close on day } i - \text{adj close on day } i-1) / \text{adj close on day } i$

Summary	Chart	Statistics	Historical data	Profile	Financials	Analysis	Options	Holders	Sustainability
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Time period: 01 Jan 2023 - 31 Mar 2023

Show: Historical prices

Frequency: Daily

Apply

Currency in AUD [Download](#)

Date	Open	High	Low	Close*	Adj. close**	Volume
31 Mar 2023	98.35	98.78	97.91	98.32	96.04	2,549,472
30 Mar 2023	97.56	97.95	97.01	97.75	95.48	2,611,402
29 Mar 2023	95.31	96.34	94.85	96.34	94.11	2,120,814
28 Mar 2023	95.60	96.58	95.50	96.06	93.83	1,915,223

A.2. Descriptive Statistics - Use Power BI and Excel for this task

Use Power BI or Excel to develop an appropriate graph. Use Excel to develop summary statistics based on the type of variable.

Tabular Techniques: e.g. Frequency tables or Grouped (joint) frequency tables.

Graphical Techniques: e.g. Pie chart, Line chart, Bar graph, or Histogram (avoid three-dimensional graphs).

Summary Statistics: e.g. Mode, Median, Mean, Standard Deviation, Range, Coefficient of Variation, and Interquartile Range (you do not have to report all of these summary statistics. Choose the most appropriate measures based on your judgment).

You will need to choose the most appropriate technique(s) for the analysis of each variable. Less appropriate/inappropriate techniques will receive fewer/no marks.

Dashboard – Use Power BI to develop a one-page dashboard, which provides all relevant graphs. The dashboard needs to be presented as a summary for Section I.

B. Section II

B. 1. Confidence intervals - Use Excel for this task

Estimate the following quantities using 95% confidence intervals. Explain the meaning of your confidence intervals.

- i. For daily returns of stocks in Industry 1.
- ii. For daily returns of stocks in Industry 2.

A. 2. Hypothesis Testing - Use Python and Excel for this task

Carry out the following hypothesis tests for the variables that you have chosen.

- i. It has been argued that Industry 1 has higher average daily returns than Industry 2. Conduct a hypothesis test between Stock 1 from Industry 1 and Stock 1 from Industry 2. **Use Excel for this test.**
- ii. It has been argued that in Industry 2, Stock 1 provides higher average daily returns than Stock 2. Conduct a hypothesis test between the daily returns of Stock 1 and Stock 2 in Industry 2. **Use Python for this test.**
- iii. It has been argued that there is no relationship between the daily returns of stocks in Industry 1. Conduct a hypothesis test between the daily returns of Stock 1 and Stock 2 from Industry 1. **Use Python for this test.**

Only present the main elements of your analysis and your important findings in the main section of the report. **The computations, Excel outputs, and Python Codes should be placed in the appendix.**

B. 3. Regression - Use Python and Excel for this task

Conduct regression analyses on the following variables:

- Daily return in Stock 1 and Stock 2 in Industry 1. **Use Excel for this analysis.**
- Daily return in Stock 1 and Stock 2 in Industry 2. **Use Python for this analysis.**

Use Stock 1 as the dependent variable.

Provide two regression models and make sure to provide full discussions on each test. Your discussions for each test should include:

- a scattergram and full interpretation
- an estimate of the linear regression model
- the coefficients of correlation and determination
- a test of the hypothesis that there is no linear relationship between dependent and independent variables.

Assignment structure:

Presentation

Presentation is an important feature of a business report. The structure of your presentation should include an Executive summary, Introduction, Analysis, and Appendices (please follow the instructions given in the Assignment Resources of Lecture 6). Your assignment should contain the following sections:

Executive summary

This is your first page and is **not** to be **included in the page count**. The executive summary should be a combined form of Introduction and Conclusions.

- Report only the highlights of the findings
- Entice an Executive to read on
- Essentially a lively summary of the main conclusions
- No longer than one page since not counted in the page count, must be on a separate page from the rest of the report.

Introduction (about half a page)

This should contain information about what we expect to read in the project.

- State the purpose of the report, e.g. what you will discuss in the report
- Briefly introduce the companies and their products
- Outline the contents of the report
- Provide a brief description of the methodology
- Describe the source of the data and state its location in the report.

Analysis

This section contains a thorough yet non-technical description of all the findings. It details the results that were highlighted in the Executive Summary. No calculation is required here but appropriate graphs and tables which are needed to support your discussions should be included. Your analysis section should contain the following divisions:

- DESCRIPTIVE STATISTICS (about three pages)

You need to provide an appropriate graph, a summary statistics table, and descriptions. You need to put the descriptive statistics table produced by Excel in the appendix and only report selected values that you want to discuss in a smaller table in the body of the report. Take one variable at a time.

- CONFIDENCE INTERVAL (about half a page)

“We are 95% confident that.....”

Do not show the method of calculating a confidence interval (calculation details should be reported in appendices). Do not draw a graph. Report the sample data used for the analysis of this section in the appendix.

- HYPOTHESIS TESTING (about one page)

Do not write H_0 , H_A , etc. Only your result such as “hypothesis test was performed on.....” Also report the type of hypothesis (i.e., upper, lower, two-tail), the test statistic, p -value, t -value, and degrees of freedom. Report the sample data used for these analyses in the appendix.

- CORRELATION and REGRESSION (about two pages)

Present your scatter plots with a line of best fit included in the graphs. Specify the dependent and independent variables and describe the strength of relationships using R and R squared values. A full linear regression model should be stated on both graphs and in the discussion.

Interpret the slope and intercept coefficients and hypothesis test results (t -value, p -value, etc.). Report the sample data used for these analyses in the appendix.

Conclusion and limitations (about one page)

All the important findings and results of your work should be presented here in a concise format. Make sure not to present tables or graphs here. In this section, you need to present:

- The conclusion of your analysis of all sections. It is essentially an expansion of the Executive Summary.
- Limitations of your analysis. In this section, you need to critically evaluate the method and data used in this analysis. What are the potential shortcomings of your conclusions?
- This section ends with a discussion on the ethical implications of statistical methods. What are the ethical elements that needed to be considered when reporting the results of statistical analysis? You need to consult the literature for this section.

Reference list

Follow the APA for all in-text references, reference lists, and bibliographies (reference lists and appendices are not included in the page count). For more information, please visit the [Swinburne library website](#).

Appendices

- Must be numbered and referred to in the main body of the report.
- Must contain your selection of random numbers and related random data and any additional calculations and computer outputs for each section.

- Also include your analysis work (both Excel and Python) for descriptive statistics, confidence interval, hypothesis testing, and regression.

Graphs must be presented in the main body along with relevant tables and discussions. Those Graphs that are only presented in the appendices will not be marked. Only include relevant outputs in the report and place the remaining in the appendices. However, try to keep the appendices to a moderate size. Remember that examination is entirely based on the report itself and any outputs that appeared in appendices are only to confirm your calculations.

Indications given above about the page lengths are only a guideline. You will not be penalised for changing these, as long as you remain within the 10-pages limit.

Marks and submission instructions

This assignment contributes 35% to the final assessment.

- Students must work independently on this assignment and submit only their own work. They are expected to submit genuine attempts at the assignment.
The penalties for plagiarism can be severe ranging from a zero grade for an assessment task to expulsion from the unit and in the extreme, exclusion from Swinburne.
- This assignment must include your ID number, family name, given name, tutorial day and time, and your lecturer's name.
- Marks will be awarded for presentation. Assignments must be word-processed and include page numbers. All relevant Excel, Python, and Power BI outputs referred to but not included in the report itself, are to be placed in an appendix.
- Assignment maximum lengths: 10 pages, Executive Summary, and Appendices. Executive Summary, Reference List, and Appendices are **not** included in the page count.
- Each student must keep a copy of their assignments for their records.
- Students are required to submit their assignments **electronically** through Turnitin. Students are allowed to submit **only one document** (including the appendices). You will have one chance to submit the assignment, so ensure that you are submitting the final version of your assignment on Turnitin. Turnitin provides a matching service that will compare final submissions with a range of databases, including comparisons with other assignments, to avoid plagiarism.

- ***Due date:*** Week 12.
- The submission times are recorded on Turnitin and the penalty for late submission of assignments is **20%** of awardable marks per day overdue.

Students are expected to deliver a face-to-face presentation to their lecturer before submitting their assignments. Without the face-to-face presentation no mark will be allocated to either assignment or presentation.