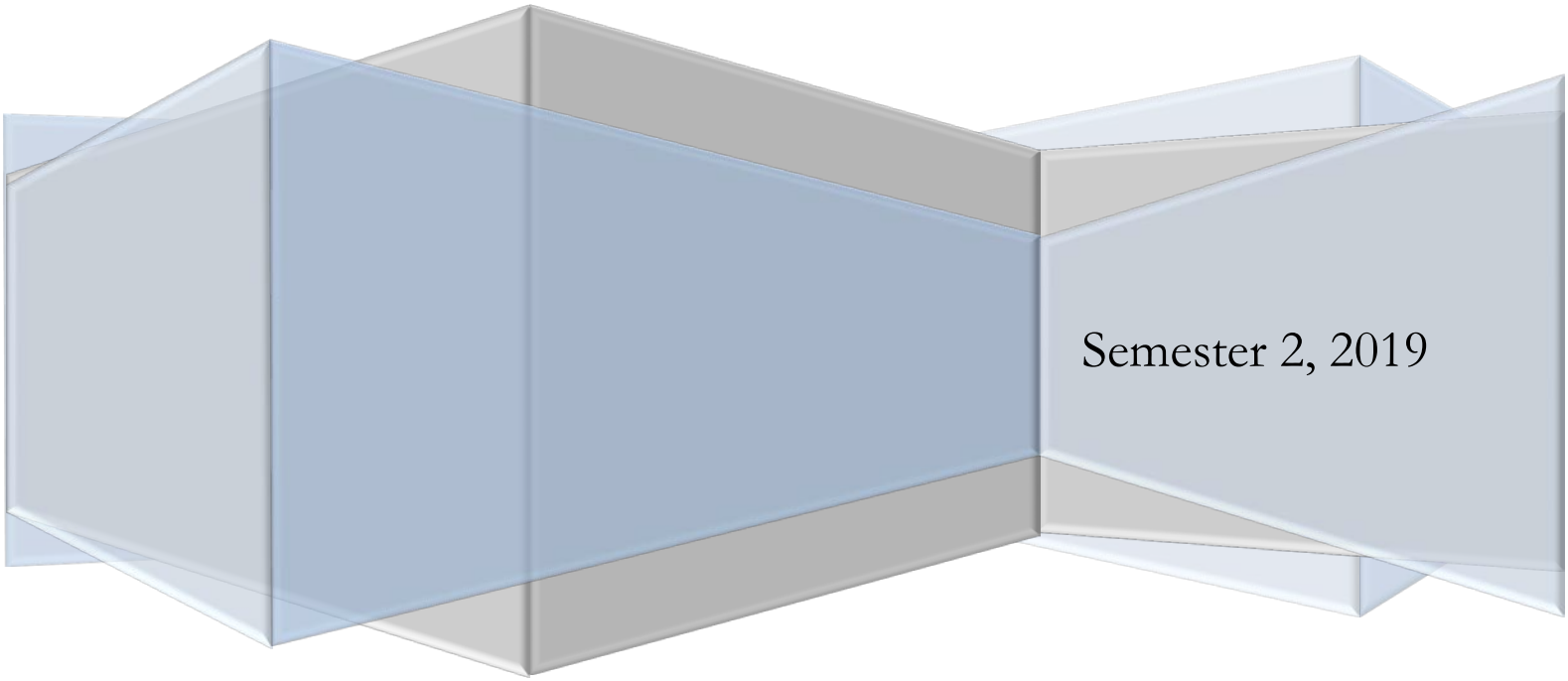
SWINBURNE UNIVERSITY OF TECHNOLOGY

Business Modelling and Analysis (FIN60003) Assignment



Semester 2, 2019

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Objectives

In this assignment you are expected to develop a business report that will be presented to a senior manager of a private investment firm. 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 on e-tivity 5.4 before you start your assignment. This assignment is worth 20% of your final mark.

This assignment provides students with opportunity to:

- combine statistical analysis and report writing skills to prepare a concise, non-technical business report,
- draw a random sample to complete statistical analysis,
- develop and enhance computing skills, specifically the use of the built-in functions in MS Excel and MS Word,
- 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 has recently watched an interview with Professor Eugene F. Fama, an economic Nobel Prize winner about the portfolio management and Fama and French asset pricing models (please watch the video posted on e-tivity 7.5, *In Pursuit of the Perfect Portfolio: Eugene F. Fama).* After the interview, Margaret decided to further study the applications of the *Fama and French Three Factor Model* across several countries.

For that purpose, Margaret asked Jason, a newly appointed analyst, to perform the analysis. Margaret collected a set of data from different sources (available on e-tivitiy 7.5), passed it to Jason and asked him to conduct several analyses listed below. There are seven (7) variables in total, out of them five (5) are related the MSCI World Index, which captures the performance of large and mid-cap stocks across a number of global stock markets, and Fama and French World Index three factor model. The other two (2) variables are related to the equity market index performance and real exchange rates of 29 countries. The sample data set includes weekly data and covers the period 1996 to 2019. Definitions of variables are provided below:

- The MSCI World Index: captures net returns of large and mid-capitalization stocks across 23 Developed Markets - Source: DataStream
- Equity Market Index: the MSCI Country Market Index that captures net returns of large and mid-capitalization stocks in a country - Source: DataStream
- $R_M - R_f$: the excess return on the market portfolio (index) - Source: Fama & French - Data Library

- SMB: the size premium (small minus big), is risk factor proxy that captures the higher systematic risk between a portfolio of small-capitalization stocks and portfolio of large-capitalization stocks - Source: Fama & French - Data Library
- HML: the value premium (high minus low), is risk factor proxy capturing the systematic risk between a portfolio of high book-to-market ratio and low book-to-market ratio - Source: Fama & French - Data Library
- RER: Real Exchange Rate - Source: Bank for International Settlement
- R_f: Risk Free Rate of Return - Source: Fama & French - Data Library

Please visit this link to learn more about Fama & French three-factor model: https://corporatefinanceinstitute.com/resources/knowledge/finance/fama-french-three-factor-model/

Presentation of a business report

You are going to help Jason in developing a report that addresses Margaret's concerns. 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 Harvard Style Guide (available on e-tivity 5.4) for all in text references, reference lists and bibliographies.

It is important that the values that have been calculated are correctly analysed, discussed and interpreted. The 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 interpretation of 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

Most of your statistical calculations should be carried out using Excel only and you will use Microsoft Word and Excel to complete this assignment.

1. Select a Random Sample

Select a random sample of five (5) years (almost 260 weeks) from the World Market data (including MSCI World Index and Fama & French 3 Factors) and one particular country level data (including Market Return and RER). It means that you need to choose **only one** of the 29 country-level data in addition to the World Market and Fama & French 3 Factors data. As a result, each student will have a different sample that includes **a total of seven (7) variables**. You will use this ***sample data*** to complete tasks 2 to 5.

2. Descriptive Statistics

Use appropriate data summary methods to describe the variables in your sample. For each of the variables, you need to have a graph and a table and descriptions for both. Use an appropriate graphical and/or summary statistical technique based on the type of variable. These techniques include:

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

Graphical Techniques: e.g. Pie chart, Bar graph, 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 personal judgement).

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

For a nominal or an ordinal (discrete) variable, draw a graph **and** present a frequency table in percentages.

For a ratio or an interval variable (continuous), draw a graph **and** a summary statistics table.

Try to use different graphs, e.g. pie chart/bar chart or histogram as much as possible for different variables. Do not draw two different graphs for the same variable.

3. Confidence intervals

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

i. The average of Risk Free Rate of Return (R_f).
ii. The average of Real Exchange Rate (RER).

4. Hypothesis Testing

Margaret has some concerns about the common assumptions regarding the implications of Fame and French three-factor model. As such, she asked Jason to carry out the following hypothesis tests based on the chosen variables in his sample.

i. It has been argued that the average **excess return on the market portfolio ($R_M - R_f$)** is higher than the average of **Risk Free Rate of Return (R_f)**.
ii. It has been argued that that there is a relation between the **value premium (HML)** and the **size premium (SMB)** factors.

iii. It has been argued that that there is a relation between the **excess return on the market portfolio ($R_M - R_f$)** and the **size premium (SMB)** factor.

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

5. Correlation and Regression

Margaret is interested in the relations between The MSCI World Index and country level variables. Margaret asked Jason to conduct regression analyses on the following variables:

- The MSCI World Index and the country Equity Market Index.
- The MSCI World Index and the country Real Exchange Rate (RER).

Use these variables to develop two regression models and make sure to provide full discussions on each test. Use your chosen sample for these analyses. 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 guide to presentation that follows includes an Executive summary, Introduction, Analysis and Appendices (please follow the instructions given in e-tivity 5.4). Your assignment should contain the following sections:

Executive summary

This is your first page and **not** to be **included in the page count**. 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
- 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 (graphs and tables will be included only where they help this discussion). 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 contains the following divisions:

- DESCRIPTIVE STATISTICS (about two pages)

There are 8 variables in your data sets. Depending on the level of measurement (Nominal, Ordinal or Interval/Ratio measures), you will need to provide an appropriate graph, a summary statistics table and descriptions. **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 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 one and half pages)

Present your scatter plots with a line of best fit included in the graphs. Clearly 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 graph and in the discussion.

Interpret the slope and intercept coefficients and hypothesis test result (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 give tables or graphs here. This section you need to present

- The final conclusion of your analysis of all sections. It is essentially an expansion of the Executive Summary written from the point of view that the Executive Summary has not been read.
- 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 elements needed to be considered when reporting results of a statistical analysis? You need to consult with the literature for this section.

Reference list

Follow the Harvard Style Guide (available on e-tivity 5.3) for all in text references, reference lists and bibliographies (reference list and appendices are not included in the page count).

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 (**do not** include the entire population in that appendix).
- Also attach your EXCEL work for descriptive statistics, confidence interval, hypothesis testing and regression.

Graphs must be presented in the main body along with relevant tables and discussion. Those Graphs that are only presented in the appendices will not be marked. Only include relevant Excel outputs in the report, and place the rest of outputs 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 excel outputs appeared in appendices are only to confirm your excel calculations.

Indications given above about the page lengths are only a guideline. You will not be penalized for changing these, as long as you remain within the 8-pages limit.

Marks and submission instructions

This assignment contributes 20% to the final assessment.

Presentation	1%
Executive Summary	1%
Introduction	1%
Descriptive statistics	4%
Confidence intervals	1%
Hypothesis Tests	4%
Correlation and Regression	4%
Conclusion and Limitations	2%
Appendix with EXCEL outputs	2%

- 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 through 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. Students are to use MS-Excel to perform the data analysis. All relevant Excel output, referred to but not included in the report itself, is to be placed in an appendix.
- Assignment maximum lengths: 8 single-sided A4 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 own 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 which will compare final submission with a range of data bases, including comparisons with other assignments, to avoid plagiarism.
- *Due date:* All assignment must be submitted by **Friday 1 November** at **5pm**.
- The submission times are recorded on Turnitin and the penalty for late submission of assignments is **20%** of awardable marks per day overdue.