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## Financial Econometrics, 2021 T2

Case Study Part I (30% of the course mark)

- 1. This Part I of the Case Study must be completed in a **group of 3 or 4 students**. Each group is identified by a class time (e.g. Wed12) and a group number (e.g. Group 2).
- 2. Each group will be assigned a dataset for the project.
- 3. Each group must submit one copy of the assignment via Turnitin. Only one submission per group. Each group must select one person to submit the assignment.
- 4. The online submission deadline is 11:55 pm on Monday 12 July, (WEEK 7).

Each group MUST https: online on which confider. com

The project Cover Sheet must be properly filled, which includes tutorial/group id, names and student numbers of the group members of Exam Help

5. A late-submission penalty of 200 will apply for each 24 hours lately project Exam Help

6. All submissions will be checked by or organism the Will Will County lagiarism as a form of academic misconduct, and has very strict rules regarding plagiarism. Where it can be established that individual students will be penalised. However, where it is judged that the plagiarism should have been clear to the other group members, the penalty will apply to all members of the group.

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# UNSW Business School School of Economics

# Financial Econometrics, 2021 T2 Case Study Part I

# **Group Cover Sheet**

#### **Check-list**

- 1. Choose one member the assignment on set top to Mobile online.
- 2. Class number, group number, all names and student numbers of the group must be filled in on this Cover Sheet.

Assignment Project Exam Help

Class/Graup IP ignment Project Exam Help

		Add Way last as are	
		Add We Chat pow	Student No.
1. (person for submission)	htt	ps://powcoder.com	n
2.	Ac	ld WeChat powco	der
3.		-	
4.			

#### **Software**

You MUST use Python to complete this assignment. You must attach a copy of your codes with your submission.

#### **Topics**

This assessment requires you to use material covered in the lectures of Week 1 to Week 4 inclusive.

#### **Data**

Select the company corresponding to your group (all these are large companies significant for superannuation funds, international share portfolios likely to hold most of these companies). The data allocation (company name) to groups can be seen in the Excel sheet: <a href="https://docs.google.com/spleatithese/d/ship policy/defit/usp=sharing">https://docs.google.com/spleatithese/d/ship policy/defit/usp=sharing</a>

Download open/close stock prices and volume information from <a href="http://finance.vychoe.com">http://finance.vychoe.com</a> as described below ASSIGNMENT Project EXAM Help

Enter the Ansasignament of Protest and Help

Please, make sure that you download the information for the 'main' stock of the company (not its derivative, or a non-US quote). See appendix for some example screen shots.

Once you are on the company page download historical prices by clicking on the corresponding link on the left-side menu.

Select the following data-period for your historical quotes:

1 September 2015 till the day of download

Enter the date range and click on "download to spreadsheet" on the bottom of the page (see Appendix). You will receive a comma-delimited file opened by Excel. The data are sorted in descending date order. For the purpose of the analysis you need to re-sort the data in the *ascending* date order.

<u>Note:</u> Some companies may have shorter periods of data available. Possible reason: company changed its name or merged with another company. Investigate if this is the case and add the data on the predecessor. Talk to me if you have difficulties.

#### **REPORT**

Write a report on the tasks below. Keep your answers short and to the point. Show the necessary information (the null of a test and the decision rule, derivation of analytical results, and only necessary Python output that is needed to answer the question). Make sure to provide comments on all of your results. Please keep the page numbers limited to 7 pages maximum. Python codes are added as an appendix and are not counted in the pages limit.

## Case Study (I) Description

Suppose that you work as a financial advisor. Your client (bank) is interested in investing in a given share.

1. Give a short profile of the company, its business and recent history (2-4 sentences).

#### (2 Points)

2. Transform daily close adj. prices to (log) returns. Plot returns over time. Plot the histogram and obtain basic descriptive statistics. Discuss your findings.

#### (3 Points)

#### 3. CAPM Model

a) Estimate CAPM model for your company. Use S&P500 index returns as a proxy for the market portfolio. The data on the index are available from yahoo (you still need to transform them into log returns). As a proxy for interest rates use the rate of return on a three-month U.S. Freesury bill (short-term government issued securities have virtually zero fisk of datauit). The data are available from <a href="https://fred.stlouisfed.org/series/DGS3MO">https://fred.stlouisfed.org/series/DGS3MO</a>

(3 Points)

Notes: ASSIGNMENT Project Exam Hep
Dates when shares were traded may not fully coincide with the dates when TBills were traded.
To match the Scatt-support of the Councilla option for range lookup to disable approximate water match. Alternatively, you may use MS Access database.

b) Test whether MATMS and suggest possible solutions (you do not have to implement them). Assume that CAPM hold (at least approximately) and construct replication portfolio with S&P500 tolex and I Bill Compute the historical expected return and the variance of the portfolio and compare it to the variance of the share. Based on these findings advise your client whether investment in portfolio is a better option.

#### (3 Points)

c) <u>Check whether the CAPM</u> model specification is stable under the COVID-19 period. You May use parameters/model stability tests like the CUSUM test. If you reject stability, re-estimate a post COVID-19 CAPM and comment on the COVID-19 market beta.

#### (3 Points)

#### 4. APT Model

a) Estimate and test an APT type pricing model using the Fama & French **three factor** model for your company stock. Data on the size/book-to-market factors can be downloaded from:

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\_library.html#Research In your report interpret the meaning of the factors beta, and what they represent in addition to the CAPM premium.

#### (3 Points)

b) Investigate whether unexpected changes in oil prices, and currency exchange rate are sources of risk that pay premium on your company stock.

Hint: Data on oil price and currency exchange rates are also available from Yahoo. Finance. Whether you include an exchange rate and which currency you want to consider depends on your company. If your company is domiciled in Australia and buys parts from China, changes in the AUD/YUAN exchange rate may impact profitability of the company and the return on investment.

#### (3 Points)

#### 5. Model Selection:

a) Test for Unit root in the series. Describe the Dickey-Fuller test (the null hypothesis and the alternative) and comment on the conclusion of the test.

#### (2 Points)

b) If you do not reject the null of unit root, describe your strategy for transforming the series into stationarity. Note that you may have deterministic source of non-stationarity. For example a structural break around COVID-19 pandemic!

#### (2 Points)

c) Fit an ARIMA(1,1) model to your company returns data. Obtain the standardized residuals from your model and investigate if there is any dependence structure left in the residuals.

Assignment Project Exam I Hint: To do this you can use BDS test (Brock, Dechert and Schienkman [1987](\*)). Expair Chythistist Appropriat, and the this test same internal of hat a test for zero correlation in the residuals series. Shortly explain the test, the null hypothesis and the outcomes. What correlations do you reach?

#### https://powcoder.com (3 Points)

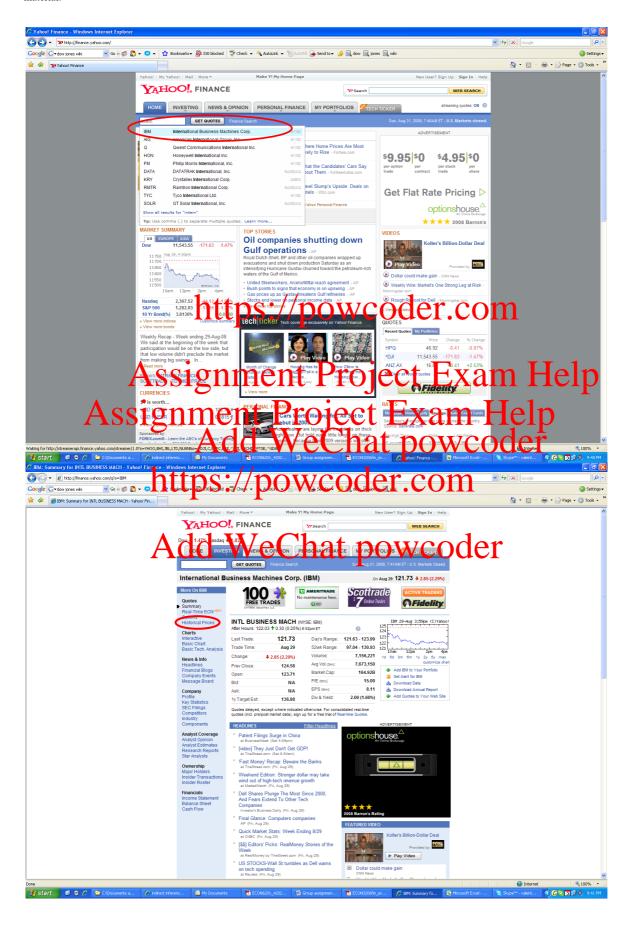
In Python, you can find codes for implementing the BDS test in:

### hat powcoder statsmodels/statsmodels/tsa/tests/test\_bds.py We(

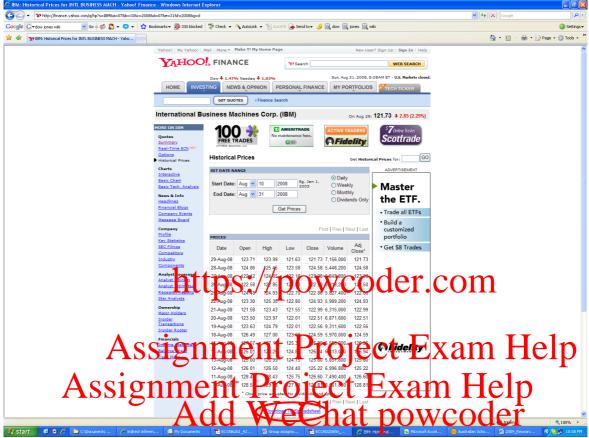
https://programtalk.com/vs2/python/

- (\*)Brock, Dechert, Scheinkman, and LeBaron, A test for independence based on the correlation dimension, Econometric Reviews, 15, 1996: 197-235.
  - d) Derive and plot the impulse response function of the ARIMA model you have estimated in (c) (3 Points)

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