

Turnitin Assignment Period	March 2020 (Element 010)
Faculty	Business and Law
School	Economics, Finance and Law
Module Code	MOD005704
Module Title	Financial Investment Analysis
Level & credit volume	Level 6; 15 Credits
Number of questions	1
Number of pages	5
Name of tutor	

Coursework Guidelines (see Turnitin Submission Guideline for further details)

1. Save the final file as a **pdf file** using the **SID number** as the file name for Turnitin submission.
2. Adhere to the 1,500-word limitation. $\pm 10\%$ is allowed, but no more than that. There will be a 10% penalty if the assignment is too short or too long. **Please indicate the word count on the cover page.**
3. The word count **excludes**: Data, tables, charts, graphs, formulas, in-text **references/citations**, footnotes/endnotes used for reference purpose **and kept within reasonable limits**, appendices and reference list. In sum, the word count **refers only to the narratives.**
4. The reference list must consist (to some extent) of peer reviewed academic journal articles published in the reputable AJG 2018 journal classifications. There is no set minimum or maximum number of references allowed.
5. The formatting must follow the Harvard Referencing guidelines (6th Edition version 6.1.2 April 2019) for both the construction of the reference list and the proper in-text citation formats – **pay attention to §3.1 in particular.**

<https://library.aru.ac.uk/referencing/harvard.htm>
6. The reference list should be named as such, i.e. do not use 'bibliography'.
7. Label all tables, charts, graphs, formulas accordingly and cite the appropriate sources when applicable.
8. Use either Arial or Times New Roman between 10 to 12 font sizes and use 1.5" margin spacing throughout. Use 'justified' margin whenever possible and centre all graphs, charts, figures, tables, etc.
9. Abstracts and table of contents are not necessary.
10. Insert a page number on every page (no page number on the cover page) on the top right with the SID number (e.g. SID140XXXXX Page 10).

11. Do not reproduce the questions on the assignment.
12. Colour output is allowed, but black and white format is sufficient.
13. Turn-on the spell check in the Word processor. Use either British English or American English, but be consistent throughout.

Mitigation – Academic Regulations (Twelfth Edition August 2019) 6.112 - 6.122

- 6.118 Claims for mitigation are submitted by the student or in exceptional circumstances (e.g. when a student has been hospitalised) by a Director of Studies or Faculty Student Adviser on behalf of the student **no later than five working days** after the published (or extended) submission deadline for the assessment task or the date on which an examination was held.

COURSEWORK

1. You are to download Rolls-Royce share price (Last Price) from January 2000 to December 2019 using monthly data from the Bloomberg terminal. Construct continuously compounded return and then answer the following questions:
 - (a) Box-Jenkins methodology involves primarily 3 stages of model building: identification, estimation and diagnostic checking. For the given series, obtain a plot of the log returns and comment on the graph.
 - (b) Analyse the correlogram structure and comment on the structure of the data.
 - (c) Express the estimated ARMA(1,1) model in equation form.
 - (d) What is the value of the BIC and AIC for ARMA(1,1) model?
 - (e) Let us suppose that it is plausible that the model specification can take the form of ARMA(0,0) to ARMA(3,3). Use AIC and BIC to identify the best model. Your outputs should consist of two 4x4 matrices for AIC and BIC. Express the chosen model in equation form.

[30 marks]

2. Assume that the trivariate series of daily exchange rates of Swiss Franc, Canadian dollar and Australian dollar against the British pound follows a VAR model. Download these exchange rates using daily frequency from 03 January 2000 to 31 December 2019 from the Bloomberg terminal. Construct continuously compounded returns series for these exchange rates and perform the following tasks:
 - (a) Choose the best VAR model using the BIC and AIC criteria and explain your reasoning.
 - (b) Estimate the final model and write down your fitted model. Examine and interpret some of the interesting characteristics. Find the R^2 for your preferred model and interpret.

- (c) Conduct a Granger-Causality (GC) test in a VAR(1) with no constant and compare this with your preferred VAR(p) model.
- (d) Draw the impulse response diagrams and interpret your results.

[35 marks]

3. Download the data file Western Texas Intermediate (WTI) Crude Oil (CL1) from the Bloomberg terminal. The data should contain historical oil prices (Last Price) for generic Western Texas Intermediate Crude Oil that is sampled monthly from January 2000 to December 2019. In addition, you should also download the historical futures price (Futures Trade Price) for the same period. An estimable linear regression can be specified as: $s_t = \beta_0 + \beta_1 f_{t-1} + u_t$, where f_t and s_t are the natural logarithms of F_t (the nearby futures price) and S_t (the spot price) for the WTI Crude Oil contract traded at the Intercontinental Exchange (ICE). Note that u_t is an error term.

- (a) Plot F_{t-1} and S_t on the same graph. Indicate on the graph any major economic events. Additionally, using an Augmented Dickey-Fuller test and selecting the relevant lag length using BIC, assess whether f_{t-1} and s_t are unit root processes.
- (b) Using the Engle-Granger 2-step method, assess whether s_t and f_{t-1} are cointegrated. If s_t and f_{t-1} are cointegrated, what does this imply?
- (c) Discuss the economic rationale behind the result in 3(b). Also, briefly comment on how this result compares with relevant economic literature. Some useful references include:
- Crowder, W.J., and Hamed, A. (1993): 'A Cointegration Test for Oil Futures Market Efficiency,' *Journal of Futures Markets*, 13:933-941.
 - Kellard, N., Newbold, P., Rayner, A. and Ennew, C. (1999), 'The Relative Efficiency of Commodity Futures Markets', *Journal of Futures Markets*, 19:413-432.

- (d) Assuming that the series are cointegrated, use the 'general to specific' methodology to estimate an ECM (Error Correction Model). Briefly comment on the properties of your final 'preferred' model including discussion of short and long run elasticities.

[35 marks]

END OF COURSEWORK