



FINAL EXAMINATION
MARCH 2024

COURSE TITLE	ECONOMETRICS
COURSE CODE	TECO4213
DATE/DAY	19 JUNE 2024 / WEDNESDAY
TIME/DURATION	02:00 PM - 04:00 PM / 02 Hour(s) 00 Minute(s)

INSTRUCTIONS TO CANDIDATES :

1. Please read the instruction under each section carefully.
2. Candidates are reminded not to bring into examination hall/room any form of written materials or electronic gadget except for stationery that is permitted by the Invigilator.
3. Students who are caught breaching the Examination Rules and Regulation will be charged with an academic dishonesty and if found guilty of the offence, the maximum penalty is expulsion from the University.

(This Question Paper consists of 4 Printed Pages including front page)

*****DO NOT OPEN THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO*****

This question paper consists of THREE (3) questions. Answer ALL questions in the answer booklet provided. [100 MARKS]

QUESTION 1

(60 Marks)

Sally is a portfolio manager at an investment management firm. She wants to test her primary equity portfolio's reaction to the factors in the Fama-French three-factor model. She collected excess returns (i.e., net of the risk-free rate) over a certain number of months. The response (aka, explained, dependent) variable is the portfolio's excess return. The three explanatory variables are the market factor (MKT), the size factor (SMB), and the value factor (HML). The size factor captures the excess return of small-capitalization stocks (SMB = "small minus big") and the value factor captures the excess returns of value stocks (HML = "high book-to-market minus low book-to-market"). Sally's regression results are displayed in Table 1 below.

Table 1

Coefficient	Estimate	Std Error	t-stat	p-value
Intercept	0.027	0.015	1.800	0.08230
MKT	0.502	0.250	2.008	0.04230
SMB	0.703	0.425	1.654	0.09053
HML	0.277	0.102	2.700	0.00906

- a) At 5% level of significance, which of the coefficients are deemed significant? (5 marks)
- b) At 10% level of significance, which of the coefficients are deemed significant? (8 marks)
- c) Sally collected her sample over 5 months period and her data is presented below:

Table 2

Portfolio Excess Return	MKT	SMB	HML	Predicted Value of Excess Return	Residuals of Regression	Variance of Portfolio Excess Return
2.26	2.14	1.52	1.25			
2.88	3.54	1.61	1.35			
3.53	2.42	2.11	1.12			
2.50	1.63	1.52	1.82			
3.20	1.78	1.65	2.12			

Complete Table 2 in your answer sheet and compute the coefficient of determination (R-squared) (20 marks)

- d) Given the formula to compute the adjusted R-squared as $Adj. R. squared = 1 - \frac{N-1}{N-p-1} (1 - R^2)$, where N is the sample size and p is the number of independent variables, compute the adjusted R-squared coefficient. (5 marks)

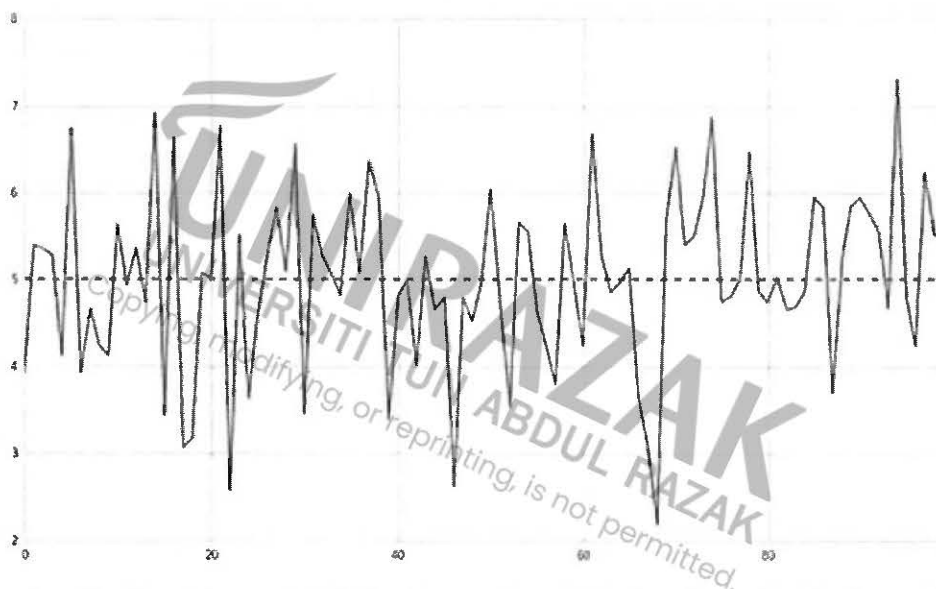
- e) Sally used a straightforward Ordinary Least Square (OLS) method to estimate the above model using time-series data.
- Briefly explain how OLS estimates the coefficients. (6 marks)
 - Which of the OLS assumptions will most likely be violated by using OLS to estimate time-series data? Explain your answer. (6 marks)
- f) Sally would like to test her estimated model for autocorrelation using the Breusch-Godfrey Test. Explain the steps involved. (10 marks)

QUESTION 2

(40 marks)

Andy is an equity analyst. He extracted the stock price of Maybank and plot it against time to obtain the following diagram:

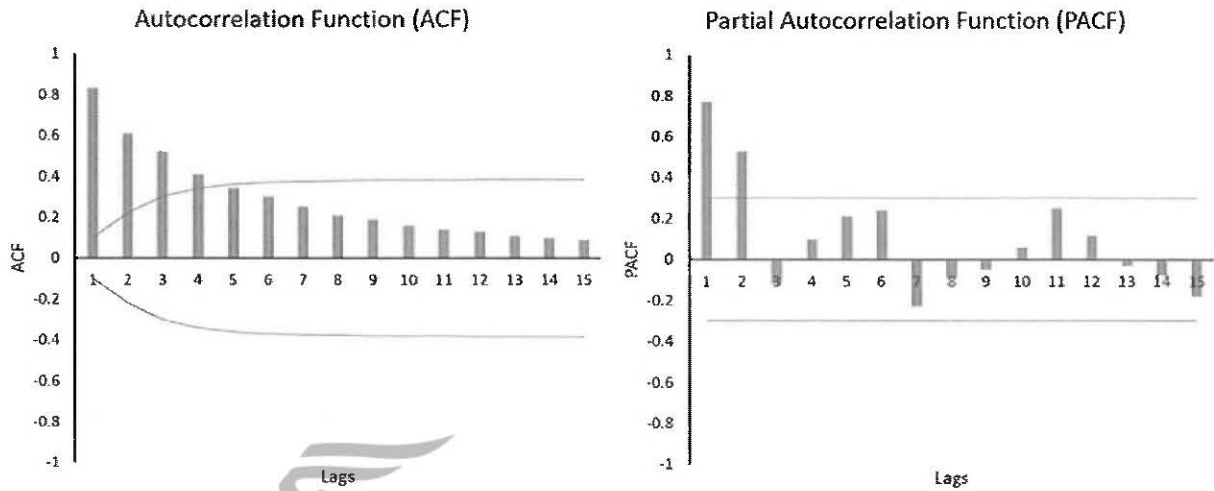
Diagram 1: Maybank Stock Price Series



- Based on visualization, do you think the time series of Maybank stock price is stationary? Explain your answer. (7 marks)
- One can test for stationary by using the Dickey-Fuller test. Explain the steps involved in carrying out the Dickey-Fuller test. (15 marks)
- Explain the difference between Augmented Dickey-Fuller (ADF) test and Dickey-Fuller (DF) test. What is / are the advantage(s) of ADF over DF. (8 marks)

- d) Andy also intends to make forecast of Maybank stock price. To do that, he needs to decide which univariate time series model that he should adopt. Based on the ACF and PACF correlogram plotted using the Maybank stock price series, determine which univariate time series model is appropriate to model the series. Explain your answer. (10 marks)

Diagram 2: ACF and PACF



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*** END OF QUESTION PAPER ***
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