



CHRISTIAN SERVICE UNIVERSITY COLLEGE
KUMASI

SCHOOL OF BUSINESS

DEPARTMENT OF ACCOUNTING AND FINANCE

End of Second semester examination

January group

Course: Financial Econometrics

Course Code: MACF 512

Date:

Time: 3 hours

Instructions to students

- i. This examination is made up of **Sections A and B** which contains eight (8) questions
 - ii. **Section A** has **four (4)** questions and candidates are required to answer any **two (2)** of these questions
 - iii. In **Section B** which contains the remaining **four (4)** questions, candidates are required to answer any **two (2)**
 - iv. Each question carries **15 marks**
 - v. Statistical tables are provided
 - vi. Candidates are to pay attention to detail, clear and neat work to earn bonus marks
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SECTION A (30 MARKS)

Instruction: Answer any two (2) questions from this section

QUESTION 1

- a) Describe three (3) types of data financial econometricians may use for analysis *(3 marks)*
- b) State any three (3) examples of problems in finance that could be undertaken using each of the data type in (a) *(3 marks)*
- c) Explain the steps involved in building of financial econometric model. *(6 marks)*
- d) State two (2) differences between regression versus correlation *(3 marks)*

QUESTION 2

- a) Write five (5) assumptions underlying the estimation of classical linear regression model (CLRM). *(5 marks)*
- b) If the assumptions listed in (a) hold, then the estimators determined by ordinary least square (OLS) will have a desirable properties known as Best Linear Unbiased Estimators (BLUE). Explain this. *(5 marks)*

- c) Given the financial model below:

$$y_t = \theta_0 + \theta_1 x_t + \mu_t$$

Where μ_t is the error term

$E(\mu_t) = 0$ is important in estimating CLRM.

- (i) When is the above violated? *(2 marks)*
- (ii) Give 2 consequences of violating $E(\mu_t) = 0$ *(3 marks)*

[Total marks =15marks]

QUESTION 3

a. Write down the following models

(6 marks)

- i. AR (4)
- ii. MA (3)
- iii. ARMA (3, 3)

b. Consider the following model

$$y_t = \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \varepsilon_t$$

(6 marks)

- i. Calculate the mean of y_t
- ii. Calculate the variance of y_t

c. Explain any two advantages of panel modeling in finance

(3 marks)

[Total marks =15 marks]

QUESTION 4

a) With the aid of diagrams, explain the difference between homoscedascity and heteroscedascity.

(5 marks)

b) Explain two (2) causes of hetroscedascity

(5 marks)

c) Consider the following regression equation;

$$y_t = \alpha + \beta_1 x_{2t} + \beta_2 x_{3t} + \varepsilon_t \dots\dots\dots 1$$

and the

$$var(\varepsilon_t) = \sigma^2 \vartheta^2 \dots\dots\dots 2$$

How do remove this hetroscedascity problem?

(5 marks)

[Total marks =15 marks]

Section B (30 Marks)

Instruction: Answer any two (2) questions from this section

QUESTION 1

A researcher estimated the equation below in order to evaluate the effects of various firm-specific factors on the returns of a sample of 200 firms listed on the Ghana Stock Exchange. A cross-sectional method was used as follows;

$$r_i = 0.080 + 0.801S_i + 0.321MB_i + 0.164PE_i + 0.084BETA_i$$

SE (0.064) (0.147) (0.136) (0.420) (0.120)

Where;

- r_i = the percentage annual return for the stock
- S_i = the size of firm i measured in terms of sales revenue
- MB_i = market to book ratio of the firm
- PE_i = the price/earnings ratio
- $BETA_i$ = stock's CAPM beta coefficient

- a) Calculate the t-ratios (5 marks)
- b) On the basis of (a), what variables are relevant in explaining the returns of the firms (5 marks)
- c) Explain the coefficients of S_i and MB_i (5 marks)

[Total marks =15 marks]

QUESTION 2

A financial analyst estimated the following model to determine if the financial sector development of Ghana can be explained by some macroeconomic variables as:

$$findex_t = \alpha_1 + \alpha_2gdp_t + \alpha_3govexp_t + \alpha_4fdi_t + \alpha_5gdi_t + \alpha_6openness_t + \mu_t$$

Where μ_t is the error term and $t = 1, 2, \dots, T$,

$findex$ = financial development index

gdp = GDP growth,

$govexp$ = government expenditure, fdi = foreign direct investment,

gdi = gross domestic investment

$openness$ = openness of the Ghanaian economy

The following output shown on Table 1 was obtained with diagnostics test result in the subsequent tables and graph. Use the information to answer the questions that follow.

Table 1. showing results from the model

Dependent Variable: FINDEX

Method: Least Squares

Date: 04/09/18 Time: 12:02

Sample: 1 32

Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	40.30958	23.93118	1.684396	0.1041
GDPG	-0.523681	1.309522	-0.399903	0.6925
GOVEXP	-1.263648	2.931076	-0.431121	0.6699
FDI	8.618404	1.718983	5.013664	0.0000
OPENNESS	0.918320	0.350839	2.617496	0.0146
GDI	0.015801	1.641257	0.009628	0.9924
R-squared	0.804266	Mean dependent var		100.0000
Adjusted R-squared	0.766625	S.D. dependent var		46.73758
S.E. of regression	22.57841	Akaike info criterion		9.239226
Sum squared resid	13254.40	Schwarz criterion		9.514052
Log likelihood	-141.8276	Hannan-Quinn criter.		9.330323
F-statistic	21.36669	Durbin-Watson stat		0.965989
Prob(F-statistic)	0.000000			

Table 2. showing Variance Inflation Factors (VIF) results from the model

Variance Inflation Factors

Date: 04/09/18 Time: 12:13

Sample: 1 32

Included observations: 32

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	572.7015	35.94940	NA
GDPG	1.714849	3.624356	1.570414
GOVEXP	8.591209	63.32129	2.127742
FDI	2.954903	2.386401	1.414934
OPENNESS	0.123088	35.19738	4.030771
GDI	2.693725	58.12891	3.167811

Table 3. showing Heteroskedasticity Test results from the model

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.834336	Prob. F(5,26)	0.0098
Obs*R-squared	13.58138	Prob. Chi-Square(5)	0.0185
Scaled explained SS	9.624598	Prob. Chi-Square(5)	0.0866

Table 4. Showing Breusch-Godfrey Serial Correlation LM Test results from the model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	8.838807	Prob. F(2,24)	0.0013
Obs*R-squared	13.57284	Prob. Chi-Square(2)	0.0011

Figure 1 showing normality test

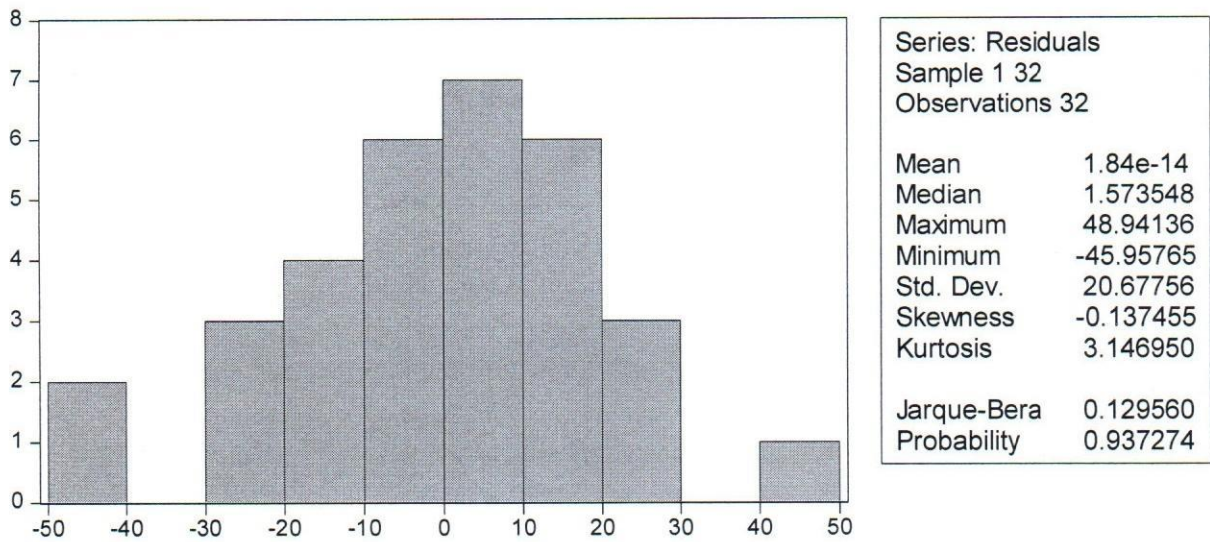
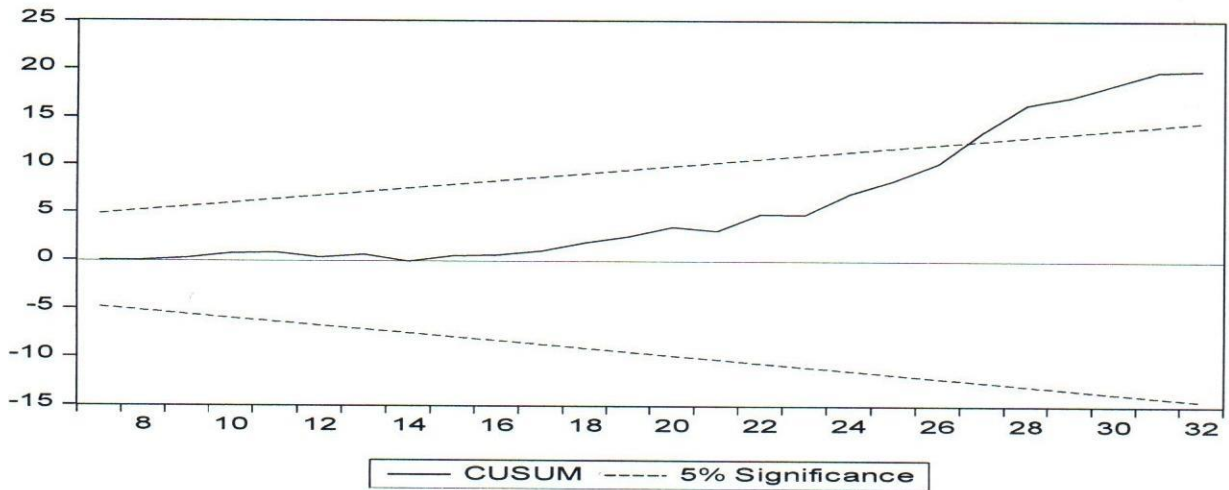


Figure 2 showing CUSUM test



- a) Interpret the coefficients of GOVEXP, FDI and OPENNESS (5 marks)
- b) Using the diagnostic test result, check whether the presence of following exist.
 - i. Multicollinearity
 - ii. Heteroscedascity
 - iii. Serial correlation
 - iv. Normality of the errors (8 marks)
- c) Determine the stability of the model using CUSUM graph (2 marks)

[Total marks =15 marks]

QUESTION 3

Consider that a financial analyst wants to examine or investigates whether returns on stocks (y) of Kodie Industries, a producer of iron rods in Ghana, show unit sensitivity to two factors, x_2 and x_3 . The following model was estimated;

$$y_t = \alpha_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \mu_t$$

Where μ_t is the error term

- a. What is the unrestricted model in this investigation (3 marks)
- b. Derive the restricted model (10 marks)
- c. If the sample size was 144, restricted residual sum of squares (RRSS) is 436.1 and the unrestricted residual sum of squares (URSS) is 397.2, use appropriate method to perform a test to confirm or reject this argument (2 marks)

[Total marks =15 marks]

QUESTION 4

It is argued that the objective of hedging is to minimize the variance of the hedged portfolio returns. If this argument stands, then the appropriate hedge ratio will be the slope estimates β in a model where the dependent variable is a time-series of spot return (RSpot) and the independent variable of future returns (RFuture). Thus, the following model was estimated in line with this argument.

$$Rspot_t = \alpha + \beta RFuture_t + \mu_t; \text{ where } \mu_t \text{ is the error term}$$

The result is shown on Table 1

Dependent variable: RSpot

Method: Least squares

Observation: 65

Table 1: showing estimates of optimal hedging

Variable	Coefficients	Std error	t-statistics	Prob
c	0.363302	0.44369	-	-
Rfuture	0.958301	0.13379	-	-
R^2	-			
S.E of regression	3.546955		Mean	0.42123
RSS	792.596		S.D Dependent variable	3.542992
ESS	10.781		Akaike info Criterion	5.400342
TSS	803.377		Scwarz Info Criterion	5.467246
F-Stats	0.85707		Durbin Watson Stats	2.116689
Prob(F-stats)	0.358093			

- a. Test the null hypothesis that the slope is zero, that is;

$$H_0: \beta = 0$$

(5 marks)

- b. Interpret the results obtained on the table

(5 marks)

- c. Estimate the R^2

(5 marks)

[Total marks =15 marks]

Examiners: Dr Sulemana Mahawiya and Dr. Paul Adjei Kwakwa