



REFORMED CHURCH UNIVERSITY

FACULTY OF COMMERCE
BACHELOR OF COMMERCE HONOURS DEGREE IN
BANKING & FINANCE
FINANCIAL ECONOMETRICS

HBAF 405

PART 4 SEMESTER 1 EXAMINATION

TOTAL MARKS [100]

DATE: JUNE 2024

Time: 3 Hours

INSTRUCTIONS

- 1 This paper has *six (6)* questions
 - 2 Answer Question One (*1*) and any other *three (3)*
 - 3 Each question carries *25 marks*
 - 4 Start each question on a new page
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1. A researcher wishes to evaluate the effect of firm-specific factors on the returns of a sample of firms. He estimates a regression of the form:

$$r_i = \beta_0 + \beta_1 S_i + \beta_2 MB_i + \beta_3 PE_i + \beta_4 BETA_i + e_i \quad \text{where:}$$

r_i is the percentage annual return for the stock,

S_i is the size of firm i measured in terms of sales revenue,

MB_i is the market to book ratio of the firm,

PE_i is the price/earnings ratio of the firm,

$BETA_i$ is the stock's CAPM beta co-efficient.

He then runs a cross-sectional regression with 200 firms and obtains the following results:

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

The standard errors for the parameters 0.064, 0.147, 0.136, 0.420 and 0.120 respectively

Required:

- (a) Calculate the t-ratios. What can you conclude about the effect of each variable the returns of the security? [15]
- (b) On the basis of your results, which variables would you consider deleting from the regression? [5]
- (c) If a stock's beta increases from 1 to 1.2, what would be the expected effect on the stock's return? Is the sign on beta as would have expected? Explain your answers in each case [5]
2. Labeeb Corporation is a diversified manufacturing firm located in Harare. In 2001, the firm reported operating income of \$632.2 million. Its corporate tax rate is 30%. The firm had book value of equity of \$3,432.1 million and book

value of debt of \$1,377.2 million at the end of 2000. The firm is in a stable industry and expects to grow only 5% a year

i) Estimate the free Cashflows to the firm assuming a net reinvestment rate of 54.34% [7]

ii) Estimate the cost of Equity if Labeeb Corporation's beta is 1.17, the risk free rate is 10.5% and the risk premium is 9.23% [8]

iii) Estimate the WACC (Weighted Average Cost of Capital) Assuming the cost of debt for Labeeb Corporation is 12.0%, and that the market value of equity is \$2,282.00 million and the market value of debt is \$1,807.30 million [10]

3. a) Using the following sub headings, distinguish between WACC and APV (Adjusted Present Value)

i) Tax shields and debt

ii) Cost of financial distress [10]

b) Project B has an NPV of -\$20,000. The Company has to issue \$2,314,285 of debt at 8% to finance the project. The new debt has a PV Tax Shield of \$60,000.

i) Calculate the adjusted NPV of the project

ii) What is the decision rule? [10]

c) i) Project A has an NPV of \$150,000. The Company has to issue stock, with brokerage costs of \$200,000. How much is needed to finance the Project (Adjusted Net Present Value)?

ii) what is the decision rule? [5]

4. A researcher is using data for a sample of 27 companies to investigate the relationship between annual profits Y_i (measured in millions of dollars per year) and annual sales revenues X_i (measured in billions of dollars per year). Preliminary analysis of the sample data yields the following sample information:

$$N=27 \quad \sum_{i=1}^N Y_i = 12\,767.00 \quad \sum_{i=1}^N X_i = 570.175$$

$$\sum_{i=1}^N Y_i^2 = 11\,809\,057.00 \quad \sum_{i=1}^N X_i^2 = 19\,058.488$$

$$\sum_{i=1}^N X_i Y_i = 398\,972.09$$

- a. State the assumptions of the regression model. [3]
- b. Compute the estimates of the intercept co-efficient β_0 and the slope coefficient β_1 . [6]
- c. Interpret what the intercept and slope co-efficiency mean in the context of the problem. [4]
- d. Perform a test of the null hypothesis $H_0 : \beta_1 = 0$ against the alternative hypothesis $H_1 : \beta \neq 0$ at the 5% level. State the decision rule you use, and the inference you would draw from the test. Would you draw the same inference if you performed the test at the 1% level of significance? [9]
- e. Calculate the error variance. [3]

5. The following data show a segment of the series on percentage wage change, Y, unemployment, X₁, and inflation, X₂.

Y	X ₁	X ₂
3	3	5
1	1	4
8	5	6
3	2	4
5	4	6

Given that $(X'X)^{-1} = \begin{pmatrix} 26.7 & 4.5 & -8.0 \\ 4.5 & 1.0 & -1.5 \\ -8.0 & -1.5 & 2.5 \end{pmatrix}$

Required:

- a) Fit a regression model $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2$ to this data using ordinary least Squares [5]
- b) Compute R^2 and $R^2_{adjusted}$ and comment. [8]
- c) Explain how the fixed effects models are equivalent to an ordinary least squares regression with dummy variables [4]
- d) What are the relative advantages and disadvantages of the fixed versus the random effects specifications and how would you choose between them for application to a particular problem? [8]
6. a) Explain what is meant by weak stationarity [4]
- b) Explain what is meant by strict stationarity [4]
- c) Find the conditions of stationarity and invertibility for an ARMA (1,2) process [6]

d) Explain how the fixed effects models are equivalent to an ordinary least squares regression with dummy variables [5]

e) A research assistant obtains the following estimates for an AR(2) model of some returns data

$$y_t = 0.803y_{t-1} + 0.682y_{t-2} + u_t$$

where u_t is a white noise error process. By examining the characteristic equation, check the estimated model for stationarity. [6]

END OF PAPER