| Name:<br>Enrolment No: | UPES<br>UNIVERSITY WITH A PURPOSE |
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# UNIVERSITY OF PETROLEUM & ENERGY STUDIES

**End Semester Examination – December, 2022**

**Program: MBA Finance** | **Semester: III**
**Subject/Course: Financial Econometrics** | **Max. Marks: 100**
**Course Code: FINC8009** | **Duration: 3 Hours**

| Q.No. | Section A | 10Q×2M=20M | COs |
|---|---|---|---|
| | **Question** | **Marks** | **COs** |
| 1 | The numerical score assigned to the credit rating of a bond is best described as what type of number?<br>(a) Continuous<br>(b) Cardinal<br>(c) Ordinal<br>(d) Nominal | 2 | CO 1 |
| 2 | Suppose that we wanted to sum the 2020 returns on ten shares to calculate the return on a portfolio over that year. What method of calculating the individual stock returns would enable us to do this?<br>(a) Simple<br>(b) Continuously compounded<br>(c) Neither approach would allow us to do this validly<br>(d) Either approach could be used and they would both give the same portfolio return | 2 | CO 1 |
| 3 | Consider a bivariate regression model with coefficient standard errors calculated using the usual formulae. It varies positively with the square root of the residual variance ($s$)<br>(i) It varies positively with the spread of $X$ about its mean value<br>(ii) It varies positively with the spread of $X$ about zero<br>(iii) It varies positively with the sample size $T$<br>Which of the following statements is/are correct regarding the standard error estimator for the slope coefficient?<br>(a) (i) only<br>(b) (i) and (iv) only<br>(c) (i), (ii) and (iv) only<br>(d) (i), (ii), (iii) and (iv). | 2 | CO 1 |
| 4 | In a time series regression of the excess return of a mutual fund on a constant and the excess return on a market index, which of the following statements should be true for the fund manager to be considered to have “beaten the market” in a statistical sense? | 2 | CO 1 |

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| | (a) The estimate for $\alpha$ should be positive and statistically significant<br>(b) The estimate for $\alpha$ should be positive and statistically significantly greater than the risk-free rate of return<br>(c) The estimate for $\beta$ should be positive and statistically significant<br>(d) The estimate for $\alpha$ should be negative and statistically significant. | | |
| 5 | What result is proved by the Gauss-Markov theorem?<br>(a) That OLS gives unbiased coefficient estimates<br>(b) That OLS gives minimum variance coefficient estimates<br>(c) That OLS gives minimum variance coefficient estimates only among the class of linear unbiased estimators<br>(d) That OLS ensures that the errors are distributed normally | 2 | CO1 |
| 6 | The type I error associated with testing a hypothesis is equal to<br>(a) One minus the type II error<br>(b) The confidence level<br>(c) The size of the test<br>(d) The size of the sample | 2 | CO1 |
| 7 | Which of the following is a correct interpretation of a "95% confidence interval" for a regression parameter?<br>(a) We are 95% sure that the interval contains the true value of the parameter<br>(b) We are 95% sure that our estimate of the coefficient is correct<br>(c) We are 95% sure that the interval contains our estimate of the coefficient<br>(d) In repeated samples, we would derive the same estimate for the coefficient 95% of the time | 2 | CO1 |
| 8 | Which of the following statements is correct concerning the conditions required for OLS to be a usable estimation technique?<br>(a) The model must be linear in the parameters<br>(b) The model must be linear in the variables<br>(c) The model must be linear in the variables and the parameters<br>(d) The model must be linear in the residuals | 2 | CO1 |
| 9 | Which of the following is NOT a good reason for including a disturbance term in a regression equation?<br>(a) It captures omitted determinants of the dependent variable<br>(b) To allow for the non-zero mean of the dependent variable<br>(c) To allow for errors in the measurement of the dependent variable<br>(d) To allow for random influences on the dependent variable | 2 | CO1 |
| 10 | Which of the following is NOT correct with regard to the *p*-value attached to a test statistic?<br>(a) *p*-values can only be used for two-sided tests<br>(b) It is the marginal significance level where we would be indifferent between rejecting and not rejecting the null hypothesis | 2 | CO1 |

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| | (c) It is the exact significance level for the test<br>(d) Given the *p*-value, we can make inferences without referring to statistical tables | | |
| **1. Each question will carry 5 marks**<br>**2. Instruction: Write short/ brief notes** | | | |
| | **Section-B** | 4Q×5M=20M | |
| 1. | Provide an example of a non-linear regression model and explain why it is non-linear. | 5 | CO 2 |
| 2. | Explain in details what do you mean by by i) heteroskedasticty ,ii) serial correlation | 5 | CO 2 |
| 3. | Explain various measures, which are part of descriptive statistics. | 5 | CO 2 |
| 4. | Sum<br>Model<br>$y_i = \beta_0 + \beta_1 x_i + u_i$<br>$ln(y_i) = \beta_0 + \beta_1 x_i + u_i$<br>$ln(y_i) = \beta_0 + \beta_1 ln(x_i) + u_i$<br>$y_i = \beta_0 + \beta_1 ln(x_i) + u_i$<br>Interpret $\beta_1$ in each of the model. | 5 | CO 3 |
| | **Section-C** | | |
| Q.No. | | 3Q×10M=30M | |
| 1 | Compare the following output from the two regression model, where wage is the dependent variable and educ is years of education.<br>Model 1: OLS, using observations 1-526<br>Dependent variable: wage<br>coefficient std. error t-ratio p-value<br>const -0.904852 0.684968 -1.321 0.1871<br>educ 0.541359 0.0532480 10.17 2.78e-022 *** | 10 | CO 3 |

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|---|---|---|---|
| | Mean dependent var 5.896103 S.D. dependent var 3.693086<br>Sum squared resid 5980.682 S.E. of regression 3.378390<br>R-squared 0.164758 Adjusted R-squared 0.163164<br>F(1, 524) 103.3627 P-value(F) 2.78e-22<br>Log-likelihood -1385.712 Akaike criterion 2775.423<br>Schwarz criterion 2783.954 Hannan-Quinn 2778.764<br><br>Compare the above regression model output with the following regression model output, where wage and educ is converted to logarithm.<br><br>Model 2: OLS, using observations 1-526<br>Dependent variable: l_wage<br><br>coefficient std. error t-ratio p-value<br>const 0.583773 0.0973358 5.998 3.74e-09 ***<br>educ 0.0827444 0.00756669 10.94 3.27e-025 ***<br><br>Mean dependent var 1.623268 S.D. dependent var 0.531538<br>Sum squared resid 120.7691 S.E. of regression 0.480079<br>R-squared 0.185806 Adjusted R-squared 0.184253<br>F(1, 524) 119.5816 P-value(F) 3.27e-25<br>Log-likelihood -359.3781 Akaike criterion 722.7561<br>Schwarz criterion 731.2867 Hannan-Quinn 726.0962<br><br>Log-likelihood for wage = -1213.22<br><br>Interpret the regression coefficient of wage in both the models. Do you think the second model is a better model specification? | | |
| 2 | Dependent Variable: ERMSOFT<br>Method: Least Squares<br>Date: 08/21/18 Time: 21:17<br>Sample (adjusted): 1986M05 2018M03<br>Included observations: 383 after adjustments<br><br>Variable / Coefficient / Std. Error / t-Statistic / Prob.<br>C 1.326002 0.475481 2.788762 0.0056<br>ERSANDP 1.280799 0.094354 13.57434 0.0000<br>DPROD -0.303032 0.736881 -0.411236 0.6811<br>DCREDIT -0.025364 0.027149 -0.934243 0.3508<br>DINFLATION 2.194670 1.264299 1.735879 0.0834<br>DMONEY -0.006871 0.015568 -0.441384 0.6592<br>DSPREAD 2.260064 4.140284 0.545872 0.5855<br>RTERM 4.733069 1.715814 2.758498 0.0061<br><br>R-squared 0.345205 Mean dependent var 1.476851<br>Adjusted R-squared 0.332982 S.D. dependent var 9.605408<br>S.E. of regression 7.844847 Akaike info criterion 6.978257<br>Sum squared resid 23078.11 Schwarz criterion 7.060723<br>Log likelihood -1328.336 Hannan-Quinn criter. 7.010970<br>F-statistic 28.24264 Durbin-Watson stat 2.097394<br>Prob(F-statistic) 0.000000<br><br>Interpret the above regression result. Do you think we have estimated the correct model or there is a scope of improvement in the above model? | 10 | CO 3 |

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|---|---|---|---|
| 3 | What do you mean by financial econometrics? Give various application of Financial Econometrics. Specify the model specification in each one of the cases. | 10 | CO3 |
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| Q.No | **Section-D** | 2Q×15M=30M | |
| 1 | An analyst has estimated the following the CAPM regression. The output is given below<br><br>Dependent Variable: ERFORD<br>Method: Least Squares<br>Date: 08/20/18 Time: 20:54<br>Sample (adjusted): 2002M02 2018M02<br>Included observations: 193 after adjustments<br><br>Variable \| Coefficient \| Std. Error \| t-Statistic \| Prob.<br>C \| -0.955984 \| 0.793085 \| -1.205400 \| 0.2295<br>ERSANDP \| 1.889755 \| 0.191620 \| 9.861972 \| 0.0000<br><br>R-squared 0.337400 Mean dependent var -0.292935<br>Adjusted R-squared 0.333931 S.D. dependent var 13.45156<br>S.E. of regression 10.97823 Akaike info criterion 7.640014<br>Sum squared resid 23019.61 Schwarz criterion 7.673824<br>Log likelihood -735.2613 Hannan-Quinn criter. 7.653706<br>F-statistic 97.25849 Durbin-Watson stat 2.518490<br>Prob(F-statistic) 0.000000<br><br>a. Interpret the above regression.<br>b. As an Investor, you will invest in this company or not, Justify your answers. | 15 | CO4 |
| 2 | A researcher is interested in assessing the driving factors of WAGE. She has collected a sample of cross sectional data on WAGE and education, experience and a dummy for female gender and a dummy,which takes value 1 if the individual is married: the All variables are in logarithm.<br><br>The researcher obtains the following regression output in EViews<br><br>Dependent Variable: WAGE<br>Method: Least Squares<br><br>Sample: 1 526<br>Included observations: 526<br><br>Variable \| Coefficient \| Std. Error \| t-Statistic \| Prob.<br>C \| -1.734481 \| 0.753620 \| -2.301532 \| 0.0218<br>EXPER \| 0.064242 \| 0.010400 \| 6.176894 \| 0.0000<br>EDUC \| 0.602580 \| 0.051117 \| 11.78817 \| 0.0000<br>FEMALE \| -2.155517 \| 0.270305 \| -7.974374 \| NA | 15 | CO4 |

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|---|---|---|---|
| R-squared | 0.309304 | Mean dependent var | 5.896103 |
| Adjusted R-squared | NA | S.D. dependent var | 3.693086 |
| S.E. of regression | NA | Akaike info criterion | 5.094053 |
| Sum squared resid | 4945.672 | Schwarz criterion | 5.126489 |
| Log likelihood | -1335.736 | Hannan-Quinn criter. | 5.106753 |
| F-statistic | 77.91966 | Durbin-Watson stat | 1.813730 |
| Prob(F-statistic) | 0.000000 | | |

a) Is the model significant in the overall? Justify your anwer . **( 3 marks**)

b) How much is the value of the adjusted R squared in this model? ( **3 marks**)

c) Compute the standard error of the regression .(**3 marks**)

d) Interpret the parameters of the model **( 6 marks**)

Can the researcher infer from the above output that the elesticity of wage to experiece is different for female individuals? Justify your answer

Or

You are given the following output of different model specification of ARIMA model for forecasting GDP.

Equation: TABLE1 Workfile: ARIMA-RAFAELA::Arima\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: DLGDP
Method: Least Squares
Date: 05/29/16 Time: 14:44
Sample (adjusted): 1981Q1 1998Q2
Included observations: 70 after adjustments
Convergence achieved after 20 iterations
MA Backcast: 1980Q2 1980Q4

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.006822 | 0.001488 | 4.585603 | 0.0000 |
| AR(1) | 0.676880 | 0.155586 | 4.350514 | 0.0000 |
| MA(1) | -0.361690 | 0.185546 | -1.949334 | 0.0556 |
| MA(2) | -0.212155 | 0.134013 | -1.583088 | 0.1183 |
| MA(3) | 0.277806 | 0.121230 | 2.291551 | 0.0252 |

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|---|---|---|---|
| R-squared | 0.269960 | Mean dependent var | 0.006335 |
| Adjusted R-squared | 0.225034 | S.D. dependent var | 0.006323 |
| S.E. of regression | 0.005567 | Akaike info criterion | -7.475335 |
| Sum squared resid | 0.002014 | Schwarz criterion | -7.314728 |
| Log likelihood | 266.6367 | Hannan-Quinn criter. | -7.411540 |
| F-statistic | 6.009048 | Durbin-Watson stat | 1.905971 |
| Prob(F-statistic) | 0.000354 | | |

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| Inverted AR Roots | .68 | | |
| Inverted MA Roots | .50+.42i | .50-.42i | -.64 |

Equation: UNTITLED Workfile: ARIMA-RAFAELA::Ari...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: DLGDP
Method: Least Squares
Date: 05/29/16 Time: 14:46
Sample (adjusted): 1981Q1 1998Q2
Included observations: 70 after adjustments
Convergence achieved after 28 iterations
MA Backcast: 1980Q3 1980Q4

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.006795 | 0.001367 | 4.972132 | 0.0000 |
| AR(1) | 0.692728 | 0.202898 | 3.414165 | 0.0011 |
| MA(1) | -0.254315 | 0.243568 | -1.044124 | 0.3002 |
| MA(2) | -0.162587 | 0.160778 | -1.011253 | 0.3156 |

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|---|---|---|---|
| R-squared | 0.218823 | Mean dependent var | 0.006335 |
| Adjusted R-squared | 0.183315 | S.D. dependent var | 0.006323 |
| S.E. of regression | 0.005714 | Akaike info criterion | -7.436204 |
| Sum squared resid | 0.002155 | Schwarz criterion | -7.307719 |
| Log likelihood | 264.2671 | Hannan-Quinn criter. | -7.385168 |
| F-statistic | 6.162620 | Durbin-Watson stat | 2.073474 |
| Prob(F-statistic) | 0.000930 | | |

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|---|---|---|
| Inverted AR Roots | .69 | |
| Inverted MA Roots | .55 | -.30 |

Equation: UNTITLED Workfile: ARIMA-RAFAELA::Ari...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: DLGDP
Method: Least Squares
Date: 05/29/16 Time: 14:47
Sample (adjusted): 1981Q1 1998Q2
Included observations: 70 after adjustments
Convergence achieved after 10 iterations
MA Backcast: 1980Q4

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.006726 | 0.001321 | 5.092872 | 0.0000 |
| AR(1) | 0.631409 | 0.161374 | 3.912704 | 0.0002 |
| MA(1) | -0.304829 | 0.216558 | -1.407604 | 0.1639 |

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|---|---|---|---|
| R-squared | 0.204555 | Mean dependent var | 0.006335 |
| Adjusted R-squared | 0.180810 | S.D. dependent var | 0.006323 |
| S.E. of regression | 0.005723 | Akaike info criterion | -7.446676 |
| Sum squared resid | 0.002195 | Schwarz criterion | -7.350312 |
| Log likelihood | 263.6337 | Hannan-Quinn criter. | -7.408399 |
| F-statistic | 8.614790 | Durbin-Watson stat | 1.930923 |
| Prob(F-statistic) | 0.000468 | | |

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| Inverted AR Roots | .63 |
| Inverted MA Roots | .30 |

Find out which model is the best model to forecast GDP.