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**SCHOOL OF BUSINESS, ECONOMICS AND MANAGEMENT**

**ECF480- ADVANCED ECONOMETRICS**

**MID SEMESTER ASSIGNMENT.**

**Instructions to Candidates:**

1. **This assignment will comprise 20% of your total grade.**
2. **There are THREE questions in this assignment, answer all questions.**
3. **Attempt all questions individually for your own benefit.**
4. **Ensure your answers are correct and concise.**
5. **All assignments must be sent via email at** [**jmwafulirwa@unilus.ac.zm**](mailto:jmwafulirwa@unilus.ac.zm) **and couriered to;**

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1. **All assignments submitted after the 4th of May, 2020 will not be accepted unless accompanied with a sick note.**

**Question One**

Below is data on money supply, exchange rates and inflation. As an economist, you are tasked to analyse the impact of money supply.

|  |  |  |
| --- | --- | --- |
| **Money Supply** | **Inflation** | **Exchange rates** |
| 30 | 10 | 5.6 |
| 32.5 | 9.5 | 4.8 |
| 28.7 | 11.2 | 5.9 |
| 29.2 | 7.6 | 5.5 |
| 33.7 | 8.8 | 4.9 |
| 28.9 | 6.4 | 5.8 |
| 27.6 | 5.5 | 6.2 |
| 26.9 | 5.7 | 6.5 |
| 26.6 | 4.5 | 6.8 |
| 27.0 | 4.9 | 7.3 |

1. Express the above data in Matrix form. **[3 Marks]**
2. Using Matrix Algebra, derive the OLS estimator of the’s. **[6 Marks]**
3. Using Matrix Algebra, derive the variance of **[6 Marks]**
4. Compute the matrix **[10 Marks]**
5. Compute the variance covariance of the residuals **[5 Marks]**
6. Compute the variance covariance matrix of **[4 Marks]**
7. Compute and interpret the R² **[6 Marks]**
8. Compute the F statistic **[5 Marks]**

**[TOTAL: 45 MARKS]**

**Question Two**

Another key estimation procedure for regression models is the maximum likelihood approach that requires the probability distribution of the variable is known.

Consider the probability distribution below;

1. Derive the MLE of . **[12 Marks]**
2. Given that t = show that the MLE of t is asymptotically unbiased.

**[5 Marks]**

1. If the variance of is t, show that t is asymptotically efficient. **[3 Marks]**

**[TOTAL: 20 MARKS]**

**Question Three**

The Output below shows the relationship between Profits and company expenditures.

Cross-sectional regression Number of obs = 37

Root MSE = 2.6e+10 F ( 1, 35) = 10.81

Prob > F = 0.0023

R-squared = 0.2360

Adj R-squared = 0.2142 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Profits\* Coef. Std. Err. z P>|z| [95% Conf. Interval]

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Advertising\* -.00042 .0000835 5.03 0.000 .0002564 .0005835

C\_service -.0017295 .0009139 -1.89 0.058 -.0035207 .0000618

Investment\* -.0597211 .0190178 3.14 0.002 .0224469 .0969953

\_cons -.005311 .0012431 -4.27 0.000 -.0077475 -.0028745

\* Indicates variables in log form

1. Provide interpretations for the coefficients of advertising and customer service. **[4 Marks]**
2. Using any approach, test if advertising has a positive significant impact on profits at 5% level of significance. **[6 Marks]**
3. Carry out a test of overall significance of the model above at 1% level of significance. **[6 Marks]**
4. Assuming the Durbin Watson statistic is 3.41, carry out a test of autocorrelation. Use 5% level of significance. **[7 Marks]**
5. Generalised least squares is one of the approaches used to correct autocorrelation or heteroscedasticity. Show how this can be used to correct for heteroscedasticity and the assumption made. **[6 Marks]**

**[TOTAL: 35 MARKS]**