UGANDA MARTYRS UNIVERSITY
NKOZI

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DAPARTMENT OF ECONOMICS

SUPPLEMENTARY EXAMINATIONS, 2014/15

Econometrics II

ECO 3202

DATE: Tuesday, August 04, 2015

TIME: 02:00 PM – 05:00PM

Instructions:

1. Attempt any **FOUR** questions.
2. Do not write anything on the questions paper.
3. Carefully read through ALL the questions before attempting.
4. No **names** should be written anywhere on the examination book.
5. Ensure your work is **clear** and **readable**. Untidy work shall be penalized.
6. Any type of examination Malpractice will lead to automatic disqualification.
7. Ensure that your **ID number** is indicated on all pages of the examination answer booklet.

Question One

(a) Write short notes on the following.

(i) Over identification. *(03Marks)*

(ii) Instrumental variable. *(02Marks)*

(iii) Reduced form equations. *(03Marks)*

(b) The following two structural equations represent a simple demand – supply model.

Demand; $Q_t = \alpha_0 + \alpha_1 P_t + \alpha_2 Y_t + u_{1t};$ $\alpha_1 < 0 \; and \; \alpha_2 > 0$

Supply; $Q_t = \beta_0 + \beta_1 P_t + u_{2t};$ $\beta_1 > 0$

Where Q is quantity, P is price and Y is consumers' income. It is assumed that the market is cleared in every year so that Q_t represents both quantity bought and sold in year t.

(i) Why is this a simultaneous – equations model? *(03Marks)*

(ii) Which are the endogenous and exogenous variables of the system? *(04Marks)*

(iii) Find the reduced – form equations corresponding to the structural equations above. *(10 Marks)*

Question Two

(a) Explain the following as applied to time series econometric modeling.

(i) Stationarity *(02Marks)*

(ii) White Noise Process *(03Marks)*

(iii) Auto Regressive Process *(02Marks)*

(b) Derive the mean, variance and auto covariance of a Moving Average (MA) process of order one. *(10Marks)*

(b) Given the following Moving Average (MA) process.

$Y_t + 2.4 + 0.34\Sigma_{t-1} + \Sigma_t$; Where $Y_t \sim N(0,1)$ and $\Sigma_t \sim N(0, \delta^2)$

(i) Find the mean and variance. *(04 Marks)*

(ii) Compute the auto covariance of order three and auto correlation at the fourth lag. *(04 Marks)*

Question Three

(a) Give a clear distinction between Ordinary Least Squares (OLS) and Maximum Likelihood Estimation (MLE) methods of estimation. *(05 Marks)*

(b) What are the asymptotic properties of Maximum Likelihood Estimators (MLE)? *(08Marks)*

(c) Use MLE method to derive the estimators of parameters of the linear model;

$$Y_i = \beta_0 + \beta_1 X_i + u_i \; \forall i = 1, 2, 3, \ldots\ldots, n$$

Where, $u_i \sim N(0, \delta^2), E(u_i u_j) = 0 \; \forall i \neq j$

$$Y_i \sim N(\beta_0 + \beta_1 X_i, \delta^2), E(Y_i Y_j) = 0 \; \forall i \neq j$$ *(12Marks)*

Question Four

(a) The speed at which variances and covariances of OLS estimators increase, can be seen with the Variance Inflating Factor (VIF). Explain how VIF can be used to demonstrate the extent of multicollinearity in any given data series.

(05Marks)

(b) Explain the Rule-of-Thumb procedures that can be applied to address the problem of multicollinearity. *(10Marks)*

(c) Given the following two-variable model:

$Y_i = \beta_1 X_{0i} + \beta_2 X_i + u_i$ *Where* $X_{0i} = 1$ *for each* i.

And, the variance of the disturbance term u_i *is heteroscedastic.*

(i) Assuming that the heteroscedastic variances δ_i^2 are known. Show how the method of Generalised Least Squares (GLS) can be used to obtain variables that satisfy the standard least-squares assumptions.

(05Marks)

(ii) Illustrate that, GLS is capable of producing estimators that are BLUE, when the variance of the disturbance term in the GLS equation is constant. *(05Marks)*

Question Five

(a) Give at least three reasons why assumptions are necessary in regression models. *(06Marks)*

(b) Define Autocorrelation and explain ways of overcoming the problems resulting from Autocorrelation. *(10Marks)*

(c) Consider the dummy variable regression model below:

$Y_i = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + u_i$ Where; $Y_i = Average\ income\ of\ a\ farmer$

$D_1 = \begin{cases} 1 & if\ Coffee\ farmer \\ 0 & Otherwise \end{cases}$ $D_2 = \begin{cases} 1 & if\ Cotton\ farmer \\ 0 & Otherwise \end{cases}$

Data was collected on variables defined above from farmers in Mpigi district and OLS regression produced the following results.

Income	**Coefficient.**	**t**	**P>|t|**
D_{1i}	331.8409	2.04	0.001
D_{2i}	111.7273	2.64	0.132
Constant	158.3864	1.98	0.450

(i) Give the interpretation of each of the coefficient estimates and comment on their significance. *(06Marks)*

(ii) Compute the average income of the farmers who grow both coffee and cotton. *(04Marks)*

Question Six

(a) Explain the following as used in choosing among competing models and in comparing models for forecasting purposes.

(i) Adjusted R Squared Criterion *(05Marks)*

(ii) Akaike's Information Criterion (AIC) *(05Marks)*

(iii) Schwarz's Information Criterion (SIC) *(05Marks)*

(b) Consider the *EViews* results for the regression of real consumption expenditure (CEXP) on real disposable income (DINC), real wealth (WEALTH), and real interest rate (INTR) for Uganda for the period 1960–2013.

Dependent Variable: LOG(CEXP)
Method: Least Squares
Sample: 1960 2013
Included observations: 54

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.276729	2.547961	-3.248373	0.0021
LOG(DINC)	1.209320	0.266376	4.539897	0.0000
LOG(WEALTH)	1.429314	0.315217	4.534379	0.0000
LOG(DINC)*LOG(WEALTH)	-0.093355	0.032489	-2.873469	0.0060
INTR	-0.007660	0.003410	-2.246655	0.0292

R-squared	0.992235	Mean dependent var	7.825880
Adjusted R-squared	0.991601	S.D. dependent var	0.552464
S.E. of regression	0.050631	Akaike info criterion	-3.040489
Sum squared resid	0.125611	Schwarz criterion	-2.856324
Log likelihood	87.09320	F-statistic	1565.337
Durbin-Watson stat	1.159609	Prob(F-statistic)	0.000000

Note: LOG stands for natural log.

(i) Interpret the coefficients of the estimated regression model. *(06Marks)*

(ii) Is there reason to suspect presence of serial correlation? *(04Marks)*

Good Luck