



The University of Zambia

in association with

ZCAS University



BEC/BEF341 ECONOMETRICS

FINAL EXAMINATION

22nd JUNE 2021

16:00-20:00HRS

TIME ALLOWED: THREE HOURS AND 30 MINUTES

INSTRUCTIONS:

1. Section A: this question is **compulsory** and must be attempted.
2. Sections B: Answer **TWO (2)** questions from this section.
3. This examination paper carries a total of **80 marks**.



QR Access Code: ac31fcd1

SECTION A: Question 1 is compulsory and must be attempted

Question 1

The model below is a regression of logarithm of expenditure on gasoline on log of personal disposable income and the log of price of gasoline.

Model 5: OLS, using observations 1959–2003 (T = 45)

Dependent variable: LGGASO

	coefficient	std. error	t-ratio	p-value	
const	-1.84632	0.271826	-6.792	2.88e-08	***
LGDPI	0.847646	0.0463479	18.29	1.29e-021	***
LPGGASO	-0.104670	0.0322767	-3.243	0.0023	***
Mean dependent var	4.758817	S.D. dependent var	0.314988		
Sum squared resid	0.099819	S.E. of regression	0.048751		
R-squared	0.977135	Adjusted R-squared	0.976046		
F(2, 42)	897.4257	P-value(F)	3.49e-35		
Log-likelihood	73.64649	Akaike criterion	-141.2930		
Schwarz criterion	-135.8730	Hannan-Quinn	-139.2725		
rho	0.944552	Durbin-Watson	0.105474		

- a. The following test is conducted to verify which assumption has been violated. Study the output below (model6) and identify the name of the test, state the null hypothesis and carry out the test. **(20marks)**

Model 6: OLS, using observations 1960–2003 (T = 44)

Dependent variable: ELGGASO

	coefficient	std. error	t-ratio	p-value	
const	-0.127743	0.0812740	-1.572	0.1239	
LGDPI	0.0284692	0.0137611	2.069	0.0451	**
LPGGASO	-0.0281122	0.00945058	-2.975	0.0050	***
ELGGASO_1	0.969979	0.0454142	21.36	1.75e-023	***
Mean dependent var	0.001227	S.D. dependent var	0.047456		
Sum squared resid	0.007781	S.E. of regression	0.013947		
R-squared	0.919653	Adjusted R-squared	0.913627		
F(3, 40)	152.6137	P-value(F)	6.21e-22		
Log-likelihood	127.6530	Akaike criterion	-247.3060		
Schwarz criterion	-240.1693	Hannan-Quinn	-244.6594		
rho	-0.057280	Durbin's h	-0.398464		

- b. The following test is conducted to verify which assumption has been violated. Study the output below (model7) and identify the name test, state the null hypothesis and carry out the test. **(20marks)**

Model 7: OLS, using observations 1959–2003 (T = 45)
 Dependent variable: ESQ LGGASO

	coefficient	std. error	t-ratio	p-value
const	0.508949	0.395176	1.288	0.2054
LGDPI	-0.183958	0.133821	-1.375	0.1771
LGP GASO	0.134380	0.0838139	1.603	0.1169
sq_LGDPI	0.0149052	0.0111577	1.336	0.1893
sq_LGP GASO	-0.000719762	0.00427376	-0.1684	0.8671
LGDPI LGP GASO	-0.0160205	0.0134719	-1.189	0.2416
Mean dependent var	0.002218	S.D. dependent var		0.002209
Sum squared resid	0.000134	S.E. of regression		0.001851
R-squared	0.377999	Adjusted R-squared		0.298255
F(5, 39)	4.740174	P-value(F)		0.001770
Log-likelihood	222.5199	Akaike criterion		-433.0399
Schwarz criterion	-422.1999	Hannan-Quinn		-428.9989
rho	0.737546	Durbin-Watson		0.570697

(total: 40 marks)

SECTION B: Attempt any TWO questions in this section

Question 2

We are estimating the relationship between being divorced and cognitive ability, level of schooling, age, earnings, weight, faith(christianity), ethnicity and gender. The variables are DIVORCED coded 1 and 0 not divorced, S, ASVBC, AGE, EARNINGS, WEIGHT, FEMALE(1 and 0 male), FAITHC(Christian 1 and 0 other), ETHBLACK(1 and 0 other) and ETHWHITE(1 and 0 other). The DIVORCED variable is binary response. We run a logit

model with the following probability density function $F(x) = \frac{1}{1 + e^{-z}}$ and

$$Z = \beta_1 + \beta_2 AGE + \beta_3 S + \beta_4 EARNINGS + \beta_5 WEIGHT + \beta_6 ASBVC + \delta_1 FAITHC + \delta_2 ETHBLACK + \delta_3 FEMALE + \delta_4 ETHWHITE$$

Model 3: Logit, using observations 1-540
Dependent variable: DIVORCED
Standard errors based on Hessian

	coefficient	std. error	z
const	6.00726	2.26302	2.655
S	-0.196926	0.0662554	-2.972
AGE	-0.0689223	0.0525272	-1.312
FEMALE	0.390727	0.272160	1.436
FAITHC	0.179542	0.208563	0.8609
ASVABC	-0.00983347	0.0160311	-0.6134
WEIGHT02	-0.00853580	0.00331183	-2.577
EARNINGS	0.00239055	0.00999203	0.2392
ETHBLACK	0.159660	0.559418	0.2854
ETHWHITE	-0.260103	0.463783	-0.5608

	Mean
FEMALE	0.50000
ETHBLACK	0.10185
ETHWHITE	0.84630
AGE	40.804
S	13.661
DIVORCED	0.21667
FAITHC	0.32037
ASVABC	51.206
WEIGHT02	178.98
EARNINGS	19.013

Calculate the marginal effects of each variable and interpret them.

(20marks)

(Total: 20 marks)

Question 3

- The data below indicate the relationship between the cost for an institution and the number of enrolments with dummy variables for the type of school. The variables such as RES is residential school coded 1 and 0 for non-residential school, TECH is coded 1 for technical school and 0 for other school, WORKER is 1 for skilled workers and 0 for other, VOC is 1 for vocational schools and 0 for others. GEN is coded 1 for general schools and 0 others.

Model 4: OLS, using observations 1-74
Dependent variable: COST

	coefficient	std. error	t-ratio	p-value	
const	-50653.2	26294.4	-1.926	0.0582	*
N	334.422	39.7433	8.415	3.87e-012	***
RES	63449.2	33777.2	1.878	0.0646	*
TECH	115350	33415.2	3.452	0.0010	***
WORKER	131001	28136.4	4.656	1.54e-05	***
VOC	52096.2	30513.6	1.707	0.0923	*
Mean dependent var	187418.0	S.D. dependent var	141969.9		
Sum squared resid	5.15e+11	S.E. of regression	86998.60		
R-squared	0.650201	Adjusted R-squared	0.624481		
F(5, 68)	25.27950	P-value(F)	2.61e-14		
Log-likelihood	-943.5227	Akaike criterion	1899.045		
Schwarz criterion	1912.870	Hannan-Quinn	1904.560		

A. Using output from model 4 state all available equations that you can formulate.

(5marks)

B. Interpret the coefficients.

(5marks)

- ii. The second output data below indicate the relationship between the cost for an institution and the number of enrolments with dummy variables for the type of school which are either occupational school (1) or regular school (0) and residential (1) or non-residential schools (0). The variable NOCC is a product of enrolment and OCC.

Model 2: OLS, using observations 1-74
Dependent variable: COST

	coefficient	std. error	t-ratio	p-value	
const	51475.2	30928.8	1.664	0.1006	
N	152.298	59.2793	2.569	0.0124	**
RES	47502.6	28600.7	1.661	0.1013	
NOCC	271.953	75.0794	3.622	0.0006	***
OCC	-16916.0	41374.9	-0.4088	0.6839	
Mean dependent var	187418.0	S.D. dependent var	141969.9		
Sum squared resid	4.52e+11	S.E. of regression	80969.05		
R-squared	0.692552	Adjusted R-squared	0.674729		
F(4, 69)	38.85700	P-value(F)	5.30e-17		
Log-likelihood	-938.7478	Akaike criterion	1887.496		
Schwarz criterion	1899.016	Hannan-Quinn	1892.091		

A. Using output from model 2 state all available equations that you can formulate.

(5marks)

B. Interpret the coefficients.

(5marks)

(Total: 20 marks)

Question 4

The output gives the results of a logarithmic regression of expenditure on food on disposable personal income and the relative price of food. Study the outputs and answer the questions below

Model 1: OLS, using observations 1960-2003 (T = 44)
Dependent variable: l_FOOD

	coefficient	std. error	t-ratio	p-value	
const	0.383871	0.178734	2.148	0.0378	**
l_DPI	0.335563	0.0676695	4.959	1.35e-05	***
l_PFOOD	-0.0773426	0.0183969	-4.204	0.0001	***
l_FOOD_1	0.527879	0.105996	4.980	1.26e-05	***
Mean dependent var	6.030691	S.D. dependent var	0.216227		
Sum squared resid	0.006159	S.E. of regression	0.012409		
R-squared	0.996936	Adjusted R-squared	0.996706		
F(3, 40)	4338.609	P-value(F)	2.73e-50		
Log-likelihood	132.7936	Akaike criterion	-257.5872		
Schwarz criterion	-250.4505	Hannan-Quinn	-254.9406		
rho	0.322802	Durbin's h	3.011163		

A. What is the short run relationship we have from the output?

(6marks)

B. What is the long run relationship we have?

(6marks)

C. Carry out a test for autocorrelation that is possible from the output.(6marks)

D. What model would this be?

(2marks)

(total 20 marks)

END OF EXAMINATION