

Answer ALL questions

Instructions

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This paper consists of 9 pages including the cover page

Subject: Econometric Techniques

Time: 3 Hours

Marks: 100

DEGREE EXAMINATIONS  
JUNE EXAMINATIONS

ECO 513/E

UNIVERSITY OF FORT HARE  
EAST LONDON CAMPUS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010671	0.003016	3.538382	0.0011
AR(1)	-0.195365	0.221144	-0.883428	0.3824
AR(2)	0.800937	0.225098	3.558164	0.0010
MA(1)	0.467478	0.372586	1.254687	0.2171
MA(2)	-0.455061	0.390666	-1.164835	0.2512
SIGMASQ	4.92E-05	1.08E-05	4.568309	0.0000
R-squared	0.419420			
Adjusted R-squared	0.344987			
S.E. of regression	0.007537			
Sum squared resid	0.002215			
Log likelihood	158.1989			
F-statistic	5.634844			
Prob(F-statistic)	0.000530			

Dependent Variable: DLCP1  
 Method: ARMA Maximum Likelihood (BFGS)  
 Date: 04/23/25 Time: 00:44  
 Sample: 1987Q2 1998Q2  
 Included observations: 45  
 Convergence achieved after 26 iterations  
 Coefficient covariance computed using outer product of gradients

Table 1: Model 1

- (i). Looking at Figure 3, comment on the stationarity (time series properties of the data) [2 Marks]
- (ii). Based on the ACF and PACF results presented on Figure 3, determine the possible numbers for p and q, as well as the number of models which may emanate from this test. Explain your answer in detail. [6 marks]
- (d). Assuming that 3 models were identified and estimated with results reported in Table 1, 2 and 3, you are required to answer the questions that follows:

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1	0.115	0.115	0.374	0.366	7.5199	0.023
2	0.041	-0.129	7.6037	0.055		
3	0.662	0.644	30.180	0.000		
4	-0.055	-0.368	30.342	0.000		
5	0.250	0.008	33.736	0.000		
6	-0.117	0.106	34.504	0.000		
7	0.500	0.041	48.780	0.000		
8						

Figure 3: ACF and PACF of the DLCP1 series

- (c). The researcher proceeded to transform the CPI variable through natural logarithm and also was first differenced. The results are presented on Figure 3.
- (i). Based on Figure 1 and Figure 2, determine whether the CPI variable is stationary or not. Explain your answer in detail. [2 marks]

$$\ln(WAGE) = \beta_1 + \beta_2 HOURS + \beta_3 EDUC + \beta_4 EXPER + e$$

Suppose you want to estimate a wage equation for married women of the form:

**Question 2** (15 Marks)

[6 Marks]

(i). Comment on the diagnostic results obtained and whether the model is acceptable.



Figure 4: AR/MA Roots display graph

	AR roots	MA roots
1	0.005	0.005
2	-0.047	0.1710
3	-0.106	-0.106
4	0.080	0.079
5	-0.016	-0.027
6	0.174	0.174
7	-0.056	-0.048
8	-0.102	-0.098
9	-0.041	-0.005
10	0.074	0.028
11	-0.064	-0.074
12	-0.173	-0.198
13	-0.116	-0.102
14	0.091	0.096
15	0.055	0.031

Date: 03/27/24 Time: 13:48  
 Sample (adjusted): 1980Q4 1998Q2  
 Q-statistic probabilities adjusted for 4 ARMA terms

Table 5: Ljung Box Q statistic

Q-Stat	Prob	PAC	AC	Partial Correlation	Autocorrelation
1	0.0021	0.005	0.005	0.005	0.005
2	0.1710	-0.047	-0.106	0.079	0.080
3	0.216	-0.027	-0.016	0.174	-0.016
4	0.139	0.174	0.174	0.048	0.174
5	0.241	-0.048	-0.056	-0.098	-0.056
6	0.281	-0.098	-0.102	-0.005	-0.102
7	0.392	0.005	-0.041	0.028	0.005
8	0.462	0.028	0.074	0.074	0.074
9	0.538	-0.074	-0.064	-0.074	-0.064
10	0.538	-0.074	-0.064	-0.074	-0.064
11	0.373	0.198	-0.173	-0.198	0.198
12	0.363	0.8495	-0.116	-0.102	-0.116
13	0.390	10.595	0.091	0.096	0.091
14	0.454	10.877	0.055	0.031	0.055

(e). Additional diagnostic tests were performed, focusing on the Ljung Box Q statistic as well as the inverse roots of AR/MA Polynomials on the proposed best model as reported in Table 4.

(i). Evaluate all three models and choose the best model which can be utilised for forecasting. [18 Marks]

Test Statistic	Value
F-statistic	6.321054

Null hypothesis: No levels relationship  
 Number of cointegrating variables: 1  
 Trend type: Rest, constant (Case 2)  
 Sample size: 103

An estimation for cointegration was made utilising the Autoregressive Distributed Lag Model and the results are presented on Table 1.

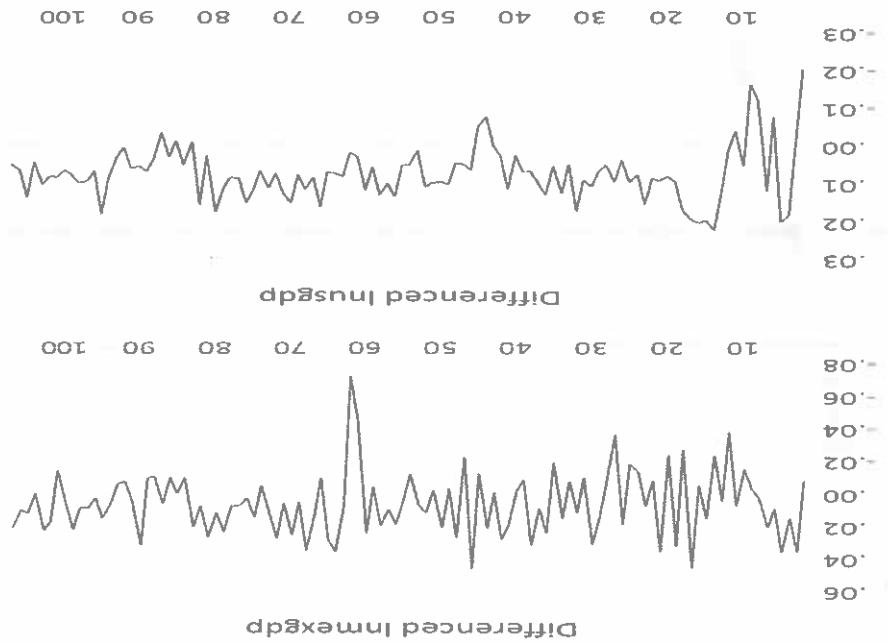


Figure 2: Graphical plots (First Difference series)

