UNIVERSITY EXAMINATIONS: 2013/2014

EXAMINATION FOR THE MASTERS OF SCIENCE (MSC) IN COMMERCE

MFI 604 ECONOMETRICS II (WEEKEND)

DATE: APRIL, 2014   **TIME: 3 HOURS**

INSTRUCTIONS: Answer Question One and Any Other Three Questions

QUESTION ONE

(a)   Explain briefly the following terms:

   (i)   Heteroscedasticiy

   (ii)   Autocorrelation

   (iii)   Multicollinearity

   (iv)   Weak stationarity

   (v)   Simultaneous equation bias   [10 Marks]

(b)   Outline the consequences of heteroscedasticity.   [4 Marks]

(c)   Explain the consequences of error terms being autocorrelated in a regression model.[4 marks]

(d)   Describe briefly the consequences of multicollinearity   [5 Marks]

(e)   Explain why is it in general important to test for non-stationarity in time series data before

   attempting to build an empirical model.   [6 Marks]

QUESTION TWO

(a)   A model was estimated for house prices as a function of the characteristics of the house

   (hedonic model)

   $Price = \beta_0 + \beta_1 lotsize + \beta_2 sqrft + \beta_3 bdrms + u$

   Where lotsize – size of land, *sqrft* – size of house, and *bdrms* – number of bedrooms.

   The regression (auxiliary) for White test was done and the following results were obtained.

```
* do auxiliary regression for version 1 of White test
. regress uhatsq lotsize sqrft bdrms lotsizesq sqrftsq bdrmssq lotsqrf lotbdrms s

      Source |       SS       df       MS                Number of obs =      88
-------------+------------------------------           F(  9,    78) =    5.39
       Model |  1.6784e+09      9   186492384           Prob > F      =  0.0000
    Residual |  2.7003e+09     78  34619264.4           R-squared     =  0.3833
-------------+------------------------------           Adj R-squared =  0.3122
       Total |  4.3787e+09     87  50330276.7           Root MSE      =  5883.8


-----------------------------------------------------------------------------
      uhatsq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+---------------------------------------------------------------
     lotsize |  -1.859507   .6370969    -2.92   0.005    -3.127869   -.5911443
       sqrft |  -2.673917   8.662183    -0.31   0.758      -19.919    14.57116
       bdrms |  -1982.841   5438.482    -0.36   0.716     -12810.03    8844.345
   lotsizesq |  -4.98e-07   4.63e-06    -0.11   0.915     -9.72e-06    8.72e-06
     sqrftsq |   .0003523   .0018396     0.19   0.849     -.0033101    .0040146
     bdrmssq |   289.7541   758.8302     0.38   0.704     -1220.961    1800.469
     lotsqrf |   .0004568   .0002769     1.65   0.103     -.0000945     .001008
    lotbdrms |   .3146468   .2520936     1.25   0.216      -.187233    .8165266
    sqrfbdrms |  -1.02086   1.667154    -0.61   0.542     -4.339909    2.298189
       _cons |   15626.24   11369.41     1.37   0.173     -7008.516       38261
```

Conduct the White test clearly specifying the null and the alternative hypotheses. [7 Marks]

(b) Testing for non-normality was carried out using Jarque- Bera test and the test statistic was 1004 and observation were 252. Carry the at 5% level. [7 Marks]

(c) Explain the consequences of non-normality in a small sample. [3 Marks]

(d) Given the following test for linear restriction at 5% level. [6 Marks]

Unconstrained regression with SSR = 3844, and restricted regression with 3959. The explanatory variables in unconstrained regression were three. The sample size was 400 and the explanatory variables were three.

QUESTION THREE

(a) Distinguish between order condition and rank condition for identification of system of simultaneous equation. [4 Marks]

(b) A researcher estimates the following model for stock market returns, but thinks that there may be a problem with it. By calculating the t-ratios, and considering their significance and by examining the value of R^2 or otherwise, suggest what the problem might be.

$Y_t = 0.638 + 0.402X_{1t} - 0.891X_{2t}$ with $R^2 = 0.96$, adj $R^2 = 0.89$

(0 .436) (0.291)   (0.763)

How might you go about solving the perceived problem?   [10 Marks]

(c)   Consider a multiple regression with two explanatory variables and a sample size of 20. The results gave a Durbin-Watson statistic = 0.2109. Conduct test for autocorrelation at 5% level.

[9 Marks]

QUESTION FOUR

(a)   An econometrician suspects that the residuals of his model might be autocorrelated. Explain the steps involved in testing this theory using the Breush-Godfrey test.   [8 Marks]

(b)   The econometrician follows your guidance in part (b) and obtains the following results: n*R-squared = 15.15657 with a sample size of 40 observations. Perform the test at 5 per cent level.

[7 Marks]

(c)   Suppose you have the following:

$$Y_t = \beta_0 + \beta_1 X_t + u_t \text{ where } u_t = \rho u_{t-1} + v_t$$

Explain how you correct for autocorrelation using Cochrane-Orcutt method.   [8 Marks]

QUESTION FIVE

(a)   Explain steps involved in the Ramsey's RESET test for misspecification.   [6 Marks]

(b)   Discuss how a researcher might test for cointegration between variables using the Johansen approach.   [8 Marks]

(c)   Explain the steps involved in the formulation of an error correction model, specifying the model and how the parameters are interpreted.   [9 Marks]

QUESTION SIX

(a)   What stylised features of financial data cannot be explained using linear time series models?

[6 Marks]

(b)   Which of these features could be modelled using a GARCH(1,1) process?   [3 Marks]

(c)   Why, in recent empirical research, have researchers preferred GARCH(1,1) models to pure ARCH(p)?   [4 Marks]

(d)   Describe two extensions to the original GARCH model. What additional characteristics of financial data might they be able to capture?   [10 Marks]