Westminster Business School
School of Finance and Accounting
7FNCE044 Predictive Analysis for Decision Making
Semesters 1 & 2
Week 4
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Seminar Week 4

Linear Regression: Extension II

Applied Questions:

1. Consider the following demand for money equation

$$lnM_t^* = \beta_0 + \beta_1 lnR_t + \beta_2 lnY_t + u_t$$

where lnM_t^* is desired, or long run, demand for money (real cash balances), lnR_t long term interest rate (in %), and lnY_t is real aggregate income. All variables are expressed in natural logarithm form. The term u_t refers to the error term. The sample size is 200 observations.

Since the desired level demand variable is not directly observable, the stock adjustment hypothesis is assumed, namely:

$$lnM_t - lnM_{t-1} = \delta(lnM_t^* - lnM_{t-1})$$

where $0 < \delta \leq 1$.

(a). The short run demand function for money is estimated using OLS. The following are estimation output:

$$lnM_t = \underset{(0.5101)}{0.8561} - \underset{(0.0131)}{0.0634} lnR_t - \underset{(0.0366)}{0.0237} lnY_t + \underset{(0.0414)}{0.9607} lnM_{t-1}$$

$$R^2 = 0.9482,\ DW = 2.25, LM(1) = 2.11$$

where *DW* and *LM* refer to the Durbin-Watson and Breusch-Godfrey statistics.

What is the interpretation of short run interest rates and short run income? Do the estimates conform to economic theory?

(b). Test the hypothesis that the adjustment coefficient is equal to 1. State all steps and hypotheses.

(c). Compute and interpret the speed of adjustment.

(d). Test for autocorrelation in the residuals using an appropriate procedure. State all steps and hypotheses.

2. The following regression was run using quarterly data, amounting to 90 observations:

$$\hat{b}_t = \underset{(0.84)}{0.49} - \underset{(0.27)}{0.27} p_t + \underset{(0.071)}{0.22} y_t$$

$$\bar{R}^2 = 0.28,\ DW = 1.20,\ \text{LM(2)=7.42}$$

where (b_t) is the demand for text books, (p_t) is the price of a book and (y_t) is the total level of income, all variables are in logarithms (standard errors in parentheses). DW is the Durbin-Watson test for the first order of autocorrelation and LM(2) is the Lagrange Multiplier test for second order autocorrelation.

(i) Explain the steps involved in testing for the first order autocorrelation using the DW test.
(ii) Does the above regression suffer from first order autocorrelation?
(iii) Briefly Describe how you would conduct the LM test for autocorrelation. Does this model suffer from second order autocorrelation?

Computer Based Questions:

Question 1

Refer back to the datafile **nls80.xls**

Use Python (or any of the following: SPSS, R, Eviews) to answer the following questions:

1. Consider the wage equation:

$$\ln(wage_i) = \beta_1 + \beta_2 educ_i + \beta_3 hours_i + \beta_4 exper_i + \beta_5 tenure_i\ u_i \quad (1)$$

What variables do you think are endogenous? Why?

Given your answer above, what variables from the data file can be used as instruments?

2. Estimate the model using OLS. Test the hypothesis that experience, and tenure have the same effects. What do you conclude?

3. Let the set of instruments include number of siblings and father's education. Regress education on these two variables using OLS. Are these two jointly significant?

4. Re-run the regression in (1) using 2SLS and GMM. How do your results change? Explain.