WESS ECONOMETRICS

Exercise Sheet 4

1. A model BMI was estimated by OLS on 1832 for individuals aged above 50 year old (robust standard errors reported in brackets).

$$\ln(BMI_i) = \underset{(0.055)}{1.006} + \underset{(0.265)}{0.665}\ln(age_i) - \underset{(0.032)}{0.086}[\ln(age)_i]^2 + \underset{(0.011)}{0.048}M_i + e_i \qquad (1)$$

RSS=8.874, TSS=9.556

BMI Body Mass Index.

age Age in years.

M =1 if individual is male

(a) At the 1% level test the hypothesis that the coefficient on M is equal to zero, against a 2-sided alternative.

(b) Calculate the p-value of the test in (a).

(c) At the 1% significance level test the joint significance of the coefficients.

(d) At the 5% significance level test that the elasticity of BMI with respect to age is zero for an individual aged 60, given the covariance between the coefficient on $\ln(age_i)$ and $[\ln(age)_i]^2$ is -0.006.

2. Consider a model for regional unemployment in England. Using data for 298 regions in estimating the model by OLS yielded the results:

$$\ln(ue_i) = \underset{(0.41)}{0.62} - \underset{(0.087)}{0.171}\ln(w)_i + \underset{(0.008)}{0.218}\ln(y)_i + \underset{(0.048)}{0.171}SE_i + \underset{(0.019)}{0.037}SE_i \times \ln(w)_i + e_i \qquad (1)$$

$R^2 = 0.092$, $RSS = 6.147$, ln = natural log

where *ue* = regional unemployment rate (%); *w* = regional real wages; *y* = regional gdp, *SE* = dummy variable (1 if region is in South East England, 0 if not); *L* = dummy variable (1 if region is London, 0 if not).

(a) Interpret the coefficients on the variables: $\ln(w)$, SE_i, $SE \times \ln(w)$.

(b) The variables L and $\ln(w) \times L$ were added into equation (1). Interpret the coefficients on these variables as well as that on the variable $SE \times \ln(w)$.

3. You are interested in performance of students in a Maths exam (E), which is measured in %. Based on a random sample of 386 individuals you estimate the following model:

$$\ln(E_i) = \underset{(0.95)}{3.81} + \underset{(0.136)}{0.512}\ln(R_i) - \underset{(0.061)}{0.142}[\ln(R_i)]^2 + \underset{(0.006)}{0.025}Male_i + e_i \qquad (1)$$

where, R = Hours of revision on Maths, measured between 1 and 50 (with an average of 8 hours), and $Male$ = 1 if individual is male and 0 otherwise.

(a) Sketch the nature of the relation specified in equation (1) on a graph of exam performance against hours of revision.

(b) Including a variable for performance in a test on Mathematical aptitude, yielded the following results:

$$\ln(E_i) = \underset{(0.51)}{2.95} + \underset{(0.026)}{0.108}\ln(R_i) - \underset{(0.019)}{0.002}[\ln(R_i)]^2 + \underset{(0.007)}{0.024}Male_i + \underset{(0.192)}{0.562}\ln(A_i) + e_i$$

What insights can you offer to explain the markedly different results?