ECONOMETRICS

Exercises 3:

1. (W 4e, C6.2) Use the data *wage1* behind this sheet for this exercise.

   a) Use OLS to estimate the equation

   $$\log(\texttt{wage}) = \beta_0 + \beta_1 \texttt{educ} + \beta_2 \texttt{exper} + \beta_3 \texttt{exper}^2 + u.$$

   b) Is $\texttt{exper}^2$ significant at the 1% level?

   c) Using the approximation

   $$\%\Delta \hat{\texttt{wage}} \approx 100(\hat{\beta}_2 + 2\hat{\beta}_3 \texttt{exper})\Delta \texttt{exper},$$

   find the approximate return to the fifth year of experience and to the twentieth year of experience.

   d) At what level of `exper` does additional experience actually lower predicted wage?

2. (W 4e, C6.3) Consider a model where the return to education depends upon the amount of work experience (and vice versa):

   $$\log(\texttt{wage}) = \beta_0 + \beta_1 \texttt{educ} + \beta_2 \texttt{exper} + \beta_3 \texttt{educ} \cdot \texttt{exper} + u.$$

   a) Show that the return to another year of education $\Delta \log(\texttt{wage})/\Delta \texttt{educ}$, holding `exper` fixed, is $\beta_1 + \beta_3 \texttt{exper}$.

   b) State the null hypothesis that the return to education does not depend on the level of `exper`.

   c) Use the data set *wage2* from exercise sheet 2 to test the null hypothesis above against the one-sided hypothesis, that the return to education increases with working experience.

   d) Let θ denote the return to education (in decimal form), when `exper`=10: $\theta = \beta_1 + 10\beta_3$. Obtain $\hat{\theta}$ and a 95% confidence interval for θ. *Hint: Write $\beta_1 = \theta - 10\beta_3$ and plug this into the equation; then rearrange. This gives the regression for obtaining the confidence interval for θ.*

3. (W 4e, C6.5 little modified) Use the housing price data *hprice1* behind this sheet to solve this exercise.

a) Estimate the model

$$\log(\texttt{price}) = \beta_0 + \beta_1 \log(\texttt{lotsize}) + \beta_2 \log(\texttt{sqrft}) + \beta_3 \texttt{bdrms} + u,$$

report and interpret the results.

b) What is the estimate of β_0 and β_2 if the square feet are changed to square meters? (1m=3.28ft).

c) Find the predicted value for log(price), when lotsize = 20 000, sqrft = 2 500, and bdrms = 4.

d) Using the method in the end of Ch 5 of the lecture notes, find the predicted price at the values given in c) by correcting with the estimate of the error variance assuming normally distributed errors.

e) As in d) but estimate the correction term from the data, dropping the assumption of normally distributed errors.