Worksheet week # 6

1. In 1986 Frederick Schut and Peter VanBergeijk published an article in which they attempted to see if the pharmaceutical industry practiced international price discrimination by estimation by estimating a model of the prices of pharmaceuticals in a cross section of 32 countries. The authors felt that if price discrimination existed, then the coefficient of per capita income in a properly specified price equation would be strongly positive. The reason they felt that the coefficient of per capita income would measure price discrimination went as follows: the higher the ability to pay, the lower (in absolute value) the price elasticity of demand for pharmaceuticals and the higher the price a price discriminator could charge. In addition, the authors expected that prices would be higher if pharmaceutical patents were allowed and that prices would be lower if price controls existed, if competition was encouraged, or if the pharmaceutical market in a country was relatively large. Their estimates were:

$$\widehat{P}_i = 38.22 + \underset{(0.21)}{1.43}\ GDPN_i - \underset{(0.22)}{0.6}\ CVN_i + \underset{(6.12)}{7.31}\ PP_i - \underset{(6.93)}{15.63}\ DPC_i - \underset{(7.16)}{11.38}\ IPC_i \ ,$$

where:

P_i	...	the pharmaceutical price level in the i-th country divided by that of the United States
$GDPN_i$	...	per capita domestic product in the i-th country divided by that of the United States
CVN_i	...	per capita volume of consumption of pharmaceuticals in the i-th country divided by that of the United States
PP_i	...	a variable equal to 1 if patents for pharmaceutical products are recognized in the i-th country and equal to 0 otherwise
DPC_i	...	a variable equal to 1 if the i-th country applied strict price controls and 0 otherwise
IPC_i	...	a variable equal to 1 if the i-th country encouraged price competition and 0 otherwise

(a) Develop and test appropriate hypotheses concerning the regression coefficients using the t-test at the 5 percent level. Do you think Schut and VanBergeijk concluded that international price discrimination exists? Why or why not?

(b) Set up 90 percent confidence intervals for each of the estimated slope coefficients.

2. Using data *wage.csv* estimate the model describing the impact of education and experience on wage:

$$wage = \beta_0 + \beta_1 educ + \beta_2 exper + \beta_3 exper^2 + \varepsilon$$

   (a) Import data into Gretl from the csv file.

   (b) Generate variable $exper^2$.

   (c) Why we include this variable into the model?

   (d) Estimate model with and without $exper^2$, compare R^2 and R^2_{adj}.

   (e) Comment on the signs and significance of β_1, β_2, and β_3 in the model with $exper^2$.

   (f) Test the following hypotheses in the model with $exper^2$:
       - test for the overall significance of the regression;
       - education has a significant impact on wage;
       - experience has a significant impact on wage.