

ECO82100 Econometrics I

Homework 4 (Due November 14)

1. A regression model with $K=16$ independent variable is fit using a panel of 7 years of data. The sums of squares for the 7 separate regressions and the pooled regression are shown below. The model with the pooled data allows a separate constant for each year. Test the hypothesis that the same coefficients apply in every year.

	1954	1955	1956	1957	1958	1959	1960	All
<i>Observations</i>	65	55	87	95	103	87	78	570
<i>e'e</i>	104	88	206	144	199	308	211	1425

2. You have a random sample from the model

$$y_i = x_i\beta_1 + x_i^2\beta_2 + \varepsilon_i \quad \text{with } E(\varepsilon_i|x_i) = 0$$

where y_i is wages (dollars per hour) and x_i is age. Describe how you would test the hypothesis that the expected wage for a 40-year old worker is \$20 an hour. You do not need to derive the theory behind your procedure.

3. Take the model

$$y_i = x_i'\beta + \varepsilon_i \quad \text{with } E(x_i\varepsilon_i) = 0$$

For a positive function $w(x)$, let $w_i = w(x_i)$. Consider the estimator

$$\tilde{\beta} = (\sum w_i x_i x_i')^{-1} (\sum w_i x_i y_i)$$

Find the probability limit of $\tilde{\beta}$. Is it consistent for β ? If not, under what assumption is $\tilde{\beta}$ consistent for β ?

4. Monte Carlo exercise 1 on page 182 of Hayashi's book.

5. In Solow's (1957) study of technical change in the U.S. economy, he suggests the following aggregate production function: $q(t) = A(t)f[k(t)]$, where $q(t)$ is aggregate output per work hour, $k(t)$ is the aggregate capital labor ratio, and $A(t)$ is the technology index. Solow considered four static models,

$$\begin{aligned} q/A &= \alpha + \beta \ln k, & q/A &= \alpha - \beta/k \\ \ln(q/A) &= \alpha + \beta \ln k, & \ln(q/A) &= \alpha - \beta/k. \end{aligned}$$

a). Solow's data for the years 1909 to 1949 are listed at

<http://pages.stern.nyu.edu/~wgreene/Text/tables/TableF7-2.txt>.

Use these data to estimate the α and β of the four functions listed above.

[Note: your results will not quite match Solow's]

Solows also states:

A scatter of q/A against k is shown in Chart 4. Considering the amount of a priori doctoring which the raw figures have undergone, the fit is remarkably right. Except, that is, for the layer of points which are obviously too high. These maverick observations relate to the seven last years of the period, 1943-1949. From the way they lie almost exactly parallel to the main scatter, one is tempted to conclude that in 1943 the aggregate production function simply shifted.

b) Draw a scatter diagram of q/A against k .

c) Estimate the four models you estimated in a) including a dummy variable for the years 1943-1949. How do your results change?

d) Solow went on to surmise that, in fact, the data were fundamentally different in the years before 1943 than during and after. If so, then one would guess that the regression should be as well. Use a Chow (structural break) test to examine the difference in the two subperiods using your four functional forms. Use an F test to test the hypothesis.