SOLUTIONS TO EXERCISE 8

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16.7

Here we have N = 50 cross-sectional units and T = 2 time series data. Refer to Point #2 in Sec. 16.5. Since we cannot regard the 50 states in the union as a random drawing, here FEM may be more appropriate.

16.8

The results are not substantially different insofar as the coefficients of the X variables are concerned. The intercepts are different, which you would expect because of the differences in the underlying assumptions of the two models.

16.9

(a). On the whole, the results make economic sense. For example, the log of the earnings is lower this year if one was unemployed in the previous year; it is also lower if your health in the previous year was poor.

(b). Qualitatively, the two models give similar results.

(c). Since we have 3774 observations, we have enough degrees of freedom to estimate a fixed effects model. But since the two models generally give similar results, one can opt for either model. More formally one can use the Hausman test to decide between the two models.

17.1

(a). False. Econometric models are dynamic if they portray the time path of the dependent variable in relation to its past values. Models using cross-sectional data are not dynamic, unless one uses panel regression models with lagged values of the regressand.

(b). True. The Koyck model assumes that all the distributed lag coefficients have the same sign.

(c). False. The estimators are biased as well as inconsistent.

(d). True. For proof, see the Johnston text cited in footnote # 30.

(e). False. The method produces consistent estimates, although in small samples the estimates thus obtained are biased.

(f). True. In such situations, use the Durbin h statistic. However, the Durbin d statistic can be used in the computation of the h statistic.

(g). False. Strictly speaking, it is valid in large samples.

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(h). True. The Granger test is a measure of precedence and information content but does not, by itself, indicate causality in the common use of the term.

17.7

(a). Since $\beta_k = \beta_0 \lambda^k$,

$$\text{mean lag} = \frac{\sum k\beta_k}{\sum_{k=0}^{k} \beta_k} = \frac{\beta_0 \sum k\lambda^k}{\beta_0 \sum \lambda^k} = \frac{\lambda/(1-\lambda)^2}{1/(1-\lambda)} = \frac{\lambda}{1-\lambda}$$

(b). If l is very large, the speed of adjustment will be slow.

17.8

Use formula $\frac{\sum k\beta_k}{\sum_{k=0}^{k} \beta_k}$ for the data in Table 17.1. This becomes $\frac{11.316}{1.03} = 10.986$.

17.14

(a). On average, over the sample period, the change in employment is positively related to output, negatively related to employment in the previous period and negatively related to time . The negative sign of the time coefficient and the negative sign of the time-squared variable suggest that over the sample period the change in employment has been declining, but declining at a faster rate. Note that the time coefficient is not significant at the 5% level, but the time-squared coefficient is.

(b). It is 0.297

(c). To obtain the long-run demand curve, divide the short-run demand function through by δ and drop the lagged employment term. This gives the long-run demand function as:

$$247.879 + 0.579Qt + 0.094t + 0.002t^2$$

(d). The appropriate test statistic here is the Durbin h. Given that $n = 44$ and $d = 1.37$, we obtain:

$$h = (1 - \frac{d}{2})\sqrt{\frac{n}{1 - nVar\,(\text{coef of } E_{t-1})}} = \left(1 - \frac{d}{2}\right)\sqrt{\frac{44}{1 - 44\,(0.001089)}} = 2.414$$

Since h asymptotically follows the normal distribution, the 5% critical value is 1.96. Assuming the sample of 44 observations is reasonably large, we can conclude that there is evidence of first-order positive autocorrelation in the data.

17.15

a. It is $(1 - 0.864) = 0.136$.

b. The short-run price elasticity is 0.218, and the long-run price elasticity is (-0.218/0.136) = -1.602.

c. The short-run interest rate elasticity is 0.855. The long-run elasticity is (-0.855/0.136) = -6.287.

d. The rate of adjustment of 0.136 is relatively low. This may be due to the nature of technology in this market. Remember that tractors are a durable good with a relatively long life.