



BUSS 230: Managerial Economics
Fall 2011-2012
Regression Assignment
Sections 1 to 6
Due Date: Monday, December 5, 2011

Instructions: The assignment contains 4 questions. Complete all the questions. The answers should be submitted individually. Assignments are due back in class. **Data required for the assignment can be found on the Moodle webpage of the course. Submit the excel regression output (results) with your assignment.**

Question 1

Consider a production function of the form $Q=f(L, K)$ where Q is the output measure and L and K are labor and capital inputs, respectively. A popular production function is the Cobb-Douglas equation:

$$\ln(Q) = \beta_1 + \beta_2 \ln(L) + \beta_3 \ln(K) + e$$

- a. Interpret the coefficients β_2 and β_3 .
- b. Use the 33 observations in the file *cobb.xls* to estimate the Cobb-Douglas production function.
- c. Test, at the 5% level, the individual significance of the coefficients β_1 , β_2 and β_3 .
- d. Test, at the 5% level, the *joint significance* of the variables in this regression.
- e. Comment on the fit of this regression.
- f. Does this production function exhibit increasing, decreasing or constant returns to scale? Justify your answer.
- g. Do you find your results in parts (c) and (d) to be coherent? If not, do you suspect a certain problem (autocorellation, heteroskedasticity or multicollinearity) with the above regression?
- h. Identify the problem with the above regression by computing one appropriate measure.

Question 2

Consider the following three demand equations:

$$\ln q_{1t} = \beta_{11} + \beta_{12} \ln p_{1t} + \beta_{13} \ln y_t + e_{1t}.$$

$$\ln q_{2t} = \beta_{21} + \beta_{22} \ln p_{2t} + \beta_{23} \ln y_t + e_{2t}.$$

$$\ln q_{3t} = \beta_{31} + \beta_{32} \ln p_{3t} + \beta_{33} \ln y_t + e_{3t}.$$

Where q_{it} is the quantity consumed of the i th commodity, $i = 1, 2, 3$ in the t th time period, $t = 1, 2, \dots, 30$, p_{it} is the price of the i th commodity in time t and y_t is disposable income in period t . The commodities are meat ($i=1$), fruits and vegetables ($i=2$), and cereals and bakery products ($i=3$). The data is found in the file *demand.xls*.

- What signs do you expect for the coefficients $\beta_{12}, \beta_{13}, \beta_{22}, \beta_{23}, \beta_{32}$ and β_{33} .
- Interpret the coefficients $\beta_{12}, \beta_{13}, \beta_{22}, \beta_{23}, \beta_{32}$ and β_{33} .
- Using excel, estimate each regression equation.
- Test, at the 5% level, the significance of the coefficients $\beta_{12}, \beta_{13}, \beta_{22}, \beta_{23}, \beta_{32}$ and β_{33} .
- Comment on the fit of these regression equations.

Question 3

A portfolio manager is interested in forecasting the value of the S&P500 index (which is denoted as P_t). To do so, he collects quarterly observations on the value of the S&P500 index over the period 1980Q1 to 2010Q3. This data can be found in the file *S&P500Q.xls*. The portfolio manager postulates the following forecasting equation:

$$P_t = a + bt + c_1D_1 + c_2D_2 + c_3D_3 + e_t$$

Where:

$$t = 1, 2, \dots, 123.$$

$$D_1 = 1 \text{ if } t \text{ is quarter 1}$$

$$D_2 = 1 \text{ if } t \text{ is quarter 2}$$

$$D_3 = 1 \text{ if } t \text{ is quarter 3}$$

- What type of forecasting equation is the portfolio manager postulating?
- Construct the variables t , D_1 , D_2 and D_3 in your excel workbook.
- Estimate the forecasting equation above.
- Test, at the 5% level, the significance of the coefficient b . Is there evidence of a time trend in S&P500 prices?

- e. Test, at the 5% level, the significance of the coefficients c_1 , c_2 and c_3 . Is there evidence of seasonality in S&P500 prices?
- f. Given the equation you estimate, provide a forecast of the value of the S&P500 for 2010Q4.
- g. Provide 3 quarter and 5 quarter moving average forecasts of the S&P index for 2010Q4.
- h. Go to the webpage of Yahoo finance: <http://finance.yahoo.com> and look up the value of the S&P 500 index on December 31, 2010 (adjusted closing price). Consider this to be the value that materializes in 2010Q4. Which of the three competing forecasts (3 quarters moving average, 5 quarters moving average and forecast from the above equation) does better at forecasting the value of the S&P 500 index?

Question 4

The file entitled *inventoriesretailsales.xls* contains quarterly observations on U.S. E-commerce retail sales and business inventories for the period 1999Q4 to 2010Q3. Both business inventories and E-commerce retail sales are measured in millions of dollars.

- a. Plot the two variables in question against time (each in separate graph). Do they seem to exhibit an increasing/decreasing trend?
- b. Compute the correlation between business inventories and retail sales. Are they highly correlated?
- c. Would you *expect, at the outset*, any clear seasonal pattern in business inventories and retail sales? **If so, what is the seasonal pattern expected and why?**

Estimate an appropriate equation for each of the variables (denote retail sales by X_t and business inventories by Y_t) to answer the following two questions. Carefully write down the equation you choose to estimate and define its components. Proceed then to constructing the variables you define in your excel workbook.

- d. Is there statistical evidence of a time trend in retail sales and business inventories?
- e. Is there statistical evidence of a seasonal pattern in business inventories and retail sales?