Economics 403B: Project 1
Winter 2018, UCLA
Instructor: Dr. Convery

Due Date: January 22, 2018

The following project includes 4 mini-case studies. The assignment that you will submit, consists of a written report which includes answers to questions below (including plots), and R source code. Even if not explicitly asked for, for every regression or model fit, please provide ample interpretation of coefficients to demonstrate your understanding of the output.

Your report needs to be typed (no limit on the number of pages).

I. Airline Data
Begin by looking at airline data provided by the `AER` package in `USAirlines`. The data consists of 25 airline firms with 15 yearly observations from 1970-1984.

(a) Keep only firms with a complete set of observations. How many firms are left in this set?

(b) Examine the summary statistics for the variables in the data set.

(c) Estimate the following cost equation:

$$lnC_{i,t} = \beta_1 + \beta_2 lnQ_{i,t} + \beta_3 (lnQ_{i,t})^2 + \beta_4 lnP_{i,t}^{fuel} + \beta_5 load_{i,t}, \quad (1)$$

where C refers to cost, Q refers to output, and P refers to price.

(d) Now re-estimate the model in to account for (1) time effects only, (2) firm effect only, (3) both firm and time effects. How do the results differ?

(e) Compare the estimated time effects between the model with both time and firm effects, and the model with only time effects. Provide a plot visualizing the estimated yearly effects.

(f) Re-estimate the model to account for random effects.

(g) According to the Hausman test, is the random effect model a suitable choice for the data at hand? Why or why not?

II. Wage Equation
Cornwell and Rupert's 1988 paper analyzes returns to schooling. The data set `wage.csv` contains 595 observations of individuals over a 7 year span.

(a) Fit a regular OLS model to the data. Are there signs of heteroskedasticity?

(b) Compute both the White standard errors and the robust panel standard errors. Compare the estimates. What does this tell us about our model?

(c) Now account for individual effects within the data. Once you fit a model accounting for individual effects, add in a time component so that you now account for both individual and time effects. How does the estimated individual effect change between these two models?

(d) Fit a random effect model. Is this a more suitable model, or should we be using a fixed effect model? Use the Hausman test to confirm.

III. US Consumption

Use the data set `USConsump1993` in the package `AER`. This should contain time series data on US income and consumption expenditure from 1950 - 1993.

(a) Calculate the investment in each time period (where investment is defined as the difference between income and expenditure).

(b) Calculate the summary statistics of each variable, and estimate the underlying distributions.

(c) Regress income on expenditure using a regular OLS model.

(d) Now calculate a two stage least squares regression, using investment as an instrumental variable. Interpret the results.

IV. Women's Education

Use the data set `fertil1.raw`. This contains observations for a thousand women living in the United States between the years 1972 - 1984. Our goal is to understand the relationship between women's education and the number of children she has.

(a) Use OLS to estimate a model relating number of children ever born to a woman (kids) to years of education, age, region, race, and type of environment reared in. You should include a quadratic in age and should include year dummies. What is the estimated relationship between fertility and education? Holding other factors fixed, has there been any notable secular change in fertility over the time period?

(b) Re-estimate the model above, but use *mothereduc* and *fatheduc* as instruments for *educ*. Check for correlations.

(c) Allow the effect of education to change over time by including interaction term.

As a reminder, you must include R Source code. Your code needs to include proper comments to help e.g., a non-R expert understand and run your code. If you do not submit your code, you will not receive credit for the assignment.