ECNS 562 –Econometrics II
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Homework 5
Due Thursday, April 19

The data for this homework can be downloaded directly from R with the following code:
data("OECDGas", package = "AER"). The data will then be stored in a table labeled as
OECDGas. All estimation must be conducted in R.

Question 1. Consider the following gasoline demand equation:

$$ln\frac{GAS}{CAR} = \alpha + \beta_1 ln\frac{Y}{N} + \beta_2 ln\frac{P_{MG}}{P_{GDP}} + \beta_3 ln\frac{Car}{N} + u$$

where GAS/CAR is motor gasoline consumption per auto, Y/N is real per capita income,
P_{MG}/P_{GDP} is real motor gasoline prices and CAR/N denotes the stock of cars per capita. This
panel consists of annual observations across 18 OECD countries, covering the period 1960-
1978. **For parts (c) – (f), you are required to use OLS (lm() procedure in R) rather than using
the plm () procedure.**

(a) Discuss the differences between a one-way and two-way error model specification. Which
    seems more appropriate in the above case? Explain.
(b) Conduct the Breusch-Pagan test for individual effects. What are individual effects? What
    do the results imply about POLS?
(c) Calculate the Pooled OLS (POLS) estimator for the above model. Briefly report and
    summarize your results. Under what circumstances are the given standard errors biased?
(d) **Using only lm()**, compute the "within" Fixed Effects (FE) estimators for the above model.
    Briefly report and summarize your results.
(e) **Using only lm()**, compute the "between" estimator. Report your results. Discuss any
    important differences between this model and the one used in part (d) and what it might
    suggest about the results.
(f) **Using only lm()**, compute the "First Differenced" FE estimator. Report your results. When
    do you expect for this method to outperform the "within" FE model in terms of model fit
    (using adjusted R squared)? Explain.
(g) Calculate the Random Effects estimator and report your results.
(h) Conduct a Hasuman test to determine whether the "within" FE or RE model are more
    appropriate for this data. Are you surprised?