

Exercises in Empirical Industrial Organization and Consumer Choice

(Presentation: Tuesday, 2018-05-22T14:15 [2:15 p.m.], He18 R120)

Exercise 3 - Analysing the US market for broilers

This exercise has been adapted from an exercise of Glenn Harrison's IO course at the MIT

The data set *broiler.csv* (on Moodle) contains quantity, price, cost, and demographic variables on broiler chickens over 40 years in the United States. The data is taken from Dennis Epple and Bennett McCallum's paper: "Simultaneous Equation Econometrics: The Missing Example"¹. Inspecting the data, you will see the following column headers: *year*, *q*, *y*, *pchick*, *pbeef*, *pcor*, *pf*, *cpi*, *qproda*, *pop*, and *meatex*. The cryptic names are common in empirical work, even appearing in a dataset that is intended to be used for instructional purposes. To decode them have a look at Table 1.

column header	explanation
cpi	consumer price index
meatex	exports of beef, veal, and pork in pounds
pbeef	price index of beef
pchick	price index of chicken
pcor	price index of corn
pf	price index of chicken feed
pop	U.S. population in millions
q	per-capita consumption of chicken in pounds, measured by boneless equivalent
qproda	aggregate production of chicken in pounds
y	real disposable income per capita
year	year of data

Table 1: Decoding table for dataset *broiler.csv*.

We are interested in using this data to estimate the demand curve for broiler chickens. Our goal is to estimate the parameters of a demand function that is linear in logs

$$\log q = \alpha + \beta \log p + \log(X)\gamma + \varepsilon$$

¹Epple, Dennis and McCallum, Bennett T., "Simultaneous Equation Econometrics: The Missing Example" (2005). *Tepper School of Business*. Paper 111. <http://repository.cmu.edu/tepper/111>

What should enter the matrix X ? The answer is everything in our data set that we think is going to shift demand for chickens.

- (a) Why do we want our demand function to have such a form? Compare with Exercise 2 and the concept of elasticities.
- (b) Download the data set and load it into a data frame in R.
- (c) Perform an OLS regression of log prices on log quantity, leaving out all X 's. What is the interpretation of the coefficient on price, and what do you make of its sign? Do you think the OLS estimator is consistent?
- (d) Which additional explanatory variables should enter the demand function for chicken? Which variables may not enter the demand function but might be valid instruments for the price?
- (e) Estimate a sensible model with instrumental variable estimation. Use the function *ivreg()* of the package *AER* and assign the output to the variable *iv*. Run *summary(iv, diagnostics=TRUE)*. What is the interpretation for your estimate of $\hat{\beta}$? What is your interpretation regarding the output of the diagnostic tests Weak Instruments, Wu-Hausmann and Sargan?
- (f) In addition to your estimations in a) and d) estimate 2 additional models (via IV or OLS). Store each regressed model in a variable. Install and load the R package *texreg*. Use the function *screenreg()* to show a table that compares your 4 estimated models in the typical format you find in academic journals.