

# Practice Problems

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Download the data set `simulateddrugs01.sas7bdat` and the associated readme file `simulateddrugs01-sas7bdat.pdf` and read the file carefully. The basic information is as follows: As the name suggests, the data is simulated: it consists of simulated sales data for 17 ADHD drugs and should not be used for drawing any conclusions about the ADHD market. It is however based on the data described in [Bokhari and Fournier \(2013\)](#) and the simulated values are based on an estimated model described in that paper. The data is set in ‘wide’ format meaning it has 3112 observations from 778 counties and upto four years (a county-year is a market and is one of the 3112 rows) while sales (quantities, revenues, prices) and some demographic information for each of these markets is given in the columns.

- (1) For the drugs 4-7 estimate a LA/AIDS model. All four of these drugs consist of the same molecule and form (molecule = MPH and form = ER). In your specifications also control for time, time square, and (logs of) children and number of doctors in a county and (logs of) amount reimbursed for drugs by Medicaid and Medicaid Enrollees in a state. Also impose homogeneity and symmetry restrictions (and adding up). Estimate the model using SUR as well as 3SLS (all relevant variables and instruments from prices are provided in the data set).
- (2) For the drugs 4-7 also estimate a LES demand model via nonlinear least squares (NL-SUR) and nonlinear instrumental variables estimators (NL-3SLS). Use the same instruments as above and other control variables. Discuss you estimated coefficients. Do they make sense?
- (3) Based on the estimates from AIDS and LES above, compute Marshallian, Hicksian and Expenditure elasticities at the sample mean and compare them.

Solutions. Try the problem on your own and then compare your estimates to mine given in the file ‘`results-AIDS-on-MPH-ER.html`’ and ‘`results-LES-on-MPH-ER.html`’. If necessary, you may also consult my code given in SAS programs ‘`estimate-AIDS-on-MPH-ER.sas`’ and ‘`estimate-LES-on-MPH-ER.sas`’.

- (3) The SAS program `model-estimate-AIDS-ver01.sas` estimates a multi-budget nested model at 4 levels – (i) all drugs, (ii) molecules, (iii) forms within molecules, and (iv) finally individual drugs within molecule-forms. This program in turn calls up two other programs (1) `mk-AIDS-segments.sas` and (2) `macros-elasticities-ver05.sas`. All regression coefficients and elasticities, including unconditional elasticity matrices for drugs in different segments, are output to the files `results01-model-estimate-AIDS-ver01.html` and `results02-model-estimate-AIDS-ver01`. Download and go through the code to see how to program a multilevel system (and optionally run the code).

#### REFERENCES

- Bokhari, Farasat A. S. and Gary M. Fournier**, “Entry in the ADHD drugs market: Welfare impact of generics and me-toos,” *Journal of Industrial Economics*, June 2013, *61* (2), 340–393.
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