Advanced Econometrics II
Homework 2

Deadline: 2011-01-24 09:30

You are to hand in your homework via email to ta@zamojski.net by 9:30 on Tuesday. I would appreciate if your answers were TeXed in full, if you insist you can scan your handwritten answers at TI and send them to me as well.

You can work in groups of two.

If there is a computational exercise included in the homework, the quality of your coding will be judged (commenting, efficiency, etc.). Your code should be easy to read. Things that make it easier: lots of comments (e.g. explaining what loops are meant to do), camel case variable names (e.g. mErrorsUniformlyDistributed), consistency. You are to include your code in the body of the report, e.g. if you are TeXing your answers then with the listings package. You can use Ox, Python, C++, or Matlab. If I am not able to run your code after extracting your answers (assuming they are zipped) to a separate folder you will lose points. Looking ahead, it is in your best interest to combine Ox (computations, sometimes graphics) and Python (database management, multiprocessing management, graphics) as it will cut the time needed for simulations considerably. In the empirical exercises you are expected to provide comments for your results and methods (e.g tests) used.

1 Exercise 1

Verify, by use of the assumption that the instruments in the matrix W are exogenous or predetermined, and by use of a suitable law of large numbers, that all the terms in (8.45) that involve V do not contribute to the probability limit of (8.45) as the sample size tends to infinity.

2 Exercise 2

Show that the vector of residuals obtained by running the IVGNR (8.49) with $\beta = \acute{\beta}$ is equal to $y - X\hat{\beta}_{IV} + M_W X\left(\hat{\beta}_{IV} - \acute{\beta}\right)$. Use this result to show that $\acute{\sigma}^2$, the estimate of the error variance given by the IVGNR, is consistent for the error variance of the underlying model (8.10) if $\acute{\beta}$ is root-n consistent.

3 Exercise 3

Show that nR^2 from the modified IVGNR (8.72) is equal to the Sargan test statistic, that is, the minimized IV criterion function for model (8.68) divided by the IV estimate of the error variance for that model.

4 Exercise 4

For this exercise you are to use the *money.data* from the dataset accompanying the textbook. The sample period you are interested in is $1968 + X$: 1-$1998 - Y$: 4 where X and Y are integers $\in [1, 9]$ derived by recursively summing digits in your dates of birth.

a) DWH test

Estimate with OLS the model:

$$m_t = \beta_1 + \beta_2 r_t + \beta_3 y_t + \beta_4 m_{t-1} + \beta_5 m_{t-2} + u_t \tag{1}$$

Perform a DWH test for the hypothesis that the interest rate, r_t, can be treated as exogenous, using r_{t-1} and r_{t-2} as additional instruments. Perform a semi-parametric bootstrap of this test.

b) IV

Estimate the model by generalized instrumental variables, treating r_t as endogenous and using r_{t-1} and r_{t-2} as additional instruments. Are the estimates much different from the OLS ones? Verify that the IV estimates may also be obtained by OLS estimation of equation (8.91) in Exercise 8.22. Are the reported standard errors the same? Explain why or why not.

c) Sargan test

Perform a Sargan test of the overidentifying restrictions for the IV estimation you have just performed. Perform a semi-parametric bootstrap of this test, you may follow the procedure outlined in the textbook. Relate this to your answers to this and previous exercises. How do you interpret the results of those tests?