

ECON 8331 — ECONOMETRICS II

Material covered, Fall 2017:

The final is cumulative. I list below what we have covered.

Programs: Be able to understand Matlab programs similar to those you used in the homeworks. I will ask you about a missing line or to add something—it is not important to get it correct in Matlab notation.

- Maximum Likelihood
- Information matrix and estimation of the variance of the parameters.
- You should be able to find the score, Hessian, ML-estimator, etc. for any (simple) model but, in particular, well known ones such as
 - Normal with regressors
 - Normal autoregressive
 - Normal moving average
 - Exponential
 - Bernoulli
 - Logit and Probit Models (univariate in detail, multivariate less detailed).
- The Newton Algorithm. (Theory or practical examples.)
- Panel data. Fixed effects and Frisch-Waugh application to fixed effects (be aware that demeaning to remove more than one fixed effect is not correct in unbalanced panels). Bias of order $\frac{1}{T}$ in short dynamic panels in the absence of strict exogeneity.
- Selectivity: ML and Heckman correction (inverse Mill's ratio).
- Duration models, briefly.
- Testing. Likelihood Ratio, Wald, and ML tests. (In detail for the ML case.)
- Systems of equations. SURE (including VAR), 2SLS, and (briefly) 3SLS. Make sure you can derive the results that SURE estimators are identical to equation-by-equation OLS when the regressors are identical using Kronecker products.
- Clustering of standard errors. Know the basic formula and know the broad conclusions of the papers by Moulton and Bertrand, Dufflo, and Mullainathan.
- Bootstrapping standard errors: simplest case. The parametric bootstrap.

- Weak Instruments. Know the Monte Carlo example of Nelson and Startz (*Journal of Business*) up until Figure 1. Know the Stock et al. rule of thumb for first stage F-tests. Be ready to repeat the derivation on pp. 326-327 in the Davidson-MacKinnon book. Know the approximate formula for the bias of the two-stage least-squares estimator on p. 123 in Michael Murray's article in the *Journal of Economic Perspectives*.
- Be able to demonstrate the issue of Local Average Treatment Effect using the simple example in my *Quantitative Economics* article (you would need to read from the bottom of page 46 till the end of Section 3.1 on p. 47)