

## ECON 8331 — ECONOMETRICS II

### Material covered, Fall 2016:

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

Programs: Be able to understand Gauss programs similar to those I have shown you in class. I will ask you about a missing line or to add something—it is not important to get it correct in Gauss 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 and the empirical issues with the Angrist-Krueger paper (or "Does compulsory school affect..". QJE 1991) . 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.
- Be able to demonstrate the issue of Local Average Treatment Effect using the simple example in my Quantitative Economics article.
- Structural VARs. Be able to find the impulse response function and variance decomposition (theoretical or in a simple application, like a two-variable AR(1) or AR(2) process) and explain how people identify the model by triangularizing the variance matrix and "ordering" the data).
- Unit Roots. Superconsistency. Direction of bias if the data is a random walk and we estimate an AR(1). The Augmented Dickey-Fuller test. Make sure about what regression we typically run to test for a unit root with drift against a stationary model with trend, and what is the null hypothesis tested.
- GMM estimation. The general setup of minimization problem. Wald testing, the J-test for overidentifying restrictions, the Likelihood Ratio type test (when is it valid?).
- Non-parametric variance estimation. What is the Newey-West (Bartlett) kernel and how is it used. What is a "bandwidth."