ECO2400F PART II

This is the second part of ECO2400. This half introduces basic concepts and methods of statistical decision theory, mainly focusing on hypothesis testing and confidence regions.

Yuanyuan Wan is the instructor of this part. Lectures will be held twice a week: Tuesday 1pm-3pm and Wednesday 11am-1pm. Office hour will be announced soon. The first module of ECO2400 is taught by Professor Christian Gourieroux.

Office Hour: Wednesday, 3pm-5pm.

Reference: main: Gourieroux and Monfort (1995). Others: Casella and Berger (2002); Greene (2010)

Course content:

(1) Introduction (and review) of statistical decision theory
   (a) Statistical decision.
   (b) Hypotheses
   (c) Tests
   (d) Types of errors and risks.
   (e) Neyman tests and Uniformly Most Power (UMP) tests.
   (f) Neyman–Pearson Theorem, UMP tests for simple hypotheses, monotone likelihood ratio family and UMP tests for one sided hypotheses.
   (g) Unbiasedness and Uniformly Most Power Unbiased (UMPU) Tests.
   (h) Exponential family and UMPU tests for two sided hypotheses.
   (i) Exponential family and UMPU tests for hypotheses with nuisance parameters.

Reference: Gourieroux and Monfort (1995, Chapter 1,14,15,16) and Casella and Berger (2002, Chapter 8).

(2) Likelihood based tests

   (a) Review of basic asymptotic theory: convergence in probability, convergence in distribution, (uniform) weak law of large number, central limit theorem, continuous mapping theorem, delta methods etc.

   (b) Wald, Score and Likelihood Ratio tests

   (c) Examples: tests in linear model with Gaussian errors, discrete choice models, limited dependent models, likelihood based Hausman tests in linear models.

   Reference: Gourieroux and Monfort (1995, Chapter 17)

(3) General asymptotic tests.

   (a) Tests based on Extremum Estimation: nonlinear least square.

   (b) Tests based on GMM: J–tests for over–identified restrictions (tests for instrument validity).

   (c) Hausman tests for exogenous regressors, Hausman tests in panel data models.

   Reference: Gourieroux and Monfort (1995, Chapter 18)

(4) Nonnested tests.

   (a) Kullback–Lebler divergence measure and Pseudo true value.

   (b) Generalized Wald, Score and Likelihood ratio tests.

   (c) Nesting Hypotheses.

   (d) Model selection criterion.

   Reference: Gourieroux and Monfort (1995, Chapter 18)

(5) Confidence sets

   (a) Pivotal functions.

(b) Inverting a test.

(c) Uniformly Most Precise and Uniformly Most Precise Unbiased confidence sets.

References: Gourieroux and Monfort (1995, Chapter 20) and Casella and Berger (2002, Chapter 9)

(6) Bootstrapping and Subsampling.

(a) Large sample approximation and Edgeworth expansion.

(b) Bootstrapping:

(i) Consistency

(ii) Higher order refinement.

(c) Subsampling

Reference: Hall (1992, Chapter 1 and 2), Horowitz (2001), Van Der Vaart (1998, Chapter 23), and Politis, Romano, and Wolf (1999, Chapter 1)

References

Casella, G., and R. Berger (2002): *Statistical Inference*. Duxbury.

Gourieroux, C., and A. Monfort (1995): *Statistics and Econometric Models*. Cambridge University Express.

Greene, W. (2010): *Econometric Analysis*. Prentice.

Hall, P. (1992): *The Bootstrap and Edgeworth Expansion*. Springer Verlag.

Horowitz, J. (2001): "The Bootstrap," in *Handbook of Econometrics*, ed. by J. Heckman, and E. Leamer, vol. 5 of *Handbook of Econometrics*, chap. 52, pp. 3159–3228. Elsevier.

Politis, D., J. Romano, and M. Wolf (1999): *Subsampling*. Springer Verlag.

Van Der Vaart, A. (1998): *Asymptotic Statistics*. Cambridge University Express.