ECO2400F PART II

This is the second module of ECO2400 in fall 2012 semester. This half introduces basic concepts and methods of statistical decision theory, mainly focusing on hypothesis testing and inference. Lectures will be held twice a week: Tuesday 1pm-3pm and Wednesday 11am-1pm.

Instructor: Yuanyuan Wan, yuanyuan.wan@utoronto.ca, Room 232.

Office Hour: Wednesday, 3pm-5pm.

TA: Shahar Rotberg (shahar.rotberg@mail.utoronto.ca).

TA's office hour: Monday, 11am-noon and 3pm-4pm.

Reference: We will cover Gourieroux and Monfort (1995, Chapter 14–18, 20, and 22). Lecture notes will be posted on Portal before class. Most of materials we will be discussing can also be found in Greene (2010) and Casella and Berger (2002).

Course work: There will be two homework assignments and a final exam.

Targeted course content:[1]

(1) Introduction (and review) of statistical decision theory (3 lectures)
   (a) Statistical decision.
   (b) Hypotheses
   (c) Tests
   (d) Types and risks of errors.
   (e) Neyman tests and uniformly most power tests.

[1†]: will not be discussed in class. Read if you are interested.

(f) UMP tests for simple hypotheses, monotone likelihood ratio family and UMP tests for one sided hypotheses.

(g) Unbiasedness and Uniformly Most Power Unbiased 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 1,14,15,16.1) and Casella and Berger (2002, Chapter 8).

(2) Likelihood based tests (3 lectures)

(a) Wald, Score and Likelihood Ratio tests

(b) 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), Greene (2010, Chapter 14.1–14.6).

(3) Asymptotic tests (3 lecture)

(a) Review of basic asymptotic theory: weak and strong convergence, convergence in distribution etc.

(b) Tests based on Extremum Estimation.

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

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

Reference: Gourieroux and Monfort (1995, Chapter 18),Greene (2010, Chapter 5.6, 5.7, 8.4, 11.4, 11.5, 13.5, 13.6).

(4) Confidence regions (1 lecture)

(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)

(5) Introduction of Bootstrapping (1 lecture)

(a) Large sample approximation: using the critical values of asymptotic distribution

(b) Bootstrapping:

(i) Consistency

(ii) Bootstrap test statistics/standard errors.

(iii) †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)

(6) Some non-standard cases (1 lecture)

(a) Robustness v.s. biases of heteroskedasticity robust variance estimators.

(b) Clustering

(c) Inference when instruments are weak

(d) Non-identified models

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.