ECO2400 FALL 2020 PART II

This is the second module of ECO2400 in fall 2021 semester (first module by Professor Mourifie). This module introduces basic concepts of statistical decision and large sample theory (of extremum estimation).

Instructor: Yuanyuan Wan, joonhwan.cho@mail.utoronto.ca

Office Hour: By appointment.

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Reference: We will cover materials from Gourieroux and Monfort (1995, Chapter 1–, 5–9, 13–16.1, and 20). This book is available online at University of Toronto library. Materials we will study can also be found in Greene (2010), Casella and Berger (2002), Lehmann (2004) and Lehmann and Romano (2006) at different levels of depth.

Course work: There will be one simulation assignment and one final exam (2 hours), both are graded. I will also provide additional non-graded assignments for practice. The total course mark of my part will contribute 50% to your final ECO2400 grade.

Targeted course content:

(1) Introduction (and review) of statistical decision theory

(2) Tests

   (a) Hypotheses

   (b) Tests

   (c) Types and risks of errors.

   (d) Neyman tests and uniformly most power tests.

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

(f) Unbiasedness and Uniformly Most Power Unbiased Tests.

(g) Exponential family and UMPU tests for two sided hypotheses.

(h) Exponential family and UMPU tests for hypotheses with nuisance parameters.

Reference: Gourieroux and Monfort (1995, Chapter 1, 2, 3, 14,15,16.1) and Casella and Berger (2002, Chapter 8).

(3) Confidence regions

(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)

(4) Unbiased Estimation

(a) Unbiased estimator

(b) Best unbiased estimator

(c) Gauss-Markov Theorem

References: Gourieroux and Monfort (1995, Chapter 6)

(5) Extremum estimation and large sample analysis

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

(b) Consistency and asymptotic normality.

Reference: Gourieroux and Monfort (1995, Chapter 8)

(6) MLE and Likelihood based tests
   (a) Properties of ML estimator
   (b) Wald, Score and Likelihood Ratio tests
   (c) Examples: limited dependent variable models
   (d) 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 7 and 17)

(7) Generalized Method of Moments
   (a) Asymptotic properties of GMM estimator
   (b) Tests based on GMM: J–tests for over–identified restrictions (tests for instrument validity).
   (c) Hausman tests for exogenous regressors

   Reference: Gourieroux and Monfort (1995, Chapter 9)

(8) Additional topics
   (a) Multiple testing
   (b) Inference when instruments are weak
   (c) Non-identified models
   (d) A glance of panel data 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.

Lehmann, E. L. (2004): *Elements of large-sample theory*. Springer Science & Business Media.

Lehmann, E. L., and J. P. Romano (2006): *Testing statistical hypotheses*. Springer Science & Business Media.