

NATIONAL TAIWAN UNIVERSITY  
Department of Economics and Department of Finance  
**ECONOMETRIC THEORY II**

Prof. Chung-Ming Kuan  
ckuan@econ.sinica.edu.tw

Spring 2007  
2782–2791 ext. 646

---

This is the second course on econometric theory for Economics and Finance Ph.D. students; well-prepared Master students are also welcome. As a prerequisite, students are expected to have completed Econometric Theory I at Ph.D. level and are familiar with the basic concepts in linear and matrix algebra, stochastic convergence, and multiple linear regressions. Those who are not sure about the required mathematical background may check my lecture notes (Chap. 1 and 5), Gallant (1997) and White (1999).

I will follow my own lecture notes (available at [www.sinica.edu.tw/~ckuan](http://www.sinica.edu.tw/~ckuan)). Unlike most econometrics textbooks that are arranged according to *models*, these notes are categorized by *theories*, where each theory can be applied to different models. What I hope is that, by introducing econometric theory in this way, students will be able to understand *how* an econometric method (estimator or test) is derived and *why* it works. In my lectures, I will first review the asymptotic least squares (LS) theory and then cover the quasi-maximum likelihood (QML) theory and the generalized method of moment (GMM). Some well known microeconomic models and time series models will be presented as applications of the QML theory. I will also provide a brief introduction to quantile regression when we move to the GMM.

I would like to also stress that modern econometric theories are built not only on analytical tools but also on computational evidences. Thus, students taking this course are required to learn a programming language and use it for computation exercises. The commonly used commercial softwares are GAUSS and Matlab; a free program is “R” which is available at the website: <http://cran.r-project.org/>. We will have a lecture introducing programming with R.

### Required Reading

1. Kuan, C.-M., Lecture notes, Academia Sinica, 2007 ([www.sinica.edu.tw/~ckuan](http://www.sinica.edu.tw/~ckuan)):  
**ET:** *Introduction to Econometric Theory*  
**KS1:** *Lecture on Robust Tests with and without Consistent Estimation of Asymptotic Covariance Matrix*  
**KS2:** *Lecture on Basic Time Series Models*  
**KS3:** *Lecture on Quantile Regression*

2. White, H., *Asymptotic Theory for Econometricians*, revised ed., Academic Press, 1999.
3. White, H., *Estimation, Inference and Specification Analysis*, Cambridge University Press, 1994.

### Supplemental Reading

1. Gallant, A. R., *An Introduction to Econometric Theory*, Princeton University Press, 1997.
2. Gourieroux, C. and A. Monfort, *Statistics and Econometric Models*, Vol. 1 & 2, Cambridge University Press, 1995.
3. Greene, W. H., *Econometric Analysis*, 4th ed., Prentice Hall, 2000.

**Office Hour:** Monday 1–2, 5–6 and by appointment

### Course Outline

1. LS: The least squares method and its asymptotic properties (ET, Chap. 3, 5, 6).
2. LS: Simulations and introduction to R
3. LS: Large sample tests (ET, Chap. 6)
4. LS: Tests with and without consistent estimation of asymptotic covariance matrix (ET, Chap. 6; KS1)
5. LS: Unit-root and cointegration (ET, Chap. 7)
6. QML: Introduction and Kullback-Leibler Information Criterion (ET, Chap. 9)
7. QML: Asymptotic Properties of the QML estimator (ET, Chap. 9)
8. QML: Large sample tests — Nested (ET, Chap. 9)
9. QML: Large sample tests — Non-nested (ET, Chap. 9)
10. QML: Applications — Microeconomic models (ET, Chap. 10)
11. QML: Applications — ARMA models (KS2)
12. QML: Applications — Volatility models (KS2)
13. GMM: Asymptotic properties and over-identifying restrictions test (ET, Chap. 11)
14. GMM: Introduction to quantile regression (KS3)

**Grading:** One midterm (40%), one final (50%), Homework (10%). *Note:* Your final grades will not be adjusted if you fail to show your effort on the homeworks.