Simulation-Based Econometrics

Course title – Intitulé du cours	Simulation-Based Econometrics
Level / Semester – Niveau /semestre	MRes
School – Composante	Ecole d'Economie de Toulouse
Teacher – Enseignant responsable	Eric Gautier and Pascal Lavergne
Other teacher(s) – Autre(s) enseignant(s)	
Other teacher(s) – Autre(s) enseignant(s)	
Other teacher(s) – Autre(s) enseignant(s)	
Other teacher(s) – Autre(s) enseignant(s)	
Other teacher(s) – Autre(s) enseignant(s)	
Lecture Hours – Volume Horaire CM	15
TA Hours – Volume horaire TD	
TP Hours – Volume horaire TP	
Course Language – Langue du cours	English
TA and/or TP Language – Langue des TD et/ou TP	English

Teaching staff contacts:

Eric Gautier eric.gautier@tse-fr.eu Office T532

Pascal Lavergne pascal.lavergne@ut-capitole.fr Office T506

Course Objectives:

The goal of this class is to acquire knowledge of

- The simulation of random vectors, Monte-Carlo methods to approximate multiple integrals by simulations,
- The simulation-based techniques in econometrics (simulated likelihood, scores, and moments, indirect inference), their main theoretical properties and their implementation
- The more recent methods such as those involving Markov-Chains and/or a (possibly approximate) Bayesian framework
- The classical and more recent examples of their applications (limited dependent variables models, random coefficients, and dynamic setups)
- Permutation test and the bootstrap
- Monte-Carlo simulations and the CLT
- Bootsrap consistency and order of correctness
- Preivoting and K-step bootstrap

Prerequisites :

Econometrics 1 in M2 ETE or equivalent material

Practical information about the sessions:

- We expect students to come to all the sessions and do the assignment asked for each subsequent session if any and participate
- Laptops or tablets allowed

Grading system :

The students are expected to present in front of their classmate a paper, book chapter, or empirical or simulation study of their own.

We value presentations which are personal and critical and take a step back, especially when presenting a paper.

Class participation will also be taken into account.

Bibliography/references :

- Simulation-Based Econometric Methods, C. Gouriéroux and A. Monfort, Oxford 2002
- Monte Carlo Statistical Methods, C. P. Robert and G. Casella, Springer, 2004
- Discrete Choice Methods with Simulations, K. Train, Cambridge, 2003
- Hesterberg, T. (2015) *What Teachers Should Know about the Bootstrap: Resampling in the Undergraduate Statis- tics Curriculum* The American Statistician 69(4) 371-386
- Jarque, C. M., and Bera, A. K. (1980). *Efficient tests for normality, homoscedasticity and serial independence of regression residuals.* Economics Letters, 6 (3): 255–259
- Anderson, T. W., and Darling, D. A. (1952). *Asymptotic theory of certain "goodness-of-fit" criteria based on stochastic processes.* Annals of Mathematical Statistics, 23: 193–212
- Beran, R., and G. R. Ducharme (1991) *Asymptotic Theory for Bootstrap Methods in Statistics.* Centre de Recherches Mathématiques, Université de Montréal
- Rice, J. (1994) *Mathematical Statistics and Data Analysis.* 2nd edition, Duxbury Press, p. 272
- Hahn, J. (1995) Bootstrapping Quantile Regression Estimators. Econometric Theory 11
- Hall, P. (1988) On Symmetric Bootstrap Confidence Intervals. Journal of the Royal Statistical Society, Series B (Methodological), 50
- Giacomini, R., Politis, D.N., and H. White (2013) A warp-spedd method for conducting Monte-Carlo experiments invoving bootstrap estimators. Econometric Theory, 29
- Ghosh, M., Parr, W.C., Singh, K., and Babu, G.J. (1984) A Note on Bootstrapping the Sample Median. Ann. Statist. 12(3), 1130-1135

- Bickel, P.J., Freedman, D.A. (1981). Some asymptotic theory for the bootstrap, Ann. Statist. 9, 1196-1217
- Beran, R. (1988) Prepivoting Test Statistics: A Bootstrap View of Asymptotic Refinements. Journal of the American Statistical Association, 83
- Beran, R. (1987) Prepivoting to Reduce Level Error of Confidence Sets. Biometrika, 74
- Robinson, P. M. (1988) The Stochastic Difference Between Econometric Statistics, Econometrica 56.
- Davidson, R., and J.G. MacKinnon (1999) Bootstrap Testing in Nonlinear Models, International Economic Review, 40
- Davidson, R., and J.G. MacKinnon (2002) Fast Double Bootstrap Tests Of Nonnested Linear Regression Models. Econometric Reviews, 21 (4). — Davidson, R., and J.G. MacKinnon (2007). Improving the reliability of bootstrap tests with the fast double bootstrap. Computational Statistics & Data Analysis, 51
- Davidson, R., and J.G. MacKinnon (1999) The Size Distortion of Bootstrap Tests. Econometric Theory, 15
- Andrews, D.W.K. (2002) Higher-Order Improvements of a Computationally Attractive k-Step Bootstrap for Extremum Estimators, Econometrica, 70

Other references will be given during the lectures

Session planning :

To be determined