

TSE DEEQA – Semester 1
Advanced Econometrics and Empirical Economics I

The course is organized in three sections. Each section features 15 hours of lectures (10 sessions of 1.5 hours).

Section 1

Dynamic discrete choice models and subjective expectations with application to labor and education economics.

François Poinas

This section of the course will deal with the estimation of structural models in the fields of labor economics and economics of education. It will cover dynamic discrete choice models, focusing on the treatment of unobserved individual heterogeneity, and models that involve elicited data on subjective expectations. Applications will cover mainly topics in labor and education economics: schooling and occupational choices, the role of liquidity constraints in schooling decisions, choosing the field of study, etc.

References:

Aguirregabiria, V., and P. Mira. 2010. "Dynamic discrete choice structural models: A survey." *Journal of Econometrics*, 156:38–67.

Arcidiacono, P., V.J. Hotz, and S. Kang. 2012. "Modeling college major choices using elicited measures of expectations and counterfactuals." *Journal of Econometrics*, 166:3–16.

Arcidiacono, P., and R.A. Miller. 2011. "Conditional Choice Probability Estimation of Dynamic Discrete Choice Models With Unobserved Heterogeneity." *Econometrica*, 79:1823–1867.

Keane, M.P., P.E. Todd, and K.I. Wolpin. 2011. "The Structural Estimation of Behavioral Models: Discrete Choice Dynamic Programming Methods and Applications." *Handbook of Labor Economics*,

Keane, M.P., and K.I. Wolpin. 1997. "The Career Decisions of Young Men." *The Journal of Political Economy*, 105:473–522.

Magnac, T., and D. Thesmar. 2002. "Identifying Dynamic Discrete Decision Processes." *Econometrica*, 70:801–816.

Manski, C.F. 2004. "Measuring Expectations." *Econometrica*, 72:1329–1376.

Rust, J. 1987. "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher." *Econometrica*, 55:999–1033.

Todd P., and W. Zhang. 2018. "A Dynamic Model of Personality, Schooling, and Occupational Choice.", Unpublished.

Wiswall, M., and B. Zafar. 2015. "Determinants of College Major Choice: Identification using an Information Experiment." *The Review of Economic Studies*, 82:791–824.

Section 2

Time series and tests

Stéphane Gregoir

The section of the course will deal with econometric approaches of multivariate time series. They rely on test procedures of which optimality properties will be discussed. This course consists of two parts. Part I is focused on the basic theory of multivariate time series modeling widely used in macroeconometrics and finance and the design of (near) optimal test procedures. It will be prefaced with a refresher in time series and an introduction to functional central limit theorems. The second part will be devoted to the question of seasonality which is present in a lot of macroeconomic and financial time series. Modeling of seasonality, in particular of persistent seasonality, will be introduced and its impact on the representation theorems of multivariate time series set out.

Boswijk H.P. et al (2015), 'Improved likelihood ratio tests for cointegration rank in the VAR model', *Journal of Econometrics*, 184.

Elliott G. et al (2015), 'Nearly optimal test when a nuisance parameter is present under the null hypothesis', *Econometrica*, 83(2).

Gregoir S. (2006), 'Efficient tests for the presence of a pair of complex conjugate unit roots in real time series', *Journal of Econometrics*, 130.

Müller U.K and M. Watson (2013), 'Low-frequency robust cointegration testing', *Journal of Econometrics*, 174.

Section 3

Econometric Analysis of Games

Cristina Gualdani

The course covers some of the leading methods for identifying and estimating the parameters governing agents' preferences in static discrete action games, possibly with multiple equilibria.

During the M2 introduction course we tackled (and I will very briefly refresh students' memory about) the econometric analysis of the complete information entry games in Bresnahan and Reiss (1991) and Berry (1992) where point identification in the presence of multiple equilibria is achieved - mainly - by restricting the sign of interaction effects. We also considered other papers adopting various assumptions on equilibrium selection helping to point identify parameters (e.g., Bjorn and Vuong, 1984; Kooreman, 1994; Bajari, Hong and Ryan, 2010). As economic theory often provides no clear guidance on equilibrium selection, we then moved to examine what happens if the researcher remains agnostic about it and discussed the partial identification approach introduced by Tamer (2003), Ciliberto and Tamer (2009), Galichon and Henry (2006; 2011), and Beresteanu, Molchanov and Molinari (2011), together with some inference techniques (e.g., Andrews and Soares, 2010; Andrews and Shi, 2013).

The core of this course will be the econometric analysis of network formation games when: (1) a large number of equilibrium networks is observed by the researcher (e.g., Miyauchi, 2016; Sheng, 2016); unfortunately, the techniques laid out in the entry game literature can not be directly applied to a network setting due to the huge number of possible equilibrium networks even when there are very few players; hence, different methods proposed to overcome this issue will be discussed; (2) one or few large networks are observed by the researcher (e.g., de Paula, Richards-Shubik and Tamer, 2018; Leung, 2015, 2019; Menzel, 2016; Mele, 2017); in this second case we will pay specific attention on how to interpret asymptotics in the number of players. We will conclude with the analysis of some papers on identification in matching models (e.g., Choo and Siow, 2006; Galichon and Salani'e, 2015; Menzel, 2015). Time permitting, we will talk about the identification of games with weak assumptions on the players' information (Magnolfi and Roncoroni, 2016; Syrgkanis, Tamer, and Ziani, 2018).

References

Andrews, D.W.K., and X. Shi (2013): "Inference Based on Conditional Moment Inequalities", *Econometrica*, 81(2), 609-666.

Andrews, D.W.K., and G. Soares (2010): "Inference for Parameters Defined by Moment Inequalities Using Generalized Moment Selection", *Econometrica*, 78(1), 119-157.

Bajari P., H. Hong, J. Krainer, and D. Nekipelov (2010): "Estimating Static Games of Incomplete Information". *Journal of Business and Economic Statistics*, 28, 469-482.

Bajari, P., H. Hong, and S.P. Ryan (2010): "Identification and Estimation of a Discrete Game of Complete Information", *Econometrica*, 78(5), 1529-1568.

Beresteanu, A., and F. Molinari (2008): "Asymptotic Properties for a Class of Partially Identified Models", *Econometrica*, 76(4), 763-814.

Berry, S. (1992): "Estimation of a Model of Entry in the Airline Industry", *Econometrica*, 60(4), 889-917.

Bjorn P., and Vuong Q. (1984): "Simultaneous Equations Models for Dummy Endogenous Variables: a Game Theoretic Formulation with an Application to Labor Force Participation", Caltech Working Paper 537.

Bresnahan, T.F., and P.C. Reiss (1991): "Entry and Competition in Concentrated Markets", *Journal of Political Economy*, 99(5), 977-1009.

Choo, E., and A. Siow (2006): "Who Marries Whom and Why", *Journal of Political Economy*, 114(1), 175-201.

Ciliberto, F., and E. Tamer (2009): "Market Structure and Multiple Equilibria in Airline Markets", *Econometrica*, 77(6), 1791-1828.

De Paula, A. (2013): "Econometric Analysis of Games with Multiple Equilibria", *Annual Review of Economics*, 5(1), 107-131.

De Paula, A., S. Richards-Shubik, and E. Tamer (2018): "Identifying Preferences in Networks with Bounded Degree", *Econometrica*, 86(1), 263-288.

Galichon, A., and M. Henry (2006): "Inference in Incomplete Models", Working paper.

Galichon, A., and M. Henry (2011): "Set Identification in Models with Multiple Equilibria", *Review of Economic Studies*, 78(4), 1264-1298.

Galichon, A., and B. Salani   (2015): "Cupid's Invisible Hand: Social Surplus and Identification in Matching Models", Working paper.

Kooreman, P. (1994): "Estimation of Econometric Models of Some Discrete Games", *Journal of Applied Econometrics*, 9(3): 255-268.

Leung, M. (2015): "Two-Step Estimation of Network Formation Models with Incomplete Information", *Journal of Econometrics*, 188(1), 182-195.

Leung, M. (2019): "A Weak Law for Moments of Pairwise-Stable Networks", *Journal of Econometrics*, 210(2), 310-326.

Magnolfi, L. and C. Roncoroni (2016): "Estimation of Discrete Games with Weak Assumptions on Information," Working Paper.

Mele, A. (2017): "A Structural Model of Dense Network Formation", *Econometrica*, 85(3), 825-850.

Menzel, K. (2015): "Large Matching Markets as Two-Sided Demand Systems", *Econometrica*, 83(3), 897-941.

Menzel, K. (2016): "Strategic Network Formation with Many Agents", Working Paper.

Miyauchi, Y. (2016): "Structural Estimation of Pairwise Stable Networks with Nonnegative Externality", *Journal of Econometrics*, 195(2), 224-235.

Sheng, S. (2016): "A Structural Econometric Analysis of Network Formation Games", forthcoming at *Econometrica*.

Syrkanis, V., E. Tamer, and J. Ziani (2018): "Inference on Auctions with Weak Assumptions on Information," arXiv:1710.03830.

Tamer, E. (2003): "Incomplete Simultaneous Discrete Response Model with Multiple Equilibria", *Review of Economic Studies*, 70(1), 147-167.