

## Static and Dynamic Discrete Choice Models: Applications in Education and Environmental Economics

Course title - Intitulé du cours	Static and Dynamic Discrete Choice Models: Applications in Education and Environmental Economics
Level / Semester - Niveau /semestre	MRes /S1
School - Composante	Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	Olivier DE GROOTE
Other teacher(s) - Autre(s) enseignant(s)	
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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 - Coordonnées de l'équipe pédagogique :**

Olivier De Groote, T517, [olivier.de-groote@tse-fr.eu](mailto:olivier.de-groote@tse-fr.eu)  
Offices hours by appointment (via email).

### **Course's Objectives - Objectifs du cours :**

This part covers the estimation of structural static and dynamic discrete choice models and how to use them for policy evaluation. We will pay special attention to estimation methods that avoid solving the model during estimation. The methods will be illustrated by discussing modeling choices made in recent papers that look at education policies and environmental policies. At the end of the course, students should understand which research questions can be addressed with each type of model, as well as the data requirements. Furthermore, they should develop insights in how to make a model tractable, while still allowing it to generate reliable conclusions.

### **Prerequisites - Pré requis :**

Economics and econometrics at the level of M2 ETE. No initial knowledge of discrete choice models (or other structural models) is required. Familiarity with Stata (or equivalent).

### **Practical information about the sessions - Modalités pratiques de gestion du cours :**

Students are expected to actively participate in class, study the material, do the assignments and read the papers on applications we will extensively discuss in class (a subset of the list below).

### **Grading system - Modalités d'évaluation :**

Students will be evaluated based on their contribution to classes, a written paper and a coding assignment. The assignment covers the estimation and interpretation of the results of static and dynamic models. The paper should explain a research question that can be addressed using a dynamic discrete choice model. The paper should consist of (1) motivation of the research question, (2) description of the dataset and (3) model and estimation strategy with a justification of the modeling assumptions and the identification.

**Bibliography/references - Bibliographie/références :**

Main material:

- Agarwal, N., and Somaini, P. 2020. Revealed Preference Analysis of School Choice Models. *Annual Review of Economics* 12: 471–501.
- Arcidiacono P., Ellickson, P., 2011. Practical Methods for Estimation of Dynamic Discrete Choice Models. *Annual Review of Economics*, 3: 363-394.
- Kalouptsi, Scott, and Souza-Rodrigues, 2020. Linear IV Regression Estimators for Structural Dynamic Discrete Choice Models. *Journal of Econometrics* 222 (1C): 228-804.
- Train, K., 2009. *Discrete Choice Methods with Simulation*. Cambridge University Press.

Some key contributions we rely on:

- Agarwal, N., and Somaini, P. 2018. Demand Analysis Using Strategic Reports: An Application to a School Choice Mechanism. *Econometrica* 86 (2): 391–444.
- Arcidiacono, P., and Miller, R. Conditional Choice Probability Estimation of Dynamic Discrete Choice Models With Unobserved Heterogeneity. *Econometrica* 79, no. 6 (2011).
- Berry, S., 1994. Estimating Discrete-Choice Models of Product Differentiation. *The RAND Journal of Economics* 25 (2): 242.
- Fack, G., Grenet, J. and He, Y, 2019. Beyond Truth-Telling: Preference Estimation with Centralized School Choice and College Admissions. *American Economic Review* 109 (4): 1486–529.
- Hotz, J., and Miller, R. Conditional Choice Probabilities and the Estimation of Dynamic Models. *The Review of Economic Studies* 60, no. 3 (1993): 497–529.
- Keane, M., and Wolpin, K. The Career Decisions of Young Men. *Journal of Political Economy* 105, no. 3 (1997): 473–522.
- Magnac, T., Thesmar, D., 2002. Identifying dynamic discrete decision processes. *Econometrica* 70, 801816.
- Rust J., 1987. Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher. *Econometrica*, 55 (5): 999-1033.

Applications:

- Abdulkadiroglu, A., Agarwal, N. and Pathak, P. 2017. The Welfare Effects of Coordinated Assignment: Evidence from the New York City High School Match. *American Economic Review* 107, no. 12: 3635–89.
- Arcidiacono, P. 2005. Affirmative Action in Higher Education: How Do Admission and Financial Aid Rules Affect Future Earnings? *Econometrica* 73, no. 5: 1477–1524.
- Arcidiacono, P., Aucejo, E., Maurel, A., Ransom, T., 2025. College Attrition and the Dynamics of Information Revelation. *Journal of Political Economy* 133, 53–110.
- Beuermann, D., Jackson, C K., Navarro-Sola, L. and Pardo, F. 2023. What Is a Good School, and Can Parents Tell? Evidence on the Multidimensionality of School Output. *The Review of Economic Studies* 90 (1): 65–101.
- Grigolon, L., Reynaert, M. and Verboven, F. 2018. Consumer Valuation of Fuel Costs and Tax Policy: Evidence from the European Car Market. *American Economic Journal: Economic Policy* 10, no. 3: 193–225.
- Kapor, A., Karnani, M., Neilson, C., 2024. Aftermarket Frictions and the Cost of Off-Platform Options in Centralized Assignment Mechanisms. *Journal of Political Economy*, 132, 2346–2395.

- De Groot, O., 2025. Dynamic Effort Choice in High School: Costs and Benefits of an Academic Track. *Journal of Labor Economics* 43, 467–502.

De Groot, O. and Verboven, F. 2019. Subsidies and Time Discounting in New Technology Adoption: Evidence from Solar Photovoltaic Systems. *American Economic Review* 109, no. 6: 2137-2172.

**Session planning - Planification des séances :**

- 1) Introduction (+-1 hour)
- 2) Static discrete choice (+- 5h)
  - Logit assumption and extensions, individual vs aggregate data, welfare
  - School choice: estimation and applications
- 3) Dynamic discrete choice (+-9h)
  - Full solution methods vs Conditional Choice Probability (CCP) methods
  - Persistent unobserved heterogeneity
  - Applications on green technology adoption and educational decisions

**Distance learning – Enseignement à distance :**

Lectures and meetings will be in person. We will only do zoom if strictly needed because of unforeseen circumstances (such as a pandemic).