Martin Mugnier

Ph.D. Candidate in Economics at CREST, ENSAE Paris, Institut Polytechnique de Paris
martin.mugnier@ensae.fr – martinmugnier.github.io – +33695037539

Office Contact Information: 5 avenue Henry Le Chatelier, 91120 Palaiseau, France
Personal Information: 07/19/1995, French
Placement Director: Philippe Choné (CREST-ENSAE) philippe.chone@ensae.fr

Primary Fields of Research: Econometrics (theory and applications), analysis of panel data
Secondary Fields of Research: Mathematical statistics, high-dimensional statistics

References

Xavier D'Haultfœuille (supervisor)
Professor of Economics
CREST-ENSAE, 5 avenue Henry Le Chatelier,
91120 Palaiseau, France
xavier.dhaultfoeuille@ensae.fr

Stéphane Bonhomme
Professor of Economics
The University of Chicago, 1126 East 59th street,
Chicago IL 60637, USA
sbonhomme@uchicago.edu

Laurent Davezies
Professor of Econometrics
CREST-ENSAE, 5 avenue Henry Le Chatelier,
91120 Palaiseau, France
laurent.davezies@ensae.fr

Education

Graduate Studies

Sep. 2019 –	**CREST, ENSAE Paris, Institut Polytechnique de Paris**, France Ph.D. Candidate in Economics • Dissertation title: *"Nonlinear Panel Data Models and High-Dimensional Statistics"* • Expected Completion Date: June 2023
2018 – 2019	**Université Paris-Saclay**, France M.Sc. in Applied Mathematics (*with honors*) • Major in Mathematical Statistics and Machine Learning Theory
2017 – 2019	**ENSAE Paris**, France Ingénieur Économiste-Statisticien, Graduate Program • Major in Data Science and Statistical Learning
2016 – 2017	**École Polytechnique, HEC Paris, ENSAE Paris, ENS Paris-Saclay**, France Master in Economics (1st year) (*with highest honors*)
2015 – 2019	**École Normale Supérieure Paris-Saclay**, France M.Sc. in Economics and Management • Civil servant student (*"normalien"*)

Undergraduate Studies

2015 – 2016	**Université Paris 1 Panthéon-Sorbonne & ENS Paris-Saclay**, France B.Sc. in Economics (*with honors*)
2013 – 2015	**Toulouse School of Economics & Lycée Ozenne**, France Licences 1 & 2 in Economics and Management (*ranked 7th out of 722 & 1st out of 274*)

Publications

"Fixed Effects Binary Choice Models with Three or More Periods"
With X. D'Haultfœuille and L. Davezies, Accepted to **Quantitative Economics**
We consider fixed effects binary choice models with a fixed number of periods T and without a large support condition on the regressors. If the time-varying unobserved terms are i.i.d. with known distribution F, Chamberlain (2010) shows that the common slope parameter is point identified if and only if F is logistic. However, he only considers in his proof $T = 2$. We show that actually, the result does not generalize to $T \geq 3$: the common slope parameter can be identified when F belongs to a family including the logit distribution. Identification is based on a conditional moment restriction. Under restrictions on the covariates, these moment conditions lead to point identification of relative effects. Finally, if $T = 3$ and mild conditions hold, GMM estimators based on these conditional moment restrictions reach the semiparametric efficiency bound.

Working Papers

"Unobserved Clusters of Time-Varying Heterogeneity in Nonlinear Panel Data Models"
Job Market Paper
In studies based on longitudinal data, researchers often assume time-invariant unobserved heterogeneity or linear-in-parameters conditional expectations. Violation of these assumptions may lead to poor counterfactuals. I study the identification and estimation of a large class of nonlinear grouped fixed effects (NGFE) models where the relationship between observed covariates and cross-sectional unobserved heterogeneity is left unrestricted but the latter only takes a restricted number of paths over time. I show that the corresponding "clusters" and the nonparametrically specified link function can be point-identified when both dimensions of the panel are large. I propose a semiparametric NGFE estimator whose implementation is feasible, and establish its large sample properties in popular binary and count outcome models. Distinctive features of the NGFE estimator are that it is asymptotically normal unbiased at parametric rates, and it allows for the number of periods to grow slowly with the number of cross-sectional units. Monte Carlo simulations suggest good finite sample performance. I apply this new method to revisit the so-called inverted-U relationship between product market competition and innovation. Allowing for clustered patterns of time-varying unobserved heterogeneity leads to a much flatter estimated curve.

"A Simple and Computationally Trivial Estimator for Grouped Fixed Effects Models"
Submitted
This paper provides a new fixed effects estimator for linear panel data models with clustered time patterns of unobserved heterogeneity. The method combines smooth and convex nuclear norm regularization with a pairwise differencing argument that takes at most $O(N^3)$ elementary operations to agglomeratively cluster cross-sectional units. Asymptotic guarantees are established in a framework where T can grow at any power of N, as both N and T diverge to infinity. In contrast to existing approaches, the proposed estimator (i) is computationally straightforward, (ii) does not require a known upper bound on the number of groups, (iii) consistently estimates the number of groups, (iv) correctly classifies units into groups with probability tending to one uniformly across units, (v) is asymptotically equivalent to the infeasible least squares estimator that controls for the true group indicators, (vi) is asymptotically normal at parametric rates, (vii) and is free of the incidental parameters problem.

"Identification and (Fast) Estimation of Large Nonlinear Panel Models with Two-Way Fixed Effects"
With Ao Wang, Submitted
We study a nonlinear two-way fixed effects panel model that allows for unobserved individual heterogeneity in slopes (interacting with covariates) and (unknown) flexibly specified link function. The former is particularly relevant when the researcher is interested in the distributional causal effects of covariates, and the latter mitigates potential misspecification errors due to imposing a known link function. We show that the fixed effects parameters and the (nonparametrically specified) link function can be identified when both individual and time dimensions are large. We propose a novel iterative Gauss-Seidel estimation procedure that overcomes the practical challenge of dimensionality in the number of fixed effects when the dataset is large. We revisit two

empirical studies in trade (Helpman et al., 2008) and innovation (Aghion et al., 2013), and find non-negligible unobserved dispersion in trade elasticity (across countries) and the effect of institutional ownership on innovation (across firms). These exercises emphasize the usefulness of our method in capturing flexible (and unobserved) heterogeneity in the causal relationship of interest that may have important implications for the subsequent policy analysis.

Work in Progress

2020 | "*Asymptotic Properties of Empirical Quantile-Based Estimators*" (with Xavier D'Haultfœuille and Jérémy L'Hour)
2019 | "*Linking Patents to Firms: Insights with French Firms*" (with Matthieu Lequien, Loriane Py and Paul Trichelair)

Grants & Awards

2022 – 2023 | French ANR 4th year of PhD grant: "Investissements d'Avenir/LabEx Ecodec"
2021 – 2022 | EUR Data Science for Economics, Finance and Management International Mobility grant
2019 – 2022 | French Ministry of Higher Education, Research and Innovation, Full Scholarship
2015 – 2019 | École Normale Supérieure Paris-Saclay, Full Scholarship
2017 | Hackaton Ernst & Young-Genius ENSAE, 2nd Prize – Deep Learning Challenge

Teaching Experience

Undergraduate Courses (Principal Instructor)
Fall '19 | Linear Algebra and Python (*24 hrs*), HEC Paris & ENSAE Paris

Undergraduate TA sessions at ENSAE Paris
Fall '20, '21 | Mathematical Foundations of Probability Theory (*21 hrs*), prof. Cristina Butucea
Spring '21 | Differentiable Optimization (*21 hrs*), prof. Guillaume Lecué

Graduate TA sessions at ENSAE Paris
Spring '20, '21 | Econometrics II (*18 hrs*), prof. Mickael Visser
Fall '20, '21, '22 | Mathematical Statistics I (*18 hrs*), prof. Arnak Dalalyan
Spring '20, '21 | Mathematical Statistics II (*11 hrs*), prof. Matthieu Lerasle

Professional Experience

April – Sep. 2019 | **CREST, Microeconometrics Lab**, Palaiseau, France (*4 months*)
Research assistant to Pr. Xavier D'Haultfœuille.
• Theoretical econometrics • Conducted research on statistical identification in discrete choice models with high-dimensional fixed effects.

June – Sep. 2018 | **Banque de France, DGSEI, SEPS**, Paris, France (*4 months*)
Research intern, supervised by Matthieu Lequien and Loriane Py.
• Designed a machine learning based agorithm to fuzzy-match patent data from the PATSTAT Global database to SIRENE, the national register of French firms held by Insee.

2017 – 2018 | **Société Générale, Inspection Générale**, Paris, France (*8 months*)
ENSAE Team Project in Applied Statistics (part-time internship), supervised by Clément Sentis and Walid Amrane.
• Designed predictive algorithms to forecast and anticipate credit risk and defaults in a portfolio of medium-sized firms for a subsidiary in Africa.

April – July 2017	**Toulouse School of Economics, IAST**, Toulouse, France (*4 months*) Research assistant to Senior Scholar Daniel-Li Chen (IAST/NBER). • Collected, cleaned and explored very large datasets. Designed and implemented econometric specifications to capture psychocognitive bias in decision-making in U.S. Courts such as cognitive caseload, time-effects, sequential-contrast effects, date of birth effects • Research assistance on the project "The Impact of Financial Payments from Pharmaceutical Industries on Prescribing Behaviors and Patient Outcomes".
May – July 2016	**French Treasury, French Embassy in Colombia, Regional Economic Service**, Bogotá, Colombia (*2 months*) Economist intern, supervised by Laurent Charpin. • Performed a statistical analysis aiming to highlight promising sectors for French exports • Produced a report from personal research and many interviews conducted in Spanish.
2016 – 2017	**C'efficace**, Paris, France (*2 years*) Individual teacher. • Taught courses in Economics, Marketing and Mathematics to high-school and undergraduate students.

Programming Skills & Languages

Prog. skills	Python***, R**, Stata**, SAS**, LaTeX***, Microsoft Office**, HTML/CSS*
Languages	English (fluent, TOEIC : 915/990), Spanish (intermediate), French (native)

Conferences, Seminars & Academic Visits

Seminars	CREST-PSE Econometrics Seminar (11/2022), University of Chicago (Econometrics Student Group, 05/2022; I.O. lunch, 04/2022; Econometrics Workshop, 04/2022), CREST Ph.D. Seminar (12/2022, 06/2022, 10/2021, 12/2020, 07/2020), CREST Microeconometrics Seminar (03/2022, 09/2021), Hadamard Doctoral School Ph.D. Seminar (02/2021), EPFL Workshop on Computational Methods in Social Science (07/2019)
Conferences	North American Summer Meeting of the Econometric Society (06/2022), European Winter Meeting of the Econometric Society (12/2021), Bristol Econometric Study Group (07/2022, 09/2021), EEA Congress (08/2022, 08/2021), China Meeting of the Econometric Society (06/2022, 07/2021), Asian Meeting of the Econometric Society (06/2021), African Meeting of the Econometrics Society (06/2021), IAAE Annual Conference (06/2021, 2020 cancelled), 50èmes Journées de la Statistique (2020 cancelled)
Co-organizer of	CREST Ph.D. Seminar (2019-2021), CREST Statistics·Econometrics·Machine-Learning Seminar (2019-2022), CREST Econometric Reading Group (2020)
Academic Visits	Department of Economics of the University of Chicago (2022 Winter and Spring Quarters), sponsor: Prof. Stéphane Bonhomme.

Other Duties

2020 – 2021	Ph.D.s' representative on the Board of Directors of Groupe des Écoles Nationales d'Économie et Statistique (Genes)
Referee	*Quantitative Economics*, *Review of Economics and Statistics*