

Federico Nutarelli

PERSONAL DETAILS

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ACADEMIC APPOINTMENTS

Visiting Scholar, TSE	September 2025 - Currently
Visiting Scholar, MIT Sloan School of Management	March 2024 - September 2024
Assistant Professor in Economics, IMT School Lucca	September 2023 - Currently
Postdoc, Bocconi University ICRIOS <i>Under the supervision of Prof. Stefano Breschi.</i>	2022-2023
Research Assistant, IMT School for Advanced Studies <i>Under the supervision of Prof. Dr. M. Riccaboni</i>	May 2022

EDUCATION

PhD in Economics, Networks and Business Analytics <i>IMT School for Advanced Studies</i>	2017-2022
Master of Science in Economics <i>Sant'Anna School for Advanced Studies</i> 110/110 Summa cum Laude	2017
Bachelor Degree in Economics and Business <i>University of Pisa</i> 110/110 Summa cum Laude	2015

ADDITIONAL EDUCATION

Course in Theoretical IO (TBD) <i>Toulouse School of Economics (TSE)</i>	(Forthcoming) Spring 2025
Course in Empirical IO (Prof. Dubois, Prof. Reynaert) <i>Toulouse School of Economics (TSE)</i>	Fall 2025
Course in User Innovation (Prof. Von Hippel) <i>MIT Sloan Summer School</i>	Spring 2024
<i>SIDE (Italian Econometrics Association), Bertinoro</i> "Machine Learning Algorithms for Econometricians"	2019
Summer School <i>TU Wien</i> "Machine Learning Methods and Data Analytics in Risk and Insurance" (VISS2018).	2018

EMPLOYMENT

Data Analysis <i>Roche</i> Supervision : Under Prof. Dr. Riccaboni M. and Giuliani G. About : Analysis of innovation in the biotechnological context and in the enhancement of advanced therapies.	2020-2023
Data Science <i>LVMH, Milan</i> Supervision : Under Dr. Romboli F. About : Efficient storage of the company data and click through rate analysis.	2019
Networks <i>ISTAT (Italian National Institute of Statistics)</i> Supervision : Under Dr. Reale A. and Prof. Dr. Drago C. About : Analysis of complex systems and Network theory.	2016

AWARDS AND SCHOLARSHIPS

CASD project: "Machine Learning Methods for Studying Firms' Responses to Unfavorable Trade Shocks"
2023-Currently
Role: scientific manager

Principal Investigator (PI) 2023-Currently
Innovation Diffusion: a consumer-side perspective. OpenLab Winner for Excellence research in Italy (MIUR) 2023

Scholarship Roche Holding AG 2020-2023
Role: research assistant

Indam GNAMPA 2020 Project Funding 2020
Role: co-investigator

Full Doctoral Scholarship, IMT School for Advanced Studies 2017
Awarded with the highest score out of 3100 candidates (ex aequo)

ISTAT 2016
Selected among the top 15 students

University of Pisa -Sant'Anna School for Advanced Studies 2015
Selected as a student in MSc Economics

BCC Scholarship 2012
Scholarship for deserving students in high-school

RESEARCH INTERESTS

Empirical IO, Pharmaceutical Industry, Causal Machine Learning, Health Economics

WORKS IN THE MAIN FIELD

Forthcoming

- * "Assessing the Heterogeneous Impact of Economy-Wide Shocks: A Causal Machine Learning Approach Applied to COVID-19" (with Dueñas M., Riccaboni M., Ortiz V., Serti F.). Forthcoming in **Oxford Bulletin of Economics and Statistics**

Complete Drafts

- * "Ramsey pricing and price of molecules: estimating own and cross elasticities of active principles"
- * "Product recalls, market size and innovation in the pharmaceutical industry" (with Riccaboni M.)
- * "Learning to Import through Production Networks" (with Huremovic K., Serti F., Vega-Redondo F.).

Works in Progress

- "Optimal recall timing for pharmaceuticals"
- "The microeconomic consequences of a unified European Scientific board in evaluating ATMPs" (with Prof. Dubois)

Future Agenda

- "The consequences of LLM adoption by producers and consumers on random coefficients models"

WORKS IN RELATED FIELDS

* Indicates the publications where I contributed as first author or the co-first author.

Journal Publications (Peer Reviewed)

2016 * "Testing the quality of the delineation of Local Labour Market Areas" (with Reale A. and Drago C.) - internal publication Italian Institute of Statistics (ISTAT)

2021 * *Optimal data collection design in machine learning: the case of the fixed effects generalized least squares panel data model.* (with G. Gnecco and Selvi D.), **Machine Learning**, 2021, DOI: 10.1007/s10994-021-05976-x

2020 * *Optimal trade-off between sample size, the precision of supervision, and selection probabilities for the unbalanced fixed effects panel data model.* (with G. Gnecco and Selvi D.), **Soft Computing**, 2020, 24, 15937–15949

2019 * *On the trade-off between number of examples and precision of supervision in machine learning problems* (with G. Gnecco), **Optimization Letters**, DOI: 10.1007/s11590-019-01486-x

2022 * *A machine learning approach to economic complexity based on matrix completion* (with M. Riccaboni and G. Gnecco), **Nature-Scientific Reports**, DOI: <https://doi.org/10.1038/s41598-022-13206-0>

2023 * "The matrix completion of world trade: an analysis of interpretability through Shapley values" (with Gnecco G., Riccaboni M.), **The World Economy**, DOI: 10.1111/twec.13457

2025 * "Predicting the technological complexity of global cities based on unsupervised and supervised machine learning methods", **Journal of Economic Behavior & Organization**, DOI: 10.1016/j.jebo.2025.107011

Under Review

2024 * "The determinants of science-based green patenting" (with Corrocher N., Morrison A.). Under review **Research Policy**.

2025 * "Modeling Innovation Ecosystem Dynamics through Interacting Reinforced Bernoulli Processes" (with Aletti G., Crimaldi I., Ghiglietti A.). Under review **Management Science**.

Conference Proceedings

2020 * "Optimal trade-off between sample size and precision of supervision for the fixed effects panel data model" (with Gnecco G.) **Proceedings of the 5th Int. Conf. on Machine Learning, Optimization & Data science (LOD 2019)**, Lecture Notes in Computer Science

2019 * "On the trade-off between number of examples and precision of supervision in regression problems" (with Gnecco G.) **Proceedings of the 4th Int. Conf. of the International Neural Network Society on Big Data and Deep Learning (INNS BDDL 2019)**, vol. 1, pp. 1-6, Springer International Publishing, 2019. ISBN: 978-3-030-16840-7.

2019 * "Network Analysis of the Mediterranean Food Footprint flows" (with Facchini A., Galli A., Caldarelli G.) **CCS2019: Conference on Complex Systems 2019**, number 286

Book Chapters

2020 * "Lecture Notes in Computer Science", LOD (2019)

TEACHING

Lecturer at IMT School for Advanced Studies <i>Graduate course: Labor Economics</i>	October 2025
Lecturer at IMT School for Advanced Studies <i>Graduate course: Machine-Learning and Causal Inference</i>	June 2023
Tutoring at Sant'Anna School for Advanced Studies <i>Undergraduate course: Advanced Econometrics</i>	March 2022-May 2022
Lecturer at IMT School for Advanced Studies <i>Graduate course: Applied Data Science</i>	2020-2021
Lecturer at IMT School for Advanced Studies	2022-2023

CONFERENCES AND INVITED SEMINARS

- 2025 **CFE-CMStatistics 2025**, Birkbeck University of London
- 2025 **30th International Panel Data Conference (IPDC)**, Université de Montpellier
- 2023 **MIT Fall Innovation Lab**, MIT
- 2023 "Complex system approaches to 21st century challenges: inequality, climate change, and new technologies", Santa Fe Institute.
- 2023 **DRUID 2023**, Nova Business School, Portugal.
- 2023 **EAI Intetain 2023** Held online. Role: Organizer
- 2022 **Research Policy (RP) 4th conference for Early Career Researchers** Held online.
- 2022 **DRUID 2022**, Copenhagen Business School, Denmark.
- 2022 **ASSA 2022**, American Economic Association.
- 2021 **YETI 2021**, YETI, Young Economists of Tuscan Institutions Conference, Pisa
- 2021 **AMASES 2021**, "Networks, Big Data, and Artificial Intelligence in Economics, Finance, and Social Sciences" Parallel Session.
- 2021 **ODS 2021** "International Conference on Optimization and Decision Science (ODS2021)" Parallel Session
- 2020 **ISOR Kolloquium**, Department of Statistics and Operations Research of the University of Wien, Organizer: Immanuel Bomze.
- 2019-2020 **IMT Reading group**, Presented several machine learning papers as a speaker at the "Reading Group in Machine Learning and Networks".
- 2019 **LOD 2019**, speaker at The Fifth International Conference on Machine Learning, Optimization, and Data Science (LOD2019)
- 2019 **ODS 2019**, in Program of the International Conference on Optimization and Decision Science (ODS 2019), p. 16, Genoa, Italy, September 4th -7th, 2019.
- 2019 **AMASES 2019**, in Program of the 43rd Annual Meeting of the Italian Association for Mathematics Applied to Social and Economic Sciences (AMASES 2019), p. 4, Perugia, Italy, September 9th -11th, 2019.

PROFESSIONAL SERVICE

Reviewer for: Dynamic Games and Applications (DGAA), NEUROCOMPUTING, LOD 2022, Economics of Innovation and New Technology, Soft Computing (SOCO), DRUID23

AFFILIATIONS

Association for Mathematics Applied to Social and Economic Sciences, AMASES, , The National Institute for Advanced Mathematics of Italy (INdAM), GNAMPA group (National Group for Mathematical Analysis, Probability and their Applications), Membro ordinario Società Italiana Statistica (SiS). LOD

LANGUAGES

<i>Italian</i>	Mother tongue
<i>English</i>	Full Professional Proficiency
<i>German</i>	Advanced

COMPUTER SKILLS

Programming Languages	PYTHON
Statistical Software:	R, STATA, MATLAB
Mark up languages	L ^A T _E X, Beamer
Other Software	GIT/GITHUB

EXTRA CURRICULAR ACTIVITIES

1. Member of Chess Club
2. Boxe
3. Guitar