

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
Research Fellow 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)	(Forthcoming) Spring 2025
<i>Toulouse School of Economics (TSE)</i> Course in Empirical IO (Prof. Dubois, Prof. Reynaert)	Fall 2025
<i>Toulouse School of Economics (TSE)</i> Course in User Innovation (Prof. Von Hippel)	Spring 2024

<i>MIT Sloan</i>	
Summer School	2019
<i>SIDE (Italian Econometrics Association), Bertinoro</i>	
"Machine Learning Algorithms for Econometricians"	
Summer School	2018
<i>TU Wien</i>	
"Machine Learning Methods and Data Analytics in Risk and Insurance" (VISS2018).	

EMPLOYMENT

Data Analysis	2020-2023
<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.	
Data Science	2019
<i>LVMH, Milan</i>	
Supervision : Under Dr. Romboli F.	
About : Efficient storage of the company data and click through rate analysis.	
Networks	2016
<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.	

AWARDS AND SCHOLARSHIPS

CASD project: "Machine Learning Methods for Studying Firms' Responses to Unfavorable Trade Shocks"	2023-Currently
<i>Role: scientific manager</i>	
Principal Investigator (PI)	2023-Currently
<i>Innovation Diffusion: a consumer-side perspective. OpenLab Winner for Excellence research in Italy (MIUR) 2023</i>	
Scholarship Roche Holding AG	2020-2023
<i>Role: research assistant</i>	
Indam GNAMPA 2020 Project Funding	2020
<i>Role: co-investigator</i>	
Full Doctoral Scholarship, IMT School for Advanced Studies	2017
<i>Awarded with the highest score out of 3100 candidates (ex aequo)</i>	
ISTAT	2016
<i>Selected among the top 15 students</i>	

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 as 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 4 th -7 th, 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 9 th -11 th, 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