Luca **Verginer**

ECONOMIST · DATA SCIENTIST

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Data-driven Ph.D. economist proficient at handling complex datasets and applying rigorous causal inference techniques.

Experience

ETH Zürich   *Zürich, CH*

POSTDOC RESEARCHER   *April 2019 – Present*

- **Research:** Lead on multiple projects in network analytics, economics, and data science, focusing on socio-economic systems.
- **Software Development:** Co-developer of widely-used data analytics packages.
- **Database Management:** Independently set up and manage databases for various research projects.
- **International Collaboration:** Engage in academic partnerships with multiple international universities.
- **Supervision:** Mentor PhD, MSc, and BSc students across departments, guiding them from research planning to execution.
- **Teaching:** Complex networks |Agent-Based Modelling of Economic Systems | Economic Dynamics and Complexity.

Education

Ph.D in Economics and Data Science   *Lucca, Italy*

IMT SCHOOL FOR ADVANCED STUDIES LUCCA   *Nov. 2015 — Feb. 2019*

- Specialized in econometrics and data science applied to economics.
- Gained proficiency in Python for data analysis and econometric causal inference methods.
- Published research papers focusing on the Economic Complexity and the Economics of Innovation.

MSc in Economics   *Trento, Italy*

UNIVERSITY OF TRENTO   *Oct. 2012 — Feb. 2015*

- Coursework included advanced statistics, international economics, and economic policy.
- Completed a Master's thesis on Keynesian Economics, which involved extensive simulations and data analysis using.

BSc in Accounting and Finance   *Bradford, UK*

UNIVERSITY OF BRADFORD   *Nov. 2009 — Feb. 2012*

- Developed a strong foundation in financial accounting and reporting.
- Studied courses such as Auditing, Financial Accounting, International Accounting Standards.

Teaching

Agent-Based Modelling of Economic Systems   *ETH Zürich*

MSc AND PhD COURSE   *2024 – Present*

- Led tutorials for 20 students, focusing on hands-on guidance.
- Taught network science from an agent based perspective applied to economics using Python.

Economic Dynamics and Complexity   *ETH Zürich*

MSc AND PhD COURSE   *2023 – Present*

- Managed tutorials for a class of 100 students.
- Taught Python techniques for solving ODEs in economic models.

Complex Networks   *ETH Zürich*

MSc AND PhD COURSE   *2020 – 2023*

- Led tutorials for 20 students, focusing on hands-on guidance.
- Employed Python for advanced network analysis in various contexts.

Professional Activities

JOURNAL REFEREE

Proceedings of the National Academy of Sciences (PNAS) | Journal of Economic Dynamics and Control (JEDC) | Frontiers in Physics | Industry and Innovation | Journal of Economic Interaction and Coordination | Nature Scientific Reports | PLOS One | Policy Studies | Research Policy | APJ Data Science | Advances in Complex Systems.

NetSciX **|** NetSci **|** Conference on Complex Systems **|** Geography of Innovation (GeoInno) **|** International Conference on Computational Social Science (IC2S2) **|** Druid **|** The Web Conference

Editorial Activities

– **Guest Editor**, Special Issue on "Special Issue on Success in Science", *Advances in Complex Systems*, 2022.

Selected Research Projects

Quantifying Resilience in Pharmaceutical Supply Chain Networks   *Pharmaceutical Sector*

Keywords: stress tests, supply chain resilience, econometrics, policy implications

- Assessed the resilience of pharmaceutical supply chains, focusing on the potential for drug shortages.
- Developed novel stress-test simulations to evaluate the vulnerabilities.
- First study appeared in *Science Advances*.

Predicting Innovation with Patents using Graph Neural Networks   *Complex Networks*

Keywords:GNN (graph neural networks), innovation, econometrics

- Developed a novel graph neural network (GNN) architecture to predict innovation from massive patent data citation networks.
- Compared the performance of the GNN with traditional machine learning methods.
- Developed the "Radical Innovation Index" to quantify the predictability firm's patent trajectory.

Estimating the Impact of COVID-19 on the Automotive Industry's Supply Networks   *Automotive Sector*

Keywords: supply chain resilience, economic shocks, econometrics

- Utilized econometric models to assess the reverberating impact of COVID-19 on global automotive supply chains.
- Isolated and quantified shock diffusion mechanisms within complex international networks.

Quantifying Intellectual Property Competition and Litigation from Patent Data   *Intellectual Property*

Keywords: intellectual property, international firms, machine learning

- Employed econometric techniques to develop a competition index among international firms in the intellectual property domain.
- Created a litigation risk assessment model based on patent data.

Pathpy: A Python Package for Temporal Network Analysis   *Software Development*

Keywords: temporal networks, Python, machine learning, education, collaboration

- Core contributor in a multi-university project.
- Developed Python package to fill gaps in network analysis tools.
- Software used in my "Complex Networks" course.

Technical Skills and Languages

Advanced Data Analysis
Time Series Analysis, Temporal Network Analysis

Machine Learning & Deep Learning
PyTorch, MLFlow, Tensorflow, Scikit-learn

Statistical & Econometric Methods
Causal Inference, Econometric Modeling

Programming Languages
Python, R, Go, Mathematica, Bash

Web Development
React, Vue, Hugo

Big Data Technologies
Hadoop, Spark, MapReduce

Database Management
SQL, Neo4j, PostGIS, PostgreSQL

Deployment & Virtualization
AWS, Azure, Heroku, Docker

Software Development
Co-development of data analytics packages

Version Control & Operations
Git, Continuous Integration/Deployment

Languages
German (Fluent), English (Fluent), Italian (Fluent), Rhaeto-Romance (Fluent), French (A2)

Publications

Peer-reviewed

Adapting to Disruptions: Managing Supply Chain Resilience through Product Rerouting
Ambra Amico, Luca Verginer, Giona Casiraghi, Giacomo Vaccario, Frank Schweitzer
Science Advances 10.3 (Jan. 2024) eadj1194. 2024

Understanding Online Migration Decisions Following the Banning of Radical Communities
Giuseppe Russo, Manoel Horta Ribeiro, Giona Casiraghi, Luca Verginer
Proceedings of the 15th ACM Web Science Conference 2023, 2023, Austin TX USA

Spillover of Antisocial Behavior from Fringe Platforms: The Unintended Consequences of Community Banning
Giuseppe Russo, Luca Verginer, Manoel Horta Ribeiro, Giona Casiraghi
Proceedings of the International AAAI Conference on Web and Social Media 17 (June 2023) pp. 742–753. 2023

The Impact of the COVID-19 Pandemic on Scientific Research in the Life Sciences
Massimo Riccaboni, Luca Verginer
PLOS ONE 17.2 (Feb. 2022) e0263001. 2022

When Standard Network Measures Fail to Rank Journals: A Theoretical and Empirical Analysis
Giacomo Vaccario, Luca Verginer
Quantitative Science Studies 3.4 (Dec. 2022) pp. 1040–1053. 2022

Analysis and Visualisation of Time Series Data on Networks with Pathpy
Jürgen Hackl, Ingo Scholtes, Luka V. Petrović, Vincenzo Perri, Luca Verginer, Christoph Gote
Companion Proceedings of the Web Conference 2021, 2021, Ljubljana Slovenia

A Network Approach to Expertise Retrieval Based on Path Similarity and Credit Allocation
Xiancheng Li, Luca Verginer, Massimo Riccaboni, P. Panzarasa
Journal of Economic Interaction and Coordination (July 2021). 2021

Reproducing Scientists' Mobility: A Data-Driven Model
Giacomo Vaccario, Luca Verginer, Frank Schweitzer
Scientific Reports 11.1 (Dec. 2021) p. 10733. 2021

Stem Cell Legislation and Its Impact on the Geographic Preferences of Stem Cell Researchers
Luca Verginer, Massimo Riccaboni
Eurasian Business Review 11.1 (Mar. 2021) pp. 163–189. 2021

Talent Goes to Global Cities: The World Network of Scientists' Mobility
Luca Verginer, Massimo Riccaboni
Research Policy 50.1 (Jan. 2021) p. 104127. 2021

Foreword to the Special Issue on Success in Science
Luca Verginer, Giacomo Vaccario, Alexander M Petersen
Advances in Complex Systems (2021) p. 2. 2021

Should the Government Reward Cooperation? Insights from an Agent-Based Model of Wealth Redistribution
Frank Schweitzer, Luca Verginer, Giacomo Vaccario
Advances in Complex Systems 23.07 (Nov. 2020) p. 2050018. 2020

The Mobility Network of Scientists: Analyzing Temporal Correlations in Scientific Careers
Giacomo Vaccario, Luca Verginer, Frank Schweitzer
Applied Network Science 5.1 (Dec. 2020) p. 36. 2020

Cities and Countries in the Global Scientist Mobility Network
Luca Verginer, Massimo Riccaboni
Applied Network Science 5.1 (Dec. 2020) p. 38. 2020

Working Papers

The Robotic Herd: Using Human-Bot Interactions to Explore Irrational Herding
Luca Verginer, Giacomo Vaccario, Piero Ronzani
Preprint, 2023

The Role of Network Embeddedness on the Selection of Collaboration Partners: An Agent-Based Model with Empirical Validation
Frank Schweitzer, Antonios Garas, Mario V. Tomasello, Giacomo Vaccario, Luca Verginer
arXiv:1403.3298 [physics] (Jan. 2022). 2022

The Impact of Acquisitions on Inventors' Turnover in the Biotechnology Industry
Luca Verginer, Federica Parisi, Jeroen van Lidth de Jeude, Massimo Riccaboni
arXiv:2203.12968 [econ, q-fin] (Mar. 2022). 2022