Fabio Vanni

Curriculum Vitae

Academic Position

01.2025 – **Professor (Associate)**, *University of Insubria, Dept. of Economics*, Varese, Italy.
(sector STAT-04/A, Metodi matematici dell'economia e delle scienze attuariali e finanziarie)

01.2022 – *12*.2024 **Assistant Position Tenure Track**, *University of Insubria*, Varese, Italy.
(Ricercatore Tempo Determinato B - sector SECS-S/06, Department of Economics)

10.2021 – *12*.2021 **Research Fellow**, *Gredeg - Université cote d'azur*, Nice, France.
(Research Grant from CNRS UMR 7321 project: *A NETwork-based analysis of human MOBIlity patterns*)

01.2019 – *09*.2021 **Research Fellow**, *OFCE - Sciences Po*, Sophia Antipolis, France.
(Assistant de recherche - Observatoire français des conjonctures économiques. Research on random matrix theory applied to macro-economic indicators and financial netowrks)

01.2013 – *12*.2018 **Postdoctoral Research Fellow**, *Scuola Universitaria Superiore Sant'Anna*, Pisa, Italy.
(projects on Financial Networks for risk and resilence analysis, mathematical model in growth theory, and firm allocation stochastic dynamics)

06.2012 – *12*.2012 **Research Fellow**, *University of North Texas*, Denton, Texas, USA.
(research project on anomalous diffusion models and fractional Brownian motion dynamics)

09.2009 – *05*.2012 **Research Assistant**, *University of North Texas*, Denton, Texas, USA.
(funded PhD sholasrships with project on "mathematical models of complex system theory in social sciences" under the supervision of Prof. Paolo Grigolini)

Education

05.2012 **Ph.D.**, *University of North Texas*, Denton, USA.
Doctorate in Physics in the research topic: Stochastic models in Cooperative Systems - (4 GPA)

10.2007 **Master Degree MSc**, *Università degli studi di Pisa*, Pisa, Italia.
Degree in Physics in the research topic: Long-Range Correlations and stochastic renewal processes

03.2002 **Bachelor of Science**, *Università degli studi di Pisa*, Pisa, Italia.
Degree in Physics in the research topic: Theory and applications of Independent Compontent Analysis machine learning technique.

Awards, Affiliations and institutional activities

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2024–2035 **National scientific qualification (ASN)**, *for the position of Associate Professor* , SECS-S/06-Mathematical Methods of Economics, Finance and Actuarial Sciences.
(Academic Recruitment Field 13/D4 - Statistics and mathematical methods for decisions, according to the national classification)

2018–2022 **Affiliate Scholar**, *at the Center for Non Linear Science*, by the college of Science at the University of Nort Texas, (USA).
For the study of complex systems theory, graph theory, dynamical systems, and stochastic processes applied to social and economic sciences.

2023–present **Affiliate Researcher**, *at the Institute of Econonics*, by Scuola Superiore Sant'Anna di Pisa.
For the study of mathematical and computational agent-based models for the analysis of interbank economic dynamics and financial markets.

2023–present **Member of the PhD board**, *at Università degli Studi dell'Insubria* .
PhD Program in Methods and Models for Economic Decisions

2023–present **Member of the AiQua Commission**, *at Università degli Studi dell'Insubria* .
for the Degree Course in Economics and Management

2023–present **Member of GNAMPA – INDAM**, *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni*, Istituto Nazionale di Alta Matematica "Francesco Severi".

2021–present **Member of AMASES**, *Association for Mathematics Applied to Social and Economic Sciences*.

Organization and Participation in research activities

Workshop and Conference Organization

Special session co-organizer	**Annual meeting of the Italian Association for Mathematics Applied to Social and Economic Sciences (AMASES)**: Special issue: "Recent advances in Economics and Finance Climate and socio-economics"	*date and location*	University of Palermo July 22th-24 2022
Workshop co-organizer	**DCP'19 Dynamics and Complexity**: Climate and socio-economics	*date and location*	CNR Pisa 1-3 July 2019
Workshop organizer	**A unifying approach in the study of complex systems**: the role of heterogeneity and the concept of time in models and data.	*date and location*	Scuola Superiore Sant'Anna di Pisa 13-15 June 2018
Workshop organizer	**Self-organized temporal criticality: sociological, biological and economical applications:** An interdisciplinary workshop on complex systems	*date and location*	Scuola Superiore Sant'Anna di Pisa 17-19 July 2017

Scientific editorials

Committee member — **Member of the Scientific and Paper Review Committee:** for the international conference of COMPLEX NETWORKS & their Applications — *editions:* 2022 2023 2024

Referee activities — Oxford Industrial and Corporate Change, Journal of economic interaction and coordination, EPJ Data Science, EPOL economia politica, Chaos solitons & fractals, Chaos

National & international research collaboration

Working group component — "Economic Impact" working group of the Covid-19 emergency task force, appointed by the Italian Ministry for Technological Innovation and Digitalization.

date and purpose — (*05*.2020 – *07*.2020) Collaboration with a team including researchers and faculty from the Sant'Anna School of Advanced Studies in Pisa, the IUSS School of Advanced Studies in Pavia, the OFCE Observatory at Sciences Po University in Paris, and the Regional Institute for Economic Planning of Tuscany in Florence.

Project researcher — Collaboration with full responsibility on scientific research entrusted by Scuola Superiore Sant'Anna di Pisa.

date and purpose — (*06*.2020 – *07*.2020) the research project: "Assessment of the Economic Impact of the Covid-19 Epidemic at the Regional Level in Italy" at the Department of Economics of the Sant'Anna School of Advanced Studies in Pisa

Scientific publications in peer-reviewed journals

- **Fabio Vanni**: *A visit generation process for human mobility random graphs with location-specific latent-variables: From land use to travel demand.* Chaos, solitons & fractals, vol. 185, ISSN: 0960-0779 (2024), doi: 10.1016/j.chaos.2024.115175
- **Fabio Vanni**, David Lambert: *Aging Renewal Point Processes and Exchangeability of Event Times*. MATHEMATICS, vol. 12, p. 1-26, (2024) ISSN: 2227-7390, doi: 10.3390/math12101529
- M. Guerini, **Fabio Vanni**, M. Napoletano: *E pluribus, quaedam. Gross Domestic Product out of a Dashboard of Indicators*. Italian Economic Journal,(2024), ISSN: 2199-322X, doi: 10.1007/s40797-024-00271-9
- **Fabio Vanni**, A. Hitaj , E. Mastrogiacomo: *Enhancing Portfolio Allocation: A Random Matrix Theory Perspective*. MATHEMATICS,vol. 12, ISSN: 2227-7390, (2024), doi: 10.3390/math12091389
- **Fabio Vanni**, David Lambert: *On an Aggregated Estimate for Human Mobility Regularities through Movement Trends and Population Density* ENTROPY, 26(5):398. (2024) doi: 10.3390/e26050398
- T. Ferraresi, L. Ghezzi, **Fabio Vanni**, M. Guerini, F. Lamperti, G. Fagiolo, A. Caiani, M. Napoletano, A. Roventini: *On the employment and health impact of the COVID-19 shock on Italian regions: a value chain approach*, Regional Studies, p. 1-17, ISSN: 0034-3404, (2023), doi: 10.1080/00343404.2023.2189508;

- S. Reissl, A. Caiani, F. Lamperti, M. Guerini, **Fabio Vanni**, G. Fagiolo, T. Ferraresi, L. Ghezzi, M. Napoletano, A. Roventini: *Assessing the economic impact of lockdowns in italy: A computational input–output approach*, Industrial and Corporate Change 31 (2), 358-409 (2022) ;
- **Fabio Vanni**, David Lambert, Luigi Palatella: *On the use of aggregated human mobility data to estimate the reproduction number*, Nature Scientific Reports 11 (1), 1-10 (2021);
- **Fabio Vanni**, David Lambert, Luigi Palatella: *Epidemic response to physical distancing policies and their impact on the outbreak risk*, Chaos Solitons & Fractals 110854 (2021) ;
- **Fabio Vanni** and Paolo Barucca, *Degree-correlations in a bursting dynamic network model,* Journal of Economic Interaction and Coordination, 1–33 (2018);
- David Lambert and **Fabio Vanni**, *Complexity and Heterogeneity in a Dynamic Network* , Chaos, Solitons & Fractals, Volume 108, March 2018, Pages 94-103;
- Giulio Bottazzi, Ugo Gragnolati and **Fabio Vanni**: *Non-linear externalities in firm localization* Regional Studies 51 (8), 1138-1150 (2017);
- M. Luković, **Fabio Vanni**, A. Svenkeson, P, Grigolini: *Transmission of information at criticality*, PHYSICA. A, vol. 416, p. 430-438, (2014), ISSN: 0378-4371, doi: 10.1016/j.physa.2014.08.066
- **Fabio Vanni**, M Luković, P Grigolini: *Criticality and transmission of information in a swarm of cooperative units*, Physical Review Letters 107 (7), 078103 (2011)
- M. Bologna, **Fabio Vanni**, A. Krokhin, P. Grigolini: *Memory effects in fractional Brownian motion with Hurst exponent $H < 1/3$*, Physical Review E, 82 (2010)

Working papers and other (non-peer reviewed) scientific publications

- Fabio Vanni, David Lambert: *Urn modeling of origin-destination mobility network and employee commuting*, work-in-progress (2024)
- Fabio Vanni: *Inter-bank market model under financial risk-leveraging cycles dynamics*, work in progress (2024)
- Ferraresi, T., Ghezzi, L., Vanni, F., Guerini, M., Lamperti, F., Fagiolo, G., ... & Roventini, A. (2020). Lockdown, dinamiche regionali e settoriali. Policy Brief per il ministero per l'innovazione tecnologica e la digitalizzazione.
- Giulio Bottazzi, Alessandro De Sanctis, Fabio Vanni: *Non-Performing Loans and Systemic Risk in Financial Networks*, Working Paper Available at SSRN 3539741 (2020)
- Fabio Vanni, G. Dosi, A. Roventini, and M. Napoletano: *Complexity and Heterogeneity in dynamical networks and system instability*, Book Of Abstract of the International Conference on Complex Networks and Their Applications (2017)
- Fabio Vanni, Giulio Bottazzi: *A numerical estimation method for discrete choice models with non-linear externalities*, LEM Working Paper Series (2014/01)

Talks at international conferences and workshops

- **AMASES 2024**, *XLVIII annual conference of the italian Association for Mathematics Applied to Social and Economic Sciences*, organized by the Department of Economics and Statistics of the University of Naples Federico II and the Associazione per lo Sviluppo di Teoria Economica, Matematica e Applicazioni., Ischia,September 5th-7th, 2024.
  title: *Aging Renewal Point Processes and Exchangeability of Event Times: a memory detection time-series analysis.*
- **DCP24**, *Workshop on Dynamics and Complexity*, host by S.Anna Scool of Advanced Studies, Pisa,June 5th-8th, 2024.
  title: *Aging and Exchangeability*. (**Invited speaker**).
- **CFE-CMStatistics 2023**, *16th International Conference of the ERCIM WG on Computational and Methodological Statistics,17th International Conference on Computational and Financial Econometrics*, host by HTW Berlin, University of Applied Sciences, Berlin, Germany, December 13th-15th, 2023.
  title: *Portfolio allocation: The advantage of using network approach*. (**Invited speaker**).
- **MOP/GP 2023**, *The 15th International Conference on Multiple Objective Programming and Goal Programming*, host by Yaşar Üniversitesi Selçuk Yaşar Kampüsü, Turkey, October, 02nd-04th, 2023.
  title: *A multiple criteria optimal control model for emission-mobility reductions and sustainable city planning*.
- **AMASES 2023**, *XLVII annual conference of the italian Association for Mathematics Applied to Social and Economic Sciences*, organized by Universita' Biccocca di Milano., Milan,September 20th-22th, 2023.
  title: *stochastic process of an inhomogeneous random graph model for a mobility origin-destination network and scaling relations of income elasticity of travel demand.*
- **DCP23**, *Workshop on Dynamics and Complexity*, host by S.Anna Scool of Advanced Studies and organized by Università di Pisa (CISSC – Dipartimento di Matematica), CNR-Area di Pisa, Univ. North Texas, Associazione Culturale XlinX ., Pisa,June 5th-8th, 2023.
  title: *A latent-variable model for daily trip mobility networks applied to real-world origin-destination visitation flows.*. (**Invited speaker**).
- **DCP22**, *Dynamics and Complexity*, host by Dept of Mathematics, University of Pisa-Italy, May 26th-28th 2022.
  title: *seeds of Complexity:The relation between human interactions with social and economic variables*. (**Invited speaker**).
- **ABM4Policy**, *Seminars for Agent Based Models and policy applications*, held online at Bank of England, December 16th 2021.
  title: *Epidemic response to physical distancing policies and their impact on the outbreak risk.*
- **SafeGraph/Placekey**, *Webinar on mobility data*, held online at Standford University (USA), May 27th 2021.
  title: *Exploring Regular Mobility Patterns During the Pandemic*.
- **WEHIA 2019**, *Workshop on Economic Science with Heterogeneous Interacting Agents* , City University of London, June 24th-26th 2019.
  title: *Leverage-driven cycles and complex dynamics in a model with endogenous network formation*
- **UCA complex days 2019**, *workshop host at Université Côte d'Azur Nice-France Université Côte d'Azur*, Nice-France, March 25th 2019.
  title:*non-poissonian dynamics and fluctuations of interactive agents.*

- **FINEXUS 2018**, *Second Conference on Financial Networks and Sustainability*, UZH, University of Zurich-Switzerland, January 17th-19th 2018.
  title: *Complexity and heterogeneityin an agent driven model temporal network: a financial perspective.*
- **WEHIA 2017**, *annual Workshop on the Economic Science with Heterogeneous Interacting Agents*, Università Cattolica di Milano, June 12th-14th 2017.
  title: *Endogenous money in a dynamic network formation model with Value at Risk constraints.*
- **Complex Networks 2017** , *The 6th International Conference on Complex Networks and Their Applications*, Lyon-France, November 29th - December 1st 2017.
  poster session: *Complexity and Heterogeneity in dynamical networks and system instability.*
- **Synthetic Populations 2017**, *International Conference on Synthetic Populations*, host at IMT-Lucca, February 22th-23th 2017.
  title: *Endogenous money in a dynamic network formation model with Value at Risk.*
- **The Network Science of Squads**, *Conference on Evolutionary Game Theory of Small Groups and their Larger Societies*, host by University of North Texas (USA), December 3rd-5th 2016.
  title: *Autonomous Agents in Capacity Degree Networks.*(**Invited speaker**)
- **Financial Networks and Systemic Risk**, *6th OFCE-GREDEG-SKEMA Workshop on Complex Evolving System Approach in Economics. Financial networks and systemic risk*, Sophia-Antipolis Nice (France), December 1st-3rd 2016.
  title: *Financial networks and systemic risk*.
- **StatPhys26**, *Satellite conference on Statistical Physics of Financial and Economic Networks*, host at Paris 1 Panthéon-Sorbonne (France), July 15th-16th 2016.
  title: *Endogenous money network model of leveraged institutions*.
- **CFE 2014**, *8th International Conference on Computational and Financial Econometrics*, Università di Pisa, December 6th-8th 2014.
  title: *A numerical estimation method for discrete choice models with non-linear externalities*.
- **IWcee14**, *International Workshop on Computational Economics and Econometrics. The Socio-Economics of Networks: Theory and Applications*, Ceris-CNR Rome, June 26th-27th, 2014 .
  title: *A numerical estimation method for discrete choice models with non-linear externalities*.
- **The growth of firms and countries**, *Conference of distributional properties and economic determinants*, Universitas Mercatorum, Roma, October 24th-25th 2013 .
  title: *Non-linearities in firms' localization choices*.

Teaching Activity

a.y.: 2023–2024 2022–2023 2021–2022

Course of: **Applied Mathematics**, *at University of Insubria* , Master's Degree in Global entrepreneurship economics and management, Class of Quantitative Methods for Management.
Course holder- 40h (english course)

a.y.: 2023–2024

Course of: **Applied Statistics**, *at University of Insubria* , Master's Degree in Global entrepreneurship economics and management, Class of Quantitative Methods for Management.
Course holder- 40h (english course)

a.y.: 2023–2024 ***Course of:*** **Matematica I**, *at University of Insubria* , Bachelor's Degree in Economics and Management, economia e management dell'innovazione e della sostenibilita' - digitale integrato.
Course holder- 40h (italian course)

a.y.: 2022–2023 ***Course of:*** **Matematica I**, *at University of Insubria* , Bachelor's Degree in Economics and Management, Economia e management dell'innovazione e della sostenibilità.
Course holder- 40h (italian course)

a.y.: 2022–2023 2021-2022 ***Course of:*** **Matematica II**, *at University of Insubria* , Bachelor's Degree in Economics and Management, Economia e management.
Course holder- 40h (italian course)

a.y.: 2021–2022 ***Course of:*** **Matematica per l'economia e la finanza**, *at University of Insubria*, Bachelor's Degree in Economics and Management, Economia e management.
Course holder- 12h (italian course)

a.y.: 2019-2020 ***Course of:*** **Calculus III**, *at Master in Economics and social sciences- SciencesPo campus of Menton - France* , Mathematical methods for economics and social sciences.
Course holder -24h (english course)

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a.y.: 2023–2024 2022-2023 ***PhD Course of:*** **Networks, Theory and Applications**, *at University of Insubria*, PhD Program in Methods and Models for Economic Decisions , graduate course.
Course holder- 10h (english course)

a.y: 2016–2017 2015–2016 2014–2015 2013-2014 **Integrative PhD teaching activity**, *International Doctoral Program in Economics at Scuola Superiore Sant'Anna - Institute of Economics*, course of: Mathematics for Social Sciences, Teaching Assistant.
12h (english course)

a.y: 2017–2018 2016–2017 2015–2016 **Integrative teaching activity**, *course of Mathematical methods for economics at Master in Economics - University of Pisa* , Teaching Assistant.
Esercitazioni di Matematica, 12h (italian course)

a.y.: 2009–2010 **Integrative teaching activity**, *at University of North Texas*, Astronomy Lab course, Teaching Assistant.
12h (english course)

Date: January 18, 2025

Signature

Le dichiarazioni rese nel presente curriculum sono da ritenersi rilasciate ai sensi degli artt. 46 e 47 del D.P.R. 445/2000