Salvatore Federico

Curriculum Vitae

✉ *s.federico@unibo.it*
sites.google.com/view/salvatorefederico/home-page
Married, two sons

Current Position

Sep 2023 – present

Full Professor, *Department of Mathematics, University of Bologna*, Italy.
Chair in Probability and Mathematical Statistics (MAT/06).

Member of INdAM–GNAMPA (Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni).

Academic Habilitations

Italian habilitation as Full Professor of Mathematical Methods for Economics, Actuarial and Financial Sciences (13/D4, 2016).

Italian habilitation as Full Professor of Mathematical Analysis, Probability and Mathematical Statistics (01/A3, 2018).

Italian habilitation as Full Professor of Political Economics (13/A2, 2018).

Research Interests

- Optimal (stochastic) control in finite and infinite dimension; Hamilton–Jacobi–Bellman equations
- Optimal control of systems with delay / path-dependent systems and of (S)PDEs
- Differential games and mean field games, also in infinite dimension; McKean–Vlasov control
- Economic and financial applications of optimal control theory (portfolio theory, real options, growth and environmental economics with spatial heterogeneity, epidemics)

Bibliometric Indicators

Publications	47 papers in international peer-reviewed journals, 1 peer-reviewed proceedings paper
Scopus	46 documents, 693 citations, h-index 16 (Scopus Author ID: 35848162800) – October 2026
Google Scholar	1330 citations, h-index 22, i10-index 35 – October 2026

Scientific Collaborations

- René Aïd, Université Paris Dauphine
- Mauro Bambi, Durham University, UK
- Raouf Boucekkine, Rennes Business School
- Alessandro Calvia, Luiss University (Rome)
- Andrea Cosso, Università di Milano
- Tiziano De Angelis, Università di Torino
- Jodi Dianetti, Università di Roma Tor Vergata
- Marina Di Giacinto, Università di Cassino
- Cristina Di Girolami, Università di Bologna
- Giorgio Ferrari, University of Bielefeld
- Giorgio Fabbri, CNRS
- Davide Fiaschi, Università di Pisa
- Paul Gassiat, Université Paris Dauphine
- Daria Ghilli, Università di Pavia

- Ben Goldys, University of Sydney
- Fausto Gozzi, Luiss (Rome)
- Huyên Pham, École Polytechnique (Paris)
- Luca Regis, Università di Torino
- Frank Riedel, University of Bielefeld
- Michael Röckner, University of Bielefeld
- Neofytos Rodosthenous, UCL, London
- Mauro Rosestolato, Università di Genova
- Patrick Schuhmann, University of Bielefeld
- Andrzej Święch, Georgia Tech
- Jun Sekine, Osaka University
- Elisa Tacconi, Università Bocconi
- Peter Tankov, ENSAE - Paris Tech
- Maria Laura Torrente, Università di Genova
- Nizar Touzi, New York University
- Elena Vigna, Università di Torino
- Bertrand Villeneuve, Paris Dauphine
- Bernt Øksendal, CMA - University of Oslo

Past Academic Positions

2020–2023 **Associate Professor**, *University of Genova*, Italy.
2016–2020 **Associate Professor**, *University of Siena*, Italy.
2015–2016 **Assistant Professor (tenured)**, *University of Florence*, Italy.
2011–2015 **Assistant Professor (tenured)**, *University of Milan*, Italy.
2010–2011 **Post-doc**, *Laboratoire de Probabilités et Modèles Aléatoires, Université Paris 7*, France.
2009–2010 **Post-doc**, *LUISS University*, Rome.

Education

2005–2009 **PhD in Mathematics for Finance**, *Scuola Normale Superiore*, Pisa.
Thesis: *Stochastic Optimal Control Problems for Pension Funds Management*. Advisor: F. Gozzi. 70/70 cum laude.
2004 **MSc in Mathematics**, *University of Pisa*, 110/110 cum laude.

Research Visits (selected)

- 2008: University of New South Wales (Sydney), invited by Ben Goldys
- 2009: University of Oslo, invited by Bernt Øksendal (ESF grant)
- 2012–2014: Université Paris 7, invited by Huyên Pham
- 2013: École Polytechnique (Paris), invited by Nizar Touzi
- 2013: University of Bielefeld, invited by Frank Riedel (DAAD grant)
- 2014: University of York, invited by Mauro Bambi
- 2015: Aix-Marseille School of Economics, invited by Raouf Boucekkine
- 2018: University of Turku (Finland), invited by Luis Alvarez
- 2019: ENSAE (Paris), invited by Peter Tankov
- 2015–2025: University of Bielefeld (several visits), invited by Giorgio Ferrari
- 2023, 2026: University College London, invited by Neofytos Rodosthenous

Invited Talks at International Conferences

- Viennese Vintage Workshop, December 4-5, 2009, Vienna, Austria.
- Workshop “Stochastic Control in Finance", March 18-23, 2010, Roscoff, France.

- EURO XXIV, July 11-14, 2010, Lisbon, Portugal.
- Control of PDEs with Nonlocal Terms, Institut Henri Poincaré, December 16-17, 2010, Paris, France.
- 12th Viennese Workshop on Optimal Control, Dynamic Games and Nonlinear Dynamics, May 30 - June 2, 2012, TU Vienna, Austria.
- Workshop on Stochastic Analysis and Applications, Centre Interfacultaire Bernoulli, EPFL, June 4-8, 2012, Lausanne, Switzerland.
- Workshop "Stochastics and Real World Models", July 15-19, 2013, University of Bielefeld, Germany.
- Conference "Stochastic Partial Differential Equations and Applications - IX", January 6-12, 2014, Levico Terme, Italy.
- Workshop "Mathematical Finance and Related Issues", March 16-20, 2015, Osaka University, Japan.
- 13th Viennese Workshop on Optimal Control and Dynamic Games, May 13-16, 2015, Vienna, Austria.
- Workshop "Strategic Aspects of Optimal Stopping and Control in Economics and Finance", July 9-11, 2015, University of Bielefeld, Germany.
- Workshop "Optimal Stopping in Complex Environments", December 18-20, 2017, University of Bielefeld, Germany.
- 14th Viennese Workshop on Optimal Control and Dynamic Games, July 3-6, 2018, Vienna, Austria.
- Viennese Vintage Workshop, December 5-6, 2019, Vienna, Austria.
- XXXI EURO Conference, July 12-14, 2021 (online), Athens, Greece.
- Workshop "Taming Uncertainty and Complexity in Economics and Finance", May 26-28, 2022, LUISS University, Rome, Italy.
- One-day Workshop in Mathematical Economics and Mathematical Finance, March 1, 2023, Bielefeld, Germany.
- Stochastic Control and Games for Risk and Regulation, October 28-31, 2024, Hammamet, Tunisia.
- Workshop "Mean Field Games and Applications", July 21-23, 2025, Humboldt University, Berlin, Germany.
- Workshop "Mean Field Models, Optimal Control and Applications in Social Sciences", June 22-25, 2026, Bolzano, Italy.

Organization of Scientific Events

- Co-organizer of the **3rd Dolomites Winter School** on *Mean-Field Control, Mean-Field Games and Applications* (DWS27), Folgarida (TN), January 25-29, 2027. Lecturers: Giorgio Ferrari (Bielefeld) and Huyên Pham (École Polytechnique). Supported by INdAM–GNAMPA. `https://sites.google.com/view/dolomitesws27`
- Co-organizer of the **2nd Dolomites Winter School** on *Mean-field systems in finance, neurosciences and AI* (DWS26), Folgarida (TN), January 11-16, 2026. Lecturers: Noufel Frikha and Eva Löcherbach (Paris 1 Panthéon-Sorbonne).
- Co-organizer of the **1st Dolomites Winter School** on *Optimal Transport: from robust pricing to model calibration* (DWS25), Folgarida (TN), January 26-31, 2025. Lecturers: Beatrice Acciaio (ETH Zürich) and Jan Obłój (Oxford).

- Co-organizer of the conference "Mathematics of Uncertain Systems for Economics and Finance" (MUCEF), Rimini, May 26-30, 2025.
- Co-organizer of a thematic session at the "15th Viennese Workshop on Optimal Control and Dynamic Games", Vienna, July 11-15, 2022.
- Co-organizer of the workshop "New frontiers in stochastics for economics and finance", University of Siena, May 30 - June 1, 2019.
- Co-organizer of two thematic sessions at the "14th Viennese Workshop on Optimal Control and Dynamic Games", Vienna, July 3-6, 2018.
- Co-organizer of the lecture series on *Martingale optimal transport* by Nizar Touzi, Department of Mathematics, University of Pisa, December 2015.
- Organizer of the workshop "Path-dependent PDEs and Stochastic Equations with Memory", University of Milan, January 23, 2015.

Editorial Activity

Topic Editor of *Risks*.

Guest Editor (with G. Ferrari and L. Regis) of the special issue "Applications of stochastic optimal control to Economics and Finance", *Risks*.

Guest Editor (with G. Ferrari and L. Regis) of the special issue "Advances in Optimal Control and Dynamic Games in Economics, Finance and Insurance", *Decisions in Economics and Finance*, Vol. 48 (2025).

Referee SIAM J. Control Optim., Ann. Appl. Probab., Stochastic Process. Appl., Finance Stoch., SIAM J. Financial Math., Electron. J. Probab., Appl. Math. Optim., J. Econom. Dynam. Control, Economic Theory, J. Math. Econom., and many others; reviewer for Mathematical Reviews and zbMATH.

Research Projects and Grants (selected)

- 2027: INdAM–GNAMPA grant for the organization of the Dolomites Winter School DWS27.
- 2026: Principal Investigator, INdAM–GNAMPA project "Stochastic games and mean field games with heterogeneous information".
- 2023–2026: Member of the PRIN 2022 project "Stochastic control and games and the role of information" (PI: T. De Angelis).
- 2020–2024: Member of the PRIN 2017 project "The Time-Space Evolution of Economic Activities: Mathematical Models and Empirical Applications" (PI: F. Gozzi).
- 2017–2020: Member of the PRIN 2015 project "Deterministic and stochastic evolution equations" (PI: A. Lunardi).
- 2010–2012: Member of the PRIN 2008 project "Stochastic and deterministic partial differential equations and their applications" (PI: A. Lunardi).
- 2018: MIUR FFABR grant (basic research funding).
- 2014: Principal Investigator, INdAM–GNAMPA project "Stochastic equations with delay and applications".
- 2010: Principal Investigator, INdAM–GNAMPA project "On the analysis of distributional properties of controlled stochastic processes and application to Portfolio Optimization".

- Member of several further INdAM–GNAMPA projects (2015, 2020–21, 2023, 2024).

Awards

2008/09 Luiss Prize for Research Activity

2012 AMASES Prize for PhD studies (best single-authored paper from a PhD thesis in Mathematics applied to Social Sciences)

Advising

- PhD advisor of Elisa Tacconi (LUISS University, Rome)
- PhD advisor of Filippo De Feo (Politecnico di Milano)
- Supervisor of the post-doc of Antonio Martire (University of Genova, 2021)
- Supervisor of several MSc and BSc theses in Mathematics, Applied Mathematics and Economics

Publications

International peer-reviewed journals

[1] S. Federico, B. Goldys, F. Gozzi, *HJB equations for the optimal control of differential equations with delays and state constraints, I: Regularity of viscosity solutions*. SIAM Journal on Control and Optimization, Vol. 48, No. 8, pp. 4910–4937 (2010).

[2] M. Di Giacinto, S. Federico, F. Gozzi, *Pension funds with a minimum guarantee: a stochastic control approach*. Finance and Stochastics, Vol. 15, No. 2, pp. 297–342 (2011).

[3] S. Federico, *A stochastic control problem with delay arising in a pension fund model*. Finance and Stochastics, Vol. 15, No. 3, pp. 421–459 (2011).

[4] S. Federico, B. Goldys, F. Gozzi, *HJB equations for the optimal control of differential equations with delays and state constraints, II: Verification and optimal feedbacks*. SIAM Journal on Control and Optimization, Vol. 49, No. 6, pp. 2378–2414 (2011).

[5] S. Federico, B. Øksendal, *Optimal stopping of stochastic differential equations with delay driven by Lévy noise*. Potential Analysis, Vol. 34, No. 2, pp. 181–198 (2011).

[6] M. Di Giacinto, S. Federico, F. Gozzi, E. Vigna, *Income drawdown option with minimum guarantee*. European Journal of Operational Research, Vol. 234, No. 3, pp. 610–624 (2014).

[7] S. Federico, P. Gassiat, *Viscosity characterization of the value function of an investment-consumption problem in presence of an illiquid asset*. Journal of Optimization Theory and Applications, Vol. 160, No. 3, pp. 966–991 (2014).

[8] S. Federico, E. Tacconi, *Dynamic programming for optimal control problems with delays in the control variable*. SIAM Journal on Control and Optimization, Vol. 52, No. 2, pp. 1203–1236 (2014).

[9] S. Federico, H. Pham, *Characterization of the optimal boundaries in reversible investment problems*. SIAM Journal on Control and Optimization, Vol. 52, No. 4, pp. 2180–2223 (2014).

[10] G. Fabbri, S. Federico, *On the infinite-dimensional representation of stochastic controlled systems with delayed control in the diffusion term*. Mathematical Economics Letters, Vol. 2, No. 3-4, pp. 33–43 (2014).

[11] S. Federico, P. Tankov, *Finite-dimensional representations for controlled diffusions with delay*. Applied Mathematics and Optimization, Vol. 71, No. 1, pp. 165–194 (2015).

[12] S. Federico, P. Gassiat, F. Gozzi, *Utility maximization with current utility on the wealth: regularity of solutions to the HJB equation*. Finance and Stochastics, Vol. 19, No. 2, pp. 415–448 (2015).

[13] R. Aïd, S. Federico, H. Pham, B. Villeneuve, *Explicit investment rules with time-to-build and uncertainty*. Journal of Economic Dynamics and Control, Vol. 51, pp. 240–256 (2015).

[14] S. Federico, P. Gassiat, F. Gozzi, *Impact of time illiquidity in a mixed market without full observation*. Mathematical Finance, Vol. 27, No. 2, pp. 401–437 (2017).

[15] M. Bambi, C. Di Girolami, S. Federico, F. Gozzi, *Generically distributed investments on flexible projects and endogenous growth*. Economic Theory, Vol. 63, No. 2, pp. 521–558 (2017).

[16] T. De Angelis, S. Federico, G. Ferrari, *Optimal boundary surface for irreversible investment with stochastic costs*. Mathematics of Operations Research, Vol. 42, No. 4, pp. 1135–1161 (2017).

[17] S. Federico, F. Gozzi, *Mild solutions of semilinear elliptic equations in Hilbert spaces*. Journal of Differential Equations, Vol. 262, No. 5, pp. 3343–3389 (2017). Corrigendum: Vol. 263, No. 9, pp. 6143–6144 (2017).

[18] A. Cosso, S. Federico, F. Gozzi, M. Rosestolato, N. Touzi, *Path-dependent equations and viscosity solutions in infinite dimension*. The Annals of Probability, Vol. 46, No. 1, pp. 126–174 (2018).

[19] S. Federico, F. Gozzi, *Verification theorems for stochastic optimal control problems in Hilbert spaces by means of a generalized Dynkin formula*. The Annals of Applied Probability, Vol. 28, No. 6, pp. 3558–3599 (2018).

[20] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *Growth and agglomeration in the heterogeneous space: a generalized AK approach*. Journal of Economic Geography, Vol. 19, No. 6, pp. 1287–1318 (2019).

[21] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *Geographic environmental Kuznets curves: the optimal growth linear-quadratic case*. Mathematical Modelling of Natural Phenomena, Vol. 14, No. 1, Paper No. 105 (2019).

[22] S. Federico, M. Rosestolato, E. Tacconi, *Irreversible investment with fixed adjustment costs: a stochastic impulse control approach*. Mathematics and Financial Economics, Vol. 13, No. 4, pp. 579–616 (2019).

[23] S. Federico, M. Rosestolato, *C_0-sequentially equicontinuous semigroups*. Kyoto Journal of Mathematics, Vol. 60, No. 3, pp. 1131–1175 (2020).

[24] S. Federico, G. Ferrari, P. Schuhmann, *A singular stochastic control problem with interconnected dynamics*. SIAM Journal on Control and Optimization, Vol. 58, No. 5, pp. 2821–2853 (2020).

[25] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *Control theory in infinite dimension for the optimal location of economic activity: the role of the social welfare function*. Pure and Applied Functional Analysis, Vol. 6, No. 5, pp. 871–888 (2021).

[26] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *From firm to global-level pollution control: the case of transboundary pollution*. European Journal of Operational Research, Vol. 290, No. 1, pp. 331–345 (2021).

[27] S. Federico, G. Ferrari, *Taming the spread of an epidemic by lockdown policies*. Journal of Mathematical Economics, Vol. 93, Paper No. 102453 (2021).

[28] S. Federico, G. Ferrari, F. Riedel, M. Röckner, *On a class of infinite-dimensional singular stochastic control problems*. SIAM Journal on Control and Optimization, Vol. 59, No. 2, pp. 1680–1704 (2021).

[29] S. Federico, G. Ferrari, P. Schuhmann, *Singular control of the drift of a Brownian system*. Applied Mathematics and Optimization, Vol. 84, Suppl. 1, pp. 561–590 (2021).

[30] A. Calvia, S. Federico, F. Gozzi, *State constrained control problems in Banach lattices and applications*. SIAM Journal on Control and Optimization, Vol. 59, No. 6, pp. 4481–4510 (2021).

[31] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *Managing spatial linkages and geographic heterogeneity in dynamic models with transboundary pollution*. Journal of Mathematical Economics, Vol. 98, Paper No. 102577 (2022).

[32] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, *A dynamic theory of spatial externalities*. Games and Economic Behavior, Vol. 132, pp. 133–165 (2022).

[33] S. Federico, G. Ferrari, N. Rodosthenous, *Two-sided singular control of an inventory with unknown demand trend*. SIAM Journal on Control and Optimization, Vol. 61, No. 5, pp. 3076–3101 (2023).

[34] S. Federico, G. Ferrari, M.L. Torrente, *Optimal vaccination in a SIRS epidemic model*. Economic Theory, Vol. 77, No. 1-2, pp. 49–74 (2024).

[35] G. Fabbri, S. Federico, D. Fiaschi, F. Gozzi, *Mobility decisions, economic dynamics and epidemic*. Economic Theory, Vol. 77, No. 1-2, pp. 495–531 (2024).

[36] F. De Feo, S. Federico, A. Święch, *Optimal control of stochastic delay differential equations and applications to path-dependent financial and economic models*. SIAM Journal on Control and Optimization, Vol. 62, No. 3, pp. 1490–1520 (2024).

[37] S. Federico, G. Ferrari, M.L. Torrente, *Irreversible reinsurance: minimization of capital injections in presence of a fixed cost*. Mathematics and Financial Economics, Vol. 18, No. 4, pp. 707–733 (2024).

[38] J. Dianetti, S. Federico, G. Ferrari, G. Floccari, *Multiple equilibria in mean-field game models of firm competition with strategic complementarities*. Quantitative Finance, Vol. 25, No. 3, pp. 343–357 (2025).

[39] S. Federico, D. Ghilli, F. Gozzi, *Linear-quadratic mean field games in Hilbert spaces*. SIAM Journal on Mathematical Analysis, Vol. 57, No. 6, pp. 5821–5853 (2025).

[40] S. Federico, F. Gozzi, A. Święch, *On mean field games in infinite dimension*. Journal de Mathématiques Pures et Appliquées, Vol. 205, Paper No. 103780 (2026).

[41] S. Federico, G. Ferrari, M. Rosestolato, *Partial regularity of semiconvex viscosity supersolutions to fully nonlinear elliptic HJB equations and applications to stochastic control*. SIAM Journal on Mathematical Analysis, Vol. 58, No. 1, pp. 149–161 (2026).

[42] G. Fabbri, S. Faggian, S. Federico, F. Gozzi, *Optimal control in infinite-dimensional spaces and economic modeling: state of the art and perspectives*. Mathematical Models and Methods in Applied Sciences, Vol. 36, No. 5, pp. 941–1017 (2026).

[43] F. De Feo, S. Federico, F. Gozzi, N. Touzi, *Sensitivity of functionals of McKean–Vlasov SDEs with respect to the initial distribution*. Stochastic Processes and their Applications, Vol. 195, Paper No. 104868 (2026).

[44] R. Aïd, S. Federico, G. Ferrari, N. Rodosthenous, *Regulation in a mean-field investment game with climate damage*. Mathematical Finance, Vol. 36, No. 4, pp. 846–869 (2026).

[45] A. Calvia, S. Federico, G. Ferrari, F. Gozzi, *Existence and uniqueness results for a mean-field game of optimal investment*. Applied Mathematics and Optimization, Vol. 94, No. 3, Paper No. 63 (2026).

[46] S. Federico, G. Ferrari, F. Riedel, M. Röckner, *Variational inequalities and smooth-fit principle for singular stochastic control problems in Hilbert spaces*. The Annals of Applied Probability, Vol. 36, No. 5, pp. 4080–4119 (2026).

[47] S. Federico, A. Modena, L. Regis, *Coordinating bank dividend and capital regulation*. Mathematical Finance, online first, doi:10.1111/mafi.70062 (2026).

Proceedings (peer-reviewed)

[48] S. Federico, *A pension fund in the accumulation phase: a stochastic control approach*. Banach Center Publications, Vol. 83 (Advances in Mathematics of Finance), pp. 61–83 (2008).

Submitted papers

[49] R. Boucekkine, G. Fabbri, S. Federico, F. Gozzi, T. P. Loch-Temzelides, C. Ricci, *Differential climate games with heterogeneous players*. SSRN preprint (2025), submitted.

PhD Thesis

Stochastic Optimal Control Problems for Pension Funds Management, Scuola Normale Superiore di Pisa, 2009.