



UNIVERSITÀ DEGLI STUDI DI MILANO

DIPARTIMENTO DI MATEMATICA "FEDERIGO ENRIQUES"

MARCO FRITTELLI
Professor of Mathematical Finance

email: marco.frittelli@unimi.it
Office phone: Italy+ 02 50316143

CV

Personal data and studies:

Italian and USA citizenship.

Degree (Laurea) in Mathematics (1989), University of Milan, Italy.

Ph.D (1993) in Mathematical Finance, University of Brescia, Italy.

Visiting Scholar (1991-1993) at the New York University.

Academic Positions:

Assistant Professor (1993-1998) at the Universities of Urbino and Milano.

Associate Professor in Mathematical Finance (1998-2001) at the University of Milano-Bicocca.

Professor in Mathematical Finance (2001-2006) at the University of Florence.

Professor of Mathematical Finance at the University of Milano (2006-present).

Visiting Professor:

Newton Institute of Mathematical Science, Cambridge University, UK (2005).

McMaster University, Canada (2005).

Carnegie Mellon University, USA (2006).

Dauphine University, Paris, Francia (2006).

University of California at Santa Barbara, USA (2008, 2009 and 2010).

The Fields Institute, Toronto (2010).

Appointments:

Member of the Editorial Board of the SIAM Journal on Financial Mathematics (2018-present).

Member of the Editorial Board of the "Annals of Applied Probability" (2003-2008) .

Member of the Scientific Council of the Bachelier Finance Society (2004-2008).

Member of the Committee ANVUR-GEV (National Agency for the Valuation of the Italian Universities) Area 13 (Mathematical Methods in Social Sciences) 2011-2013.

Co-Director of the CIME-EMS Summer School "Stochastic Methods in Finance", (2003).

Selected Invited talks:

- "Plenary Lecturer" at SIAM Conference on Financial Mathematics and Engineering, S. Francisco, 2010.

- "Guest Lecturer" in the Course: "Foundations of Mathematical Finance", Thematic Program on Quantitative Finance, Fields Institute, Toronto Jan. 2010.

- "Plenary Lecturer" at the V Congress of the Bachelier Finance Society, London 2008.

- "Principal Lecturer" at the "NSF/CBMS Regional Conference in the Mathematical Sciences" University of California at Santa Barbara, USA 2008.

- Annual Meeting of the American Mathematical Society, New Orleans USA, 2007.

- Symposium "Probability toward 2000", Columbia University 1995.

Tutorial, Summer schools, Research weeks

- Advances in stochastic analysis for risk modeling, CIRM, Marseille 2017 and 2014.

- Banff International Research Station for Mathematical Innovation, Canada, 2014 and 2004.



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- Tutorial on Risk Measures, Lectures at the Workshop on Non Linear Expectation and Stochastic Calculus under Knightian Uncertainty, Institute of Mathematical Science, National University Singapore, 2013
- Tutorial on Risk Measures, Lectures at Ecole CEA EDF INRIA – Systemic Risk and Quantitative Risk Management, Paris, Oct. 2012.
- Advanced course on Convex duality methods in Mathematical finance, Third Summer School in Mathematical Finance, African Institute for Mathematical Sciences, Capetown, South Africa 2010.
- Oberwolfach weeks on "Stochastic Analysis in Finance" in 2008, 2003 and 1997.
- Advanced course on risk measures, Technical University of Lisbon, 2006.
- Special lecturer at the Winter School on Mathematical Finance, Lunteren, The Netherlands, 2005.
- Joint Mathematical Weekend of the European Mathematical Society, Lisbon, Portugal, 2003.

Organization of Conferences:

- Organizer of the "de Finetti Risk Seminars", Milano Lectures on the Mathematical Theory of Economics and Finance, Milano 2011/2012, 12/13, 13/14, 14/15, 15/16, 17/18 and 18/19.
- Organizer of the "First Gran Sasso Workshop in Mathematical Finance", GSSI L'aquila, September 2017.
- Organizer of the Workshops: "Model Uncertainty and Robust Finance", Milano University, 2018 and 2016.
- Organizer of the Quantitative Finance Retrospective Workshop, Fields Institute, Toronto, October 2013.
- Member of the Scientific Committee of the Conference: Probability and Finance, 2012, Pescara Italy.
- Organizer of the Minisymposium: Portfolio Optimization and Risk Measures, ICIAM 2011, Vancouver.
- Chair of the Scientific Committee of the Workshop "Foundations of Mathematical Finance", during the Thematic Program on Quantitative Finance, Fields Institute, Toronto, 2010.
- Member of the Scientific Committee of the VI Congress of the Bachelier Finance Society, Toronto 2010.
- Organizer of the Session on Risk Measures at the VI Congress of the Bachelier Finance Society, Toronto 2010.
- Organizer of the Minisymposium: On Dynamic Measures of Risk, SIAM Conference on Financial Mathematics 2010, S. Francisco.
- Member of the Scientific Council of the Workshop Further Developments in Quantitative Finance, Edinburgh 2007;
- Member of the Scientific Council of the conference New Mathematical Methods in Risk Theory, in honor of Prof. H. Bühlmann, University of Firenze 2005;
- Organizer of the Minisymposium: "Mathematical modeling for pricing and hedging financial risk", EMS-SMAI-SMF Conference: Applied Mathematics and Applications, Nizza, 2003.
- Member of the Scientific Council of the International Workshops on Quantitative Finance held in: Torino University, 2003; Siena University, 2004; Bocconi University, Milano 2005; Perugia University, 2006; Roma Tor Vergata University, 2008; Padova University, 2011, Milano-Bicocca University 2017, Roma Tor Vergata 2018, ETH Zurich 2019.

Invited speaker at the following universities: Newton Institute of Mathematical Science, Cambridge Univ. UK; Oxford Univ. UK; King's College UK; Princeton Univ. USA; Columbia Univ. New York; University of California at Los Angeles USA; University of California at Santa Barbara USA; University of California at Irvine USA; University of Southern California USA; Austin Univ. USA; Boston Univ. USA; Illinois Institute of Technology Chicago USA; Carnegie Mellon Univ. Pittsburgh USA; ETH Zurich; Zurich University; Humboldt Univ. Berlino; Munich Univ. Germany; Parigi VI Univ.; H. Poincaré Institute Parigi; Université de France-Comte Besancon; CIRM Marseille; INRIA, Paris; Vienna Univ.; Freiburg Univ.; Banach Center Varsavia; USI Lugano University, Switzerland; The Fields Institute Toronto Canada;



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McMaster Univ. Canada; University of Technology, Sydney Australia; National University of Singapore; Fudan Univ. Shanghai.

Research activity:

The research is focused on the application of stochastic analysis and convex analysis in Mathematical Finance. In particular it comprehends: the Fundamental Theorem of Asset Pricing in markets without frictions and with frictions; martingale pricing in incomplete markets based on the principle of entropy minimization; the Dynamic Certainty Equivalent approach to financial valuation based on utility theory and convex duality; indifference pricing; utility maximization in incomplete markets with not necessarily bounded semi-martingales; the supermartingale property of the optimal wealth process; the weak super-replication price; convex risk measures, dynamic risk measures, risk measures for processes, law invariant risk measures; general capital requirements; utility maximization and risk measures on Orlicz spaces; quasiconvex dynamic risk measures and conditional certainty equivalent; evenly convex sets and quasiconvex maps on modules; risk measures on distribution functions and $\Delta V@R$; scientific research measures; universal arbitrage and robust pricing-hedging duality; model risk; pathwise finance; systemic risk.

Referee activity:

Mathematical Finance, Finance and Stochastics, Applied Mathematical Finance, Annals of Applied Probability, Stochastic and Stochastics Reports, SIAM J on Financial Mathematics, Stochastic Processes and their Applications, Positivity, Annals of Finance, Journal of Banking and Finance, D.E.F. Journal, among others.

Research Projects:

- National Director of the Italian Project PRIN 2008, "Probability and Finance".
- Director of the research Unit of Firenze "Duality in Mathematical Finance", in the Italian National Project: "Stochastic Methods in Finance", MURST (Ministero of University and of Scientific and Technological Research), 2004-2006.
- Director of the research Unit of Firenze "Martingale methods for optimization in incomplete markets", in the Italian National Project: "Stochastic Processes and Applications to Filtering, Control and Mathematical Finance", MURST 2001-2003.
- Director of the Research Unit of Milano of the Project: "Methodologies and measurements for financial market and credit risk", MURST 1999-2001.
- Director of the Project "Applications of Orlicz space theory in mathematical finance", INDAM-GNAMPA (National Institute of Advanced Mathematics – Group of Analysis, Probability and their Applications): 2007.
- Director of the Project "Duality in Mathematical Finance", INDAM-GNAMPA (National Institute of Advanced Mathematics – Group of Analysis, Probability and their Applications): 2004.
- Director of the Project "Mathematical Finance: valuation and hedging in incomplete markets", INDAM-GNAMPA, 2003.
- Director of the Research Projects FIRST, University of Milano, Mathematical Finance, 2007 and 2008.
- Director of the Research Projects MURST 60%:
 - Dynamic risk measures and utility maximization, 2004
 - Financial mathematics: dynamic risk measures, 2003;
 - Financial mathematics: risk measures, 2002;



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Ph.D. students:

Andrea Carelli, 1997, Università di Milano
Fabio Bellini, 1998, Università di Brescia
Emanuela Rosazza Gianin, 2002, Università di Bergamo
Giacomo Scandolo, 2003, Università di Milano
Sara Biagini, 2005, Scuola Normale Superiore Pisa
Roberto, D'ercole, 2009, Università di Milano-Bicocca
Marco Maggis, (2010), Università di Milano
Ilaria Peri (2013) Università di Milano-Bicocca
Matteo Burzoni (2015) Università di Milano
Alessandro Doldi, Università di Milano

Teaching activity:

Special Courses:

-Seminars for the Ph.D. Course at the University of California at Santa Barbara, 2008 and 2009.
-Advanced course on Mathematical Finance, Università degli Studi di Bologna, at the "Scuola di Alta Formazione in Finanza Matematica", Bologna University, 2006.
-Advanced course on stochastic calculus with application in finance: for junior researchers at the 8th Italian-Spanish Meeting on Financial Mathematics, Verbania, Italy, 2005

Ph.D. and Master Courses:

- PhD course on Mathematical Finance, University of Milano-Bicocca 2016, 2017 and 2018.
- PhD course on Financial Modeling, UCSB, California USA, 2010 and 2012.
-Collegio Carlo Alberto, Università di Torino, Master Course on Probabilistic Methods for Finance, Torino, 2007, 2008, 2009, 2011, 2012 and 2014.
-Università degli Studi di Milano-Bicocca, Master MAMI, Course on Financial Mathematics, Milano, 06/07.
-Università degli Studi di Firenze, Master course on "Mathematical methods in finance and insurance" Master Programme in "Finance and insurance" 02/03 and 03/04.
-INDAM, Istituto Nazionale di Alta Matematica and MAMI, Università degli Studi di Milano – Bicocca, Master Course on "Modeling financial markets" A.A. 00/01 and 01/02.
-Università degli Studi di Firenze, Department of Mathematics and Decisions, Seminars on "Duality in mathematical finance" for the PhD Programme: 01/02.
-Università Cattolica, Milano, Master course on "Finance", Master Programme in "International Finance", 98, 99 and 00.
-Università degli Studi di Brescia, PhD Course on "Stochastic calculus and mathematical finance", 93/94, 94/95, 95/96 and 96/97.
-Università degli Studi di Milano, Seminars on "Introduction to mathematical finance" for the PhD Programme "Computational Mathematics and Operation Research", Department of Mathematics 1995.

Laurea Magistrale Courses:

-Università degli Studi di Milano, Advanced Course in Mathematical Finance, Laurea Magistrale in Applied Mathematics, 2014/15, 15/16, 16/17, 17/18, 18/19.
-Università degli Studi di Milano, Course on "Mathematical Finance 2", Laurea Magistrale in Applied Mathematics, 2007/08, 08/09, 09/10, 10/11, 11/12, 12/13 and 14/15.
-Università degli Studi di Milano, Course on "Mathematical Finance 1", Laurea Magistrale in Applied Mathematics, 2006/07, 07/08, 08/09, 09/10, 10/11, 11/12, 12/13, 14/15, 15/16, 16/17, 17/18, 18/19.



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-Università degli Studi di Firenze, Course on "Mathematical Finance", Laurea Magistrale in Finance, 2004/05

Laurea Courses:

-Università degli Studi di Firenze, Economic Faculty:

Course on "Mathematical model of financial markets", 01/02, 02/03 and 03/04

Course on "Risk Theory", 01/02, 02/03 and 03/04

-Università degli Studi di Milano-Bicocca, Economic Faculty:

Course on "Financial mathematics", 00/01

Course on "Modeling financial markets", 99/00

Course on "Basic financial mathematics", 98/99 and 99/00

Course on "Calculus", 97/98, 98/99 and 99/00

-Università di Urbino, Economic Faculty, Università Cattolica, Faculty of Mathematical and Physical Sciences ; Università degli Studi di Milano, Economic Faculty:

Tutoring Courses on Calculus and Financial Mathematics, 93/94, 94/95, 95/96.

Pubblicazioni scientifiche

1. F. Biagini, JP Fouque, M. Frittelli and T. Meyer-Brandis (2019) *A Unified Approach to Systemic Risk Measures via Acceptance Sets*, Mathematical Finance, Vol. 29, pp 329-367.
2. M. Burzoni, M. Frittelli, Z. Hou, M. Maggis and J. Obloj (2018), *Pointwise Arbitrage Pricing Theory in Discrete Time*, Mathematics of Operation Research, forthcoming.
3. M. Frittelli and M. Maggis (2017), *Disentangling Price, Risk and Model Risk: Value and Risk Measures*, Mathematics and Financial Economics.
4. M. Burzoni, M. Frittelli, M. Maggis (2017) *Model-free Superhedging Duality*, The Annals of Applied Probability Vol. 27/3, pp 1452-1477.
5. M. Burzoni, M. Frittelli and M. Maggis (2016) *Universal Arbitrage Aggregator in Discrete-time Markets under Uncertainty*, Finance and Stochastics, Vol 20/1, pp 1-50.
6. M. Frittelli, L. Mancini and I. Peri (2015), *Scientific Research Measures*, Journal of the Association for Information Science and Technology, Vol 67, pp 3051-3063.
7. M. Frittelli, M. Maggis and I. Peri (2014), *Risk Measures on P(R) and Value at Risk with Probability/Loss Function*, Mathematical Finance, Vol 24/2, pp 442-463.
8. M. Frittelli and M. Maggis (2014), *Complete Duality for Quasiconvex Dynamic Risk Measures on modules of the Lp-type*, Statistics and Risk Modeling, Vol 31/1, pp 103-128.
9. M. Frittelli and M. Maggis (2011), *Dual Representation of Quasi-convex Conditional Maps*, SIAM J. Financial Math., Vol 2, pp 357-382.
10. M. Frittelli and M. Maggis (2011) *Conditional Certainty Equivalent*, International Journal of Theoretical and Applied Finance, Vol 14/1, pp. 41-59.
11. M. Frittelli and E. Rosazza Gianin (2011) *On the penalty function and on continuity properties of risk measures*, International Journal of Theoretical and Applied Finance, Vol 14/1, pp. 163-185.
12. S. Biagini, M. Frittelli and M. Grasselli (2011) *Indifference price with general semimartingale*, Mathematical Finance, Vol 21/3, pp. 423-446.



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13. S. Biagini and M. Frittelli (2009) On the extension of the Namioka-Klee theorem and on the Fatou property for risk measures, In: *Optimality and risk: modern trends in mathematical finance*. The Kabanov Festschrift Editors: F. Delbaen, M. Rasonyi, Ch. Stricker, pp. 1-29.
14. S. Biagini and M. Frittelli (2008) A unified framework for utility maximization problems: an Orlicz space approach, *Annals of Applied Probability*, Vol. 18/3, pp. 929-966.
15. S. Biagini and M. Frittelli (2007) The supermartingale property of the optimal wealth process for general semimartingale, *Finance and Stochastics*, Vol. 11/2, pp. 253-26.
16. M. Frittelli (2007) No Arbitrage and Preferences, In: *Economia matematica e econometria: problemi e prospettive*, Istituto Lombardo – Accademia di Scienze e Lettere, LED, pp 181-201.
17. M. Frittelli and G. Scandolo (2006) Risk measures and capital requirements for processes, *Mathematical Finance*, Vol. 16/4, pp. 589-613.
18. S. Biagini and M. Frittelli (2005) Utility maximization in incomplete markets for unbounded processes, *Finance and Stochastics*, Vol. 9/4, pp. 493-517.
19. M. Frittelli and E. Rosazza Gianin (2005) Law invariant convex risk measures *Advances in Mathematical Economics*, Vol. 7, pp. 33-46.
20. S. Biagini and M. Frittelli (2004) On the super-replication price of unbounded claims, *The Annals of Applied Probability*, Vol. 14/4, pp. 1970-1991.
21. M. Frittelli (2004) Some remarks on arbitrage and preferences in securities market models *Mathematical Finance*, Vol. 14/3, pp. 351-357.
22. M. Frittelli and E. Rosazza Gianin (2004) Dynamic convex risk measures, *New Risk Measures for the 21th Century*, G. Szego ed., John Wiley & Sons, pp. 227-248.
23. F. Bellini and M. Frittelli (2002) On the existence of minimax martingale measures *Mathematical Finance*, Vol. 12/1, pp. 1-21.
24. M. Frittelli and E. Rosazza Gianin (2002) Putting order in risk measures *Journal of Banking and Finance*, Vol. 26 pp. 1473-1486.
25. M. Frittelli (2000) The minimal entropy martingale measure and the valuation problem in incomplete markets *Mathematical Finance*, Vol. 10/1 pp. 39-52.
26. M. Frittelli (2000) Introduction to a theory of value coherent with the no arbitrage principle, *Finance and Stochastics*, Vol. 4/3, pp. 275-297.
27. M. Frittelli (1997) Semimartingales and asset pricing under constraints, *Mathematics of Derivative Securities*, S. Pliska, M.A.H. Dempster eds., Newton Institute for Mathematical Science, Cambridge University Press, pp. 265-277.
28. M. Frittelli Così la formula Black e Scholes ha cambiato la storia delle opzioni, *Il Sole 24 ORE*, October 30, 1997.
29. M. Frittelli (1996) Dominated families of martingale, supermartingale and quasimartingale laws, *Stochastic Processes and their Applications*, Vol. 63, pp. 265-277.
30. P. Falbo, M. Frittelli and S. Stefani (1996) Commodity futures markets and trading strategies opportunities, *Modelling Techniques for Financial Markets and Bank Management*, M. Bertocchi and S. Komlosi eds., Physica Verlag, Heidelberg, pp. 48-64.
31. M. Frittelli (1996) Valuation principle in security markets models with frictions, *Contributions in Probability*, Carlo Cecchini ed., Forum, pp. 131-139, Udine.
32. M. Frittelli and P. Lakner (1995) Arbitrage and free lunch in a general financial market model: the fundamental theorem of asset pricing, *Mathematical Finance*, IMA Volumes in Mathematics and Applications, M.H.A Davis, D. Duffie, W. Fleming and S. Shreve eds., Vol. 65, Springer-Verlag, New



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York, pp.89-94.

33. M. Frittelli and G. Zambuno (1994), Aspetti rilevanti nella modellizzazione stocastica dei mercati finanziari. In: C.F.Manara, M. Faliva, M. Marchi. Scritti in onore di Giovanni Melzi. p. 133-155, Milano: Vita e Pensiero, ISBN: 88-343-1361-5
34. M. Frittelli and P. Lakner (1994) Almost sure characterization of martingales, Stochastics and Stochastic Reports, Vol. 49, pp. 181-190.