

Massimiliano Frezza

Curriculum Vitae

Place: Roma (Rm)
Date: 03 – 10 –2024

Part I – General Information

Full Name	Massimiliano Frezza
Date of Birth	
Place of Birth	
Citizenship	
Permanent Address	
Mobile Phone Number	
E-mail	
Spoken Languages	Italian - English

Part II – Education

II A – General Education

Type	Year	Institution	Subject
University graduation	2005	University of Cassino and Southern Lazio	Economics
PhD	2009	University of Naples – Federico II	Mathematics for Economic Analysis and Finance

II B – Other Education achievements

Type	Year	Institution	Notes
PhD (Financial Mathematics)	2005	Sapienza University of Rome	Admission
PhD (Financial Mathematics)	2005	University of Bergamo	Admission

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
21-10-2021	To date	Sapienza University of Rome	Researcher (RTD-A) , Mathematical methods of economics, finance and actuarial sciences
01-10-2010	31-03- 2011	University of Cassino and Southern Lazio	Post-doctoral fellow
9-12- 2013	8-12-2014	University of Cassino and Southern Lazio	Post-doctoral fellow

Part IV – Teaching experience

Year	Institution	Lecture/Course
2023-2024	Sapienza University of Rome	Fractional Calculus for Finance, Ph.D. course on Models for Economics and Finance (2°term)
2023-2024	Sapienza University of Rome	Matematica corso base (72 h., 9 ECT)
2023-2024	Sapienza University of Rome	Matematica per il Machine Learning, (24 h., 3 ECT)
2022-2023	Sapienza University of Rome	Matematica corso base (72 h., 9 ECT)
2022-2023	Sapienza University of Rome	Matematica per il Machine Learning , (48 h., 6 ECT)
2021-2022	Sapienza University of Rome	Matematica per il Machine Learning , (48 h., 6 ECT)
2020-2021	University of Salerno	Laboratorio di applicazioni finanziarie (30 h, 5 ECT)
2020-2021	Sapienza University of Rome	Matematica corso base (72 h., 9 ECT)
2020-2021	University of Cassino and Southern Lazio	Matematica Finanziaria (44 h., 6 ECT)
2020-2021	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2020-2021	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)
2019-2020	University of Cassino and Southern Lazio	Matematica Generale (63 h., 10 ECT)
2019-2020	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2019-2020	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)
2018-2019	University of Cassino and Southern Lazio	Matematica Generale (63 h., 10 ECT)
2018-2019	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2018-2019	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)
2017-2018	University of Cassino and Southern Lazio	Matematica Generale (63 ore, 10 cfu)
2017-2018	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2017-2018	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2017-2018	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)
2017-2018	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2016-2017	University of Cassino and Southern Lazio	Matematica Generale (63 h., 10 ECT)
2016-2017	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2016-2017	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2016-2017	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2016-2017	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)
2015-2016	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2015-2016	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2015-2016	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2015-2016	University of Cassino and Southern Lazio	Esercitazioni di Matematica Finanziaria (20 h.)

2014-2015	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2014-2015	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2014-2015	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2013-2014	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2013-2014	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2013-2014	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2012-2013	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2012-2013	University of Cassino and Southern Lazio	Esercitazioni di Strumenti quantitativi per l'economia e la finanza (20 h.)
2011-2012	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2011-2012	Sapienza University of Rome	Matematica Finanziaria (72 h., 9 ECT)
2011-2012	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2009-2010	University of Cassino and Southern Lazio	Precorso di Matematica Generale (20 h.)
2009-2010	University of Cassino and Southern Lazio	Esercitazioni di Matematica Generale I-II (20+20 h.)
2009-2010	Sapienza University of Rome	Exerciser and Expert in the Subject for the course of "Financial Mathematics" (Chair Professor Angrisani)
2006-2009	University of Naples – Federico II	Expert in the Subject for the course of "Basic and advanced Financial Mathematics" (Chair Professor Di Lorenzo)

Part V - Society memberships, Awards and Honors

Year	Title
October 13, 2023	Best runner-up Paper Award: "Hurst-Hölder regularity and fair volatility", Bianchi S., Angelini D., Bianchi F., Frezza M., Pianese A., Eurasia Business and Economics Society (sponsored by Springer Nature), 45th EBES Conference, Budapest
May 22, 2022	Best Presentation award: "The volume-volatility relationship conditional to market efficiency", XVII International Conference on Applications of Financial Mathematics, Barcellona
July, 2017	AIP Scilight, Recognition for the innovativeness and originality of the work "Fractal stock markets: International evidences of dynamical (In)efficiency", <i>CHAOS</i> , 27, 071102. (with Sergio Bianchi) (http://aip.scitation.org/doi/full/10.1063/1.4997016), Scilight 2017, 050003 (2017). American Institute of Physics (Special section)
2018-2023	Member of NINSO - The Northumbria Internet & Society Research Interest Group – Northumbria University - NEWCASTLE
2005	Winner of the "Culture 2005" award for the best thesis of the 2003/2004 academic year in Economics at University of Cassino, Bellavista Foundation

Part VI - Funding Information [grants as PI-principal investigator or I-investigator]

Year	Title	Program
2023	Foundations of High-Quality AI	<i>PNRR: Extended Partnership 1 - Spoke</i> 5. Participant as investigator to the project called “ <i>Foundations of High-Quality AI</i> ”, Macroarea F – project leader CNR, PI-Sapienza Prof. Iocca Luca PE0000013-FAIR
2022	Portfolio optimization in multifractional markets	<i>Sapienza 2022 small-medium research projects</i> . Principal Investigator of the project called “ <i>Portfolio optimization in multifractional markets</i> ”.

Part VII – Research Activities

Keywords	Brief Description
(multi)fractional processes in finance	Application of (multi)fractional processes to financial modeling with special focus on market volatility and fat tails.
Efficiency of Financial market	Market efficiency and its link with martingale models is investigated through the use of the Hurst-Holder exponent as a parameter of pointwise regularity.
Liquidity of financial markets	Market liquidity is related and studied through the value of self-similarity parameter of certain stochastic processes.
Portfolio optimization	The portfolio optimization problem is reformulated replacing variance by regularity measures.

Part VIII – Publications

Referred journal articles:

- 1) BIANCHI S., BRUNI V., FREZZA M., MARCONI S., PIANESE A., VANTAGGI B., VITULANO D., “An information theory approach to stock market liquidity”, **CHAOS: an interdisciplinary journal of nonlinear science**, 34, 061102 (2024). (AIP) - <https://doi.org/10.1063/5.0213429> **Classe A**
- 2) BIANCHI S., ANGELINI D., PIANESE A., FREZZA M., “Rough volatility via The Lamperti transform”, **Communications in Nonlinear Science and Numerical Simulation**, 127 (2023), 107582 (ELSEVIER) <https://doi.org/10.1016/j.cnsns.2023.107582> **Classe A**
- 3) FREZZA M., BIANCHI S., PIANESE A, “Nonlinearity of the volume–volatility correlation filtered through the pointwise Hurst–Hölder regularity”, **Communications in Nonlinear Science and Numerical Simulation**, 121 (2023), 107204 (ELSEVIER) <https://doi.org/10.1016/j.cnsns.2023.107204>, **Classe A**
- 4) FREZZA M., BIANCHI S., PIANESE A, “Forecasting Value at Risk in turbulent markets”, **Computational Management Science**, (2022) (SPRINGER) - Science, 19, pp 99-132 <https://doi.org/10.1007/s10287-021-00412-w> **Classe A.**

- 5) FREZZA M., BIANCHI S., PIANESE A, “*Fractal analysis of market (in)efficiency during the COVID-19*”, **Finance Research Letters**, 38, (2021), 101851, (ELSEVIER).
<https://doi.org/10.1016/j.frl.2020.101851>. **Classe A**
- 6) FREZZA M., “The volume-volatility relationship: a fractal analysis for a stock index”, **Mathematical Methods in Economics and Finance – m2ef**, 13/14 n.1 2018/2019, pp 37-48 (2020). ISSN (print): 1971-6419, ISSN (online): 1971-3878.
- 7) BIANCHI S., PIANESE A, FREZZA M. , “*A distribution-based method to gauge market liquidity through scale invariance between investment horizons*”, **Applied Stochastic Models in Business and Industry**, 36(5), 809-824 (2020). (WILEY)
<https://doi.org/10.1002/asmb.2531> **Classe A.**
- 8) BIANCHI S., FREZZA M., PIANESE A, *L’impatto della pandemia Covid-19 sull’efficienza dei mercati azionari.* - **DEMOCRAZIA E DIRITTI SOCIALI.** - ISSN 2610-9166. - Numero speciale, 571-587 (2020)
- 9) BIANCHI S., FREZZA M., “*Liquidity, Efficiency and the 2007-2008 Global Financial Crisis*”, **Annals of Economics and Finance**, 19-2 (November, 2018), 375-404. CEMA.
- 10) FREZZA M., “*A fractal-based approach for modeling stock price variations.*”, **CHAOS: an interdisciplinary journal of nonlinear science**, 28, 091102 (2018); (AIP)
<https://doi.org/10.1063/1.5050867>). **Classe A**
- 11) BIANCHI S., FREZZA M., “*Fractal stock markets: International evidences of dynamical (In)efficiency*”, **CHAOS: an interdisciplinary journal of nonlinear science**, 27, 071102 (2017). (AIP) - **Classe A.** <https://doi.org/10.1063/1.4987150>
- 12) FREZZA M., “*Goodness of fit assessment for a fractal model of stock markets*”, **Chaos, Solitons and Fractals: the interdisciplinary journal of Nonlinear Science, and Nonequilibrium and Complex Phenomena**, 66 (2014), 4. (ELSEVIER) - **Classe A.**
<https://doi.org/10.1016/j.chaos.2014.05.005>
- 13) FREZZA M., “*Modeling the time-changing dependence in stock markets*”, **Chaos, Solitons and Fractals: the interdisciplinary journal of Nonlinear Science, and Nonequilibrium and Complex Phenomena**, 45 (2012) 1510-1520 (ELSEVIER) - **Classe A.**
<https://doi.org/10.1016/j.chaos.2012.08.009>

Referred book articles:

- 14) Bianchi, S., Angelini, D., Frezza, M., Palazzo, A.M., Pianese, A. (2024). Fair Volatility in the Fractional Stochastic Regularity Model. In: Corazza, M., Gannon, F., Legros, F., Pizzi, C., Touzé, V. (eds) **Mathematical and Statistical Methods for Actuarial Sciences and Finance**. MAF 2024. Springer, Cham. https://doi.org/10.1007/978-3-031-64273-9_11 (SPRINGER).
- 15) Bianchi S., Frezza M., Pianese A., Palazzo A.M. (2022) “Modelling H-volatility with Fractional Brownian Bridge”. In: Corazza M., Perna C., Pizzi C., Sibillo M. (eds), in **Mathematical and Statistical Methods for Actuarial Sciences and Finance**. Cham. https://doi.org/10.1007/978-3-030-99638-3_16 (SPRINGER)
- 16) Bianchi S., Pianese A., Frezza M., Palazzo A.M. (2021) Stochastic Dominance in the Outer Distributions of the α -Efficiency Domain. In: Corazza M., Gilli M., Perna C., Pizzi C., Sibillo M. (eds), in **Mathematical and Statistical Methods for Actuarial Sciences and Finance**. eMAF 2020, Cham. https://doi.org/10.1007/978-3-030-78965-7_15 (SPRINGER)

Referred proceedings articles:

- 17) FREZZA M., PANTANELLA A., “Simulation of price dynamics using MPRE: a focus on autocorrelation in squared returns”, **International Conference on Mathematics, Business and Economics 2011**, Iasi 3-5 June 2011, ISBN 978-0-7918-5971-1. (ASME PRESS)
Doi: <https://doi.org/10.1115/1.859711.paper43>
- 18) FREZZA M., “Multifractional approach to financial price dynamics”, In: **XVII Meeting on Risk Theory 2011**, NAPOLI: Loffredo, ISBN 978-88-96818-67-1.

Working papers:

- 19) FREZZA M., “Modelling price movements via the Multifractional Brownian motion, Working paper n. 2, Department of “Institutions, quantitative methods and territory”, Faculty of Economics, University of Cassino and Southern Lazio (2009).
- 20) FREZZA M., “A stochastic modelling of the memory function of Multifractional Brownian motion”, Working paper n.3, Department of “Institutions, quantitative methods and territory”, Faculty of Economics, University of Cassino and Southern Lazio (2008).

Book:

FREZZA M.: “Esercizi di Matematica Finanziaria svolti e commentati”, **McGraw-Hill**, 2019. ISBN: 978-88-386-9642-8.

Part IX – Conference and Seminar Presentations

- 1) April 05, 2024. Title: “Fair Volatility in the Fractional Stochastic Regularity Model”, 11th International Conference Mathematical and Statistical Methods for Actuarial Sciences and Finance (MAF2024). University of Le Havre Normandie, Le Havre Cedex (**Speaker**).
- 2) July 12, 2023. Title: “Forecasting the tails of financial indexes distributions”, 9th International conference on Time Series and Forecasting - ITISE 2023 – Gran Canarie (**Speaker**)
- 3) June 28, 2023. Seminar. Title: “(multi)fractional processes in finance”, Seminar for PNRR Project, Partenariato esteso 1 – Spoke 5 called “Foundations of High-Quality AP”, MEMOTEF- Sapienza University of Rome (**Speaker**)
- 4) May 22, 2023. Title: “The volume-volatility relationship conditonal to market efficiency”, XVII International Conference on Applications of Financial Mathematics, Barcellona, issn: 1307-6892 (**Speaker**)
- 5) May 15, 2023. Title: “The Shannon Entropy and Multifractional Markets”- ICFMA 2023: Int. Conf. on Financial Mathematics and Applications”, Montreal, issn: 1307-6892 (**Speaker**)
- 6) June 27, 2022. Title: “An analysis of liquidity through the self-similarity surfaces”, 8th International conference on Time Series and Forecasting - ITISE 2022 – Gran Canarie (**Speaker**)
- 7) May 31, 2022. Workshop. Title: “Multifractional processes and volatility”, 12th research day, Metodi e Modelli per l'Economia, il Territorio e la Finanza MEMOTEF - Sapienza University of Rome, Piazza cavalieri di Malta 2, Roma (**Speaker**)
- 8) April 20, 2022. Title: “Modelling H-volatility with Fractional Brownian Bridge”, Tenth International Hybrid Conference on Mathematical and Statistical Methods for Actuarial Sciences and Finance. MAF2022 – Salerno (**Speaker**)
- 9) June 15, 2021. Title: “Modelli (multi) frazionari e mercati finanziari”, Public seminar for rtd-a call at Department of Methods and Models for Economics and Territory (MEMOTEF) - Sapienza University of Rome (**Speaker**)

- 10) September 2020, e-Maf2020. Title: “*Stochastic dominance in the outer distributions of the a-efficiency domain*” (co-author).
- 11) December 2019, 13th International Conference on Computational and Financial Econometrics (CFE 2019). Title: *A distribution-based method to gauge market liquidity through scale invariance between investment horizons*. Senate House, University of London, UK (co-author).
- 12) March 22, 2014, Workshop on “Complessità e fragilità del sistema economico-finanziario. Il ruolo della Matematica nell’Economia”. E. Mattei, Isernia. Title: “*Il ruolo della Matematica nell’Economia*” University of Cassino and Southern Lazio (**Speaker**).
- 13) September 07, 2010. XVII Meeting on Risk Theory 2011, University of Molise. Title: “*Multifractal approach to financial price dynamics*” (**Speaker**)
- 14) May 16, 2009. Seminar, DIMET University of Cassino and Southern Lazio Title: “*Modelling price movements via the Multifractal Brownian motion*” (**Speaker**)
- 15) September 01-04, 2008. AMASES (Associazione Italiana per la Matematica Applicata all’Economia ed alle Scienze Sociali) Conference. University of Trento. Title: “*A stochastic modelling of the memory function of Multifractal Brownian motion: an application to financial data*” (**Speaker**)
- 16) April 09, 2008. Seminar, DIMET University of Cassino and Southern Lazio Title: “*A stochastic modelling of the memory function of Multifractal Brownian motion*” (**Speaker**)

Part X : Conferences and Workshops organized and attended.

- March 26-27, 2024, Member of the organizing committee of 14th research day, Metodi e Modelli per l’Economia, il Territorio e la Finanza MEMOTEF - Sapienza University of Rome, Piazza cavalieri di Malta 2, Roma
- April 5-6, 2023, Member of the organizing committee of the international conference: “*New professional and scientific perspectives in pensions and actuarial sciences*”, invited speakers: Prof. Pierre Devolder (April, 5) - Prof. Mogens Steffensen (April, 6). MEMOTEF. Sapienza University of Rome
- March 22, 2014, Member of the organizing committee and moderator of the national workshop: “*Complessità e fragilità del sistema economico-finanziario. Il ruolo della Matematica nell’Economia*”. I.T.I.S. E. Mattei, Isernia. University of Cassino and Southern Lazio
- February 21, 2013. International Conference on Pension Systems Sustainability. Faculty of Economics, Sapienza University of Rome
- September 16, 2010. Seminar, title: “*Financial indicator stress*”, Prof.ssa Marianna Grimaldi (European Central Bank), Faculty of Economics, University of Cassino and Southern Lazio
- 01-04 Settembre 2008, XXXII A.M.A.S.E.S. Conference, Faculty of Economics, University of Trento.
- June 27, 2008, XV Conference on Risk Theory, Faculty of Economics, University of Molise.
- February 22, 2008, Seminar. Title: “*ERM in life insurance: the Framework*” Prof. Ermanno Pitacco (University of Trieste). “ERM in life insurance: hedging in longevity risk” Prof.ssa Annamaria Olivieri (University of Parma), University of Naples – Federico II, Dipartimento di Matematica e Statistica
- October 11-13, 2006. MAF 2006: “*Metodi matematici e statistici per le assicur. e la finanza*”, Faculty of Economics, University of Salerno.
- June 27, 2006 “XIII Conference on Risk Theory, Faculty of Economics, University of Molise.
- 23 Giugno 2006, Seminar. Title: “*Nuove frontiere nella gestione del rischio di credito*”, Faculty of Economics, University of Parthenope.

Part XI – Journal Service

- Editorial board member (Associate Editor) for the Journal “Ratio Mathematica”, included in UGC care list (Group I) and ANVUR (Area 13 e 11).
- Editorial board member (Review Editor) for the Journal “Frontiers in Applied Mathematics and Statistics - Mathematical Finance”

- (co)Guest Editor of the Special Issue “Fractional Calculus and Models in Finance and Economics”, Mathematics (MPDI), ISSN 2227-7390 – 2024
- Referee for (among others):
 - Computational Management Science (Springer). Classe A
 - Finance Research Letter (Elsevier).
 - Frontiers in Applied Mathematics and Statistics–Mathematical Finance