

## PERSONAL INFORMATION

## Beatrice Foroni

 [beatrice.foroni@uniroma1.it](mailto:beatrice.foroni@uniroma1.it) [beatriceforoni.github.io](https://github.com/beatriceforoni) [quantileregressionlab.github.io](https://github.com/quantileregressionlab) [ORCID 0000-0002-4683-2879](https://orcid.org/0000-0002-4683-2879)

Nationality Italian

## WORK EXPERIENCE

May 2025 - May 2026

## Postdoctoral Researcher

*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*

Hidden Markov Quantile Graphical Model

April 2025 - May 2025

## Research Collaborator

*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*

3-month research contract on the development of quantile regression models and spatio-temporal datasets for economic, financial, and environmental variables, integrating national and international data sources

April 2024 - April 2025

## Postdoctoral Researcher

*University of Pisa - Department of Economics and Management, Pisa, Italy*

Estimation and Prediction of Indicators for measuring and monitoring Sustainable Development Goals

April 2023 - April 2024

## Postdoctoral Researcher

*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*

Generalized Dynamic Graphical Models for the impact of the COVID-19 pandemic on financial markets

## TEACHING ACTIVITIES

Sept. 2024 - Feb. 2025

## Tutoring activity for Advanced Statistics, SECS-S/01

*University of Pisa - Department of Economics and Management; Scuola Superiore Sant'Anna, Pisa, Italy*

Master of Science in Economics, 40 hours. Taught in English.

Sept. 2024 - Feb. 2025

## European Statistical System and Data Production Model, 6CFU

*University of Pisa - Department of Economics and Management, Pisa, Italy*

Master's Degree in Economics, 48 hours. Taught in English.

May 2024

## Course for PhD students of the MEMOTEF Department

*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*

Financial risk modeling and forecasting using quantile regression methods, 8 hours. Taught in English.

Feb 2024 – May 2024

## Teaching Assistant in Econometrics, SECS-S/01

*LUISS Guido Carli University, Business Administration bachelor's degree, Rome, Italy*

- Sept 2023 – Dec 2023 **Teaching activity in Statistics, disciplinar sector SECS-S/01**  
*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*  
 Winner of the comparative procedure 1132/2023 for the performance of additional teaching activities for the course of Statistics to master's degree students of the Faculty of Economics.
- Feb 2023 – May 2023 **Teaching Assistant in Statistics, SECS-S/01**  
*LUISS Guido Carli University, Rome, Italy*  
 Business Administration bachelor's degree
- Sept 2021 – Aug 2022 **Integrating tutoring and teaching activity for disciplinar sector SECS-S/01, for a total of 40 monthly hours for 12 months**  
*LUISS Guido Carli University, Faculty of Political Science, Rome, Italy*
- March 2021 – Sept 2021 **Integrating tutoring and teaching activity for disciplinar sector SECS-S/01, for a total of 40 hours**  
*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*  
 Winner of the comparative procedure 1223/2020 for the performance of additional teaching activities and tutoring for courses falling within the disciplinary scientific sector SECS-S/01 Statistics.
- March 2020 – March 2021 **Integrating tutoring and teaching activity for disciplinar sector SECS-S/06, for a total of 40 hours**  
*La Sapienza University - MEMOTEF Department, Faculty of Economics, Rome, Italy*  
 Winner of the comparative procedure 80/2020 for the performance of additional teaching activities and tutoring for courses falling within the disciplinary scientific sector SECS-S/06 Mathematical methods of economics and actuarial and financial sciences.

## CONFERENCE PRESENTATIONS

- June 2025 **Evaluating Hub Structures in Hidden Markov Graphical Models**  
*University of Genova, Genova, Italy*  
 SIS 2025
- December 2024 **Hidden Markov linear quantile graphical model**  
*King's College, London, UK*  
 18th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics2024)
- June 2024 **Hidden Markov graphical models with generalized hyperbolic distributions: a financial analysis on commodities and green energy indexes**  
*University of Bari Aldo Moro, Bari, Italy*  
 SIS 2024
- December 2023 **Quantile and expectile copula-based hidden Markov regression models for the analysis of the cryptocurrency market**  
*HTW Berlin, University of Applied Sciences, Berlin, Germany*  
 16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics2023)
- June 2023 **Using expectile regression with latent variables for digital assets**

UNIVPM, Ancona, Italy

Statistical Learning, Sustainability and Impact Evaluation - SIS 2023

September 2022 **Time varying quantile graphical model: a financial perspective**

*Federico II University, Napoli, Italy*

European Conference on Data Analysis - ECDA2022

May 2022 **Analyzing the Correlation Structure of Financial Markets Using a Quantile Graphical Model**

*University of Campania "Luigi Vanvitelli", Caserta, Italy*

51ST Scientific Meeting of the Italian Statistical Society - SIS 2022

May 2022 **Time-varying graphical models for financial markets: a quantile approach**

*University of Perugia, Perugia, Italy*

9th International Conference on Risk Analysis - ICRA 2022

April 2022 **Graphical models for commodities: a quantile approach**

*University of Salerno, Salerno, Italy*

10th International Hybrid Conference on Mathematical and Statistical Methods for Actuarial Sciences and Finance - MAF 2022

March-April 2022 **Graphical models for commodities: a quantile approach**

*University of Tor Vergata, Roma, Italy*

XXIII Workshop on Quantitative Finance - QFW2022

May 2021 **Sparse graphical model for joint estimation of conditional quantiles**

*University of Pavia, Pavia, Italy*

Network Models for Financial Contagion and Systemic Risk.

## CONFERENCE ORGANIZATION

22 September 2023 **Member of the Local Organizing Committee of the 1st Workshop on quantile regression in Rome**

*Sapienza University of Rome, Rome, Italy*

WorkshopQRome - New perspectives of quantile regression in applied sciences.

## SUMMER SCHOOLS

June - July 2021 **Network Econometrics**

*University Ca' Foscari, Venezia, Italy*

Postgraduate Course of Econometrics

July - August 2018 **Strumenti e Tecniche MATLAB per il Calcolo Parallelo, l'Apprendimento Automatico e l'Analisi Massiva dei Dati**

Scuola di Calcolo Scientifico con MATLAB - 2018, University of Palermo

July 2018 **Programmazione e Calcolo Scientifico con MATLAB**

*University of Palermo, Palermo, Italy*

Scuola di Calcolo Scientifico con MATLAB

## GRANTS AND AWARDS

## 2024 PhD Contribution Honourable Mention - SIS 2024

*University Aldo Moro, Bari, Italy*

PhD Contribution Honourable Mention at the SIS 2024 conference for the work "Hidden Markov graphical models with generalized hyperbolic distributions: a financial analysis on commodities and green energy indexes" (joint with Petrella, L. and Merlo, L.)

## 2019 - 2022 PhD Scholarship

*Sapienza University of Rome, Rome, Italy*

## RESEARCH PROJECTS

## 2024 Quantile Regression Lab

Co-founder of the research group Quantile Regression Lab ([quantileregressionlab.github.io](https://quantileregressionlab.github.io))

## 2023 Progetti di Ricerca Medi 2023

*Sapienza University of Rome, Rome, Italy*

Principal investigator of the research project "Quantile and Expectile Hidden Markov regression models with regime-switching copulas for digital assets", Sapienza University of Rome

## 2021 Progetti di Ricerca Medi 2021

*Sapienza University of Rome, Rome, Italy*

Member of the research group for the project: "Generalized Dynamic Graphical Models for the impact of the COVID-19 pandemic on financial markets". Principal investigator: Prof. Lea Petrella

## EDUCATION AND TRAINING

Nov 2019 – June 2023

## PhD in Models for Economics and Finance, Title: "New Insights on Hidden Markov Models for Time Series Data Analysis "

ISCED 6

Ottimo cum Laude

*Sapienza University of Rome, Rome, Italy*

- GARCH models
- Graphical Models
- Copula-based models for financial time series Quantile Regression
- Expectile Regression
- Hidden Markov Models

## 2017–2019 Master degree in Finance and Insurance

Summa cum Laude

*Sapienza University of Rome, Rome, Italy*

## 2012–2017 Bachelor's Degree in Mathematics

*Sapienza University of Rome, Rome, Italy*

## PERSONAL SKILLS

Mother tongue Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C2	B2	C1	C2
French	B2	B1	B2	B1	B1

Diplôme d'études en langue française (DELFI) B2

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user  
[Common European Framework of Reference for Languages](#)

Digital competences

SELF-ASSESSMENT				
Information Processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Proficient user	Proficient user	Proficient user

[Digital competences - Self-assessment grid](#)

Computer skills – competent with most Microsoft Office and Adobe programmes  
 – R, C++, Matlab, HTML

Driving licence B

## PUBLICATIONS

- [1] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Hidden Markov Graphical Models with Generalized Hyperbolic Distributions: A Financial Analysis on Commodities and Green Energy Indexes". In: *Methodological and Applied Statistics and Demography IV: SIS 2024, Short Papers, Contributed Sessions 2*. Springer Nature, 2025, pp. 43–48.
- [2] **Beatrice Foroni**, Abbas Khalili, Lea Petrella, and Nicola Salvati. "Evaluating Hub Structures in Hidden Markov Graphical Models". In: *Scientific Meeting of the Italian Statistical Society*. Springer. 2025, pp. 421–427.
- [3] Sabrina Forte, **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Spatial Quantile Random Forests for the Analysis of Upward Mobility in Texas". In: *Scientific Meeting of the Italian Statistical Society*. Springer. 2025, pp. 255–260.
- [4] Luca Merlo, Emilio Ferrante, **Beatrice Foroni**, and Lea Petrella. "Estimation of Undirected Graphs for Multivariate Time Series Using Hidden Semi-Markov Models". In: *Scientific Meeting of the Italian Statistical Society*. Springer. 2025, pp. 36–41.
- [5] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Quantile and expectile copula-based hidden Markov regression models for the analysis of the cryptocurrency market." In: *Statistical Modelling (2024)*. DOI: doi:10.1177/1471082X241279513.
- [6] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Expectile hidden Markov regression models for analyzing cryptocurrency returns". In: *Statistics and Computing* 34.2 (2024), p. 66.
- [7] **Beatrice Foroni**, Giacomo Morelli, and Lea Petrella. "The network of commodity risk". In: *Energy Systems* 15.1 (2024), pp. 167–213.
- [8] **Beatrice Foroni**. "New insights on hidden Markov models for time series data analysis". PhD thesis. PhD Thesis, 2023.
- [9] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Graphical Models for Commodities: A Quantile Approach". In: *Methods and Applications in Fluorescence*. Springer International Publishing, 2022, pp. 253–259.

- [10] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Using expectile regression with latent variables for digital assets". In: *Book of short papers SIS 2023*. Pearson, 2023, pp. 1309–1314.
- [11] **Beatrice Foroni**, Luca Merlo, and Lea Petrella. "Analyzing the Correlation Structure of Financial Markets Using a Quantile Graphical Model". In: *Book of the Short Papers*. Pearson, 2022, pp. 852–857.
- [12] **Beatrice Foroni** et al. "GLASSO Estimation of Commodity Risks". In: *Book of Short Papers SIS 2020*. Pearson, 2020, pp. 957–962.

#### SUBMITTED PAPERS

- 1. **Beatrice Foroni**, Luca Merlo, Lea Petrella. "Hidden Markov graphical models with state-dependent generalized hyperbolic distributions." Revised and resubmitted, *Canadian Journal of Statistics*, (202X).
- 2. **Beatrice Foroni**, Luca Merlo, Lea Petrella, Nicola Salvati. "Hidden Markov quantile graphical models" Revised and resubmitted, *Journal of Computational and Graphical Statistics*, (202X).
- 3. Emilio Ferrante, **Beatrice Foroni**, Luca Merlo, Lea Petrella. "Nonparanormal hidden semi-Markov graphical models for analyzing financial markets interconnectivity" Submitted, *Journal of the Royal Statistical Society: Series A*, (202X).
- 4. **Beatrice Foroni**, Luca Merlo, Lea Petrella, Luca Salvati. "Estimating the Spatial Impact of socioeconomic drivers on land degradation risk using expectile regressions" Submitted, *Envirometrics*, (202X).

#### WORK IN PROGRESS

- 1. Beatrice Foroni, Luca Merlo, Abbas Khalili, and Lea Petrella. *Hidden Markov Hubs Graphical Models*.
- 2. Sabrina Forte, Beatrice Foroni, Luca Merlo and Lea Petrella. *Spatial Quantile Random Forest with Splines*.

Data

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24/06/2025