

Ali Habibnia

Virginia Tech

Department of Economics
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[GitHub](#) | [Google Scholar](#) | [ORCID](#) | [Dataism Lab](#)

Education

- 2017** Ph.D. in Statistics, **London School of Economics and Political Science**
Thesis: Essays in High-Dimensional Nonlinear Time Series Analysis. [\[thesis\]](#)
Principal supervisor: Matteo Barigozzi.
- 2012** M.S. in Quantitative Finance, **Bayes Business School (formerly Cass Business School)**
- 2010** M.S. in Economics, **University of Tehran**
- 2007** B.S. in Economics, **University of Tehran**

Areas of Research Interest

Big Data Econometrics • Statistical and Causal Machine Learning • Reinforcement Learning
Quantum Machine Learning for Finance • Nonlinear Time Series Analysis • Forecasting
Financial Networks & Systemic Risk • Market Microstructure • Portfolio and Execution Models

Current Appointments

- 2018–** Assistant Professor, Department of Economics, Virginia Tech
- 2018–** Core Faculty, Computational Modeling and Data Analytics (CMDA), College of Science, Virginia Tech
- 2024–** Founding Director, Dataism Laboratory for Quantitative Finance (DLQF)
Research laboratory; 30+ researchers, affiliates and students
- 2022–** Affiliated Faculty, Kellogg Center for Philosophy, Politics, and Economics, Virginia Tech

Past Appointments

- 2021–2024** Visiting Faculty (hybrid), Deep Learning Program, NMIMS University, India
- 2021–2023** Visiting Faculty (hybrid), Machine Learning Program, Indian Institute of Technology Kharagpur
- 2016–2018** Scientific Chair of Big Data Economics, Tehran Institute for Advanced Studies (TeIAS), Iran
- 2015–2018** Founding Board Member, Tehran Institute for Advanced Studies (TeIAS), Iran
- 2012–2017** Research Fellow, London School of Economics, UK
Systemic Risk Centre; Time Series and Statistical Learning Group
- 2013** Quantitative Research Analyst, Pantheon Ventures LLP, London, UK
- 2007–2011** Head of Equity Market and Research Department, Rahbord Investment Company, Tehran, Iran
- 2009–2011** Co-Founder and Chair of the Board, Behineh Sazan Pargar, Tehran, Iran
- 2009–2010** Derivatives Trading Strategist and Team Lead, Wise Enterprises FZCO, Dubai, UAE
- 2004–2006** Stock Market Analyst Intern, Nikan Capital, Tehran, Iran

Publications

† Senior research lead: conceptualization, methodology, supervision, and writing (review and editing).

JOURNAL ARTICLES

- 2026** Li, Q., Mukhopadhyay, C., Bayat, A., and **Habibnia, A.**† “Quantum Reservoir Computing for Realized Volatility Forecasting.” *Physical Review Research*, 8, 023028. [DOI](#).
- 2026** **Habibnia, A.**, and Golshani Nasab, P. “Trading on Emotion: Behavioral and Predictive Determinants of Algorithmic Trading Adoption.” *Journal of Behavioral Finance*, 27(2), 238–251. Special Issue on Statistical and Machine Learning for Investor Modeling. [DOI](#).
- 2025** Ardalankia, J., **Habibnia, A.**, Ausloos, M., & Jafari, G. R. “Hidden Community Interlayer Spillover Detection in Financial Multilayer Networks: Generalization of Hierarchical Clustering to Multilayer Networks.” *PLOS ONE*, 20(9), e0330372. [DOI](#).
- 2024** Saffar, M., Kalhor, A., & **Habibnia, A.**† “A Geometric Approach for Accelerating Neural Networks Designed for Classification Problems.” *Scientific Reports*, 14, 17590. [DOI](#).
- 2021** **Habibnia, A.**, & Maasoumi, E. “Forecasting in Big Data Environments: An Adaptable and Automated Shrinkage Estimation of Neural Networks (AAShNet).” *Journal of Quantitative Economics*, 19(Suppl 1), 363–381. Special issue in honor of Anirudh Lal Nagar. [DOI](#).
- 2011** Haeri, A., Rabbani, M., & **Habibnia, A.** “Mathematical Models for Decision-Making and Forecasting on Euro-Yen...” *Iranian Economic Review*, 16(30), 67–91. [DOI](#).

OTHER JOURNAL PUBLICATION

- 2026** Goltabar, S., Abounoori, E., & **Habibnia, A.**† “Deep Learning-Based Modeling for Stock Price Prediction in Iran.” *Financial Research Journal*, 28(2), 424–463. [In Persian; English abstract] [DOI](#).

BOOK CHAPTER

- 2024** Razavi, H., & **Habibnia, A.** “The Rise of AI in Middle Eastern Fintech With the Case Studies From the UAE and Turkey.” In H. Taherdoost, N. Le, M. Madanchian, and Y. Farhaoui (eds.), *Exploring Global FinTech Advancement and Applications*, 259–297. IGI Global. [DOI](#).

DISCUSSION AND REFEREED WORKSHOP PAPERS

- 2026** Abolghasemi, A., Tavakoli, S. R., Naderi, P., Mirzaei, N., Jahani, B., Yousefzade, S., Javaheri, T., Rohban, M. H., Alirezaie, M., Aminian, G., & **Habibnia, A.**† “StochLOB: Heavy-Tailed Score Matching for Robust Limit Order Book Trend Prediction.” Accepted for oral presentation, *NeurIPS 2026 Workshop on AI for Stochastic Dynamics (STODY)*.
- 2017/18** Etesami, J., **Habibnia, A.**, & Kiyavash, N. “Econometric Modeling of Systemic Risk: Going Beyond Pairwise Comparison and Allowing for Nonlinearity.” *LSE Systemic Risk Centre Discussion Paper No. 66*, 2017. [\[discussion paper\]](#). Refereed version: “Econometric Modeling of Systemic Risk: A Time Series Approach”, MiLeTS at KDD, London, 2018. [\[workshop paper\]](#).
- 2013** **Habibnia, A.** “Foreign Exchange Rate Risk Measurement and Management.” *5th Conference on Development of Financing System*, Tehran, Iran. [DOI](#).

Working Papers and Manuscripts Under Review

Zahedian, M., Ardalankia, J., Hosseiny, A., **Habibnia, A.**, & Jafari, G. R. “Bullish and Bearish Regimes in Cryptocurrencies: Information Flow Networks and Balance Model Features.” Revise and resubmit, *Physica A: Statistical Mechanics and its Applications*.

Habibnia, A., Maasoumi, E., & Shah, G. “Panel Double Machine Learning with Common Treatment Timing: Identification, Nuisance Restrictions and a Banking Application.” Working paper.

Chao, Y., Gökhan, R., Etesami, J., & **Habibnia, A.**† “Learning Nonlinear Factor Models with Unknown Monotone Links from Incomplete and Noisy Data.” Working paper. [arXiv:2605.26271].

Etesami, J., **Habibnia, A.**, & Kiyavash, N. “Modeling Systemic Risk: A Time-Varying Nonparametric Causal Inference Framework.” [arXiv:2312.16707].

Ardaiz, A., Budati, V., & **Habibnia, A.** “Mixture-of-Experts for Cryptocurrency Order Execution: Training Stability, Tail Risk, and Failure Modes.” Working paper.

Gendron, J., & **Habibnia, A.** “Evaluating Meta-Regression Techniques: A Simulation Study on Heterogeneity in Location and Time.” Working paper. Earlier version: [arXiv:2504.16696].

Koushki, A., **Habibnia, A.**, Sioofy Khoojine, A., & Farkhondeh Rouz, O. “Dynamic Analysis of Systemic Risk in the Banking Sector Through Transfer Entropy and Temporal Measures.”

Habibnia, A., & Soltanzadeh, M. “Optimizing Portfolio with Two-Sided Transactions and Lending: A Reinforcement Learning Framework.” [arXiv:2408.05382].

Habibnia, A., Gendron, J., & Jaimes Sandoval, A. “Testing Dependence: Why Permutation Tests Deserve More Attention.”

Gendron, J., & **Habibnia, A.** “Filling the Gaps in Meta-Regressions: Machine Learning in Realistic Heterogeneity Structures.”

Research in Progress

Habibnia, A., & Golshani Nasab, P. “Artificial Intelligence Adoption by Financial Decision-Makers: A Review and Meta-Analysis.”

Amini, A. A., **Habibnia, A.**, & Sadeghi, H. “Online Detection of Change in Correlation for Dynamic Asset Allocation.”

Habibnia, A., & Lunkad, R. “Beyond Separability: A Study of Higher-Order Metrics on Latent Space.”

Ardalankia, J., & **Habibnia, A.** “A Multiplex Network Approach to Portfolio Selection.”

Habibnia, A. “A Review of the Past, Present, and Future of Testing for Nonlinearity in Time Series.”

Grants and Fellowships

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| 2022 | Kellogg Center PPE Research Fellowship, Virginia Tech. Principal Investigator; \$3,500 research funding and \$500 travel support.
<i>Project:</i> The History and New Trends of Measuring Dependence: From Bayes, Galton, and Pearson to the 21st Century. |
| 2021 | Lay Nam Chang Dean’s Discovery Fund Grant, Virginia Tech College of Science. Co-Principal Investigator with Russell J. Hewett; \$20,000 total award for one year. Supported Dawson J. Miller’s master’s research in deep learning for nonlinear common-factor modeling and forecasting in economics. |
| 2013–2017 | Doctoral Fellowship, ESRC and LSE Systemic Risk Centre; tuition and living support. |
| 2012–2013 | Ph.D. Scholarship, LSE Department of Statistics; first-year doctoral funding. |

Honors and Awards

- 2024** Finalist (Top 5), ADIA Lab Best Paper Award, “Modeling Systemic Risk: A Time-Varying Nonparametric Causal Inference Framework.”
- 2023** Outstanding Faculty in Undergraduate Teaching, Department of Economics, Virginia Tech.
- 2015** Highly Commended Research Prize, LSE Research Festival.
- 2010** Recognized as a Scientific Elite, Iran National Elites Foundation.
- 2007** Exceptional Talent Recognition, National Organization for Development of Exceptional Talents.

Teaching

VIRGINIA TECH (COURSES DEVELOPED IN 2018; TAUGHT REGULARLY)

Advanced Big Data Economics (ECON 5314G, Ph.D.)

Big Data Economics (ECON 4314 / CMDA 4314, undergraduate)

Data Science for Quantitative Finance (ECON 4984 / CMDA 4984; ECON 5984, graduate)

Machine Learning & Data Classifiers (C7 - Module for Program In Business Analytics)

Teaching recognition: Outstanding Faculty in Undergraduate Teaching, Department of Economics, 2023. Recent course evaluations available upon request.

NMIMS AND IIT KHARAGPUR

- 2021–2024** Machine & Deep Learning from Theory to Practice, module for M.Tech. in Data Science.
- 2024** Invited Instructor, Applications of Machine Learning, B.Tech. in Data Science, NMIMS University.

LONDON SCHOOL OF ECONOMICS AND LONDON BUSINESS SCHOOL

- 2012–2017** Elementary Statistical Theory (ST102); Quantitative Methods (ST107); Time Series Forecasting (ST304); Applied Regression with R (ST211).
- Factor Models in Time Series, Summer Programme with Matteo Barigozzi.
- 2013** London Business School: teaching assistant, Global Business Environment (MBA).

UNIVERSITY OF TEHRAN

- 2008–2012** Econometrics (graduate); Macroeconomics I and II (undergraduate); Machine Learning Applied to Finance (graduate).

SELECTED PROFESSIONAL AND EXECUTIVE EDUCATION

AI-Based Algorithmic Trading with Python, for practitioners and firms (recurring)

- 2022** Big Data & Machine Learning for Causal Inference and Treatment Effects with Python, *TeIAS, Iran*
- 2018** Linear Algebra & Probability for Machine Learning in Python, *Tehran Stock Exchange*
- 2018** Time Series Forecasting with Python, *Tehran Stock Exchange*
- 2017** Algorithmic Trading with Python, *Tehran Stock Exchange*
- 2017** Deep Learning & Machine Learning Applied to Trading, *Tehran Stock Exchange*
- 2015** Econometrics of Monetary Policy (postgraduate), *Khatam University*
- 2008–2016** Technical Analysis of Financial Markets, *More than 25 times in various universities and institutes*

Research Supervision and Advising

DOCTORAL SUPERVISION AT VIRGINIA TECH

- 2026** Jonathan Gendron, Ph.D. Economics; advisor and committee chair.
Dissertation: Evaluating Meta-Regression Models with Simulation Studies and Machine Learning Driven Imputation.
Placement: Assistant Professor, Business Analytics and Information Systems, Xavier University (Williams College of Business).
- 2027** Jamshid Ardalankia, Ph.D. Economics (expected); advisor and committee chair.

MASTER'S SUPERVISION AT VIRGINIA TECH

- 2025** Gaurav K. Shah, M.S. Computer Science and Applications; co-chair and research advisor.
- 2022** Dawson J. Miller, M.S. Mathematics; co-chair and research co-advisor.

DOCTORAL COMMITTEE MEMBERSHIP AT VIRGINIA TECH

Arin Shahbazian (Economics, 2026); Austin E. Bradley (Economics, 2024); Brian Arthur D'Orazio (Economics, 2023); Mohammad Mahdi Banasaz (Economics, 2022); He Jiang (Economics, 2022).

UNDERGRADUATE RESEARCH

- 2026** *Summer research*
Viraj Chawda, Tensor-Based Factor Models for Economic Forecasting
Laird Sutherland, Causal Machine Learning for Economic Policy Evaluation
Chuyang Zhang, Nonlinear Dependence Measures in Economics and Finance
- 2024–2025** *Undergraduate research course in economics*
Nicole Raphael, Permutation Tests for Correlation
Max Brenner, Forecasting Sports Outcomes via Machine Learning

OTHER INSTITUTIONS

- University of Tehran*
- 2027** Farnam Shahba, Ph.D. Economics and Econometrics (expected); advisor.
- 2024** Soheil Aeen, Ph.D. Economics and Econometrics; co-advisor.
- 2023** Mohsen Saffar, Ph.D. Electrical and Computer Engineering; co-advisor.
- 2023** Mahdi Bagheri, Ph.D. Electrical and Computer Engineering; committee member.
- Tehran Institute for Advanced Studies (TeIAS)*
- 2023** Mahdi Soltanzadeh, M.S. Financial Engineering; advisor.
- K. N. Toosi University of Technology*
- 2017** Mahsa Rajabi, Ph.D. Electrical Engineering; committee member.
- 2017** Raheleh Shahrokhi, Ph.D. Electrical Engineering; committee member.
- Khatam University*
- 2016** Emad Habibzadeh, M.S. Financial Engineering; advisor.
- 2016** Fatemeh Ghasempour, M.S. Risk Management; advisor.

Conference Presentations and Invited Talks

- 2026** Causal Effects of Financial Deregulation on Bank Risk: Insights from Double Machine Learning with Panel Data, *QFFE 2026 International Conference*
- 2026** Systemic Risk and Cryptocurrency Spillovers: Time-Varying Directed Information Graphs, *QFFE 2026 International Conference*
- 2026** Learning Nonlinear Factor Models with Unknown Monotone Links from Incomplete and Noisy Data, *7th Vienna Workshop on High-Dimensional Time Series in Macroeconomics and Finance*
- 2026** Learning Nonlinear Factor Models with Unknown Monotone Links from Incomplete and Noisy Data, *RCEA International Conference in Economics, Econometrics, and Finance*
- 2026** Causal Effects of Financial Deregulation on Bank Risk: Insights from Double Machine Learning with Panel Data, *Camp Econometrics XX*
- 2025** Policy Analysis of Reduced Regulatory Supervision on Bank Risk Using Double Machine Learning for Panel Data, *Southern Economic Association, 95th Annual Conference, Session on High-Dimensional Econometrics and Machine Learning*
- 2025** Realized Volatility Forecasting with Quantum Reservoir Learning, *Department of Economics Seminar, University of Kansas*
- 2024** Realized Volatility Forecasting with Quantum Reservoir Learning, *The 5th Annual DC-MD-VA Econometrics Workshop*
- 2023** A Time-Varying Causal Inference Framework for Modeling Systemic Risk in High-Dimensional Financial Networks, *The 4th Annual DC-MD-VA Econometrics Workshop*
- 2023** The History and New Trends of Measuring Dependence, *Kellogg Center PPE Research Fellow Panel*
- 2023** Quantum Computing Solutions for Econometrics, *Physics of Quantum Information Technology (PQIT) Group, University of Electronic Science and Technology of China*
- 2023** Enhancing Economic Analysis and Policy-Making: The Synergy of AI, Big Data, and HPC, *Perspectives on the Human AI Event, ICAT, Virginia Tech*
- 2023** Topics in Advanced Financial Econometrics, *University of Tehran, Faculty of Economics*
- 2023** Algorithmic Trading and Intelligent Investment Strategies, *Kharazmi University*
- 2022** Quantum Computing & Quantum Machine Learning Solutions for Economics and Finance, *University of Electronic Science and Technology of China (UESTC)*
- 2021** Information Theory & Financial Network Analysis, *University of Tehran, Dept. of Economics*
- 2021** Shrinkage Estimation of Neural Networks, *41st International Symposium on Forecasting*
- 2020** Machine Learning for Econometricians, *North Carolina State University, Dept. of Economics*
- 2019** Adaptable and Automated Shrinkage Estimation of Neural Networks (AAShNet), *Stanford Institute for Theoretical Economics – Asset Pricing Theory and Computation Summer Workshop*
- 2019** Big Data and Machine Learning for Policymaking, *International Monetary Fund, Strategy, Policy and Review Department*
- 2018** Introduction and Overview of Applications of Artificial Intelligence and Machine Learning in Scientific Research, *Virginia Tech*
- 2018** Financial Time Series Analysis: Deep Learning Approach, *MathWorks Computational Finance*
- 2018** Text Mining & Sentiment Analysis in Trading, *Tehran Stock Exchange*
- 2016** Machine Learning for Economic and Financial Forecasting, *The Technical Analyst*
- 2015** Nonlinear Forecasting with Many Predictors by Neural Network Factor Models (Poster), *LSE Research Festival, London School of Economics. [\[LSE record\]](#)*
- 2015** Nonlinear Forecasting with Many Predictors by Neural Network Factor Models, *35th International Symposium on Forecasting (ISF), Riverside, California*

- 2014** Forecasting in Big Data Environments: Shrinkage Estimation of Neural Networks, *International Conference on Computational and Financial Econometrics (CFE-ERCIM)*, University of Pisa
- 2013** Foreign Exchange Rate Risk Measurement and Management, *5th Conference on Development of Financing System, Tehran, Iran*
- 2012** Time Series Forecasting Using Wavelet Kernel Support Vector Machine, *LSE*

Professional Service

DEPARTMENTAL AND UNIVERSITY SERVICE

- 2019–2020** Organizer, weekly departmental seminars, Department of Economics, Virginia Tech.
Faculty search committee member, Department of Economics, Virginia Tech.
Contributed to development of the department’s master’s program and to CMDA program activities.
- 2011–2012** Student Experience Committee Member, M.Sc. Quantitative Finance, City University London.

RESEARCH SEMINARS

- 2026** Organizer, DLQF Seminars, focusing on large language models (LLMs) and agentic AI.

EDITORIAL BOARD

- 2023–** International Editorial Board, *Journal of Countries Studies*.

JOURNAL REFEREEING

Journal of Business and Economic Statistics; Econometric Reviews; Econometrics; International Journal of Forecasting; Applied Economic Perspectives and Policy; Proceedings of the National Academy of Sciences (PNAS); Risks; Entropy; Economic Modelling; Journal of Economic Behavior and Organization; INFORMS Journal on Computing.

CONFERENCE AND WORKSHOP REVIEWING

- 2026** Reviewer, 7th ACM International Conference on AI in Finance (ICAIF); NeurIPS Workshop EconML; NeurIPS Workshop on AI for Stochastic Dynamics (STODY).

Software and Research Resources

- 2023** **Habibnia, A.** “Algorithmic Trading with Python.” Open-source curriculum covering market microstructure, strategy backtesting, broker & exchange APIs, with live execution. [GitHub](#) (500+ stars).
- 2018** **Habibnia, A., & Rahimikia, E.** “Nonlinearity Test for PCA.” MathWorks. [DOI](#).
- 2017** **Habibnia, A., & Rahimikia, E.** “MATLAB Tutorial for Data Science.” MathWorks. [DOI](#).

Technical Skills

Programming: Python, R, MATLAB; working familiarity with C.

Tools and Computing: Git, Linux; working knowledge of AWS.

Econometric Packages: EViews, G@RCH, OxMetrics, Stata, JMulTi.

Financial Platforms and Data: Bloomberg Terminal, broker and exchange APIs, Binance, Crypto Lake; limit order book and alternative data.