

# Babak Mahdavi-Damghani

QUANTITATIVE FINANCE & MACHINE LEARNING RESEARCHER ·

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## Executive summary

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Researcher and entrepreneur with a PhD in Machine Learning and applied computation for social sciences and nearly two decades of experience at the intersection of engineering and the applied mathematical, statistical and computational sciences for various applications. Research contributions span algorithmic trading, stochastic modeling, machine learning for financial data, and agent-based modeling, with publications in peer-reviewed journals such as *Algorithmic Finance*, *Wilmott*, and *The Journal of Financial Data Science*. Teaching experience includes lecturing and tutoring at Oxford, Cambridge, and the Certificate in Quantitative Finance programme, covering topics from mathematical methods to advance topics in quantitative finance. Actively engaged in peer review for leading journals. Combines rigorous theoretical work with applied research in markets, developing novel methodologies for volatility modeling, portfolio optimization, and market simulation. Dedicated to advancing the field of Mathematical & Computational Science in their broad definition, while mentoring the next generation of researchers.

## Education

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### University of Oxford

*Oxford, UK*

#### DPHIL MACHINE LEARNING

*2016 - 2019*

- Advisor: Pr. Stephen Roberts
- Jury: Pr. Jean Philippe Bouchaud & Pr. Álvaro Cartea
- Industry work experience, Quantitative Research, Trading, Portfolio Management and Risk roles (2010-2016)
- **University of Cambridge**, MSc courses & research in Pure Mathematics, Statistics (DPMMS) & Engineering (2008 - 2009)
- **Sorbonne Université** (previously called université Paris 6), MSc courses & research in "Probabilités et Finance" (2007 - 2008)
- **École Polytechnique**, MSc courses & research in Applied Mathematics (2006 - 2007)

### University of Oxford

*Oxford, UK*

#### MSc COMPUTER SCIENCE

*2005 - 2006*

- Advisor: Dr. Vasile Palade & Patrick McSharry
- Final Dissertation awarded an A, judged excellent by the jury

### University of Pennsylvania

*Philadelphia, USA*

#### BSc SYSTEMS ENGINEERING FOCUSED ON ECONOMIC & FINANCIAL SYSTEMS

*2000 - 2004*

- Minor in Mathematics
- Senior designed awarded an A (maximum grade)

## Awards & Scholarships

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- 2016-2019 **DTC Studentship Full award maintenance & fees**, University of Oxford
- 2019 **Algorithmic Trading Programme scholarship**, University of Oxford
- 2006-2008 **Bourse d'Excellence**, École Polytechnique
- 2001 **Member of the Outstanding Student Honor Society (OSHS)**, (Top 10% rank in class)

## Research Interest

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Statistics, Financial Mathematics, Quantitative Finance, Optimization, Evolutionary Dynamics, Agent Based Models, Evolutionary Game, Algorithmic Trading, Quantitative Financial Strategies, Cryptocurrencies, Implied Volatility Modelling, Machine Learning, Sequential Monte Carlo Methods,

## Publications

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### SELECTED PUBLICATIONS (GOOGLE SCHOLAR: CITATIONS~300, H-INDEX~10, I10-INDEX~10)

- Babak Mahdavi-Damghani, Stephen Roberts. 2023. Guidelines for building a realistic algorithmic trading market simulator for backtesting while incorporating market impact. *Algorithmic Finance*, vol. Pre-press, pp. 1-25.
- Babak Mahdavi-Damghani, Robert Fraser, James Howell, John Halldorsson. 2022. Cryptocurrency sectorization through clustering and web-scraping: Application to systematic trading. *The Journal of Financial Data Science*, 4 (1), 158-179.
- Babak Mahdavi-Damghani, Konul Mustafayeva, Christian Buescu, Stephen Roberts. 2020. Portfolio optimization for cointelated pairs: SDEs vs Machine learning. *Algorithmic Finance*, 8 (3-4), 101-125.
- Babak Mahdavi-Damghani. 2020. Data-Driven Models & Mathematical Finance: Apposition or Opposition? University of Oxford (Oxford-Man Institute of Quantitative Finance).
- Babak Mahdavi-Damghani. 2017. Introducing the HFTE Model: A Multi-Species Predator Prey Ecosystem for High Frequency Quantitative Financial Strategies. *Wilmott*, 89.
- Babak Mahdavi-Damghani. 2015. Introducing the Implied Volatility Surface Parametrization (IVP): Application to the FX Market. *Wilmott*, 77: 68-81.
- Babak Mahdavi-Damghani. 2013. The Non-Misleading Value of Inferred Correlation: An Introduction to the Cointelation Model. *Wilmott*, 67: 50-61.
- Babak Mahdavi-Damghani, Andrew Kos. 2013. De-arbitraging With a Weak Smile: Application to Skew Risk. *Wilmott*, 64: 40-49.
- Babak Mahdavi-Damghani, Dani Welch, Ciaran O'Malley, Stephen Knights. 2012. The Misleading Value of Measured Correlation. *Wilmott*, 62: 64-73.
- Babak Mahdavi-Damghani (under the pseudonym of Ibn Gosset). 2012. The Unfortunate cosT Of Pattern rEcognition (UTOPE-ia): the Genetic Disorder of the Financial Industry. *Wilmott (Cover Story)*, 60: 28-37.

### SELECTED WORKING PAPERS

- Babak Mahdavi-Damghani. Validating the PNL in NLP.
- Babak Mahdavi-Damghani, Stephen Roberts. Addendum on how many times Cointelated pairs cross paths, Oxford-Man Institute of Quantitative Finance.
- Babak Mahdavi-Damghani, Stephen Roberts. Machine Learning Techniques for Deciphering Implied Volatility Surface Data in a Hostile Environment: Scenario Based Particle Filter, Risk Factor Decomposition & Arbitrage Constraint Sampling, Oxford-Man Institute of Quantitative Finance.
- Babak Mahdavi-Damghani, Stephen Roberts. A proposed risk modeling shift from the approach of stochastic differential equation towards machine learning clustering: Illustration with the concepts of anticipative, Oxford-Man Institute of Quantitative Finance.
- Babak Mahdavi-Damghani, Konul Mustafayeva, Stephen Roberts. Convergence of Heston to SVI Proposed Extensions, Oxford-Man Institute of Quantitative Finance.

## Selected Presentations

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2024. *Guidelines for building a realistic algorithmic trading market simulator for backtesting while incorporating market impact*. **Quant Insight: Machine Learning in Quant Finance**, London, UK.
2019. *A Bottom-up Approach to the Financial Markets: Agent-Based Quantitative Algorithmic Strategies: Ecosystem, Dynamics & Detection*. **Risk Summit**: Event London, UK.
2018. *Portfolio Optimization for Cointelated Pairs: SDEs vs. Machine Learning*. **Mathematics & Finance: Research in Options** Instituto Nacional de Matemática Pura e Aplicada, Rio de Janeiro, Brazil.
2017. *Agent Based Model and Predator Prey Models*. **University of Oxford** Man Group Institute of Quantitative Finance, Oxford, UK.

## Teaching Experiences

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|------|---------------------------------------------------------------------------|------------------|
| 2019 | <b>Oxford Algorithmic Trading Programme</b> , Teaching Assistant          | <i>Oxford</i>    |
| 2017 | <b>High Frequency Trading Ecosystem (HFTE) model</b> , Guest Lecturer     | <i>CQF</i>       |
| 2017 | <b>Financial Markets Ethics</b> , Guest Lecturer                          | <i>CQF</i>       |
| 2015 | <b>Cointelation &amp; Inferred Correlation Models</b> , Guest Lecturer    | <i>CQF</i>       |
| 2015 | <b>Implied Volatility surface Parameterization</b> , Guest Lecturer       | <i>CQF</i>       |
| 2009 | <b>Mathematical Methods 1A</b> , Downing College Course Instructor        | <i>Cambridge</i> |
| 2009 | <b>Mathematical Methods 1A</b> , Engineering Department Course Instructor | <i>Cambridge</i> |
| 2009 | <b>Mathematical Methods 1B</b> , Downing College Course Instructor        | <i>Cambridge</i> |
| 2009 | <b>Mathematical Methods 1B</b> , Engineering Department Course Instructor | <i>Cambridge</i> |

## Grants and Allocators

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|------|-----------------------------------------------------------------------------------------|
| 2022 | <b>\$100,000</b> , Geneva Trading (for the development of AI models for MFT strategies) |
| 2025 | <b>\$250,000</b> , Nickel Asset Management (for the development of HFT strategies)      |
| 2025 | <b>\$100,000</b> , Coincall (for the development of Options strategies)                 |

## Professional Experience & Consultancies

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|-----------|----------------------------------------------------------------------------|
| 2022-2023 | <b>Senior Quantitative Researcher</b> , London Stock Exchange Group (LSEG) |
| 2021-2022 | <b>Senior Quantitative Trading Strategist</b> , Andurand Capital           |
| 2014-2015 | <b>Senior Quantitative Analyst</b> , London Clearing House (LCH)           |
| 2011-2014 | <b>Quantitative Analyst</b> , Credit Suisse                                |
| 2010-2011 | <b>Exotics Trader</b> , Citigroup                                          |
| 2008-2008 | <b>Quantitative Analyst</b> , GAM Systematic                               |
| 2007-2007 | <b>High Frequency Quantitative Analyst</b> , Société Générale (Socgen)     |
| 2003-2003 | <b>Research Associate</b> , General Motors                                 |
| 2002-2002 | <b>Marketing Engineer</b> , Siemens                                        |

## Entrepreneurial Experiences

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| 2014-now  | <b>CEO</b> , EQRC                     |
| 2011-now  | <b>CAIO</b> , Stable Match & Oolalaaa |
| 2015-now  | <b>CIO</b> , Sunray Properties        |
| 2005-2007 | <b>CTO</b> , YourRug                  |

## Professional Certificates

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|------|-----------------------------------------------------------------------------------------------------------|
| 2019 | <b>Oxford Algorithmic Trading Programme</b> , University of Oxford (Oxford, UK)                           |
| 2010 | <b>Approved Person &amp; Derivatives (two different certificates)</b> , Financial Conduct Authority (FCA) |

## Peer Reviewing

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**Journal of Machine Learning Research, Journal of Financial Data Science, European Journal of Finance, Wilmott Magazine, Journal of Mathematics, Ledger, Algorithmic Finance, Risk Magazine,**

## References Available Upon Request

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**Pr. Stephen Roberts (University of Oxford), Pr. Jean Philippe Bouchaud (École Polytechnique), Pr. Vasile Palade (University of Oxford), Dr. Paul Wilmott (University of Oxford), more available upon request,**