Chaoyi Zhao 赵朝熠

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Affiliations

Massachusetts Institute of Technology, Sloan School of Management — MA, USA
Postdoctoral Associate @ MIT Laboratory for Financial Engineering — 2024 – Present
- Advisor: Prof. Andrew W. Lo

Society of Actuaries
Fellow (FSA, SOA) — 2024 – Present
Associate (ASA, SOA) — 2023 – 2024

Research Interests

Investments: Healthcare investing, Factor investing, High-frequency investing/trading
Statistics: High-dimensional statistics, Machine learning & deep learning
Actuarial Sciences: Copula theory

Education

Peking University, School of Mathematical Sciences — Beijing, China
Ph.D. in Statistics — Sep 2019 – Jan 2024
- Main advisor: Prof. Lan Wu   Secondary advisor: Prof. Ruixun Zhang
- Early graduated for half a year

Peking University, School of Mathematical Sciences — Beijing, China
B.S. in Mathematics and Applied Mathematics — Sep 2015 – Jul 2019
- Elite Undergraduate Program of Applied Mathematics — Sep 2017 – Jul 2019

Peking University, School of EECS — Beijing, China
B.S. (Double Degree) in Computer Science and Technology — Sep 2016 – Jul 2019

Honors

Awards

Outstanding Doctoral Dissertation Award (Peking University)	2024
Beijing Outstanding Graduate, Peking University Excellent Graduate	2019, 2024
Merit Student (Peking University)	2016, 2020 – 2023
S&P Global Academic ESG Research Award	2022
Second place in the Best Paper Prize for Young Scholars, Annual Conference of the Operations Research Society of China (Financial Engineering and Risk Management Branch)	2022
Excellent Graduate of Elite Undergraduate Program of Applied Mathematics	2019
The Student of The Year (10 students per year, Peking University)	2018
Merit Student Pacesetter (Peking University)	2018
Beijing Merit Student	2018
Excellent Student Leader (Peking University)	2017

Scholarships

National Scholarship	2018, 2023

President Scholarship (Peking University)	2019 – 2022
Leo KoGuan Scholarship (Peking University)	2022
Huatai Science and Technology Scholarship (Peking University)	2021
CETC the 14th Research Institute Glarun Scholarship (Peking University)	2020
The National Southwest Associated University Scholarship (Peking University)	2018
Shenzhen Finance Institute Scholarship (the Chinese University of Hong Kong, Shenzhen)	2017
Founder Scholarship (Peking University)	2016

Publications

$^{\#}$Alphabetical order; *Corresponding author.

Portfolio Theory and Investing

1. High-Frequency Liquidity in the Chinese Stock Market: Measurements, Patterns, and Determinants
   Chaoyi Zhao, Yufan Chen, Lintong Wu, Yuehao Dai, Ermo Chen, Lan Wu, and Ruixun Zhang.
   Pacific-Basin Finance Journal, 90, 102681, 2025. [PDF][Appendix][Journal]
2. Optimal Impact Portfolios with General Dependence and Marginals
   Andrew W. Lo, Lan Wu, Ruixun Zhang, and Chaoyi Zhao$^{\#*}$.
   Operations Research, 72(5), 1775–1789, 2024. [PDF][Appendix][Journal]
   Second place in the Best Paper Prize for Young Scholars, Annual Conference of the Operations Research Society of China (Financial Engineering and Risk Management Branch).
   Reported by Center for Statistical Science, Peking University.
3. Measuring and Optimizing the Risk and Reward of Green Portfolios
   Andrew W. Lo, Ruixun Zhang, and Chaoyi Zhao$^{\#*}$.
   The Journal of Impact and ESG Investing, 3(2), 55–93, 2022. [PDF][Journal]
   Winner of the S&P Global Academic ESG Research Award.
   Reported by Center for Statistical Science and School of Mathematical Sciences, Peking University.
4. Order Types and Natural Price Change: Model and Empirical Study of the Chinese Market
   Siyu Liu, Chaoyi Zhao*, and Lan Wu.
   International Journal of Financial Engineering, 9(04), 2250033, 2022. [PDF][Journal]

Actuarial Sciences

5. The Checkerboard Copula and Dependence Concepts
   Liyuan Lin, Ruodu Wang, Ruixun Zhang, and Chaoyi Zhao$^{\#}$.
   SIAM Journal on Financial Mathematics, 16(2), 426–447, 2025. [PDF][Journal]
6. Construct Smith–Wilson Risk-Free Interest Rate Curves with Endogenous and Positive Ultimate Forward Rates
   Chaoyi Zhao*, Zijian Jia, and Lan Wu.
   Insurance: Mathematics and Economics, 114, 156–175, 2024. [PDF][Journal]

High-dimensional Statistics, Machine Learning, and Artificial Intelligence

7. On Consistency of Signature Using Lasso
   Xin Guo, Binnan Wang, Ruixun Zhang, and Chaoyi Zhao$^{\#*}$.
   Operations Research, forthcoming, 2025. [PDF][Appendix][Journal]
   Reported by Center for Statistical Science, Peking University.

8. The Evolution of Discrimination Under Finite Memory Constraints
   Andrew W. Lo, Ruixun Zhang, and Chaoyi Zhao#*.
   Scientific Reports, 15, 31774, 2025. [PDF] [Appendix] [Journal]
9. Interpretable Image-Based Deep Learning for Price Trend Prediction in ETF Markets
   Ruixun Zhang, Chaoyi Zhao, and Guanglian Lin.
   The European Journal of Finance, forthcoming, 2023. [PDF][Journal]
10. The Success of AdaBoost and its Application in Portfolio Management
    Yijian Chuan, Chaoyi Zhao, Zhenrui He, and Lan Wu.
    International Journal of Financial Engineering, 8(02), 2142001, 2021. [PDF][Journal]

Books

11. Quantitative Investing (in Chinese)
    Jian Sun, Lan Wu, and Chaoyi Zhao.
    Science Press, 2023. [Link]
12. Financial Market Risk Management Analytics (in Chinese)
    Frank H. Koger. Translated by Chaoyi Zhao.
    Truth & Wisdom Press, 2022. [Link]
13. The Maths Book (in Chinese)
    Dorling Kindersley Ltd. Translated by Chaoyi Zhao.
    Publishing House of Electronics Industry, 2021. [Link]

Preprints

14. No Asset Is an Island: A Real Options Framework for Valuing Interdependent Projects
    Shomesh E. Chaudhuri, Andrew W. Lo, and Chaoyi Zhao#*.
    Under review.
15. The Health of Nations Fund: Financing Global Drug Development
    Joonhyuk Cho, Manish Singh, Chaoyi Zhao, Shomesh E. Chaudhuri, and Andrew W. Lo.
    Under review.
16. Optimal Multi-Period Dynamic Portfolios for Sustainable Investing
    Danping Li, Ruixun Zhang, and Chaoyi Zhao#*.
    Under review. [SSRN]
17. Breaking the Factor Zootopia: Factor Selection via Significant Tests of Multi-Task Lasso
    Chaoyi Zhao* and Lan Wu.
    Working Paper.

Research Projects

Data-driven Financial Risk Forecasting
National Key R&D Program of China, participant 2023 – 2024

Portfolio Analytics and Risk Management for Green Investing: Theory and Application
National Natural Science Foundation of China, participant 2023 – 2024

High-Frequency T+0 Quantitative Trading Strategy Based on Deep Learning
Peking University and Founder Securities, participant 2019 – 2020

Gradient Optimization Model Based on Genetic Programming
Ernst & Young (China) Advisor Ltd, intern 2019

Multi-Factor Alpha Strategy Based on the AdaBoost Algorithm
Peking University and Founder Securities, participant — 2018 – 2019

Application of Statistical Learning in Modeling the Relationship Between Stock Index and Futures
Peking University, undergraduate research, group leader — 2017 – 2018

Teaching Experience

Teaching Assistant for Massachusetts Institute of Technology
Healthcare Finance — Fall 2024
Elective for Graduate and Senior Undergraduate Students. Instructor: Prof. Andrew W. Lo

Teaching Assistant for Peking University
Quantitative Trading — Fall 2020, 2022
Elective for Graduate and Senior Undergraduate Students. Instructors: Prof. Jian Sun and Lan Wu
Practice for Fixed Income Securities — Fall 2021, 2022
Elective for Graduate and Senior Undergraduate Students. Instructors: Prof. Lan Wu *et al.*
Theory and Practice for Futures and Other Derivatives — Spring 2022
Elective for Graduate and Senior Undergraduate Students. Instructors: Prof. Lan Wu *et al.*
Mathematical Analysis III (Including Exercise Class) — Fall 2021
Core Class for Undergraduate Students. Instructor: Prof. Jiazhong Yang
Mathematical Analysis II (Including Exercise Class) — Spring 2021
Core Class for Undergraduate Students. Instructor: Prof. Jiazhong Yang
Risk Management and Financial Regulation — Spring 2021
Core Class for Graduate Students. Instructor: Prof. Lan Wu
Exercise Class for Probability and Statistics — Spring 2020
Elective for Undergraduate Students.
Introduction to Financial Mathematics — Fall 2019
Core Class for Undergraduate Students. Instructor: Prof. Lan Wu

Talks

No Asset Is an Island: A Real Options Framework for Valuing Interdependent Projects
Peking University Seminar — Sep 18, 2025

On Consistency of Signature Using Lasso
SIAM Conference on Financial Mathematics and Engineering (FM25) — Jul 15, 2025
(Session Chair) 2024 INFORMS Annual Meeting — Oct 22, 2024
CSIAM 2023 — Oct 15, 2023
UC Berkeley Seminar — May 7, 2023

Breaking the Factor Zootopia: Factor Selection via Significant Tests of Multi-Task Lasso
7th PKU-NUS Annual International Conference on Quantitative Finance and Economics — May 20, 2023
Peking University Seminar — Apr 21, 2023
CSIAM Financial Math Annual Conference — Nov 13, 2022

Optimal Impact Portfolios with General Dependence and Marginals
ICIAM 2023 @ Tokyo — Aug 20–25, 2023
The 11th Annual Conference of the Operations Research Society of China (Financial Engineering and Risk Management Branch) — Dec 10, 2022
- Second place in the Best Paper Prize for Young Scholars

Sun Yat-sen University Seminar — Nov 4, 2022

The 19th Chinese Finance Annual Meeting Oct 30, 2022

High-Frequency Liquidity in the Chinese Stock Market: Measurements, Patterns, and Determinants

China Finance Review International & China International Risk Forum Joint Conference Jul 29, 2023
CSIAM Financial Math Annual Conference Nov 12, 2022
IFZ FinTech Colloquium 2022, Lucerne University of Applied Sciences and Arts Nov 2, 2022
2022 INFORMS Annual Meeting Oct 17, 2022
(Session Chair) 11th World Congress of Bachelier Finance Society Jun 15, 2022

Construct Smith-Wilson Interest Rate Curves with Endogenous Ultimate Forward Rates

United As One: 24th International Congress on Insurance: Mathematics and Economics Jun 5, 2021

Statistical Patterns of High-Frequency Data for A-share stocks in Shenzhen Stock Exchange

3rd Seminar for Young Scholars in Financial Engineering and Risk Management Jun 12, 2021

Discussions

2025 MRS International Risk Conference July 26, 2025

Non-Academic Talks

Speech for the Opening Ceremony of School of Mathematical Sciences, Peking University Sep 15, 2018

- Representative of seniors [Link]

Skills

Programming: Python, R, C/C++, MATLAB, Java, SQL
Languages: Mandarin Chinese, English
Hobbies: Swimming, Rowing, Hiking, Stand-up Comedy