Chaoyi Zhao 赵朝熠

Sloan School of Management, Massachusetts Institute of Technology
Cambridge, MA, USA
Email: cy_zhao@mit.edu
Homepage: https://zhaochaoyi.github.io/

Affiliations		
	Massachusetts Institute of Technology, Sloan School of Management	
	Postdoctoral Associate	2024 – Present
	Society of Actuaries	
	Associate (ASA, SOA)	2023 – Present

Research Interests

Investments: Factor investing, High-frequency investing/trading, Sustainable investing
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 graduation 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, Electronics Engineering And Computer Science	Beijing, China
	B.S. (Double Degree) in Computer Science and Technology	Sep 2016 – Jul 2019

Honors

Awards

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.

Factor Investing

1. Breaking the Factor Zootopia: Factor Selection via Significant Tests of Multi-Task Lasso
   Chaoyi Zhao* and Lan Wu.
   Working Paper.

High-Frequency Investing/Trading

2. High-Frequency Liquidity in the Chinese Stock Market: Measurements, Patterns, and Determinants
   Ruixun Zhang, Chaoyi Zhao*, Yufan Chen, Lintong Wu, Yuehao Dai, Ermo Chen, Zhiwei Yao, Yihao Zhou, and Lan Wu.
   Under review. [SSRN]

3. 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]

Sustainable Investing

4. 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.

5. Optimal Impact Portfolios with General Dependence and Marginals
   Andrew W. Lo#, Lan Wu#, Ruixun Zhang#, and Chaoyi Zhao#*.
   Operations Research, 2024, forthcoming. [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.

Machine/Deep Learning and Their Applications in Finance

6. On Consistency of Signatures Using Lasso
   Xin Guo#, Ruixun Zhang#, and Chaoyi Zhao#*.
   Under review. [arXiv]

7. 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]

8. 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]

Actuarial Sciences

9. The Checkerboard Copula and Dependence Concepts
   Liyuan Lin[#], Ruodu Wang[#], Ruixun Zhang[#], and Chaoyi Zhao[#].
   Under review. [arXiv]

10. 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]

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]

Research Projects	**Data-driven Financial Risk Forecasting**	
	National Key R&D Program of China, participant	2023 – Present
	Portfolio Analytics and Risk Management for Green Investing: Theory and Application	
	National Natural Science Foundation of China, participant	2023 – Present
	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 Peking University**	
	Quantitative Trading	Fall 2020, 2022
	Elective for Graduate and Senior Undergraduate Students. Instructor: Prof. Jian Sun and Lan Wu	
	Practice for Fixed Income Securities	Fall 2021, 2022
	Elective for Graduate and Senior Undergraduate Students. Instructor: Prof. Lan Wu *et al.*	
	Theory and Practice for Futures and Other Derivatives	Spring 2022
	Elective for Graduate and Senior Undergraduate Students. Instructor: 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

Teaching Assistant for Master Program of Tulane University & University of Chinese Academy of Social Sciences

Fixed Income Analysis   2020, 2021

Core Class for Graduate Students. Instructor: Prof. Bill W. Reese

Investment and Asset Pricing   2020, 2021

Core Class for Graduate Students. Instructor: Prof. Frank H. Koger

Risk Management   2019, 2020, 2021

Core Class for Graduate Students. Instructor: Prof. Frank H. Koger

Options and Other Derivatives   2019, 2020, 2021

Core Class for Graduate Students. Instructor: Prof. Paul A. Spindt and Josh Pierce

Valuation   2020, 2021

Core Class for Graduate Students. Instructor: Prof. Peggy Huang

Portfolio Management   2020, 2021

Core Class for Graduate Students. Instructor: Prof. Helmuth Chavez

Talks

On Consistency of Signatures Using Lasso

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

PKU 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

11th World Congress of Bachelier Finance Society Jun 15, 2022

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

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

Speech for the Opening Ceremony of School of Mathematical Sciences

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

– Representative of seniors [Link]

Skills

Programming: Python, R, C/C++, MATLAB, Java, SQL

Languages: Chinese, English, Chinese sign language

Hobbies: Swimming, Ukulele