Zhou Zhou

Contact Information

School of Mathematics and Statistics, University of Sydney, NSW 2006 Australia.
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Research Interests

Mathematical finance, optimal stopping, applied probability, stochastic control and games.

Employment

- Senior Lecturer, School of Mathematics and Statistics, University of Sydney, January 2021 -.
- Lecturer, School of Mathematics and Statistics, University of Sydney, February 2018 - December 2021.
- Postdoctoral Assistant Professor, Department of Mathematics, University of Michigan, September 2017 - December 2017.
- Postdoctoral Fellow, Institute for Mathematics and its Applications, University of Minnesota, September 2015 - August 2017.

Education

University of Michigan, Ann Arbor, Michigan, USA

Ph.D. in Applied and Interdisciplinary Mathematics — **April 2015**

- Thesis Advisor: Prof. Erhan Bayraktar
- Dissertation Title: Topics in Fundamental Theorem of Asset Pricing and Optimal Stopping

Nankai University, Tianjin, China

B.S., Mathematics (GPA is Top 1 among 58) — **June 2010**

Grants

- Australian Research Council Discovery Project, co-CI with Ivan Guo, Anna Aksamit, Kihun Nam and Marek Rutkowski, $390,000, 2022-2025.
- USyd-NUS Partnership Collaboration Award, co-CI with Chao Zhou, $20,000, 2020.

Honors and Awards

- AMS MRC Travel Funding, 2016.
- Rackham Conference Travel Grant, University of Michigan, 2014.
- SIAM Student Travel Award, 2014.
- Alice Webber Glover in Math Scholarship, 2014.
- Rackham International Student Fellowship, 2013.
- Mathematics Departmental Scholarship, University of Michigan, 2011, 2012.
- Title of "Outstanding Graduate with Bachelor Degree", Nankai University, 2010.
- National Scholarship, Nankai University, 2009.
- Top-Grade Beiyecaituan Scholarship, Nankai University, 2008.
- First Prize of Excellent Undergraduate Scholarship, Nankai University, 2007, 2008.

Submitted Papers

- Convergence of Policy Improvement for Entropy-Regularized Stochastic Control Problems (with Yu-Jui Huang and Zhenhua Wang).
- Equilibria of Time-inconsistent Stopping for One-dimensional Diffusion Processes, (with Erhan Bayraktar and Zhenhua Wang).

- Robust Pricing-Hedging Duality for Multi-Action Options, (with Anna Aksamit, Ivan Guo, and Shidan Liu).
- Multiscale Linear-Quadratic Stochastic Optimal Control with Multiplicative Noise, (with Beniamin Goldys, Gianmario Tessitore, and James Yang).
- Robust No Arbitrage and the Solvability of Vector-valued Utility Maximization Problems, (with Andreas Hamel and Birgit Rudloff).
- Non-zero-sum Stopping Games in Discrete Time.
- Non-zero-sum Stopping Games in Continuous Time.

PUBLICATIONS

- Optimal Relative Performance Criteria in Mean Field Contribution Games, to appear in **Mathematics of Operations Research**.
- Time-Inconsistency, Precommitment and Equilibrium Strategies for a Stackelberg Game, to appear in **SIAM Journal on Control and Optimization**.
- Stability of Time-inconsistent Stopping for One-dimensional Diffusion, (with Erhan Bayraktar and Zhenhua Wang), to appear in **SIAM Journal on Financial Mathematics**.
- Stability of Equilibria in Time-inconsistent Stopping Problems, (with Erhan Bayraktar and Zhenhua Wang), to appear in **SIAM Journal on Control and Optimization**.
- A Time-Inconsistent Dynkin Game: from Intra-personal to Inter-personal Equilibria, (with Yu-Jui Huang), **Finance and Stochastics**, Vol. 26, No. 2, pp 301-334, 2022.
- Singular Perturbation of Zero-Sum Linear-Quadratic Stochastic Differential Games, (with Beniamin Goldys and James Yang), **SIAM Journal on Control and Optimization**, 60(1), 48-80, 2022.
- Teamwise Mean Field Competitions, (with Xiang Yu and Yuchong Zhang), **Applied Mathematics and Optimization**, 84, pages 903-942, 2021.
- Optimal Bookmaking, (with Matt Lorig and Bin Zou), **European Journal of Operational Research**, Vol. 295, No. 7, pp. 560-574, 2021.
- Utility Maximization When Shorting American Options, **SIAM Journal on Financial Mathematics**, 12(1), 47-78, 2021.
- Equilibria Concepts for Time-Inconsistent Stopping Problems in Continuous Time, (with Erhan Bayraktar and Jingjie Zhang), **Mathematical Finance**, 31(1), 508-530, 2021.
- Strong and Weak Equilibria for Time-Inconsistent Stochastic Control in Continuous Time, (with Yu-Jui Huang), **Mathematics of Operations Research**, 46(2), pp 428-451, 2021.
- Transport Plans with Domain Constraints, (with Erhan Bayraktar and Xin Zhang), **Applied Mathematics and Optimization**, 84(1), 1131-1158, 2021.
- Optimal Equilibrium Barrier Strategies for Time-Inconsistent Dividend Problems in Discrete Time, (with Zhuo Jin), **Insurance: Mathematics and Economics**, Vol 94, 100-108, 2020.
- Optimal Equilibria for Time-Inconsistent Stopping Problems in Continuous Time, (with Yu-Jui Huang), **Mathematical Finance**, Vol. 30, No. 3, 1103-1134, 2020.
- Time Consistent Stopping for the Mean-Standard Deviation Problem — the Discrete Time Case, (with Erhan Bayraktar and Jingjie Zhang), **SIAM Journal on Financial Mathematics**, 10(3), 667-697, 2019.
- A Mathematical Analysis of Technical Analysis, (with Matt Lorig and Bin Zou), **Applied Mathematical Finance**, Vol. 26, No 1, pp. 38 - 69, 2019.
- No-arbitrage and Hedging with Liquid American Options, (with Erhan Bayraktar), **Mathematics of Operations Research**, 44 (2), 468-486, 2019.

- Optimal Equilibrium for Time-Inconsistent Stopping Problems — the Discrete-Time Case, (with Yu-Jui Huang), **SIAM Journal on Control and Optimization**, 57(1), 590-609, 2019.
- On Zero-sum Optimal Stopping Games, (with Erhan Bayraktar), **Applied Mathematics and Optimization**, 78 (3), 457-468, 2018.
- On Arbitrage and Duality under Model Uncertainty and Portfolio Constraints, (with Erhan Bayraktar), **Mathematical Finance**, Vol 27, No. 4, 988-1012, 2017.
- Super-hedging American Options with Semi-static Trading Strategies under Model Uncertainty, (with Erhan Bayraktar), **International Journal of Theoretical and Applied Finance**, 20 (6), 10 pages, 2017.
- Arbitrage, Hedging and Utility Maximization Using Semi-static Trading Strategies with American Options, (with Erhan Bayraktar), **Annals of Applied Probability**, Vol. 26, No. 6, 3531-3558, 2016.
- On an Optimal Stopping Problem of an Insider, (with Erhan Bayraktar), **Theory of Probability and Its Applications**, 61 (1), 181-186, 2016.
- On a Stopping Game in Continuous Time, (with Erhan Bayraktar), **Proceedings of the AMS**, 144 (8), 3589-3596, 2016.
- On Hedging American Options under Model Uncertainty, (with Erhan Bayraktar and Yu-Jui Huang), **SIAM Journal on Financial Mathematics**, 6(1), 425-447, 2015.
- A Note on the Fundamental Theorem of Asset Pricing under Model Uncertainty, (with Erhan Bayraktar and Yuchong Zhang), **Risks**, 2(4), 425-433, 2014.
- On Controller-stopper Problems with Jumps and Their Applications to Indifference Pricing of American Options, (with Erhan Bayraktar), **SIAM Journal on Financial Mathematics**, 5(1), 20-49, 2014.

Presentations

- HK/SG Joint Seminar in Financial Mathematics/Engineering (online), May 4, 2022.
- Seminar at the Department of Actuarial Studies and Business Analytics, Macquarie University, April 6, 2022.
- Invited speaker at the DKU-NUSRI Joint Workshop on Pure and Applied Mathematics (online), January 6-9, 2022.
- Stochastics and Finance Seminar, School of Mathematics and Statistics, University of Sydney (online), September 22, 2021.
- MAS Seminar Series, Nanyang Technological University (online), June 17, 2021.
- Seminar in Financial Mathematics, National University of Singapore (online), September 30, 2020.
- Invited speaker at the 2nd International Symposium on Partial Differential Equations & Stochastic Analysis in Mathematical Finance, January 6-10, 2020.
- AustMS Conference, Monash University, December 3-6, 2019.
- Centre of Financial Mathematics Seminar Series, University of Wollongong, November 13, 2019.
- Invited speaker at the 7th Asian Quantitative Finance Conference, July 2-5, 2019.
- Mini-symposium speaker at the SIAM Conference on Financial Mathematics and Engineering, June 4-7, 2019.
- School Seminar Series, School of Risk and Actuarial Studies, University of New South Wales, May 3, 2019.
- Stochastics and Finance Seminar, School of Mathematics and Statistics, University of Sydney, March 12 and 26, 2019.

- ANZIAM Conference, Nelson, New Zealand, February 3-7, 2019.
- The Quantitative Methods in Finance Conference, University of Technology Sydney, December 11-14, 2018.
- Centre of Financial Mathematics Seminar Series, University of Wollongong, April 19, 2018.
- Financial Mathematics Seminar, School of Mathematics and Statistics, University of Sydney, April 10, 2018.
- Actuarial Science Seminar, Department of Mathematics, University of Connecticut, October 17, 2017.
- Financial/Actuarial Mathematics Seminar, University of Michigan, October 4, 2017.
- Stochastics Seminar, University of Colorado Boulder, April 27, 2017.
- Probability Seminar, University of Minnesota, March 31, 2017.
- Department of Mathematics, Shanghai Jiao Tong University, February 16, 2017.
- School of Mathematics and Statistics, University of Sydney, February 1. 2017.
- Department of Mathematics, University of Kentucky, January 17, 2017.
- Invited speaker at the conference on Stochastic Analysis in Finance and Insurance, University of Michigan, June 6-10, 2016.
- MCFAM Seminar, School of Mathematics, University of Minnesota, April 8, 2016.
- Departmental Seminar Series, Department of Statistical Sciences, University of Toronto, February 11, 2016.
- Department Seminar, Department of Statistics and Actuarial Science, University of Waterloo, January 21, 2016.
- IMA Postdoc Seminar, University of Minnesota, December 14, 2015.
- AMS MRC workshop in Financial Mathematics, Snowbird Resort, Utah, June 14-20, 2015.
- Stochastic Portfolio Theory and related topics, Columbia University, May 8 and 9, 2015.
- Financial/Actuarial Mathematics Seminar, University of Michigan, April 1, 2015.
- Financial/Actuarial Mathematics Seminar, University of Michigan, December 10, 2014.
- Mini-symposium speaker at the SIAM Conference on Financial Mathematics and Engineering, November 13-15, 2014.
- Financial/Actuarial Mathematics Seminar, University of Michigan, March 26, 2014.
- Financial/Actuarial Mathematics Seminar, University of Michigan, January 29, 2014.
- Financial/Actuarial Mathematics Seminar, University of Michigan, December 10, 2012.

Students

PhD students

- Xiao Sa (in progress).
- Shidan Liu (Associate supervision. In progress)
- Huansang Xu (Associate supervision. In progress)
- James T.F. Yang (Co-supervision with Prof. Ben Goldys. Completed in July 2020. Now at Coolabah Capital Investments.)

MPhil by research students

- Ziyuan Wang (Completed in September 2022. Now PhD student at Northwestern University).

Honours students

- Ruizhe Xiao (in progress)
- Blake Nielson (2021-2022)
- Sirui Jiang (2020-2021)
- Kenneth Guo (2020)
- David Hyland (2020)

Teaching Experience

University of Sydney

Lecturer
- MATH4511 Arbitrage Pricing in Continuous Time, Semester 1, 2020-2022.
- FMAT3888 Projects in Financial Mathematics, Semester 2, 2019-2022.
- SCDL1991 Science Dalyell Showcase, Semester 2, 2018.
- MATH2070/2970 Optimisation and Financial Mathematics, Semester 2, 2018.
- MATH1014 Introduction to Linear Algebra, Semester 2, 2018, 2019.

Tutor
- MATH4511 Arbitrage Pricing in Continuous Time, Semester 1, 2020-2022.
- MATH1002 Linear Algebra, Semester 1, 2020.
- FMAT3888 Projects in Financial Mathematics, Semester 2, 2019, 2020, 2022.
- MATH2070/2970 Optimisation and Financial Mathematics, Semester 2, 2018.
- MATH1014 Introduction to Linear Algebra, Semester 2, 2018, 2019.
- MATH1021 Calculus of One Variable, Semester 1, 2018, 2019.

University of Minnesota

Lecturer
- Math 4997 Independent Study, Spring 2017.
- Math 5651 Basic Theory of Probability and Statistics, Fall 2016.

University of Michigan

Lecturer
- Math 526 Stochastic Processes, Fall 2017.
- Math 216 Calculus IV (lab and recitation), Fall 2014.
- Math 215 Calculus III (lab and recitation), Fall 2012.
- Math 115 Calculus I (primary instructor), Winter 2012.
- Math 105 Pre-calculus (primary instructor), Fall 2011.

Teaching assistant
- Math 623 Computational Finance, Fall 2013.

Tutor
- To answer various math questions from all levels of undergraduate students in the math tutoring lab, Fall 2010, Winter 2011.

Service

Organizer of conferences/workshops:

- NUS-USyd-NUSRI joint online workshop on Quantitative Finance and Stochastic Analysis, December 15-16, 2021.
- Special session in financial mathematics in the Australian Mathematical Society annual meeting, December 4-5, 2019.

Referee for journals:

Annals of Applied Probability, ANZIAM Journal, Applied Mathematical Finance, Applied Mathematics and Computation, Applied Mathematics and Optimization, Decisions in Economics and Finance, European Journal of Control, European Journal of Operational Research, Finance and Stochastics, Insurance: Mathematics and Economics, International Journal of Finance and Economics, International Journal of Theoretical and Applied Finance, Journal of Applied Probability, Journal of the Australian Mathematical Society, Mathematical Finance, Mathematical Methods of Operations Research, Mathematical Reviews, Mathematics of Operations Research, Operations Research Letters, Proceedings of IEEE Conference on Decision and Control, Quantitative Finance, SIAM Journal on Control and Optimization, SIAM Journal on Financial Mathematics, Stochastic Processes and their Applications.

COMPUTER SKILLS Matlab, C++, LaTeX, Maple, Microsoft Office