Yu-Jui Huang

Contact Information

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Research Areas

Mathematical finance, stochastic control, optimal stopping, mathematics of machine learning.

Employment

University of Colorado, Boulder, USA
Assistant Professor, Department of Applied Mathematics — **Aug. 2016 onward**

Dublin City University, Dublin, Ireland
Lecturer in Financial Math., School of Mathematical Sciences — **Sep. 2013-Aug. 2016**

Education

University of Michigan, Ann Arbor, USA (2008-2013)

Ph.D., Applied and Interdisciplinary Mathematics — **May 2013**

- **Advisor:** Prof. Erhan Bayraktar
- **Dissertation:** "Topics in Stochastic Control with Applications to Finance"

National Taiwan University, Taipei, Taiwan (2002-2007)

B.S., Mathematics — **June 2007**
B.B.A., Finance — **June 2007**

Grants

National Science Foundation, Division of Mathematical Sciences
Topics in Stochastic Control: Finance, Epidemics, and Machine Learning
DMS-2109002, PI, $273,374 — **2021-2024**

National Science Foundation, Division of Mathematical Sciences
Stochastic Games for Intergenerational Equity in Mathematical Finance
DMS-1715439, PI, $186,166 — **2017-2021**

Awards

2021 SIAM SIGEST Award
Awarded by Society for Industrial and Applied Mathematics (SIAM) for the article "American Student Loans: Repayment and Valuation" in SIAM Journal on Financial Mathematics.

2015 Bruti-Liberati Fellow
Quantitative Finance Research Centre, University of Technology Sydney

Submitted Papers

- Yu-Jui Huang and Li-Hsien Sun (2023)
  Partial Information Breeds Systemic Risk
- Erhan Bayraktar, Yu-Jui Huang, Zhenhua Wang, and Zhou Zhou (2023)
  Relaxed Equilibria for Time-Inconsistent Markov Decision Processes
- Yu-Jui Huang, Zhenhua Wang, and Zhou Zhou (2022)
  Convergence of Policy Improvement for Entropy-Regularized Stochastic Control Problems
- Arash Fahim, Yu-Jui Huang, and Saeed Khalili (2019)
  Generalized Duality for Model-Free Superhedging given Marginals

Publications

Journal articles:

- Joshua Aurand and Yu-Jui Huang (2023)
  Epstein-Zin Utility Maximization on a Random Horizon
  Mathematical Finance, Vol. 33, Issue 4, pp. 1370–1411.

- Yu-Jui Huang and Yuchong Zhang (2023)
  GANs as Gradient Flows that Converge
  Journal of Machine Learning Research, Vol. 24, No. 217, pp. 1–40.
- Paolo Guasoni and Yu-Jui Huang (2022)
  Minimizing the Repayment Cost of Federal Student Loans
  SIAM Review, Vol. 64, No. 3, pp. 689–709.
- Yu-Jui Huang and Zhou Zhou (2022)
  A Time-Inconsistent Dynkin Game: from Intra-personal to Inter-personal Equilibria
  Finance and Stochastics, Vol. 26, Issue 2, pp 301–334.
- Joshua Aurand and Yu-Jui Huang (2021)
  Mortality and Healthcare: A Stochastic Control Analysis under Epstein-Zin Preferences
  SIAM Journal on Control and Optimization, Vol. 59, No. 5, pp 4051–4080.
- Yu-Chih Huang, Yu-Jui Huang, and Shih-Chun Lin (2021)
  Asymptotic Optimality in Byzantine Distributed Quickest Change Detection
  IEEE Transactions on Information Theory, Vol. 67, No. 9, pp 5942–5962.
- Yu-Jui Huang and Xiang Yu (2021)
  Optimal Stopping under Model Ambiguity: A Time-Consistent Equilibrium Approach
  Mathematical Finance, Vol. 31, Issue 3, pp 979–1012.
- Yu-Jui Huang and Zhou Zhou (2021)
  Strong and Weak Equilibria for Time-Inconsistent Stochastic Control in Continuous Time
  Mathematics of Operations Research, Vol. 46, Issue 2, pp 428–451.
- Yu-Jui Huang and Zhenhua Wang (2021)
  Optimal Equilibria for Multi-Dimensional Time-Inconsistent Stopping Problems
  SIAM Journal on Control and Optimization, Vol. 59, No. 2, pp 1705–1729.
- Paolo Guasoni, Yu-Jui Huang, and Saeed Khalili (2021)
  American Student Loans: Repayment and Valuation
  SIAM Journal on Financial Mathematics, Vol. 12, No. 2, pp SC-16–SC-30.
- Yu-Jui Huang and Zhou Zhou (2020)
  Optimal Equilibria for Time-Inconsistent Stopping Problems in Continuous Time
  Mathematical Finance, Vol. 30, Issue 3, pp 1103–1134.
- Yu-Jui Huang, Adrien Nguyen-Huu, and Xunyu Zhou (2020)
  General Stopping Behaviors of Naïve and Non-Committed Sophisticated Agents, with Application to Probability Distortion
  Mathematical Finance, Vol. 30, Issue 1, pp 310–340.
- Paolo Guasoni and Yu-Jui Huang (2019)
  Consumption, Investment, and Healthcare with Aging
  Finance and Stochastics, Vol. 23, Issue 2, pp 313–358.
- Yu-Jui Huang and Saeed Khalili (2019)
  Optimal Consumption in the Stochastic Ramsey Problem without Boundedness Constraints
  SIAM Journal on Control and Optimization, Vol. 57, No. 2, pp 783–809.
- Yu-Jui Huang and Zhou Zhou (2019)
  The Optimal Equilibrium for Time-inconsistent Stopping Problems - the Discrete-Time Case
  SIAM Journal on Control and Optimization, Vol. 57, No. 1, pp 590–609.
- Yu-Jui Huang and Adrien Nguyen-Huu (2018)
  Time-consistent Stopping under Decreasing Impatience
  Finance and Stochastics, Vol. 22, Issue 1, pp 69–95.
- Xiaoshan Chen, Yu-Jui Huang, Qingshuo Song, and Chao Zhu (2017)
  The Stochastic Solution to a Cauchy Problem for Degenerate Parabolic Equations
  Journal of Mathematical Analysis and Applications, Vol. 451, Issue 1, pp 448–472.
- Arash Fahim and Yu-Jui Huang (2016)
  Model-independent Superhedging under Portfolio Constraints

Finance and Stochastics, Vol. 20, Issue 1, pp. 51–81.

- Erhan Bayraktar, Yu-Jui Huang, and Zhou Zhou (2015)
  On Hedging American Options under Model Uncertainty
  SIAM Journal on Financial Mathematics, Vol. 6, No. 1, pp. 425–447.
- Erhan Bayraktar and Yu-Jui Huang (2013)
  Robust Maximization of Asymptotic Growth under Covariance Uncertainty
  Annals of Applied Probability, Vol. 23, No. 5, pp. 1817–1840.
- Erhan Bayraktar and Yu-Jui Huang (2013)
  On the Multi-Dimensional Controller-and-Stopper Games
  SIAM Journal on Control and Optimization, Vol. 51, No. 2, pp. 1263–1297.
- Erhan Bayraktar, Yu-Jui Huang, and Qingshuo Song (2012)
  Outperforming the Market Portfolio with a Given Probability
  Annals of Applied Probability, Vol. 22, No. 4, pp. 1465–1494.

Conference articles:

- Yu-Jui Huang, Shih-Chun Lin, Yu-Chih Huang, Guan-Huei Lyu, Hsin-Hua Shen, and Wan-Yi Lin (2023)
  On Characterizing Optimal Wasserstein GAN Solutions for Non-Gaussian Data
  2023 IEEE International Symposium on Information Theory, pp. 909–914.
- Yu-Chih Huang, Shih-Chun Lin, and Yu-Jui Huang (2019)
  A Tight Converse to the Asymptotic Performance of Byzantine Distributed Sequential Change Detection
  2019 IEEE International Symposium on Information Theory, pp. 2404–2408.
- Yu-Jui Huang, Shih-Chun Lin, and Yu-Chih Huang (2019)
  On Byzantine Distributed Sequential Change Detection with Multiple Hypotheses
  2019 IEEE International Symposium on Information Theory, pp. 2209–2213.

Research Visits

University of Technology Sydney, Sydney, Australia
Quantitative Finance Research Centre — **December 2015**

City University of Hong Kong, Hong Kong, China
Department of Mathematics — **May-June 2013**

Invited Talks

- *SIAM Activity Group on FME Talk Series*
  Virtual seminar — **December 14, 2023**
- *Seminar at Graduate Institute of Communication Engineering*
  National Taiwan University — **August 7, 2023**
- *Probability Seminar*
  National Central University — **June 9, 2023**
- *Seminar at Graduate Institute of Statistics*
  National Central University — **June 6, 2023**
- *Mathematical Finance Colloquium*
  University of Southern California — **March 27, 2023**
- *Financial Mathematics Seminar*
  Florida State University — **February 23, 2023**
- *Seminar at Graduate Institute of Communication Engineering*
  National Taiwan University — **August 4, 2022**
- *Hong Kong-Singapore Joint Seminar in Financial Mathematics/Engineering*
  International online seminar — **July 21, 2022**
- *SIAM Annual Meeting*
  Pittsburgh, Pennsylvania — **July 13, 2022**

- *Mathematical Finance, Stochastic Analysis, and Machine Learning Seminar*
  Illinois Institute of Technology **April 5, 2022**
- *One World Optimal Stopping and Related Topics Seminar*
  Virtual seminar **December 8, 2021**
- *SIAM Annual Meeting*
  Virtual conference **July 23, 2021**
- *Stochastics and Finance Seminar*
  University of Sydney **May 27, 2021**
- *Control and Optimization Seminar*
  University of Connecticut **March 29, 2021**
- *AMS Spring Eastern Meeting*
  Virtual conference **March 20, 2021**
- *Financial/Actuarial Mathematics Seminar*
  University of Michigan **February 24, 2021**
- *Analysis Seminar*
  University of Oklahoma **November 16, 2020**
- *INFORMS Annual Meeting*
  Virtual conference **November 10, 2020**
- *SIAM Conference on Control and Its Applications*
  Chengdu, China **June 19, 2019**
- *SIAM Conference on Financial Mathematics and Engineering*
  Toronto, Canada **June 5, 2019**
- *Financial Mathematics Seminar*
  Dublin City University, Dublin, Ireland **January 29, 2019**
- *Systems Engineering and Engineering Management Seminar*
  The Chinese University of Hong Kong **January 14, 2019**
- *AIMS Conference on Dynamical Systems, Differential Equations and Applications*
  Taipei, Taiwan **July 6, 2018**
- *Symposium on Optimal Stopping — in Memory of Larry Shepp*
  Rice University **June 28, 2018**
- *Applied Mathematics Colloquium*
  The Hong Kong Polytechnic University **May 21, 2018**
- *Byrne Workshop on Stochastic Analysis in Finance and Insurance* (Plenary speaker)
  University of Michigan **May 9, 2018**
- *Mathematical Finance and Applied Probability Seminar*
  University of Connecticut **April 11, 2018**
- *Mathematical Finance and Probability Seminar*
  Rutgers University **March 20, 2018**
- *Probability Seminar*
  University of Colorado, Boulder **November 16, 2017**
- *Mathematical Finance Seminar*
  Columbia University **November 9, 2017**
- *Seminar on Financial Mathematics*
  National Center for Theoretical Sciences, Taipei, Taiwan **July 11, 2017**
- *Stochastic Analysis and Financial Mathematics Common*
  Worcester Polytechnic Institute **March 27, 2017**
- *SIAM Conference on Financial Mathematics and Engineering*
  Austin, Texas **November 19, 2016**
- *Mathematical Finance Colloquium*

University of Southern California **September 26, 2016**

- *Stochastics Seminar*
  National Central University, Taoyuan, Taiwan **June 3, 2016**
- *Probability Seminar*
  Academia Sinica, Taipei, Taiwan **May 30, 2016**
- *Mathematical Finance Seminar*
  Boston University **February 1, 2016**
- *Statistics Seminar*
  University of Toronto **January 28, 2016**
- *Special Mathematics Departmental Seminar*
  Rutgers University **January 26, 2016**
- *Nicola Bruti-Liberati Lecture*
  Quantitative Methods in Finance Conference (QMF), Sydney **December 18, 2015**
- *Special Applied Mathematics Departmental Seminar*
  University of Colorado at Boulder **December 1, 2015**
- *Nomura Seminar in Mathematical Finance*
  University of Oxford **June 4, 2015**
- *ORFE Colloquium*
  Princeton University **January 30, 2015**
- *Mathematics Colloquium*
  Florida State University **January 16, 2015**
- *Financial Mathematics Seminar*
  Florida State University **January 15, 2015**
- *Seminar on Probability and Statistics with Applications*
  National Chiao Tung University, Hsinchu, Taiwan **January 5, 2015**
- *One-Day Course in Financial Mathematics*
  National Tsing Hua University, Hsinchu, Taiwan **December 17, 2014**
- *Mathematical Finance Seminar*
  The Hebrew University of Jerusalem **May 26, 2014**
- *Joint Financial Mathematics and Risk Stochastics Seminar*
  London School of Economics **March 3, 2014**
- *Mathematics Colloquium*
  Dublin City University, Dublin, Ireland **October 24, 2013**
- *Probability Seminar*
  Academia Sinica, Taipei, Taiwan **June 27, 2013**
- *Mathematical Finance Seminar*
  University of Texas at Austin **April 12, 2013**
- *AMS Sectional Meeting (Special Session on Financial Mathematics)*
  Boston College, Chestnut Hill **April 7, 2013**
- *Probability and Statistics Seminar*
  Wayne State University, Detroit **March 20, 2013**
- *SIAM Conference on Financial Mathematics and Engineering*
  Minneapolis **July 9 & 10, 2012**
- *Financial and Actuarial Mathematics Seminar*
  University of Michigan **September 29, 2011**
- 7^{th} *International Congress on Industrial and Applied Mathematics (ICIAM)*
  Vancouver **July 21, 2011**

Contributed Talks

- *IEEE International Symposium on Information Theory (ISIT)*

Taipei, Taiwan **June 27, 2023**

- 9^{th} *World Congress of the Bachelier Finance Society*
  New York, USA **July 19, 2016**
- 8^{th} *World Congress of the Bachelier Finance Society*
  Brussels, Belgium **June 5, 2014**
- *AMS Sectional Meeting (Special Session on PDE and stochastic Analysis)*
  Temple University, Philadelphia **October 13, 2013**
- *Probability, Control and Finance, a conference in honor of Ioannis Karatzas*
  Columbia University **June 5, 2012**
- *Workshop on Stochastic Analysis in Finance and Insurance*
  University of Michigan **May 18, 2011**
- *Mathematical Finance and Partial Differential Equations Conference*
  Rutgers University **December 10, 2010**
- 6^{th} *World Congress of the Bachelier Finance Society*
  Toronto, Canada **June 23, 2010**

Students

University of Colorado

Ph.D. students (degree; current position):

- Zachariah Malik (Ph.D. student in Applied Math, defense expected Spring 2026).
- Joshua Aurand (Ph.D. in Applied Math, May 2020; Machine Learning Engineer–Robotics, Verus Research).
- Zhenhua Wang (Ph.D. in Math, May 2020; Postdoc, University of Michigan).
- Saeed Khalili (Ph.D. in Math, Dec. 2019; Assistant Professor of Math, Fort Lewis College).

Master's students (degree; current position):

- Dennis Krimer (MS in Applied Math, thesis defended January 2023).
- Li-Yin Young (Professional MS in Applied Math, May 2020; Software/AI Engineer, NOAA).

Undergraduate research students:

- Iker Acha on the project "Gradient Flow Approach for Generative Adversarial Networks"
  (Discovery Learning Apprenticeship Program) **August 2022-April 2023**
- Trevor McCord on the project "Merton's Problem with Human Capital Investment"
  (Discovery Learning Apprenticeship Program) **August 2016-April 2017**

Dublin City University

Internship students:

Monitored the progress of internship students in financial firms. Duties included communications/meetings with students and their supervisors, and on-site visits to the companies.

- Michael Flynn, Sean McCarthy, and Thomas Quinn
  @ Office of the Comptroller and Auditor General, Ireland **February-September 2016**
- Adelle Heskin
  @ AIG Asset Management **February-September 2015**
- Damian Murphy and Eoin Phelan
  @ SCOR Global Life Reinsurance Ireland **February-September 2015**
- Jenifer Black
  @ Hannover Re (Ireland) Limited **February-September 2014**

Service

Academia

Panelist:

- National Science Foundation, Division of Mathematical Sciences.

Associate Editor:

- Proceedings of 2018 IEEE Conference on Decision and Control (CDC 2018).

Organizer of conferences/symposiums:

- Organized the minisymposium "Advances in Stochastic Control with Financial Applications" in SIAM Annual Meeting (virtual, July 19-23, 2021).
- Organized the minisymposium "Advances in Stochastic Control and Machine Learning" in SIAM Conference on Financial Mathematics and Engineering (virtual, June 1-4, 2021).
- Organized the minisymposium "New Developments on Optimization under Time-inconsistency" in SIAM Conference on Financial Mathematics and Engineering (Toronto, July 4-7, 2019).
- Co-organized (with Chao Zhu) the special session "Recent Developments in Stochastic Analysis, Stochastic Control and Related Fields" in AIMS Conference on Dynamical Systems, Differential Equations and Applications (Taipei, Taiwan, July 5-9, 2018).
- Co-organized (with Adrien Nguyen-Huu) the minisymposium "Stochastic Control and Stopping under Time Inconsistency" in SIAM Conference on Financial Mathematics and Engineering (Austin, Texas, November 17-19, 2016).
- Co-organized (with Arash Fahim) the minisymposium "Robust Hedging and Pricing under Model Uncertainty" in SIAM Conference on Financial Mathematics and Engineering (Chicago, November 13-15, 2014).

Referee for peer-reviewed journals:

- Advances in Applied Probability
- Annals of Applied Probability
- Applied Mathematics and Optimization
- Finance and Stochastics
- Games and Economic Behavior
- Journal of Applied Probability
- Journal of Industrial and Management Optimization
- Journal of Mathematical Analysis and Applications
- Management Science
- Mathematical Finance
- Mathematics and Financial Economics
- Mathematics of Operations Research
- Methodology and Computing in Applied Probability
- Nonlinear Analysis: Hybrid Systems
- Operations Research Letters
- Probability, Uncertainty and Quantitative Risk
- SIAM Journal on Control and Optimization
- SIAM Journal on Financial Mathematics
- Stochastic Processes and their Applications

Referee for book series:

- Springer Finance

University of Colorado

Department of Applied Mathematics:

- Serving on Graduate Committee (August 2019-present)
- Served on Undergraduate Committee (August 2016-May 2019)
- Served on Probability/Statistics Preliminary Exam Committee (August 2023, August 2022, January 2022, August 2020, August 2019, August 2018, January 2017)
- Served on Applied Analysis Preliminary Exam Committee (August 2017)

Outreach

Boulder STEM Camp:

- Taught "Introduction to Machine Learning" to high school and middle school students (at Trail Ridge Middle School, Longmont, Colorado, on June 22, 2018).

STEM School Highlands Range:

- Enriched the middle school's science program by introducing how mathematics matters to finance and economics, and assisted a seventh-grade student to complete a project on mathematical finance and economics.

Teaching

University of Colorado Boulder

- APPM 6570 *Stochastic Differential Equations* (Spring 2021)
- APPM 6560 *Measure-Theoretic Probability* (Spring 2023, Spring 2022)
- APPM 4530/5530 *Stochastic Analysis for Finance* (Fall 2023, Fall 2022, Fall 2021, Fall 2020, Fall 2019, Fall 2018, Fall 2017)
- APPM 4120/5120 *Operations Research* (Spring 2023, Spring 2021, Spring 2017)
- APPM 3170 *Discrete Applied Mathematics* (Spring 2022, Spring 2020)
- APPM 1360 *Calculus II for Engineers* (Fall 2019, Spring 2017, Fall 2016)

Dublin City University

- *Probability and Finance I* (Fall 2015)
  A measure-theoretic probability course for graduate students, with common financial models introduced as applications.
- *Probability I* (Spring 2016, Spring 2015, Spring 2014)
  An introductory probability course for undergraduate students.
- *Data Analysis and Statistics* (Fall 2014)
  A statistics course for biological engineering students, with a focus on analyzing biological and medical data.
- *Statistics I* (Fall 2013)
  An introductory statistics course for undergraduate students.

University of Michigan

- *Integral Calculus* (Fall 2011, Winter 2010).
- *Differential Calculus* (Fall 2009, Winter 2009).
- *Pre-calculus* (Fall 2008).

Last Updated

December 14, 2023