CAI WU

+86 19916642244 ◇ caiwu@berkeley.edu, 20307110113@fudan.edu.cn ◇ vincentcaiwu.github.io

EDUCATION

Fudan University   *Sep 2020 - Jun 2024(expected)*

4th year undergraduate in Economics, minor in Financial Mathematics; GPA: 3.56/4

Selected courses: Mathematical Finance, Numerical Analysis and Numerical Linear Algebra, Time Series Analysis, Econometrics (Honor), Game Theory (Honor), Mathematical Economics, Investments

University of California, Berkeley   *Jan 2023 - May 2023*

Visiting student in BGA program; GPA: 3.92/4

Selected courses: Real Analysis, Stochastic Processes, Financial Engineering, Quantitative Finance Seminar

RESEARCH INTEREST

Domain	Financial Engineering, Stochastic Analysis, Quantitative Finance, Operations Research
Detailed	Option pricing, Market Microstructure, Algorithmic Trading, Stochastic Control and Games, Monte Carlo simulation

PUBLICATIONS AND PREPRINTS

1. Z. Cui, **C. Wu**, L. Zhu. Explicit solution to the economic index of riskiness. *Economics Letters*, Vol. 232, November 2023, 111343.

2. Z. Cui, **C. Wu**. An exact explicit solution to the adjustment coefficient in risk theory. Under review at *European Actuarial Journal*.

RESEARCH EXPERIENCE AND ONGOING PROJECTS

Valuation of VIX derivatives through combined Itô-Taylor expansion and Markov chain approximation

Undergraduate researcher advised by Prof. Zhenyu Cui   *Aug 2023 - Present*

- We propose an analytical method to valuate VIX derivatives under stochastic volatility models based on a closed-form approximation of VIX index through Itô-Taylor expansion and the subsequent continuous-time Markov chain approximation.
- The accuracy and efficiency of the proposed method is tested under several models comparing with benchmarks.

Variance optimality of empirical martingale simulation estimators

Undergraduate researcher advised by Prof. Zhenyu Cui   *July 2023 - Present*

- We rigorously provide theoretical foundations of the variance optimality of empirical martingale simulation (EMS) estimator introduced in Duan and Simonato (1998), which is an improvement of Monte Carlo estimator.
- The conditions under which the asymptotic variance of the EMS estimator is smaller than that of the standard Monte Carlo estimator are established, with specific cases where the EMS estimator is not effective in reducing the variance discussed.
- Implementations of numerical experiments to European option pricing for several models validate and enhance our theoretical findings.

Adding and subtracting Merton: A new approach for the optimal portfolio problem

Undergraduate researcher advised by Prof. Zhenyu Cui   *May 2023 - Present*

- We propose a diffusion-operator-integral-expansion-based method to solve optimal investment and consumption problems.
- We develop the closed-form correction terms and establishing the convergence and theoretical error bounds of the approximation.
- Numerical experiments under several stochastic models illustrate the accuracy and efficiency of the proposed method.

Offline simulation of portfolio default risk under stochastic volatility models   Fudan University

Undergraduate researcher advised by Prof. Yanxi Hou   *Nov 2022 - Present*

- We replicate numerical tests implemented in Jiang et al. (2020) to verify their proposed method.
- Variance reduction techniques are combined to the simulation as a modification to the perturbation method.
- Additional experiments under stochastic volatility models and portfolios with exotic derivatives included are ready to be implemented.

SKILLS

Coding Languages	Python, MATLAB, LaTeX
Natural Languages	Mandarin (native), Japanese (native), fluent English (TOEFL 108), basic French