

Bo Liu
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RESEARCH INTERESTS

High-Frequency Trading, Market Microstructure, Machine Learning in Finance, Financial Econometrics

EDUCATION

<i>PhD candidate</i> , Economics, University of Victoria	2019 - Now
MS, Computer Science, Georgia Institute of Technology	2017 - 2019
MS, Financial Engineering, New York University	2014 - 2016
BS, Mathematics, University of Oregon	2012 - 2014

WORKING PAPERS

- **“Speed bump and stock market quality: evidence from NYSE American”** with Ke Xu, 2022, Revise & Resubmit, Financial Management (Semifinalist of Best Paper, Financial Management Association Annual Meeting, Atlanta, Georgia, 2022)

Abstract: Should trading speed of high-frequency traders be regulated? Using the Trade and Quote data (TAQ) from the New York Stock Exchange (NYSE) American, this paper examines the impact of speed bump on market liquidity and price discovery measures. Our results indicate that the use of a speed bump can lower the costs of adverse selection and reduce informed trading. However, it also has a negative effect on price discovery, as trading activity slows down. The speed bump policy is a double-edged sword that improves liquidity but reduces the informativeness of prices.

- **“Price discovery and long-memory property: simulation and empirical evidence from the bitcoin market”** with Ke Xu, Yu-Lun Chen and Jian Chen, 2023, under review, Journal of Futures Markets

Abstract: Price discovery studies of a single asset traded in multiple markets have traditionally focused on assessing the relative price discovery contribution of each market. However, in this paper, we demonstrate that the overall price discovery across all markets can undergo changes even when the relative price discovery of each market remains constant. We propose that this overall change in price discovery can be effectively captured by the fractional parameter in the fractionally cointegrated vector autoregressive (FCVAR) model. In contrast, the widely used cointegrated vector autoregressive (CVAR) model fails to account for this dynamic in overall price discovery. Through a combination of simulation exercises and empirical applications, we show that the FCVAR approach outperforms the CVAR model not only in evaluating the relative price discovery contributions but, more importantly, in providing a comprehensive measurement of overall price discovery.

- **“Predict mini flash crashes from high-frequency data by machine learning”** with Ke Xu and Xingwei Zheng, 2023, first draft available

Abstract: Mini flash crashes have been a new risk in modern electronic trading markets and have attracted attention from academics, regulators, and market participants. Using the NYSE Trade and Quote database (TAQ), we develop machine learning techniques to estimate the probability of mini flash crashes. The forecast of a mini flash crash, just like the forecast of an earthquake, will not prevent it from happening but will help market participants to better control their positions and get ready for the event. We show evidence that mini flash crashes have reliable patterns when they are coming. Machine learning can show impressive performance on mini flash crashes forecasting. We also provide a list of microstructure signals that have predictability on mini flash crashes.

WORK-IN-PROGRESS

- **“Does speed bump resolve the problems of mini flash crashes? Evidence from NYSE American”**, Job market paper

Abstract: In recent times, mini flash crashes have emerged as a novel risk in modern electronic trading markets and have become a topic of interest for scholars, market participants, and regulators. The speed of trading is widely believed to be a crucial factor leading to these mini flash crashes. In this study, I utilize the NYSE Trade and Quote database (TAQ) to demonstrate that implementing a speed bump can effectively mitigate the risk of mini flash crashes. My analysis is based on the machine learning-based estimation of the probability of mini flash crashes in NYSE American. My findings provide empirical evidence the implementation of speed bumps may not a potential solution to reduce the risk of mini flash crashes in electronic trading markets.

- **“A point process model for dynamics of limit order book in fragmented markets”**

Abstract: The financial market is significantly fragmented in the U.S. and Europe. U.S. Securities and Exchange Commission (SEC) describes market fragmentation as a potential double-edged sword still worth some regulatory concerns. Using the NYSE Trade and Quote database (TAQ), I develop a multi-dimensional self-exciting point process that captures fragmented stock markets information routing between different exchanges’ limit order books. I propose a tractable parametrization of the model and perform the estimation of the model using high-frequency data. My findings show that the routing information from fragmented Best Bid and Offer (BBO) can provide extra predicting signal to the consolidated National BBO limit order book, which is an evidence of potential informed trading opportunity of high-frequency traders.

AWARDS AND GRANTS

<i>University of Victoria Graduate Award \$10,000, University of Victoria</i>	2022-2023
<i>University of Victoria PhD Student Travel Grant, MFS Annual Meeting, Paphos, Cyprus</i>	June, 2023
<i>AFA PhD Student Travel Grant, AFA Annual Meeting, New Orleans, Louisiana</i>	January, 2023
<i>Semifinalist of Best Paper, FMA Annual Meeting, Atlanta, Georgia</i>	October, 2022
<i>University of Victoria PhD Student Travel Grant, CEA Annual Meeting, Ottawa, Canada</i>	June, 2022
<i>University of Victoria Fellowship Doctoral \$10,000, University of Victoria</i>	2021-2022

<i>Henry Poulton Fund \$7,000, University of Victoria</i>	2021-2022
<i>Van Dusen Graduate Scholarships \$3,000, University of Victoria</i>	2021-2022
<i>Van Dusen Graduate Scholarships \$15,000, University of Victoria</i>	2020-2021
<i>University of Victoria Graduate Award \$5,000, University of Victoria</i>	2020-2021
<i>Van Dusen Graduate Scholarships \$29,500, University of Victoria</i>	2019-2020
<i>University of Victoria Graduate Award \$5000, University of Victoria</i>	2019-2020
<i>New York University Graduate Scholarship \$5000, New York University</i>	2014-2015

CONFERENCE PRESENTATIONS

<i>Annual Conference of Multinational Finance Society, Paphos, Cyprus</i>	July 2023
<i>Annual Conference of Canadian Economics Association, Winnipeg, Canada</i>	June 2023
<i>Annual Conference of Canadian Economics Association, Ottawa, Canada</i>	June 2022
<i>Annual Conference of Canadian Economics Association, Online, Vancouver, Canada</i>	June 2021
<i>Brown Bag Seminar, Department of Economics, University of Victoria, Victoria, Canada</i>	February 2021
<i>Brown Bag Seminar, Department of Economics, University of Victoria, Victoria, Canada</i>	October 2020

TEACHING EXPERIENCE

<i>Econ 305 Money and Banking (Undergraduate core), UVic</i> Instructor	Summer, 2023, Spring, 2024
<i>Econ 545 Econometric Analysis (Graduate core), UVic</i> Lab Instructor for Dr.Christopher Auld	Fall, 2021
<i>Econ 345 Applied Econometrics (Undergraduate), UVic</i> Lab Instructor for Dr.Alan Mehlenbacher, Dr.Martin Farnham, Brooklynn Trimble, Dr.Natasha Kang	Spring, 2021 - Summer, 2022
<i>Econ 350 Mathematical Economics I (Undergraduate), UVic</i> Lab Instructor for Dr.Alan Mehlenbacher, Dr.David Snooes	Fall, 2019 - Fall, 2020, Fall 2022
<i>Econ 305 Money and Banking (Undergraduate), UVic</i> Teaching Assistant for Dr.Eric Chi, Dr.Olha Yermolenko	Fall, 2022, Spring 2023
<i>Econ 454 Corporate Finance (Undergraduate), UVic</i> Teaching Assistant for Dr.Pascal Courty, Dr.Ke Xu	Spring, 2022, 2023
<i>Econ 435 Financial Economics (Undergraduate), UVic</i> Teaching Assistant for for Dr.Ke Xu	Fall 2019, 2021, Spring, 2020, 2022
<i>Econ 351 Mathematical Economics II (Undergraduate), UVic</i>	Spring, 2020

Teaching Assistant for Dr.Alok Kumar

Econ 203 Intermediate Microeconomics I (Undergraduate), UVic
Teaching Assistant for Betty J.Johnson

Spring, 2023

INDUSTRY EXPERIENCE

Assistant Risk Manager, American Express International, Hong Kong, China

2018 - 2019

Data Analytics Associate, PricewaterhouseCoopers, Jersey City, NJ, The USA

2017 - 2018

PROFESSIONAL AFFILIATIONS

Canadian Economics Association, Financial Management Association, Multinational Finance Society

PERSONAL INFORMATION

Nationality: People's Republic of China, Canada PR is being processed

Language: Mandarin (native), English (fluent)

Techniques: C++, MATLAB, Python, R, SQL, LaTeX, Bloomberg, Linux, Excel VBA, Spark, Hive

Certificate: Bloomberg Essential (FX Essential), Hadoop Platform and Application Framework (UC San Diego, Coursera)

REFERENCES

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