

Chengyu Zhang

🌐 zhang-chengyu.github.io | ✉ chengyu.zhang@mail.mcgill.ca | 📞 +1.579.421.6196

EDUCATION

McGill University, Montreal, Canada Sep 2017- Jun 2023 (Expected)
Ph.D. in Finance

McGill University, Montreal, Canada Jul 2016 - Aug 2017
Master of Management in Finance, Dean's Honour List

University of Toronto, Toronto, Canada Sep 2011 - Jun 2016
Honours Bachelor of Science with Distinction, Specialist (Co-op) in Statistics

RESEARCH INTERESTS

Empirical Asset Pricing, Machine Learning and Big Data, Financial Derivatives, Market Microstructure

JOB MARKET PAPER

Dynamic Optimal Portfolio with Trading Cost Constraints via Deep Reinforcement Learning
With Abdallah Aaraba (Department of Computer Science, University of Sherbrooke) ssrn.com/abstract=4221316

The advantages of dynamic trading-cost-aware portfolio optimization have been theoretically demonstrated in Gârleanu and Pedersen (2013) and Collin-Dufresne et al. (2020), however the empirical implementation at large scale remains challenging to this day. Empowered by the latest development in computer science, we adopt deep neural networks and reinforcement learning towards bottom-up portfolio construction where the agent has mean-variance preferences and trading is costly. Our model offers flexibility in terms of return/transaction cost dynamics, and allows explicit constraints on volatility and liquidity risks. Using a large set of stock characteristics and macroeconomic indicators, our model substantially outperforms existing benchmarks and other trading-cost-agnostic machine learning models in out-of-sample tests, while keeping the transaction costs and turnover at the admissible minimum from real investment perspective. Our results are not driven by extensive short-selling or leverage, and remain robust under various economic restrictions and market conditions. In addition, we identify stock and macroeconomic features that are most important in building an economically feasible portfolio with forward-looking insights.

Presented at: McGill University (scheduled)

RESEARCH

Long Horizon Multifactor Investing with Reinforcement Learning
With Ruslan Goyenko (McGill University) ssrn.com/abstract=4187056

We provide a novel approach for multi-factor investing with big data by a long term investor who takes into consideration long-term versus short-term volatility, liquidity and trading costs trade offs while maximizing expected portfolio returns. Reinforcement learning (RL), which is generally used to solve problems with long- versus short-term reward trade-offs, allows explicitly incorporating long, up to ten years, investment horizon considerations during training. In out-of-sample, RL portfolio of long term investors performs competitively vis-à-vis their short-term peers, and outperforms the latter due to lower portfolio rebalancing frequencies, turnover and trading costs. Importantly, it uses different, and more fundamental, economic signals compared to short-term strategies.

Presented at: McGill University, CREDIT 2022 Conference: Long Run Risks*, JP Morgan Asset Management Global Quant Council (invited, scheduled)*

Asset Pricing with Attention Guided Deep Learning
*With Philippe Chatigny (University of Sherbrooke) ssrn.com/abstract=3971876
and Ruslan Goyenko (McGill University)*

Deep learning methods, which can accommodate wide ranges of various stock characteristics to identify optimal investment portfolio or stochastic discount factor (SDF), have been criticised for extracting their superior performances from difficult to arbitrage stocks, high limits-to-arbitrage market conditions or extreme turnovers. We introduce *attention-guided* deep learning, which allows, in a data driven way, identifying the most influential time-varying firm characteristics contributing to SDF. The attention guided SDF outperforms existing models after excluding small and micro-cap stocks, avoids extreme portfolio weights, turnovers and unlike other models, its performance is not driven by specific market regimes.

Presented at: University of Manitoba, Yale School of Management*, 2022 INQUIRE Spring Residential Seminar*, 4th Future of Financial Information Conference, McGill University Centre for Intelligent Machines*, 2022 China International Conference in Finance**

The Joint Cross Section of Option and Stock Returns Predictability with Big Data and Machine Learning

With Ruslan Goyenko (McGill University)

Reject & Resubmit, Review of Finance

ssrn.com/abstract=3747238

Which market has leading informational advantage: stocks or options? Using large set of stock and option characteristics, and machine learning, we provide a comprehensive analysis of which characteristics are the first order importance predictors of option and stock returns. First, we find that option, rather than stock, characteristics are dominant predictors of option returns. Second, option, rather than stock, characteristics are also dominant predictors of stock returns. Consistent with the argument that an increase in trading activity in derivatives decreases information asymmetry about the underlying, option illiquidity is identified as the most important predictor of both stock and option returns.

Presented at: ITAM, 14th Financial Risks International Forum, Tilburg University*, Virtual Derivatives Workshop*, SoFiE Annual Conference**

Liquidity Guided Machine Learning: The Case of the Volatility Risk Premium

With Eric Ghysels (University of North Carolina at Chapel Hill)

ssrn.com/abstract=3726743

and Ruslan Goyenko (McGill University)

The financial industry has eagerly adopted machine learning algorithms to improve on traditional predictive models. In this paper we caution against blindly applying such techniques. We compare forecasting ability of machine learning methods in evaluating future payoffs on synthetic variance swaps. Standard machine learning methods tend to identify contracts which are illiquid, and hard to trade. The most successful strategies turn out to be those where we pair machine learning with institutional and market/traders inputs and insights. We show that liquidity guided pre-selection of inputs to machine learning results in trading strategies with improved pay-offs to the writers of variance swap contract replicating portfolio.

Demand Pressures and Option Returns

With Ruslan Goyenko (McGill University)

ssrn.com/abstract=3489347

Delta-hedged option and straddle returns of S&P500 Index and equity options computed using end-of-day (EOD) closing prices are always higher compared to those based on any other price of the day. The difference between these returns can easily reach more than 100 bps per day or week. Options end-users' demand pressures contribute to deviation of EOD prices from fundamental values. Computing returns using first half of the day prices, which are less distorted by demand pressures, helps explain several anomalies in the literature and establish identical volatility pricing across equity and index options.

Presented at: Canadian Derivatives Institute Conference, Virtual Derivatives Workshop**

(* indicates presentation by coauthor)

WORK IN PROGRESS

Intra-day Option Returns: a Tail of Two Momentum

With Zhi Da (University of Notre Dame) and Ruslan Goyenko (McGill University)

Deep Learning for Financial Statements: Reading between the Lines using AI

With Nicolas Chapados (ServiceNow), Zhenzhen Fan (University of Manitoba), Ruslan Goyenko (McGill University), Issam Hadj Laradji (ServiceNow), and Fred Liu (University of Guelph)

PROFESSIONAL SERVICES

Ad Hoc Referee

International Review of Financial Analysis

TEACHING EXPERIENCE

McGill University, Montreal, Canada Jul 2021 – Aug 2021

Instructor, FINE 444 Principles and Strategies of Securities Trading

– Developed syllabus, lectures, assessments, and instructional strategies

McGill University, Montreal, Canada Jul 2017 – Apr 2022

Teaching Assistant

– FINE 441 Investment Management, FINE 442 Capital Markets and Institutions, FINE 444 Principles and Strategies of Securities Trading, MGCR 651 Managing Resources, FINE 678 Financial Economics, FINE 680 Investments, FINE 690 Advanced Topics in Finance 1

– Held tutorials, office hours, and review sessions; graded assignments and exams

AI IN FINANCE INITIATIVE

Financial Innovations and Risk Management Labs, FIRM, Montreal, Canada May 2021 – Present

Senior Research Associate

firmlabs.ca/research/

INDUSTRY EXPERIENCE

Desautels Capital Management, Montreal, Canada Jul 2016 – May 2017

Quantitative Strategist

– Developed and back-tested quantitative strategies that were later used by a student-run equity fund to screen stocks for investment candidates

Analyst, Information Technology

– Presented an industry report on the Information Technology sector; conducted analyses on historical data, key trends, and multiples; and provided market outlook on the Semiconductors subsector to the members of the fund

– Performed quantitative screening and fundamental analyses, and formulated investment theses to initiate investment opportunities in the Semiconductor subsector

SCHOLARSHIPS, HONOURS, AND AWARDS

2017 - 2020 Graduate Excellence Award, McGill University

2020 PhD Program Award, McGill University

2018 National Bank Financial Group Fellowship, McGill University

2018 1st Place in Rotman International Trading Competition (RITC) MATLAB Volatility Trading Case

2017 Hian Siang Chan Fellowship, McGill University

2017 Dean's Honour List, Master of Management in Finance, McGill University

2016 MMF Graduate Award, McGill University

SKILLS

Language Skills Fluent English and Native Mandarin
Computer Skills Python, R, SAS, MATLAB, Java

REFERENCES

Ruslan Goyenko

Associate Professor of Finance
Desautels Faculty of Management
McGill University
ruslan.goyenko@mcgill.ca
+1 514-398-5692

Daniel Andrei

Associate Professor of Finance
Desautels Faculty of Management
McGill University
daniel.andrei@mcgill.ca
+1 514-398-5365

Zhi Da

Howard J. and Geraldine F. Korth
Chair in Finance
Professor of Finance
Mendoza College of Business
University of Notre Dame
zda@nd.edu
+1 574-631-0354