



Ph.D. Dissertation Defense

Candidate:	Zequn Li
Degree:	Doctor of Philosophy
School/Department.:	School of Business / Financial Engineering
Date:	Monday, April 28, 2025
Time:	2:00 – 4:00 pm
Location:	UCC 207
Title:	Interpreting Machine Learning Models in Empirical Asset Pricing
Chairperson:	Dr. Steve Yang, Financial Engineering, School of Business Dr. Ying Wu, Finance, School of Business
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Abstract

This dissertation investigates asset return predictability from both cross-sectional and time-series perspectives. It emphasizes machine learning methods to improve the economic significance of predictions. Traditional empirical approaches mainly rely on linear models and in-sample analysis. However, these methods often lack out-of-sample robustness and fail to capture complex interactions among predictors. This dissertation consists of three essays addressing these limitations.

The first two essays examine cross-sectional return predictability. The first essay applies machine learning models and explicitly explores how firm characteristics and their interactions influence expected returns using model-agnostic interpretation methods. Building on these findings, the second essay further investigates the moderation effects among characteristics. Interpretations from machine learning models improve the understanding of conditional marginal effects in return predictions. The economic value of these predictions is validated through out-of-sample portfolio analysis.

The third essay examines asset return predictability from a time-series perspective. It introduces a novel predictive modeling framework that integrates Transformer-based reinforcement learning. Unlike conventional two-step methods, this approach directly optimizes investment outcomes. Thus, this method addresses shortcomings associated with traditional prediction methods and further demonstrates machine learning's potential in generating economically meaningful predictions.

Overall, this dissertation provides insights into effectively leveraging machine learning methods to improve both cross-sectional and time-series asset return predictability. The findings demonstrate that robust predictions from machine learning models enable economically meaningful interpretations. These interpretations further enhance the practical application of predictions in investment strategies.