Advisor's Report on Dissertation Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University
Opletalova 26, 110 00 Praha 1, Czech Republic
Phone: +420 222 112 330, Fax: +420 222 112 304

Author:	**Martin Hronec**
Advisor:	Doc. PhDr. Jozef Baruník Ph.D. (IES)
Title of the Thesis:	Asset Pricing and Portfolio Selection via Machine Learning
Type of Defense:	**DEFENSE**
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Address the following questions in your report, please:

a) Can you recognize an original contribution of the author?
b) Is the thesis based on relevant references?
c) Is the thesis defendable at your home institution or another respected institution where you gave lectures?
d) Do the results of the thesis allow their publication in a respected economic journal?
e) Are there any additional major comments on what should be improved?
f) What is your overall assessment of the thesis? (a) I recommend the thesis for defense without substantial changes, (b) the thesis can be defended after revision indicated in my comments, (c) not-defendable in this form.

(Note: The report should be at least 2 pages long.)

This thesis consists of three research papers that make original contributions to the fields of asset pricing and portfolio selection. The central theme of the dissertation is the integration of big data, machine learning and modern quantitative techniques to address contemporary challenges in finance. Given the increasing availability and complexity of financial data, understanding how these technological advances impact decision making in financial markets is of paramount importance. The research conducted in this thesis is timely and provides novel insights into the use of machine learning methods to extract valuable information from large datasets. As such, the dissertation makes a significant contribution to the literature and offers potential applications with broad impact in both academia and industry.

The originality and relevance of the findings are reflected in the recognition the research has received within the academic community. The results presented in the thesis have been published or are under review in leading financial journals, with citations from prominent researchers in the field. In particular, the work has been recognised in top-tier journals such as the Journal of Financial Economics, underlining its academic significance and potential practical impact.

The first paper explores the application of machine learning techniques to the forecasting of global equity market returns. By constructing long-short portfolios based on machine learning-derived return forecasts, the study demonstrates significant profitability gains that have not been previously explored in the literature. Using an extensive dataset of anomalies and various machine learning techniques, the paper provides empirical evidence of out-of-sample performance improvements in international financial markets. The results contribute to the asset pricing literature by highlighting the predictive power of machine learning in return forecasting and portfolio optimization.

The second paper presents innovative methods for predicting the full distribution of stock returns using a large set of financial characteristics and explanatory variables. This advance is crucial for a wide range of financial applications, including asset pricing, risk management and portfolio selection. By employing a data-driven approach to learning return distributions, the study avoids restrictive parametric assumptions and allows for the modelling of heavy-tailed return distributions and complex non-linear interactions. The proposed methodology provides an essential tool for researchers and practitioners seeking to improve risk assessment and investment decision making.

The third paper investigates the dynamic portfolio allocation problem for an investor with quantile-based preferences, going beyond the traditional mean-variance framework. By proposing a numerical solution to this optimization problem, the study provides novel empirical insights into investor behaviour across quantiles. The out-of-sample results reveal heterogeneity in investment decisions and contribute to the growing literature on risk preferences and portfolio optimization. The findings have implications for both theoretical finance and practical asset management, offering new perspectives on portfolio selection under alternative risk considerations.

The dissertation makes a significant contribution to financial research by integrating machine learning and big data methods into asset pricing and portfolio selection. The studies presented in the thesis provide a comprehensive analysis of forecasting returns, modelling return distributions, and optimising portfolio choices under quantile preferences. These contributions advance our understanding of financial decision making and introduce novel methodologies with broad applicability.

The thesis is well executed, methodologically rigorous and presents results of significant general interest. Due to the originality, depth and impact of the research, the thesis is considered defensible at any prestigious international institution in its current form. The findings pave the way for future research in financial econometrics, risk assessment and data-driven investment strategies.

Date:	14.3.2025
Advisor's Signature	
Advisor's Affiliation	Doc. PhDr. Jozef Baruník Ph.D. (IES)