

## AI vs. HUMANS: WHO MAKES MORE RATIONAL JUDGEMENTS? COMPARING THE PERFORMANCE OF LARGE LANGUAGE MODELS AND HUMANS IN FINANCIAL FORECASTING

### STATEMENT OF RESEARCH PROJECT

Technology, particularly Large Language Models (LLMs), has profoundly impacted individual investors and the overall financial markets. Individual investors tend to seek information, advice, or predictions in their decision-making process. Generative AI, such as ChatGPT, has significantly altered the decision-making behavior of individual investors by providing information and personalized advice. However, there are certain limitations to these technological advances, such as cognitive and behavioral biases, for instance. LLMs are vulnerable to data and model assumptions, which can impact the effectiveness of LLMs in financial decision-making, resulting in potential biases or errors in their prediction decisions and judgments.

Recent studies of large language models have demonstrated cognitive bias in the model output. Although newer models have improved and reduced biases, a certain degree of biases still exists. The cognitive biases exhibited by LLMs while making decisions in simulated financial market scenarios need to be further tested under experiments, including analyzing the performance and reliance of LLMs in scenarios such as market forecasting, investment advice, investment decisions, and risk assessment. Meanwhile, comparing biases in LLMs with human cognitive biases and assessing how the LLMs could intervene in the decision-making processes effectively and improve overall outcomes in financial environments. For instance, models can exhibit biases from excessive reliance on specific data patterns, which might affect the quality of financial decisions. In a financial market context, being aware of the possible impact of generative AI in the financial decision-making process and improving it can increase market efficiency.

A range of strategies can be employed to optimize the application of LLMs in financial market decision-making in order to mitigate the impact of limited rationality, to improve judgements in financial decision makings, to curb excessive risk-taking, and to enhance decision quality in general. Prompting methods and persona setting are essential in optimizing generative AI performance and reliability. Additionally, it is crucial to evaluate the long-term implications and challenges associated with developing LLMs for financial markets to ensure that technological advancements effectively support market fairness and efficiency.

Despite the promising applications of LLMs in supporting decision-making in financial markets, the potential risks must be emphasized. Policy and regulatory frameworks for applying LLMs in economic decision-making also remain underexplored. The proposed research will reveal the impact of LLMs on decision quality across various economic contexts through laboratory experimental and empirical analyses. By investigating the intersection of the advances in generative AI and behavioral economics, the proposed research will assess the potential risks and policy guidance, bridge the gap in interdisciplinary research, and offer new directions and insights for future investigation. The research will also significantly contribute to the academic field and provide practical insights for policymakers and businesses.

### SCOPE OF WORK FOR SELECTED PHD STUDENT

#### 1. Completion Requirements:

To successfully complete the PhD, the student must fulfill several key milestones:

- (1) Qualifying Exams: Passing the required exams that demonstrate comprehensive knowledge in relevant fields.
- (2) Progress Reports: Submitting regular reports to track research progress.
- (3) GAP Hours: Completing 416 hours in the Graduate Assistantship Programme (GAP).

- (4) PhD Dissertation Defense: Successfully defending their dissertation before a committee.

## 2. Interdisciplinary Research:

The PhD student's work will focus on interdisciplinary research. Specific tasks include:

- (1) Literature Review: Reviewing existing research across relevant disciplines to identify gaps and inform the direction of the student's research.
- (2) Data Collection & Analysis: The student will gather data through experimental simulations and use advanced statistical tools such as Stata for data analysis. The oTree platform will be used for programming and constructing experiments that simulate market behavior.
- (3) Programming: The student will write and refine code using oTree to design and implement experimental simulations, allowing for precise control of variables and real-time data collection. This data will be analyzed with software like Stata to draw meaningful conclusions.
- (4) Model Development: Developing both theoretical and empirical models to address key research questions.
- (5) Co-Authoring Papers: Writing research articles for submission to academic journals, contributing to the existing body of knowledge on algorithmic trading and market behavior.

## 3. Graduate Assistantship Programme (GAP):

The student will complete 416 hours of assistantship duties, which will provide valuable professional development and experience. These hours will be allocated as follows:

- (1) Teaching & Laboratory Supervision (up to 100% of GAP hours): Assisting faculty with teaching duties, supervising lab work, or helping to run experiments.
- (2) Research Assistance (up to 60% of GAP hours): Supporting ongoing research projects that are outside the scope of the student's primary research, contributing to collaborative efforts across the department.
- (3) Developmental Assignments (up to 20% of GAP hours): Engaging in tasks that support the student's academic and professional growth, such as attending workshops, seminars, or completing specialized training.

## 4. Collaboration & Coursework:

The PhD student will collaborate with faculty across various disciplines, combining insights from finance, economics, and data science to create innovative research. The student will also be required to complete interdisciplinary coursework to ensure a well-rounded academic foundation. In addition, the student will present research findings at academic conferences, fostering connections with other researchers and receiving feedback to refine their work.