**SCIENTIFIC ADVISOR’S REFERENCE**

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| **Program:** | Master in Corporate Finance Program |
| **Student:** | Ensa Haskasa |
| **Title of thesis:** | ARE MARKETS SO DIFFERENT? FORECASTING MARKETS' RETURN WITH LSTM MODEL AND OPTIMIZATIONS |

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| **Justification of the topic choice. Accuracy in defining the aim and objectives of the thesis.** Justification of the topic choice; accuracy in defining the aim and tasks of the thesis; originality of the topic and the extent to which it was covered; alignment of the thesis’ topic, aim and objectives. |
| The topic is very relevant and comprehensively explained. The growing importance of machine learning techniques in finance supports the relevance of this topic, as these techniques can enhance market forecasting and decision-making processes. The aim and objectives are well-explained and clearly defined |
| **Structure and logic of the text flow.** Logic of research; full scope of the thesis; alignment of thesis’ structural parts, i.e. theoretical and empirical parts. |
| The thesis is well-structured, with a logical flow throughout all sections. This logical structure enhances the readability and comprehensibility of the thesis. |
| **Quality of analytical approach and quality of offered solution to the research objectives.** Adequacy of objectives coverage; ability to formulate and convey the research problem; ability to offer options for its solution; application of the latest trends in relevant research are for the set objectives. |
| The analytical approach of the thesis is robust, employing various techniques to optimize LSTM model parameters and enhance predictive accuracy. The solutions to the research objectives are appropriate. The candidate, however, forgot to explain that the Random Walk theory is a part of market efficiency, which is why it supports the RW theory. |
| **Quality of data gathering and description.** Quality of selecting research tools and methods; data validity adequacy; adequacy of used data for chosen research tools and methods; completeness and relevance of the list of references. |
| The thesis employs appropriate data preprocessing techniques, ensuring data quality and suitability for the chosen forecasting methods. The selection of research tools and methods is well justified, and the list of references is relevant and comprehensive. However, the thesis could benefit from including several more references, discussing them in the study, and linking them to the findings. |
| **Scientific aspect of the thesis.** Independent scientific thinking in solving the set problem/objectives; the extent to which the student contributed to selecting and justifying the research model (conceptual and/or quantitative), developing methodology/approach to set objectives. |
| Ensa has contributed significantly to selecting and justifying the research model, developing the methodology, and comprehensively addressing the research objectives. |
| **Practical/applied nature of research.** Extent to which the theoretical background is related to the international or Russian managerial practice; development of applied recommendations; justification and interpretation of the empirical/applied results. |
| The thesis results are well-justified and interpreted, offering practical guidance for investors and policymakers. |
| **Quality of thesis layout.** Layout fulfils the requirements of the Regulations for master thesis preparation and defence, correct layout of tables, figures, references. |
| The layout fulfills the requirements of the Regulations for master thesis preparation and defense. However, the overall presentation could be improved. Such studies are rich in exhibits showing different trends, but not bar exhibits. Additionally, I recommended that the candidate exclude codes from the main body of the text and present them in the Appendix; however, the codes remain in the main text. Figure 7 should be a table. Figure 2 is excellent and explains the entire work. ADF results should be presented in table format (Figure 8). |
| **Originality of the text.** All sources of match identified by the Safe Assign system follow the allowed cases, the paper does not contain any elements of plagiarism. |
| The paper does not contain any elements of plagiarism. Originality is 96.8%. |

The Master thesis of **Ensa Haskasa** meets the requirements for master thesis of MCF program thus the author of the thesis can be awarded the required degree.

Date: June 03, 2024

Scientific Advisor: Dr. Darko Vuković