

OPINION

by

Prof. Miglena Nikolaeva Koleva, DSc
University of Ruse “Angel Kanchev”

on

dissertation „Modeling and research of foreign exchange financial markets”
of Ivaylo Vladimirov Boyoukliev,

for awarding the educational and scientific degree “Doctor”

in the doctoral program „Mathematical Modeling and Application of
Mathematics ”

in professional field 4.5 “Mathematics”, Area of Higher Education 4. Natural
Sciences, Mathematics and Informatics

This opinion is prepared according to the order No RD-21-238 from 29.01.2024 of the Rector of the Paisii Hilendarski University of Plovdiv, by which I was elected as a member of the scientific jury and according to the decision of the first meeting of the jury held on 31.01.2024 – 01.02.2024 to prepare an opinion.

1. Description of the presented materials

As a member of the scientific jury, I received the following documents: curriculum vitae, Dissertation, Abstract of the dissertation in Bulgarian and English languages, list of dissertation publications, copies of the dissertation publications, information about the implementation of the minimum requirements of University of Plovdiv, Declaration of originality, information about participation in projects.

The submitted documents are in accordance with Law for Development of Academic Staff in Republic of Bulgaria (LDASRB), the Regulations for the Application of LDASRB and the rules and conditions and specific requirements of Paisii Hilendarski University of Plovdiv for acquisition scientific degrees and competitions for academic positions occupation.

2. Relevance of the problem developed in the PhD thesis

The dissertation is devoted to the development and application of machine learning methods for statistical modeling and data analysis in the applied area of currency and financial markets. The analysis and adequate forecasting of financial and foreign exchange markets, as well as the determination of the factors influencing the forecasting process, are important for all participants in the financial markets, when managing the liquidity of their funds.

3. Level of the knowledge of the state of the problem

The dissertation presents an overview of known results related to the research topic, as well as the main methods for solving the problems. The aims and objectives are clearly formulated. The bibliography of the dissertation includes 135 titles.

The PhD student is well acquainted with the state and the results obtained in the specialized scientific literature

4. General description of the dissertation and scientific contributions

The dissertation is in a volume of 160 pages, contains 68 Figures and 46 Tables. The structure includes an Introduction, 4 chapters, Conclusion, approbation of the results, a list of publications included in the dissertation and Bibliography. The abstract both in Bulgarian and English includes 32 pages and completely corresponds to the content of the dissertation.

Briefly, the main scientific and applied-scientific contributions of the dissertation are:

- Statistical modeling of univariate and multivariate time series in the field of currency and financial markets;
- Application and study of the CART Ensembles and Bagging (EBag) ensemble method in order to build and analyze predictive models of one-dimensional time series for foreign currency deposits of Bulgarian citizens;
- Implementation and investigation of the Arcing ensemble method of the gradient amplification class, in order to construct and analyze multivariate time series forecasting models for the EUR/USD exchange rate;
- Development and implementation of an approach for hybrid Arcing-ARIMA modeling of data for deposits of Bulgarian citizens with transformed and untransformed data.

I have not found plagiarism

5. Publications on the dissertation

Ivaylo Boyouklev presented a list of 4 publications included in the dissertation. One paper is with IF 1.2 (Q3) and one is with SJR rank. All publications are co-authored with the supervisors.

The results of the dissertation have been reported at 5 seminars and conferences, one of them in Germany.

The credits in group of indicators "G" are 93 and many times exceed the required 30 credits according to the Minimum National Requirements under LDASRB, the Regulations for the Application of LDASRB for obtaining educational and scientific degree "Doctor" in professional field 4.5 Mathematics.

6. Conclusions

The presented dissertation corresponds to all criteria and indicators for acquiring the educational and scientific degree "Doctor", according to the Law for development of the academic staff in the Republic of Bulgaria, the Rules of Paisii Hilendarski University of Plovdiv for application of LDASRB.

Due to the above, I give my positive assessment of the conducted research, presented by the dissertation work, summary, achieved results and contributions, and I strongly recommend to the scientific jury to award educational and scientific degree "Doctor" (PhD) to Ivaylo Vladimirov Boyouklev, in the Area of Higher Education 4. Natural sciences, Mathematics and Informatics; Professional Field 4.5. Mathematics; Doctoral Program "Mathematical Modeling and Application of Mathematics".

11.03.2024

Opinion author:.....

/Prof. Miglena Koleva, DSc/