National Research University Higher School of Economics
International College of Economics and Finance

SUPERVISOR'S REPORT
On Bachelor Diploma Paper

ICEF Student's name Alexey Vetrov
Supervisor Victor Lapshin
(name, academic degree, academic rank)

Topic Analysis of Informational Efficiency of Russian Bond Market Via Conventional Models and Neural Networks

The paper compares conventional ARIMA(X)-GARCH models with relatively modern LSTM neural networks in the task of predicting the spread between various Russian bond indices and the RUONIA rate serving as a proxy for the risk-free rate. Ties to the efficient market hypothesis provide the necessary flavour of a scientific work to an otherwise applied paper.

Alexey worked completely independently. We discussed the problem in some detail in the beginning – and then he returned with an almost completed paper and several minor questions. I should also say that the research question was Alexey's idea at first. All I did was to help shape it into something suitable for an ICEF BSc diploma paper.

Literature review is adequate in justifying the chosen research question but could provide a better overview perspective.

The technical side of the analysis is great as far as I can judge. The paper clearly demonstrates that Alexey's got the skills and the knowledge expected at the bachelor level at ICEF. I should explicitly mention that I didn't have to push for all the statistical tests, which are usually omitted in similar ICEF papers. It was to my pleasure to discover that Alexey was completely aware what level of scientific argument was considered adequate in this field.

The last part with the variance ratio test appears kind of out of the blue. I'm not sure how it's related to the previous text.

The conclusion is a bit unclear. I would summarize the findings as follows:

- Recurrent neural networks are not needed to predict Russian bond index spreads. Popular exogeneous regressors don't help either. One is better off with a usual ARIMA-GARCH model.
- However, ARIMA-GARCH beats the random-walk model, so at the end at least some degree of sophistication doesn't hurt.

I like the paper very much. It has all the potential to develop into something more interesting and substantial. According to the ICEF guidelines, I recommend the grade of '**Excellent (8-9)**'.

Date: 16.06.2019

Supervisor's name — Signature

Victor Lapshin