Report on **Bachelor / Master Thesis**

Institute of Economic Studies, Faculty of Social Sciences, Charles University

Student:	**František Vlach**
Advisor:	**Mgr. Luboš Hanus, Ph.D.**
Title of the thesis:	**Comparison of GARCH models forecasting performance with respect to Value at risk**

OVERALL ASSESSMENT *(provided in English, Czech, or Slovak):*

Please provide a short summary of the thesis, your assessment of each of the four key categories, and an overall evaluation and suggested questions for the discussion. The minimum length of the report is 300 words.

Short summary

The author focuses on the estimation and subsequent forecasting of VaR. He uses both daily (GARCH models) and high frequency data. Models for HF data are based on realised volatility class of non-parametric measures. These measures are then used in the HAR family of models. This is a standard form of forecasting exercise where students can demonstrate their understanding of the models used and their ability to interpret the results. As such, the work does not bring any original contribution, but it is not a main objective of the bachelor thesis.

However, I see that there are some problems with a perfect understanding of the methods used in the thesis. The author probably uses standard library functions for estimation and forecasting, but still there are many serious errors in the description of the theory. For example, on page 14 the author describes the GARCH model, but in the text there is an AR(1) GARCH model. The epsilon (innovation process) is not mentioned at all. Furthermore, the description of the ARMA(1,1)-GARCH(1,1) model on page 32 is incorrect and the author also uses different variable names (h and sigma).

Another problem that lowers a manuscript's score is high similarity to other texts. The Turnitin analysis shows a fairly high degree of similarity. Fortunately, this is not a copy-paste case, but the similarity is still high.

Contribution

The contribution is not original, but is acceptable for the bachelor thesis.

Methods

The author uses standard methods for volatility modeling. However, we cannot be sure if they are used correctly, beuase in many cases the methods are wrongly defined.

Literature

The author uses relevant literature. Sometimes he cites corectly, but there is a strong similarity with other uncited texts.

Manuscript form

The form of the manuscript is weak. There are parts that have a high degree of similarity with other texts. There are also many errors in the definitions of models. The author describes models that he does not use. In addition, the manuscript is difficult to read and in some parts is rather chaotic.

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Overall evaluation and suggested questions for the discussion during the defense

To conclude, the author presents a thesis that has several serious problems. On the other hand, it was clearly a lot of work to complete the thesis. However, the thesis needs more work to be done properly. In my opinion, the thesis fulfils the requirements for a bachelor thesis at the IES, Faculty of Social Sciences, Charles University, I recommend it for defence and suggest a grade E in (all) my questions are addressed. Unfortunately, the Turnitin analysis shows significant text similarity with other available sources, so I recommend that the committee pay special attention to this fact.

Questions for the defence:

1) What is the motivation for using ARMA(1,1) in the GARCH model? What are the potential problems of over-fitting the first moment?

2) In Table 3.2. we see that in all (!) cases the HAR-RSRK model performs better on the rolling window than on the expanding window. Has the author checked for the problem of non-convergence or other problems?

3) What is the motivation for using the discrete returns (page 29)?

SUMMARY OF POINTS AWARDED *(for details, see below):*

CATEGORY		**POINTS**
Contribution	*(max. 30 points)*	20
Methods	*(max. 30 points)*	20
Literature	*(max. 20 points)*	10
Manuscript Form	*(max. 20 points)*	10
TOTAL POINTS	*(max. 100 points)*	**60**
GRADE	**(A – B – C – D – E – F)**	**E**

NAME OF THE REFEREE: Mgr. Lukáš Vácha, PhD.

DATE OF EVALUATION: 27.8.2024

Digitálně podepsáno
Lukáš Vácha

Referee Signature

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EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Overall grading:

TOTAL	**GRADE**
91 – 100	**A**
81 - 90	**B**
71 - 80	**C**
61 – 70	**D**
51 – 60	**E**
0 – 50	**F**