Evaluation report for habilitation thesis of Peter Molnar:

Volatility modeling and forecasting:
utilization of realized volatility, implied volatility and the highest and lowest price of the day.

Habilitation thesis of Peter Molnar consists of an introduction and 6 published articles. Structure of the thesis is appropriate.

The introduction provides a brief summary of volatility modelling, with focus on alternatives to traditional volatility models based on daily returns: realized volatility, implied volatility, and highest and lowest price of the day. This introduction serves two purposes: 1) it is a unifying introduction to enclosed articles, and 2) it explains that six enclosed articles are just small part of Molnar's contribution to volatility modelling, as he published at least 10 other papers within this field, see references in his habilitation thesis.

The first three papers can be considered as theoretical / methodological. The first paper studies properties of volatility estimators based on daily high-low range, and explains strengths and weaknesses of these estimators. Second paper builds upon the first paper. It uses high-low range for improving the univariate GARCH model. The third paper shows that the same idea can also be applied to the dynamic conditional correlation GARCH model.

Next three papers are applied research papers based on the methodology of the first three papers. The fourth paper examines the impact of announcements of central banks on the volatility of stock markets in G7 countries. In this paper, utilization of realized and implied volatilities allows to answer the research question more precisely than those done with model based on daily data. The fifth paper studies the volatility forecasting for crude oil and natural gas can be improved by utilizing information from the other commodity by averaging forecasts from various models. The last article studies the co-movement between stock market volatility and oil market volatility, conveniently utilizing implied volatility and volatility estimator based on high-low range.

The habilitation thesis is at a high level. It clearly reflects the scientific research of Molnar in the field of volatility modelling. Each of his papers produces new knowledge. The thesis is balanced, it has both theoretical parts where Molnar suggests new models, and applied parts where existing methods are used to answer economic questions.

I consider utilization of estimators based on open, high, low and close prices as the main contribution of this thesis, and of Molnar's contribution to the field of volatility modelling. The reason is that even though these prices are easily available, people often utilized closing prices only. Therefore, publishing new models and applications of these estimators in scientific journals help other researchers to become familiar with this valuable data source.

When I think about what could be improved in this habilitation thesis, I see two issues: introduction and references. Introduction is relatively short, and it focuses on Molnar's own work. It could be more comprehensive, and discuss more contributions of other authors. However, each of the six included papers has separate introduction with references to other authors, and therefore I still consider this introduction is sufficient.

In references, some of the words that should start with capital letters, do not, e.g. "Forecasting exchange rate volatility: The case of the czech republic, hungary and poland." However, I believe that this happened by references being automatically generated.

Summary:

Altogether, my evaluation of this habilitation thesis is positive. I recommend Peter Molnar for the formal defense of his habilitation, and, if he successfully pass the defense, I recommend awarding him the title associate professor (docent).

Question(s) for discussion:

There are some questions in the following:

I believe that using daily high and low prices to estimate and forecast volatility would be more precise than merely using daily close price. First, because high-frequency data is much more available nowadays, how do you think the volatility forecasting ability between the model based on realized volatility and the GARCH model with daily range volatility? Second, based on the model proposed in "High-low range in GARCH models of stock return volatility, how can we make multi-period, contrasted to the one-step-ahead, forecasting in the GARCH context?

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August 15, 2020

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