MUNI

Annex No. 10 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University	
Applicant	Ing. Tomáš Plíhal, Ph.D.
Habilitation thesis	Essays on Volatility Modeling: The Effect of Expected and Unexpected Events
Reviewer	Prof. Ing. Evžen Kočenda, Ph.D., DSc
Reviewer's home unit, institution	Charles University, Institute of Economic Studies

The habilitation thesis consists of six previously published papers in the field of volatility modelling and forecasting. The individual papers are described in Chapters 2 – 4, and they are supplemented with an informative Introduction and a brief review of volatility models (Chapter 1). Last section provides concise conclusions. The text is logically organized, informative and summarizes the key points well. Some minor imperfections in sentence structure do not present any problem.

The individual papers were already published in academic journals. As such, they went through individual refereeing processes. For that, I am not going to scrutinize their details in large extent. Rather, in my following account, I will present some issues that are both related to an assessment of individual papers, and they can also serve as potential source for questions during the habilitation defence.

In Chapter 1, the author states that "one of the stylized facts of financial time series is so-called time-varying volatility clustering" that points at "observable periods of high volatility followed by periods of low volatility and vice versa." This is a key feature that merits a slightly more elaboration. Plus, a missing reference to classical work of Mandelbrot (1963) is a must.

The heterogenous autoregressive (HAR) model is used frequently throughout the habilitation thesis, for the fist time in subchapter 2.1. The dominating reliance on this specific method slightly reduces possibilities of alternative assessments. On the other hand, the HAR is often modified to serve better empirical needs. These empirically motivated extensions are well justified, and relevant reasoning is supplied. Still, it would be good to provide some theoretical basis of the HAR extensions to place them on more solid ground.

In subchapter 3.1, quite demanding effort is made to collect the data needed for assessment of the central bank announcements. An analysis itself is performed within a standard time-series framework. An alternative approach would be to perform an event study that would most likely deliver results that could be better linked to specific events and dates. Low statistical significance that is also reported, might be because a standard time-series approach is unable to capture individual impacts related to specific central bank announcements. Again, an even study might represent a better choice for such assessment.

In subchapter 3.2, effect of macroeconomic news on the bitcoin volatility is analyzed. The paper is well executed with ample empirical literature motivating the analysis. Still, it would be nice to provide some relevant theoretical background that would improve the motivation and increase the value added of the paper as well. As of now, the paper seems to be quite data-

driven. Further, on p. 38, it is stated that "macroeconomic news announcements are represented by dummy variables that indicate the date of the announcement". This is not an ideal solution because it does not fully exploit the information content of the news. By not using the values of the specific news, it is not possible to calculate the surprise impact of the news over their expectations. As such, it is not possible to assess the reaction with respect to the extent of the surprise. Finally, it is also stated that the focus is "only on the news related to the US economy because the exchange rate for bitcoin is usually quoted against the US dollar." This approach is understandable, but one should keep in mind that exchange rate quotes against the US dollar reflect the general economic development in the US. The quotes against the US dollar potentially reflect also important news whose impact might be limited due to such arrangement.

In subchapter 4.1, volatility dynamics and its reactions are characterized by complicated patterns. The covid period is a very non-standard and chaotic one. As such any results should be taken with a grain of salt, or they might even be considered as questionable. The period is obviously not fault of the author. Still, it might be worth to discuss this issue in more detail.

In subchapter 4.2, it is claimed that "intraday investors' expectations drive intraday realized price fluctuations". The statement seems quite strong given the fact that no causality testing was performed. Estimation is performed sensibly, and limited length of the data is correctly acknowledged. Testing for the presence of serial dependence in residuals is aptly performed; this is very good as this step is often overlooked in many empirical studies. Still, testing for iid residuals in high-frequency data might call for more reliable testing procedure(s).

The habilitation thesis consisting of six previously published papers in the field of volatility modelling and forecasting. It represents a solid piece of empirical work on a clearly stated topic. The individual papers underwent a refereeing process, and my comments should be taken as suggestions relevant for discussion during the habilitation defence as well as for the future research. My overall assessment of the habilitation thesis is positive, and I have no major concerns with respect to its defence.

Reviewer's questions for the habilitation thesis defence: Questions are integrated into my thesis assessment above. They are not in a form of specific questions. Rather, they are nested in specific issues that might be commented on or explained during the defence.

Conclusion

The habilitation thesis entitled *Essays on Volatility Modeling: The Effect of Expected and Unexpected Events* by Ing. Tomáš Plíhal, Ph.D. **fulfils** requirements expected of a habilitation thesis in the field of Finance.

Date: 20.12.2022   Signature