Opponent’s Report on Dissertation Thesis

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Title of the Thesis: Applications of modern spectral tools in financial econometrics.
Type of Defense: DEFENSE
Date of Pre-Defense: May 17, 2017
Opponent Prof. Jan Hanousek

Address the following questions in your report, please:

a) Can you recognize an original contribution of the author?
b) Is the thesis based on relevant references?
c) Do the results of the thesis allow their publication in a respected economic journal?
d) Are there any additional major comments on what should be improved?
e) Were the comments raised at the pre-defense, addressed in the dissertation submitted to the regular defense?
f) What is your overall assessment of the thesis? (a) I recommend the thesis to be defended without major changes; (b) The thesis is not defendable.

(Note: The report should be at least 2 pages long.)

Content of the Report:

The thesis reflects common trends in one of the main streams of the (high-frequency) time series econometrics. Using spectral analysis become widely used tools in analysis of financial market data, in particular of those in high frequency domain. As it standard, the author mostly concentrates on issues related to the realized volatility, where he applies the extension of proposed spectral analysis.

His approach builds on a belief that agents in the markets obtain information on various time horizons and hence, agents should form their expectations accordingly in a synthetic way. As the result, the overall volatility process is nothing but a mixture of a wide spectrum of specific processes representing specific frequencies and time horizons. Basically, the core of the approach introduced and applied in the thesis is based on a nice idea of combination of several time horizons or/and time frequencies.
One can follow author’s logic and agree that it could bring quite different view on any time-series process when it is studied on different frequencies or/and if the modelling aim to capture (several) different time horizons.

The thesis is structured into several chapters. Second chapter is devoted to a model for forecasting volatility in frequency domain. The author starts with a spectral decomposition of realized volatility and introduces a multivariate GARCH-type model. For the estimation of the underlying process he used quasi-maximum likelihood and generalized autoregressive score procedures. For the empirical application author employed volatility forecasting for GBP, CHF, and EUR currency markets. He concludes that the multi-scale model fitted by the generalized autoregressive score procedure produces forecasts are in most cases superior to competing models. In addition, he found that most of the information for future volatility comes from high frequency part of the spectra representing the very short investment horizons. Third chapter is devoted to study a battery of connectedness measures (Diebold and Yilmaz, 2014). As before, the author employed a synthetic approach across different frequencies to get the complex picture of connectedness. Here again, based on the spectral representation frequency specific measures of connectedness are defined. In this chapter two empirical applications are presented. 1) Connectedness measures are applied in the context of systemic risk on the US financial markets and 2) supply and demand sides shocks of the oil market on petroleum markets are analyzed using proposed measures.

**Overall comments**

The thesis brings an interesting extension. Combination of several frequencies, using underlying spectral decomposition is a quite new approach. In particular, when used for predictions in different time horizons. In my opinion, the thesis meets the standards required by the profession; my previous comments were incorporated into the final version of the thesis.

For the high quality journal I would recommend careful English editing, though. On a technical side, the thesis is well conducted; the methodology is explained and follows the econometric standards. However, on non-technical side it sometimes lacks the clarity of explaining the issues in a plain language or/and better links to other existing approaches. For the publication in a top journal it really needs careful rewrites. The applications should likely
go more on the front (motivation) with the links on the other/similar studies, some of the technicalities should be moved to the appendix. Also, for simulation or selection of the competing measures it would be better to incorporate more references from the existing literature to support the actual choice. Nevertheless, I found the thesis original and interesting with a high potential and I approve it for the defense.

Date: September, 1, 2017

Opponent’s Signature: 

Opponent’s Affiliation: Prof. Jan Hanousek
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