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. Dr. Weining Wang**

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.)

1. Outline

As mentioned by all previous reviewers, I think this thesis contributes the literature significantly. It has sufficient references, and deserves to be published in respectable journals. I have no major comments and all the comments raised at pre-defense have been successfully resolved. Therefore I recommend the thesis to be defended without major changes.

I would suggest that the author also check the grammar again, I give two examples:

1. ("the under-going of Lehman Brothers", P.93)
2. "The Figure also attests to a success that was the speech of Mario Draghi that essentially stated that the European Central Bank will do whatever it takes to help Greece. This moved decreased had both long-run and medium-run connectedness to unprecedented levels." P.89

The thesis focuses on using spectral tools to address important problems in econometrics. This dissertation provides different spectral-based methods and their applications to deal with these problems. The first chapter is dedicated to spectral decomposition of realized volatility and a multivariate GARCH type model. In the second part, the thesis is providing a spectral decomposition of a system multivariate connectedness measure based on Diebold and Yilmaz (2014). The relevant empirical applications are provided and analyzed carefully.

The contribution of the author to the literature is significant in my opinion. The thesis is built on a sufficient pool of very relevant references. The thesis is definitely defendable at my home institute. I have been noticed that both chapters of the thesis has already been published or papers are under revision with international recognized journals (eg. Energy economics, Journal of Financial Econometrics). I therefore recommend the thesis for defence without substantial changes.

2. Critical appraisal of individual chapters

Chapter 2:

This chapter is concerning GARCH models for high frequency data. The research aims at investigating the importance of disentangling jump variation and integrated variance in a recently developed framework, which combines the appeal of a widely used GARCH(1,1) specification with high frequency data. Multiscale estimators that decompose volatility into several investment horizons are considered. The chapter has a nice combination of empirical findings and solid theory. The decomposed integrated volatilities and jumps influence the future volatility using the realized GARCH framework. The paper also has the potential to trigger a big class of future research on analyzing high frequency data using spectral approaches.

Chapter 3:

Systemic risk endangers financial markets and can trigger serial bankruptcies and is thus defined by Schwarcz (2008), as causing institutional failure through a chain reaction and / or domino effect, resulting in economic shocks. This chapter introduces a new spectral perspective for understanding these sources of connectedness in a network system; it is valuable to understand the frequency dynamics of the connectedness, as shocks to economic activity impact variables at varying frequencies with various strengths. The methodology is in particular important to conduct analysis in financial markets, where shocks due to changes in investor's expectations will have rich impacts at different time-scales. The two event studies on the Global Financial Crisis and the European Debt Crisis give a good qualitative insight and clearly show the advantages of the methodology.

As a second application of the methodology, the author looks into the cyclical connectedness of the petroleum markets. He elaborates a set of new stylized facts as a result of the analysis. Key findings are that shocks to volatility with response shorter than a week are increasingly important for the transmission mechanism, demand side shocks to volatility are becoming

increasingly important in creating short-run connectedness and supply side shocks to volatility resonating in both the long and the short run are important sources of connectedness. This work is highly relevant for the energy sector and gives hands-on insights for the industry.

The proposed framework is useful to measure the connectedness of an estimated system at different frequency bands. I believe that the work is a good complement to the connectedness measure developed by Diebold and Yilmaz (2016). However, I hope more applications can be provided to illustrate the usage of the methodology.

3. Summary

This dissertation has nice element of systemic risk, spectral analysis and high frequency data. It is obvious that the author has made significant contribution to the literature. The work is original and fits well into the existing literature. I come to the conclusion that this thesis can be defended without any substantial changes, based on my experience of past dissertation defences at my home institution, the Humboldt-University Berlin. The quality of the thesis completely fulfils the standards of renowned economic journals.

Date:	5th of Sep 2017
Opponent's Signature:	
Opponent's Affiliation:	Humboldt-Universität zu Berlin