

Opponent's Report on Dissertation Thesis

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Author:	Jozef Baruník
Advisor:	Prof. Ing. Miloslav Vošvrda, CSc.
Title of the Thesis:	Wavelet-based realized variation and covariation theory
Type of Defense:	DEFENSE
Date of Pre-Defense:	May 4, 2011
Opponent	Prof. Ing. Evžen Kočenda, Ph.D.

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) Is the thesis defensible at your home institution?
- d) Do the results of the thesis allow their publication in a respected economic journal?
- e) Are there any additional major comments on what should be improved?
- f) Were your comments raised at the pre-defense, addressed in the dissertation submitted to the regular defense? (The pre-defense report is enclosed below)
- g) What is your overall assessment of the thesis? (a) I recommend the thesis to be defended without major changes; (b) The thesis is not defensible.

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

Content of the Report:

The dissertation entitled "Wavelet-based realized variation and covariation theory", written by Jozef Baruník, employs the wavelet theory to decompose measures of the realized volatility and to find jumps in the financial markets' data.

a) The author brings an original contribution in his dissertation. Based on a generalization of the wavelet-based realized variation estimator Mr. Baruník proposes a wavelet-based realized covariance theory. The proposed method is designed to study the realized correlations on various investment horizons. Methods are also skillfully applied on real high-frequency financial data. A major contribution of the dissertation is that it proposes an estimator of covariance that is robust to noise and that is also able to deal with jumps in data. An interesting contribution is also a design to disentangle jumps from co-jumps.

b) The dissertation is based on an ample volume of relevant references. Some contributions that could be incorporated and that were already mentioned in my earlier report are these:

Discussion on the data synchronization could be related to the non-synchronous trading and its effects specifically on Central European stock markets presented by Baumöhl and Výrost (2010); Eduard Baumöhl & Tomáš Výrost, 2010. "Stock Market Integration: Granger Causality Testing with Respect

to Nonsynchronous Trading Effects," Czech Journal of Economics and Finance (Finance a uver), vol. 60(5), pages 414-425.

Discussion of the jumps issues should be related to the recent comparative study on price jumps indicators' efficiency performed by Hanousek: et al., (2011); Hanousek, J., Kočenda, E., Novotný, J., 2011. Identification of Price Jumps. CERGE-EI Working Paper No. 434.

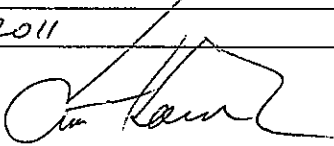
c) Based on my previous experience the presented dissertation is defensible at my home institution.

d) The results of the dissertation could be published in specialized econometric or finance journals. Before the publication the parts (that need to be turned into separate articles) require major shortening and additional formal revisions that would make them condensed pieces ready for submission.

e) The dissertation was revised and Mr. Barunik successfully accounted for the comments of the referees and explained in a detail how and what revisions were made. Therefore, I do not have any major comments for improvements at this stage.

f) My key comments raised at the pre-defense were addressed.

g) The presented dissertation is a solid piece of work. I recommend the dissertation to be defended without major changes.

Date:	5.9.2011
Opponent's Signature:	
Opponent's Affiliation:	Prof. Ing. Evžen Kočenda, Ph.D. CERGE-EI, Charles University Politických vězňů 7 111 21 Prague, CZ

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Author:	Jozef Baruník
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Title of the Thesis:	Wavelet-based realized variation and covariation theory
Type of Defense:	PRE-DEFENSE

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) Is the thesis defensible at your home institution or another respected institution where you gave lectures?
- d) Do the results of the thesis allow their publication in a respected economic journal?
- e) Are there any additional major comments on what should be improved?
- 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 defensible.

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

Content of the Report:

The dissertation entitled „Wavelet-based realized variation and covariation theory“, written by Jozef Baruník, employs the wavelet theory to decompose standard realized measures and find jumps in the financial markets' data.

a) The author brings an original contribution in his dissertation. Based on a generalization of the wavelet-based realized variation estimator Mr. Baruník proposes a wavelet-based realized covariance theory. The proposed method is designed to study the realized correlations on various investment horizons. Methods are also skillfully applied on real high-frequency financial data.

The theoretical as well as empirical parts of the dissertation deal to a large extent with the existence of the price jumps in financial markets' data. Researchers agree on the presence of price jumps, but they disagree about the source (new information, local lack of liquidity on the market, market participants create an environment that tends to cause extreme reactions and thus price jumps, manifestation of Black Swans, etc.). The key role price jumps play in financial engineering triggered interest in the financial econometrics literature, especially how to identify price jumps. Despite the fact that there is still no clear consensus in the literature on how to identify price jumps properly, there is a need to deal with them effectively. In this

respect a major contribution of the dissertation is that it proposes an estimator of covariance that is robust to noise and that is also able to deal with jumps in data. An interesting contribution is also a design to disentangle jumps from co-jumps.

b) The dissertation is based on an ample volume of relevant references. Some contributions that could be incorporated at the later stage are these:

Discussion on the data synchronization in section 8 could be related to the nonsynchronous trading and its effects specifically on Central European stock markets presented by Baumöhl and Výrost (2010); Eduard Baumöhl & Tomáš Výrost, 2010. "Stock Market Integration: Granger Causality Testing with Respect to Nonsynchronous Trading Effects," Czech Journal of Economics and Finance (Finance a uver), vol. 60(5), pages 414-425.

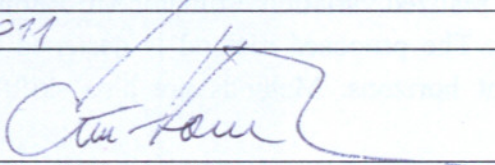
Discussion of the jumps issues should be related to the recent comparative study on price jumps indicators' efficiency performed by Hanousek et al., (2011); Hanousek, J., Kočenda, E., Novotný, J., 2011. Identification of Price Jumps. CERGE-EI Working Paper No. 434.

c) Based on my previous experience the presented dissertation is defensible at my home institution.

d) The results of the dissertation could be published in specialized economic or finance journals. Before the publication the parts, that would be turned into separate articles, require major shortening and additional formal revisions that would make them condensed pieces ready for submission.

e) I do not have any major comments for improvements. However, the dissertation should be checked for spelling accuracy and typos since these unnecessarily cast a small shadow on the text. For example, there is misspelled "portmanteau" test (p. 47), "Hurst" exponent with lower-case h (p. 97), etc.

f) The presented dissertation is a solid piece of work. I recommend the dissertation to be defended without major changes.

Date:	19. 4. 2011
Opponent's Signature:	
Opponent's Affiliation:	Prof. Ing. Evžen Kočenda, PhD. CERGE-EI Charles University Politických vězňů 7, Praha