Report on **Master Thesis**

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Student:	**Lukáš Frýd**
Advisor:	**Lukáš Vácha**
Title of the thesis:	**Volatility and Skewness Spillover Effects: Multiresolution Analysis**

OVERALL ASSESSMENT *(provided in English, Czech, or Slovak):*

Please provide your assessment of each of the following four categories, summary and suggested questions for the discussion. The minimum length of the report is 300 words.

Contribution

The main aim of the thesis is to study volatility and skewness spillover effects among seven world stock indices and WTI crude oil. While volatility spillovers fit into the large literature studying transmission of uncertainty proxied by volatility, skewness is a novel element in the information transmission literature. Unfortunately, it is not clearly motivated and articulated why skewness should be important. Thesis is an unclear mix of several methodologies that are not connected well, and reader never learns why it is interesting to look at the question of interest. Namely, why skewness (third moment of return distribution) should have an impact on volatility (second moment of the distribution) spillovers at all? How do we interpret a shock to skewness? What is the mechanism driving this type of behaviour? What are economic reasons? etc. Hence hypotheses are very vaguely discussed and reader will never find the more detailed answers in the empirical discussion too. Methodologically, there are several problems described in the next section too, and the contribution of the thesis is hence rather limited.

Methods

Author uses number of advanced methodologies and it seems to me it must have been quite demanding work with this respect. If I understand it correctly (it is really hard from the text) author first decomposes the returns to horizon specific time series using MRA. On these horizon specific time series, author estimates conditional volatility and skewness with GAS model and then use this as input series in the VAR to construct several spillover measures. Unfortunately, I find the analysis bit problematic from several reasons that make it hardly interpretable:

1/ Spillover indices are built from coefficients estimated from VAR model. Since variables entering the VAR are already estimated from a different model, it will have some estimation error. We call this a generated regressor problem, and these errors from double estimation are potentially large. Even worse, the variables entering the first stage are already filtered series. So in turn, a filtered data enter some model and outcomes of this model enter again another model. I believe that in the last stage coefficients approximate largely dependencies between filters used in the previous steps, and can be hardly used for building such measures as connectedness. In addition we can not calculate, nor simulate the errors. One would need to come up with really sophisticated bootstrap theory. Hence, it is hard to interpret the results at all.

2/ Variables entering VAR are estimated via GAS(1,1) but it is not so clear from the text how. GAS is a general method of estimation rather than model itself, so I am bit confused why author would not use standard GARCH type models or some other models for conditional volatility and skewness

3/ MRA decomposed time series of returns will by definition contain only portion of the total variance (information) of data. Hence D1, D2, D3… will contain 50%, 25%, etc of information and it is very hard to compare the spillovers. In other words, we may find very high spillover on long term in terms of magnitude which has zero information value. In such an analysis, we always have to take into account all information.

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4/ Spillover measure based on VARs in the way author uses it in fact tell us how shocks to volatility and skewness transmit across variables of interest. This is indeed very interesting problem to interpret. But the volatility and skewness are already outcomes from some model that moreover has inputs filtered by wavelets as noted before. Hence in turn, we look at how shocks to a volatility and skewness modelled by some coefficients on filtered data behave, and I believe that this measure will mostly capture the coefficients and Wavelet filter behaviour and not the effects author intended to capture.

5/ I find interpretation of skewness spillovers very difficult to understand. It is really interesting idea but needs to be discussed in rigorous way.

Literature

Literature is quite complete and summarizes current literature well. Author showed he is capable of working with the literature well.

Manuscript form

Overall the manuscript is rather hard to understand mainly thanks to the language syntax. Models are described in a rather uninformative form and bit confusing way. I am working with wavelets, GAS methods, as well as spillover indices from classical vector autoregressions for number of years and I understand these theories quite deeply, but it was very hard even for me to understand what exactly author is trying to do. I doubt a reader not familiar with the methods will be able to replicate it at all.

Summary and suggested questions for the discussion during the defense

In conclusion, the thesis aims to look at an intriguing question of information value of the third moment of the return distribution to the spillover effect from a shock to the second moment of the distribution which is already widely studied. Unfortunately, the research questions are vaguely formulated, methodology is improperly used and hence results are hardly interpretable. In case the student is able to confidently discuss the issues outlined above, I suggest grade D.

SUMMARY OF POINTS AWARDED (for details, see below):

CATEGORY		POINTS
Contribution	*(max. 30 points)*	21
Methods	*(max. 30 points)*	16
Literature	*(max. 20 points)*	17
Manuscript Form	*(max. 20 points)*	8
TOTAL POINTS	*(max. 100 points)*	**62**
GRADE	**(A – B – C – D – E – F)**	**D**

NAME OF THE REFEREE: Jozef Barunik
DATE OF EVALUATION: 27.1.2020

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Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Overall grading:

TOTAL	GRADE
91 – 100	A
81 - 90	B
71 - 80	C
61 – 70	D
51 – 60	E
0 – 50	F