Report on Master Thesis

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

Student:	Bc. Daniel Benčík	
Advisor:	PhDr. Jozef Baruník, Ph.D.	
Title of the thesis:	Range-based Volatility Estimation and Forecasting	

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

The master thesis "Range-based Volatility Estimation and Forecasting" is, in short, an outstanding achievement. In the thesis, Daniel touches probably the most challenging topic in finance/financial economics – volatility modeling. Using a wide range of volatility estimators, Daniel compares their efficiency and their forecasting performance. While reading the thesis, a reader obviously sees that the author has spent a lot of time on the thesis, carefully dealing with problems of volatility modeling. The only criticism stems in the fact that the thesis, or rather the covered material, is very extensive and in some cases, it could have been rather more intensive and detailed. This way, it sometimes leaves a reader with a feeling that the author could have selected only some of the issues. There are, of course, several typos in the text. Nonetheless, the thesis reads nicely and is well written.

Nevertheless, I have several comments which should be taken as notes for further research rather than criticism (chronologically):

- p. 12, eq. (17) the author discusses possible heteroskedasticity but possible non-stationarity might be a bigger problem
- p. 12 combination of AdjR^2 and a footnote looks puzzling
- p. 18-19 very high H based on GHE might be indicative of non-stationarity; for such high values of Hurst exponent, it might be a good idea to use some other method which can deal with it, namely detrended fluctuation analysis (DFA); also, the reference Barunik & Kristoufek (2010) gives us more credit than we're due because we have showed that GHE is the most efficient for uncorrelated series regardless of the fat tails only
- p. 19 the author argues that there is long memory in the series and then uses only 5 lags for the ADF test
- p. 19 why is KPSS test not used? Indeed, it would yield non-stationarity of the series
- p. 21 author talks about correlations between volatility, volume and number of transactions but are these even stationary (stationarity of volume and number of transactions is not discussed)?
- p. 29 the author talks about persistence of the series a lot and then dismisses it; this should've been better described
- ARMA-GARCH modeling the author shows that volatility series are not normal and skewed, then uses ARMA-GARCH with *t* disturbances. Does it make sense?
- ARMA-GARCH is there any economic/financial rationale to assume GARCH process in the volatility series?
- Keeping in mind that the whole ARMA-GARCH is probably misspecified (due to long memory discussed in the text), does it make sense to include it?
- HAR (and its expansion provided by the author) assumes stationarity of the series, i.e. it should have been mentioned that this might cause a problem

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To summarize, the thesis brings many novel results and it is written in a logical fashion. Moreover, it covers a topic which is well above of the scope which is normally achieved at the Master's level at IES FSV UK. Therefore, in the case of successful defense, I recommend "výborně" (excellent, 1) and I recommend the thesis for the Award of the Dean of FSV UK.

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

CATEGORY		POINTS
Literature	(max. 20 points)	20
Methods	(max. 30 points)	29
Contribution	(max. 30 points)	30
Manuscript Form	(max. 20 points)	19
TOTAL POINTS	(max. 100 points)	98
GRADE	(1 – 2 – 3 – 4)	1

NAME OF THE REFEREE: PhDr. Ladislav Krištoufek

DATE OF EVALUATION: 21.6.2012

Referee Signature

Ladislav Kristin/