

Report on Rigorosis Thesis

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

Student:	Bc. Diana Burdová
Advisor:	PhDr. Jozef Baruník, Ph.D.
Title of the thesis:	Modeling Conditional Quantiles of Central European Stock Market Returns

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

This is a resubmitted master's thesis with the Dean's distinction. Therefore, I believe there is no need for an additional report. The master's thesis report is appended below in *italics*.

The thesis discusses a very up-to-date topic of Value at Risk (VaR) estimation. The main contribution of the thesis is the application of the Conditional Autoregressive Value at Risk (CAViaR) of Engle & Manganelli (2004) on the dataset of the Central European stock indices (PX, BUX and DAX) and S&P500. All in all, for me, the thesis presents a "standard A thesis", it selects an interesting up-to-date topic, describes it in a sufficient detail and then provides some empirical exercise with necessary testing procedures. For that reason, I suggest grade A for the defense.

I have following comments:

- *Why does the empirical part focus only on stock indices? It is not obvious whether these are spot (but untraded) or futures prices. Based on the way the data has been retrieved, I believe that these are spot index values, which are, however, not traded, which makes the contribution of the empirical part weaker.*
- *Distinction between unconditional and conditional distribution of returns should be more stressed in the basic VaR description. It is quite well documented in the literature that if volatility is sufficiently well estimated (e.g. with realized volatility and its hybrids), the standardized returns are very close to the Gaussian distribution. This might have been at least mentioned. The fact that the residuals from GARCH models are far from the Gaussian is only a reflection of GARCH not being able to capture long-term memory in volatility and this is quite likely also true for the GARCH-like specifications of the CAViaR models.*
- *Section 2.1 very nicely describes the VaR approaches, even though there are few issues (see below).*
- *α -stable distributions could have been considered (mentioned) alongside the other distributions in Section 2.1.2 which would somewhat change the notation and the square-root law due to self-similarity.*
- *The section on GARCH models does not fit well into the structure of Section 2.1(.2).*
- *Section 2.1.3 is inadequately short compared to the preceding ones. (Similarly for Sections 2.2 and 3.2.)*
- *How is the dependent variable in Eq. 3.1 obtained from the data? This is not explained in a sufficient detail. Keeping in mind that Eq. 3.1 is crucial for the whole thesis, it should have been given more space.*
- *Concluding stationarity based only on the ADF test is insufficient. Series can still be non-stationary with d between 0.5 and 1.*
- *Sums of α_1 and β_1 are very close to 1 for practically all estimated GARCH models (especially for the GFC period). This should have been at least somehow discussed. This is related to my second comment.*

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- *In a similar manner, the autoregressive part of the CAViaR is quite close to 1 which hints a unit-root in the process of quantiles. Stationarity of quantiles entering the CAViaR model(s) should have been checked as well (as well as other standard statistics).*
- *It might be really interesting to check possible long-term memory of the $\{q_t\}$ process of the CAViaR model. Similarly to the volatility process, it is likely that the long-term memory models describe the quantiles better than the short-term memory ones (such as GARCH and its alternatives).*

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

CATEGORY	POINTS
Literature (max. 20 points)	18
Methods (max. 30 points)	26
Contribution (max. 30 points)	25
Manuscript Form (max. 20 points)	16
TOTAL POINTS (max. 100 points)	85
GRADE (1 – 2 – 3 – 4)	1

NAME OF THE REFEREE: PhDr. Ladislav Krištofuk, Ph.D.

DATE OF EVALUATION: 23.10.2014

Referee Signature