

Report on Bachelor / Master Thesis

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

Student:	Marek Klaus
Advisor:	PhDr. Boril Šopov, MSc., LL.M.
Title of the thesis:	Multivariate Dependence Modeling using Copulas

The thesis is focused on comparison of several multivariate GARCH models. Author's main research question is whether a copula-based type multivariate volatility model is able to describe dependency structure better than a dynamic conditional correlation GARCH (DCC-GARCH) model. The thesis is divided into seven parts. I really appreciate author's choice of his research area as correct asset correlation modeling is one of the main issues arising from the recent crisis.

The thesis is well written and author is obviously able to present rather difficult issues in an understandable way. For me the most interesting is the empirical part of the thesis, i.e. chapters 5 & 6, where author compares several copula based GARCH models with a DCC-GARCH on a sample of several stocks and stock indices. Author chose to model bivariate dependency of several asset pairs: the Czech PX stock index and CEZ, KB and ERSTE, Unipetrol and Telefonica (all traded on the Czech stock market) and finally NASDAQ and S&P stock indices. The analysis shows that, except Unipetrol and Telefonica, copula-based models are able to explain the dependency structure slightly better than the DCC-GARCH.

Despite a good quality of the thesis, I have several comments that could still improve the thesis in several areas. First, the author should at least shortly describe some mathematics of the DCC-GARCH model in the Chapter 2. As the thesis is quite mathematically and statistically oriented, more mathematical expressions could make the thesis more readable for mathematicians. Second, the author misspelled the Pearson correlation – several times. This mistake should definitely not happen in a statistical work as the Pearson correlation is a very basic statistical concept. Third, the data description, which is partially summarized in tables, is quite chaotic. Generally, author's work with tables and figures is far from being perfect. Some tables and figures are situated in subsections that are different from those where these tables and figures are explained and belong to. Another problem regarding the data was a complete lack of some more detailed discussion of the datasets, i.e. discussion of jumps and dividends effects, lengths of the datasets, changes in the index structures, etc. The author should definitely dedicate more time to the work with the datasets.

My last comment relates to the comparison of the model residuals. At each asset pair, the author compares the residuals from all computed models graphically only. Definitely, before making a judgment, the author should use some test to prove whether the residual are or not less dependent.

Overall, despite several abovementioned shortcomings I evaluate the thesis as a very nice one, definitely above the university standards. Therefore I recommend the thesis for a defense. Because the author managed to treat a modern and quite difficult theme in a good quality thesis, I propose grading A (výborně, 1).

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

CATEGORY	POINTS
<i>Literature</i> (max. 20 points)	17
<i>Methods</i> (max. 30 points)	25
<i>Contribution</i> (max. 30 points)	25
<i>Manuscript Form</i> (max. 20 points)	20
TOTAL POINTS (max. 100 points)	87
GRADE (1 – 2 – 3 – 4)	1

NAME OF THE REFEREE: Petr Gapko

DATE OF EVALUATION: June, 21st 2012

Referee Signature