

Report on Bachelor / Master Thesis

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

Student:	Alexander Terziev
Advisor:	PhDr. František Čech, Ph.D.
Title of the thesis:	Stock market comovements in Central and Eastern Europe during the COVID-19 pandemic and the Russian war in Ukraine

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

Short summary

The thesis investigates the comovements of stock markets in Central and Eastern Europe (CEE) with those of the European Union and Russia from 2013 to 2023. It focuses on the impacts of the COVID-19 pandemic and the Russian war in Ukraine. Using multivariate GARCH models, DCC and asymmetric DCC models, significant asymmetries in conditional covariances are found, highlighting increased interdependence during crises and suggesting a slowdown in market integration within the European Union.

Contribution

The thesis provides an empirical analysis of stock market comovements in the CEE region during significant geopolitical and health crises. It contributes to the literature by highlighting the varying impacts of these events on market correlations, which translate to the limited diversification potential of CEE markets during crises.

Methods

DCC and ADCC models are used to estimate conditional correlations, with relevant background to time series modeling introduced. These advanced models are not typically taught at the bachelor level. The methodology appears well presented at first glance. However, several mistakes raise doubts about the author's understanding of the topic:

- Regarding EGARCH "This model addresses the asymmetry by transforming the variances using the log function."
- On p. 10. regarding VEC model "leading to difficult estimation with increasing n observations."
- And mainly, on p. 17-18, the main model used, ADCC, is incorrectly defined. It is possibly a mix of misunderstanding the original notations and discarding confusing equations. Given that estimating the DCC and ADCC models on their dataset is the main contribution, I expected correct description of the model.

For the univariate models (first step of estimating ADCC), they use ARMA(1,0)-GARCH(1,1) model assuming normally distributed residuals. There is no reasoning for the choice of lags in the mean equation, especially since there is remaining autocorrelation in residuals for several time series (Table 4.3). It is also mentioned that assuming t-distributed residuals would be better, but they decide to skip this step because the data has too many outliers anyway and any improvement is futile (p.21). On one hand, I appreciate that the author is aware of this limitation of blindly selecting ARMA(1,0)-GARCH(1,1) for all time series and acknowledges this in the conclusion. On the other hand, this simplification is directly undermining the main results when estimating the ADCC model.

Literature

There is quite comprehensive overview of literature on stock market comovements, EU market integration, impact of COVID-19 and war conflicts. Additionally, there is an introduction to univariate and multivariate GARCH modelling.

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Manuscript form

The manuscript is well-written in good English and appropriately formatted. The general organization is good, but the conclusion contains a discussion of results and comparisons with other papers, which should be included in the results/discussion section. Separating the methodology from the actual model estimation would also improve clarity. For example, the decision to use AR(1)-GARCH(1,1) as the mean equation is mentioned only in the methodology, which is otherwise very general. The results section could be better organized by first discussing univariate results or at least mentioning which model is used, then commenting on the second step of ADCC estimation and conditional correlations.

- Summary statistics (Table A.1.) would be clearer in percentages because of the small values.
- Table 4.1 has unexpectedly named column 't-prob' which seems to be p-value. Univariate GARCH estimates are not reported or commented on but can be found in the additional materials.
- On p. 15-16, "For $t = 1$, the recursion is started by using the sample mean and assuming the initial residuals to be equal to zero." and "In order to start the recursion" sentences are slightly confusing, as it has not been mentioned that we are using recursion.
- Figure 4.1 is not very useful and the red line does not seem to be (standard) normal distribution as claimed, but rather some density approximation of the data.
- Figures of conditional correlations would benefit from highlighting the discussed time periods for easier orientation.

Suggested questions/topics for the discussion during the defense:

- Are there any missing observations in your dataset, and what is your approach if that is the case?
- On p. 27 "may lead to misleading results as it takes several time periods for the model to adjust appropriately". Please discuss how many time periods it takes for the model to reflect a shock.
- I would like to hear the interpretation of univariate and multivariate model coefficients. Which test would you use to check the normality of standardized residuals?

In my view, the thesis does fulfil the requirements for a bachelor thesis at IES, Faculty of Social Sciences, Charles University; That is, I suggest a grade C. The results of the Turnitin analysis do indicate significant text similarity with other available sources.

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

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CATEGORY	POINTS
<i>Contribution (max. 30 points)</i>	20
<i>Methods (max. 30 points)</i>	20
<i>Literature (max. 20 points)</i>	15
<i>Manuscript Form (max. 20 points)</i>	17
TOTAL POINTS (max. 100 points)	72
GRADE (A – B – C – D – E – F)	C

NAME OF THE REFEREE: *Lenka Nechvátalová*

DATE OF EVALUATION: 28.5.2024

Digitally signed (28.5.2024):
Lenka Nechvátalová

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