

Report on Master Thesis

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

Student:	Marek Hauzr
Advisor:	Jozef Barunik
Title of the thesis:	Neural network models for conditional quantiles of financial returns and volatility

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

The thesis proposes a new modelling framework for quantiles of financial returns allowing for direct semi-parametric Value-at-Risk (VaR) forecasting that does not rely on usual restrictive assumptions. The idea stems from previous work of J.Barunik and F.Zikes who quantile regress future returns on its past realized volatility, and successfully model and forecast conditional quantiles of stock market returns. Contribution of Marek is that he abandons assumption of a simple linear relation and suggests a non-linear influence of past volatility on future returns. To capture the complicated dynamics, he uses Quantile Regression Neural Networks (QRNN) successfully, and finds edge over the previously proposed methods. In terms of contribution, the thesis stands on very solid results that could be interesting for the mainstream literature.

In terms of the methods used, QRNNs represent a novel framework generalizing the estimation and allowing us to explore the data deeper. Marek worked very independently, although reporting and discussing the results to me on a frequent basis, he developed the demanding estimation framework by himself. Mastering such an advanced technique, Marek showed strong quantitative skills which he translated into a functional, contributive framework for modeling conditional quantiles of the return distribution.

Although the text has clear structure, good form, and is logically organized, the presentation of results remains to be the weakest point of the thesis as the text lacks deeper detail in many places. Stronger economic motivation (i.e. "why the work is important") as well as detailed discussion of the results is missing, possibly due to lack of time at the finish.

In conclusion, I believe that during the work Marek proved himself to be an independent researcher, obtained interesting and contributive results, mastered advanced techniques, hence the thesis deserves to be defended. In case Marek will be confident in presenting the details of the work during the defense (focusing mainly on economic motivation, and contribution side of the project), I suggest to award grade "1" despite the weaker level of the organization and writing skills itself.

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

CATEGORY	POINTS
<i>Literature</i> (max. 20 points)	12
<i>Methods</i> (max. 30 points)	30
<i>Contribution</i> (max. 30 points)	30
<i>Manuscript Form</i> (max. 20 points)	10
TOTAL POINTS (max. 100 points)	82
GRADE (1 – 2 – 3 – 4)	1

NAME OF THE REFEREE: Jozef Barunik

DATE OF EVALUATION: August 29, 2016

Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

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

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
20	10	0

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.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
30	15	0

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.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
30	15	0

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.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
20	10	0

Overall grading:

TOTAL POINTS	GRADE		
81 – 100	1	= excellent	= výborně
61 – 80	2	= good	= velmi dobře
41 – 60	3	= satisfactory	= dobře
0 – 40	4	= fail	= nedoporučuji k obhajobě