

Report on Master Thesis

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

Student:	Bc. et Bc. Dominik Vach
Advisor:	PhDr. Petr Gapko, Ph.D.
Title of the thesis:	Artificial Neural Networks in Option Pricing

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

Please provide your assessment of each of the following four categories, summary and suggested questions for the discussion. The minimum length of the report is 300 words.

Contribution

The thesis concerns an artificial neural network approach to an option pricing problem. The author proposes a novel approach which builds on top of existing neural network models and suggests several improvements to the network setup. All hypothesis and proposed improvements are supported by numerical simulations on a large training data set.

The thesis was motivated by several interesting novel research questions which I am convinced were all answered in an impressive way and subsequent deep insight to the topic and experience from training the proposed architectures of the neural networks led to further suggestion for future improvements (which, I very well understand go beyond the scope of the current thesis).

I am convinced that after editing the text, the manuscript could be considered for a publication in a respected international IF journal.

Methods

The author of the thesis shows deep understanding of historical development of option pricing (before and after introduction of Black and Scholes formula), and is well aware of strengths and weaknesses of parametric and non-parametric approaches to the option pricing problem. Proposing own architectures of artificial neural networks (and their coding) goes way far beyond the average scope of knowledge of a master student at IES FSV UK.

Literature

The literature overview is informative and illuminating and shows the author's good grasp and insight in the studied area of mathematical finance. I would however enjoy reading the Literature review section only after the section Theoretical Part, where only then many of the terminology used throughout the paper is nicely and gently presented to the reader. But I understand that the author followed certain general instructions leading to this order of the text.

The list of references is flawless (from the citation standard point of view).

Manuscript form

The text is written in an easy and fast to read English (which is corrupted with occasional typographical errors which however do not disrupt the ultimate understanding of the text). The author has near flawless command of typesetting the mathematical formulas which I enjoyed very much. Especially in the second, empirical part of the manuscript, the author complements the text with many figures and flowcharts which helps the reader to grasp the comments of the author. I would like to emphasise the notes which accompany some of the figures which definitely save time of the reader to grasp the essence of the depicted phenomena. The only minor negative comment in this section would be the lack of author's comments in the enclosed Python codes which makes it a bit harder to use or modify for future users of these codes.

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Summary and suggested questions for the discussion during the defense

Overall, this is a very skillfully written thesis, results of which contribute not only for the award of the diploma for the author but also contain novel results relevant for the considered field of mathematical finance (both in form of newly proposed artificial neural network architectures and in form of new interesting research questions for future research). Thus, I suggest to award the thesis grade A depending on the performance during the thesis defense.

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

CATEGORY	POINTS
<i>Contribution</i> (max. 30 points)	29
<i>Methods</i> (max. 30 points)	30
<i>Literature</i> (max. 20 points)	19
<i>Manuscript Form</i> (max. 20 points)	18
TOTAL POINTS (max. 100 points)	96
GRADE (A – B – C – D – E – F)	A

NAME OF THE REFEREE: RNDr. Michal Červinka, Ph.D.

DATE OF EVALUATION: January 15, 2019



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.*

Strong Average Weak
30 15 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.*

Strong Average Weak
30 15 0

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

Strong Average Weak
20 10 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.*

Strong Average Weak
20 10 0

Overall grading:

TOTAL	GRADE
91 – 100	A
81 - 90	B
71 - 80	C
61 – 70	D
51 – 60	E
0 – 50	F

