

Report on Bachelor / Master Thesis

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

Student:	Dominik Vach
Advisor:	Petr Gapko
Title of the thesis:	Artificial Neural Networks in Option Pricing

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

The thesis focuses on option pricing with neural networks. It stipulates four hypotheses, which the author tends to confirm by his research. These are the comparison of the neural networks stock price valuation with the classic Black-Scholes formula, comparison of two types of neural networks, namely feedforward and modular, comparison of valuation with and without the use of virtual options and, finally, comparison of the volatility prediction methods used in the neural network valuation algorithm.

The thesis is well written, and a reader is easily able to follow the text. However, the spell check should be done more rigorously as the thesis contains more typos than it should. This unfortunately slightly pushes down the quality of the thesis, which, on the other hand and according to my evaluation, is of a high quality.

The author's hypotheses are clearly described, and the author also managed to discuss the results in connection with them, which makes it easier to read the results. Regarding the results, these are discussed in detail with a lot of tables. I find the number of charts and tables in the results section to be adequate and not unnecessarily disruptive. However, for example the discussion of estimation of volatility might have been performed more in detail. I would expect e.g. a discussion of how different volatility measures influenced the final valuation model and its results. This might be a point for discussion during the defense.

Overall, I find the thesis very good and thus my evaluation is positive.

Contribution

The author's contribution is sufficient for a master thesis. In some cases (e.g. volatility forecasting, models comparison) could the author show more innovative approaches, as using more recent and more evolved models than the methodologies used in the thesis.

Methods

The author used rather complicated methodology, which proves his ability to perform a research of complicated issues. The methods used are in some cases more advanced (neural networks) and in some cases more standard (Black-Scholes model used as a proxy for comparison, GARCH modeling of volatility). However, the methods are sufficiently advanced to be used not only in master thesis, but also, after some enhancements, in a dissertation.

Literature

The author referenced relevant literature, both more standard and more recent. The sources were used correctly. In some cases, the most recent literature tends to be local and in my view, the author could use more recent inspiration from abroad.

Manuscript form

Report on Bachelor / Master Thesis

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

Student:	Dominik Vach
Advisor:	Petr Gapko
Title of the thesis:	Artificial Neural Networks in Option Pricing

The manuscript structure is logic and the thesis is not unnecessarily long. However, the author should dedicate more time to final checks of the language to avoid an increased number of typos, which appears throughout the thesis.

Summary and suggested questions for the discussion during the defense

The author used a modular neural network mechanism, which requires to split the data sample according to chosen parameters into different subsets. The author took over an approach, which was used in the literature previously, however, the author did not challenge the split. I suggest discussing the split of the sample more in detail during the defense.

Also, the author chose several approaches to estimate/calculate the volatility of the underlying asset, which is then included in the option pricing engine. These include the historical volatility, the implied volatility and the GARCH style volatility modeling. These represent a majority of the volatility modeling approaches, but during the defense I propose to discuss a competing approach, the realized volatility concept, which could be used as well. Also, a more details on how the choice of volatility measures influence the final option valuation model might be discussed.

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

CATEGORY	POINTS
<i>Contribution</i> (max. 30 points)	27
<i>Methods</i> (max. 30 points)	25
<i>Literature</i> (max. 20 points)	16
<i>Manuscript Form</i> (max. 20 points)	14
TOTAL POINTS (max. 100 points)	82
GRADE (A – B – C – D – E – F)	B

NAME OF THE REFEREE: Petr Gapko

DATE OF EVALUATION: January 13th, 2019



Referee Signature