Philosophical Faculty Palacký University Olomouc

Department of Applied Economics

FINAL THESIS REVIEW

Thesis type: **Bachelor**

Student (name and surname): **Martin Michálek**
Supervisor: **Mgr. et Mgr. Jan Stoklasa, Ph.D.**
The topic of the final thesis: **Algorithmic trading strategies focussed on cryptocurrencies**

1. Difficulty of the thesis in:

Theoretical knowledge	**standard**	~~high~~
Input data and its elaboration	**standard**	~~high~~
Applied methods	**standard**	~~high~~

2. Evaluation of the thesis:

Criterion	**Evaluation grade (acc. to SC UP)**					
	A	**B**	**C**	**D**	**E**	**F**
Level of reaching the thesis goal(s)			X			
Logical construction of the thesis			X			
Student's work during the topic elaboration					X	
Amount of the student's own contribution in comparison to the amount of taken information				X		
Suitability of applied methods		X				
Work with resources including citations						X
Layout of the thesis (text, graphs, tables)					X	
Stylistic level, grammaticality			X			
Applicability of the thesis conclusions in practice					X	

3. Questions to answer during the defence (eventually remarks of the supervisor):

The author sets the goal of the thesis on page 7 in the following way: "*The purpose of this bachelor thesis is to demonstrate the possibility of backtesting various algorithmic strategies for trading BTC/USD and LTC/USD. We will automate the process of backtesting in simple and available software, Microsoft Excel.*"
Presented in this way, the goal is achievable, but not very ambitious. It is clear from the start that backtesting will be possible. Demonstrating it thus does not promise any interesting new results. On

the other hand, the implementation in Excel could provide interesting piece of information for the students of finance that only just start understanding various technical trading strategies – it could show that Excel can be used for this purpose. Given that the thesis is a bachelor one, the goal is in my opinion borderline acceptable.

The language of the thesis contains some grammatical errors, there are also some instances of a non-scientific form of the text, e.g. "[…] *we will present some theoretical knowledge about financial markets, trading, cryptocurrencies, market analysis* […]" (p. 7) – what "some"? chosen based on what?, "*To predict future prices and profitability, traders say: "Buy the rumor and sell the news"*" (p. 15) – how could this be translated into a price prediction strategy? Etc.
Also the references throughout the thesis (mainly in its first chapters) are chaotic, some claims seem not to be backed up by references, some references seem to be missing, some are completely unclear, e.g. "*Secondly, cryptocurrencies are also not totally secure against theft. There have been some incidents in the history of Bitcoin caused by problematic or malicious transactions. In the worst of these incidents and the only one of its kind, someone created an illusion of an infinite possession of Bitcoin for almost 9 hours (10).*" (p. 17) – what is the (10) referring to? There is also a reference to (11) on the same page! Some references are too general to be of any use (e.g. www.forbes.com on page 17).

The names of chapters/subchapters could have been more self-explanatory, e.g. "Statistics" is too brief to understand what exactly is in the subchapter. One would also expect, that when the cryptocurrencies are claimed to be very volatile, then the price-statistics would be cited with more precision than by day (e.g. exact time to the second would be more appropriate). Note, that the Table with the statistics on page 18 is not labelled.

The formulas in Chapter 5 could have been numbered, also the notation is slightly unclear in several places. E.g. on page 28 EMA_t is calculated, hence the subscript of EMA seems to represent time, but in the formula for MACD the subscript of EMA seems to represent the length of the window. Also, there is not a single reference in the subchapter presenting the VWAP indicator. The three formulas on page 30 are in my opinion written in a way that allows for their miscalculation.

As for the practical part, the chosen data is described rather briefly and the choice of the split of the timeseries in four 6-months-long series is not clearly motivated. It is, however, clearly stated that even a success of a strategy in the analysis (i.e. a profit generated by the strategy) does not guarantee profits in the future. I appreciate that this limitation is clearly stated as is the omission of the transaction costs. Chapter 8 provides a description of the excel implementation of the strategies summarized in chapter 7. This provides a nice addition to the cd with the Excel files with the computations. Although some notation is also incomplete and possibly misleading, e.g. "100-(100/(1+RS)." on page 41 is missing an end bracket.

The results section would have been much more easy to follow if the tables were referred to by their numbers (which is not possible, because their labels do not include the usual "Table x: " start). Otherwise, the results are presented in a meaningful and reasonable way, the comments seem to be OK, but a comparison/summary of the results across all the analysed strategies is slightly missing. A short comparison is presented in the Conclusions chapter though. But given the goal of the thesis was to demonstrate the possibility of backtesting, which was done, it just seems a wasted opportunity to get more from the results. But the goal seems to be fulfilled.

Some questions for the defence:

1) What are the defining characteristics of a cryptocurrency?
2) Please, explain the references to (10) and (11) on page 17.

3) On page 10 the author claims, that it is possible to make profit even if the "*price of an asset does not move*" – how would this work?
4) On page 10 the author also claims that selling an asset because of an expected decrease in its value helps the trader to make a profit. This however seems to be a loss minimization approach rather than a profit creating one. Or how is it possible to make a profit this way? Please, explain.
5) What is the possible effect of your choice not to consider transaction costs in the results of your analysis? The claim that transaction costs are not considered is made on page 19.
6) What is the value of EMA_0 on page 28 in the formula for the calculation of EMA_t?
7) On page 44 you talk about significant loss/profits of the strategies. What statistical test was used to assess their significance?

4. The thesis has gone through the STAG theses.cz anti-plagiarism control resulting in:
the thesis the thesis is not a plagiarism. Note, that the anti-plagiarism system theses.cz points out a similarity of 44% with one document, but this document is a previous version of the same thesis. This thus does not constitute a problem with plagiarism. On the other hand, the references in the first chapters of the thesis are rather chaotic, but the citation style improves in the second part of the thesis.

5. The thesis **is** recommended for the defence.

6. Suggested classification grade: **E** (but if the questions are reasonably answered, the evaluation can be improved)

Place and date | Signature of the supervisor

Olomouc, 23.12.2019