Philosophical Faculty Palacký University Olomouc

Department of Applied Economics

FINAL THESIS REVIEW

Thesis type: **Bachelor**

Student (name and surname): **Tomáš Novák**
Supervisor: **Mgr. et Mgr. Jan Stoklasa, Ph.D.**
The topic of the final thesis: **Algorithmic trading strategies focused on currencies**

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 thesis is a revised version of a previously submitted thesis on the same topic. This version has undergone vast changes and it has improved a lot in terms of its readability and also in terms of the reasonability of the results and their presentation. The language still contains a higher amount of errors, though.

The author sets the following goal for the thesis (p. 8):

"The goal of this thesis is to backtest algorithmic trading strategies on three types of technical indicators: Stochastic oscillator, CMF indicator and EMA indicator. The backtesting process will be implemented on a 4-hour interval historical data. The backtesting and calculation process of selected indicators will be made in Microsoft Excel."

The focus on Excel is clearly explained, the calculations are subsequently presented in figures from excel and are also available on the attached CD. However, the declared goal seems to miss the WHY part. What is the actual reason for the backtesting of the selected strategies? From the context of the thesis and from the results it seems that a comparison of performance of the strategies was intended, which could have been more clearly stated by the author.

The thesis has a rather logical structure, but some parts seem to be not needed (e.g. the description of OTC markets) – or if they are needed, their connection with the other topics and with the goals of the thesis should have been established better. Also some pieces of information are repeated on several places in the thesis without clear need to do so.

Some of the figures overlap with the margins of the page, but it seems to be in order to improve their readability. Also, sometimes the figures seem no to be in line with the comments in the text. E.g. figure 2.2 does not contain 12 in the red area, even though the author claims on page 25 that *"On the contrary, if traders are able to, day trade the USD/JPY between 12:00 pm GMT and 15:00 pm GMT it maximizes their trading efficiency, ..."*. Also, the analysis considers 4-hour windows, but the low/high volatility periods in the market as indicated in Figure 2.2 seem to be shorter. How reasonable then is to use data with the chosen frequency?

The practical part is written rather well, although the presentation of the formulas is slightly lacking mathematical rigor. E.g. the equation of EMA_N on page 35 does not seem to include the exponential weighting explicitly. Also the formula for AG_i and AL_i do not seem to be mathematically correct, but their main idea might be understandable. Also, on page 43 the author claims that "MAX denotes absolute value" – why would absolute value be denoted by a maximum operator?

The data description in chapter 5 is rather brief and the selection of the algorithms is not clearly justified. Some justification is presented in chapter 6, but this seems to be rather late. It is, however, true, that the chapter 6 explains the strategies nicely on the provided plots.

As for the presentation of the actual results, the results of the B&H strategy are not presented (is a table missing?). Otherwise, the tables seem to summarize the performance of the chosen strategies during the chosen period rather well, the requirements on the algorithms are also well stated. A discussion of the results is, however, missing. The practical part is, however, well executed and summarized and seems to provide reasonable results.

Questions for the defence:
1) In the thesis you talk about the EMH (efficient market hypothesis). Which for of the EMH do you assume for your analysis? Is the ability to predict price movements in line with the strong form of EMH?
2) In the introduction you mention "insignificant limitations of the data" – please specify what are these limitations and why do you consider them to be insignificant.
3) On page 14 you mention that "*... trading assets is a bit different from Exchange markets.*" Please, specify how.
4) On page 14 you also state that *"On the market, it is not important if the prices are going up, down or staying still, it is still possible to make a profit. It is possible to make money even though the market stagnates."* How would you generate profit on a stagnating (stable) market?

5) Where is the exponential weighting in the equation of EMA_N on page 35?
6) Why did you select different time-periods for different strategies in the plots in Chapter 6?
7) What was the actual (numerical) performance of the buy and hold strategy?
8) What are the limitations of your study and its results?
9) Please, justify the claim "*The selected algorithmic strategies have made a minor profit in both currency pairs.*" That you present in the Conclusions – I do not seem to be able to see it in your results.

4. The thesis has gone through the STAG theses.cz anti-plagiarism control resulting in:
the thesis the thesis **is not a case of plagiarism**. Note, that the anti-plagiarism system theses.cz points out a similarity of 39% with one document, but this document is a previous version of the same thesis. As such the high similarity is not relevant and all other similarities are below 5%.

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

6. Suggested classification grade: **C**

Place and date   Signature of the supervisor

Olomouc, 23.12.2019