

Report on Bachelor / Master Thesis

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

Student:	Vojtěch Suchánek
Advisor:	Mgr. Nicolas Fanta
Title of the thesis:	Arbitrage on the Cryptocurrency Markets: An Analysis of Potential Opportunities

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

Please provide a short summary of the thesis, your assessment of each of the four key categories, and an overall evaluation and suggested questions for the discussion. The minimum length of the report is 300 words.

Short summary

The submitted thesis studies arbitrage opportunities in the relatively new cryptocurrency market. The author constructs several trading strategies and demonstrates profit of up to 362% during six months window when stable coins are used to transfer money from one exchange to another. When the USD or EUR were used, the profit decreased to 39%.

Contribution

The submitted thesis contributes to the literature by exploring arbitrage opportunities in the cryptocurrencies markets. Since the single cryptocurrency is analyzed, although the one with the highest market capitalization, the contribution is limited. The biggest contributions of the work are that the author explicitly accounts for trading fees (which is not standard in literature) and the work with the high-frequency dataset (collecting and preprocessing this dataset). Since the mid-price are used for analysis and not bid/ask price, the findings regarding arbitrage profit might not be valid in real-world trading.

Methods

The methods used in the thesis are rather simple – detection of different price levels on several exchanges and using this mispricing to arbitrage. Although the method is simple, its proper implementation requires very careful work and given the results, I think the analysis was done correctly. There are a couple of details that could be elaborated on in further research, e.g.

- using bid/ask data to detect arbitrage opportunities (small price difference between mid-price on different exchanges might not create arbitrage since the bid/ask spread might be higher than this inter-exchange difference),
- accounting for fees of overnight holding of an open leveraged position
- accounting for mark-to-market of the leveraged position
- using the last-observation-carry-forward method to replace missing values might create unrealistic arbitrage opportunities – theoretically, arbitrage might exist, but there might be no counterparty to execute the trade

Literature

Literature used throughout the thesis is sufficient, and the author demonstrates good knowledge of it.

Manuscript form

The manuscript form of the thesis is adequate. There are a couple of typos in the text, e.g. p.17 „eighter“ instead of either, „lest assume“ on p.18 etc. In the future work, the author should also stick to the same labels used in text and figures – e.g. on p.6 we learn that in Figure 1 magnitude of price deviations is displayed, label of y-axis of Figure 1 says „Difference“ and caption of Fig.1 says that we see comparison of price variances. The author should also define what is the „Difference“ in the picture and what are the units of this difference.

Overall evaluation and suggested questions for the discussion during the defense

The submitted thesis tries to detect arbitrage opportunities on the cryptocurrencies markets, and under some simplifying conditions, the author finds that arbitrage exists. Although some simplifying

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assumptions were made in the analysis, the results of the thesis can be used as a reference for further research. During defense author should explain each step of the mechanism of the arbitrage strategy defined on page 5. Specifically, the author should explain

- difference of points 4 and 5 - what is the difference of closing shortsell and selling bitcoin on sell-side exchange?
- point 6 – if we buy BTC at the buy-side exchange and transfer it to sell-side exchange, I think we have no initial capital left on the buy-side exchange, so I do not understand what should we withdraw. Why do we withdraw only half of the profit from the sell-side exchange?
- point 6 and 7 – why in one step we should withdraw capital from buy-side exchange and in the next step deposit it back?

The results of the Urkund analysis do not indicate significant text similarity with other available sources. In my view, the thesis fulfills the requirements for a bachelor thesis at IES, Faculty of Social Sciences, Charles University, I recommend it for the defense and suggest a grade C.

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

CATEGORY	POINTS
<i>Contribution</i> (max. 30 points)	25
<i>Methods</i> (max. 30 points)	20
<i>Literature</i> (max. 20 points)	20
<i>Manuscript Form</i> (max. 20 points)	15
TOTAL POINTS (max. 100 points)	80
GRADE (A – B – C – D – E – F)	C

NAME OF THE REFEREE: *František Čech*

DATE OF EVALUATION: *28.8.2021*

Digitálně podepsáno (28.8.2021):
František Čech

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.*

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.*

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

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.*

Overall grading:

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