Report on Bachelor Thesis

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

Student:	**Pavel Fišer**
Advisor:	**PhDr. Jiří Kukačka**
Title of the thesis:	**Econometric Analysis of Bitcoin and its 2013 Bubbles**

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

The thesis "Econometric Analysis of Bitcoin and its 2013 Bubbles" thoroughly analyses the Bitcoin market between 2012 and 2015 from the econometric point of view with a special focus on two major bubble-crash events in 2013. Pavel not only fits standard static time series models but also extends the analysis via rolling estimation to capture possible dynamics of the market. This approach might be of a crucial importance in such a wild environment as virtual currencies generally are. Finally, Pavel fits the advanced Log-Periodic Power Law model (LPPM) model and analyses the Bitcoin prices in terms of the probability of the upcoming crash. Within this concept, Pavel introduces a contributive idea of focusing on the difference of the scaling ratios instead of the scaling ratio "lambda" itself. According to results of this work the "delta lambda" variable more clearly indicates the forthcoming crash.

I am pleased to summarise at the very beginning that **Pavel has written a quality piece of work** and **I can honestly suggest the highest grade (1)**.

Pavel managed to get well familiar with relatively advanced master-level topics, coded for the first time using Wolfram Mathematica and Gretl, and was able to extract important conclusions from loads of time series econometric results. It might be important to note that Pavel managed to study and pass the IES module Econometrics II containing the ARIMA time series analysis from abroad during his Erasmus stay in London and moreover in the final semester Pavel successfully passed an optional advanced course of Applied Econometrics to master more advanced time series models and approaches. However, the most interesting part of the thesis is Chapter 8 covering the LPPL model analysis as the nonlinear log-periodic model seems to be the dominant and the most appropriate tool for the Bitcoin price analysis. I have to stress here that such a topic is not a part of any bachelors (and perhaps even master) unit at the IES FSV UK. Pavel not only fits the model to the data but also compares and contrasts various modifications of data as well as results of a "loop analysis" in which the critical time in the model is being shifted in succesive steps of one observation. Introducing and analysing the "delta lambda" variable Pavel also brings interesting contribution to the LPPL model literature.

The cooperation with Pavel from my advisor's point of view was great. Pavel had many questions, we discussed the progressing work regularly during the entire semester, and Pavel considered all my comments that emerged from our discussions. On the other hand Pavel also showed ability to independently suggest solutions to several non-trivial issues especially during the final part of the work, concluding and displaying research results, and the LPPL model analysis. Unfortunately, due to the limited time we did not incorporate analysis of possible long memory processes behind the Bitcoin behaviour into the text of the work and focused rather on the (from the subjective point of view of the advisor) more interesting and contributing LPPL model in the final part of the thesis.

The aim, design, and conclusion of the work are clearly stated and carefully elaborated. The approaches presented are more than legitimate for students at bachelor's program, and the format of the work meets high academic standards.

Suggested questions for the defense:

- Compare and contrast the Bitcoin prices with other typical financial markets. What features are unique for Bitcoin only and in what the Bitcoin is roughly similar to e.g. stock prices.
- Explain the importance/purpose of the scaling ratio variable "lambda" in the LPPL model and demonstrate using the thesis results how the "delta lambda" serves as a better indicator of the forthcoming crash in the Bitcoin case.

Report on Bachelor Thesis

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

Student:	**Pavel Fišer**
Advisor:	**PhDr. Jiří Kukačka**
Title of the thesis:	**Econometric Analysis of Bitcoin and its 2013 Bubbles**

Summary:
As large, I do find this thesis **more than fulfilling academic standards for bachelors theses written at the IES**. Personally considered, the ability of the author to provide very extensive and detailed step-by-step econometric analysis together with mastering the advanced LPPL model and even suggesting an extending concept of the analysis are the most distinctive qualities of the work.

I am very pleased **I can recommend the thesis of Pavel Fišer to defense at the IES FSV UK. With no doubts, I suggest the grade "1". i.e. "excellent"**.

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

CATEGORY		**POINTS**
Literature	*(max. 20 points)*	16
Methods	*(max. 30 points)*	27
Contribution	*(max. 30 points)*	28
Manuscript Form	*(max. 20 points)*	19
TOTAL POINTS	*(max. 100 points)*	**90**
GRADE	**(1 – 2 – 3 – 4)**	**1**

NAME OF THE REFEREE: Jiří Kukačka

DATE OF EVALUATION: 28. 8. 2015

Digitally signed by Jiri Kukacka
DN: cn=Jiri Kukacka, o=Charles University in Prague, Faculty of Social Sciences, ou=Institute of Economic Studies, email=jiri.kukacka@fsv.cuni.cz, c=CZ
Date: 2015.08.28 19:53:43 +02'00'

Referee ***Signature***

EXPLANATION OF CATEGORIES AND SCALE:

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*

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*

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*

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 POINTS	**GRADE**		
81 – 100	**1**	= excellent	= výborně
61 – 80	**2**	= good	= velmi dobře
41 – 60	**3**	= satisfactory	= dobře
0 – 40	**4**	= fail	= nedoporučuji k obhajobě