

This paper analyzes the statistical properties, Metcalfe's law, Granger causality, and the crash time in the cryptocurrency market, and comes to the conclusions: (1) the existence of heavy tails, (2) the validity of Metcalfe's law, (3) the causalities between Bitcoin price and network size, and (4) the best-fit market crash dates. Although the authors do a lot of work, there are still many areas for improvement in this paper. I have the following comments.

Major comments

- (1) The structure of this paper is not well organized, even somewhat messy. One paper should contain one story. I don't find a clear thread to put the three parts into one economic story. The authors say they "refer only to the most recent papers dealing with three areas regarding the cryptocurrencies market", but this is not convincing and the empirical results seem separate from each other.
- (2) What's the most important contribution of the paper? The three parts have been studied in the current literature. But what is the new finding? The authors should add texts to emphasize the contributions and point out the differences between this paper and the published ones.
- (3) Is it reasonable to regard the used addresses at time t as the connected users? I assume it is the number of unique (from or to) addresses per day (see <https://bitinfocharts.com>). For example, I have a Bitcoin wallet and receive 100 Bitcoin on Jan 1st 2019. My address is counted as used or active address on Jan 1st 2019. Then I don't receive or send any Bitcoin until Feb 1st 2019 when I spend 10 Bitcoin. One important question is raised: my address isn't counted as used or active address during the period from Jan 2nd 2019 to Jan 31st 2019 but I still think I am a connected not a silent Bitcoin user and contribute to the Bitcoin network. How do the authors tackle this issue?
- (4) I am curious about Figure 6 where r -square of 500-days is very close to zero around 2015, and Figure 7 where beta of 250-days and 500-days is lower than -1 around 2015. What happened in 2015?
- (5) I suggest that the authors should remove the LPPL section. The authors have stated that the main conclusion is the validity of Metcalfe's law, but what is the relationship between Metcalfe's law and cryptocurrency bubble?
- (6) The title should be changed, don't mention "herding". Because the authors only say the herding is potential or possible and the paper does not use the CASD and CSSA approaches, such as Bouri *et al.* (2018) and Vidal-Tomás *et al.* (2018). To be frank, I don't know how to conclude the herding behavior from Metcalfe's law. The logic is far-fetched.

Minor comments

- (1) The cryptocurrencies listed in Table 1 should be ordered in market capitalization.
- (2) I use MATLAB 2018b to test the stationarity of log Bitcoin price (Coincapmarket.com) ranging from 2013/04/28 to 2018/10/02, but find the p-value of ADF test is 0.9847. So I think the authors should check the computing process.
- (3) The authors miss some important references. For example, although the paper cites Fry (2015), I don't find it in the reference part; Cheah and Fry (2015) and Fry and Cheah (2016) are also about the bubble of cryptocurrency; the pioneer paper on the inefficiency of Bitcoin (Urquhart, 2016) is related to the statistical properties; Van Vliet (2018) also studies Metcalfe's Law in Bitcoin market; Shen et al. (2019) use VAR and Granger causality, which

are linked to Section 3.3.3. The authors should cite them.

- (4) The journal name of Ref [19] should be Journal of Empirical Finance, not Empirical Finance. Ref [26] – [31] should be footnotes.

I suggest that the authors should consider the above comments and revise the paper.

- Bouri, E., Gupta, R., & Roubaud, D. 2018. Herding behaviour in cryptocurrencies. *Finance Research Letters*.
- Cheah, E.-T., & Fry, J. 2015. Speculative bubbles in Bitcoin markets? An empirical investigation into the fundamental value of Bitcoin. *Economics Letters*, 130, 32-36.
- Fry, J., & Cheah, E.-T. 2016. Negative bubbles and shocks in cryptocurrency markets. *International Review of Financial Analysis*, 47, 343-352.
- Shen, D., Urquhart, A., & Wang, P. 2019. Does twitter predict Bitcoin? *Economics Letters*, 174, 118-122.
- Urquhart, A. 2016. The inefficiency of Bitcoin. *Economics Letters*, 148, 80-82.
- Van Vliet, B. 2018. An alternative model of Metcalfe's Law for valuing Bitcoin. *Economics Letters*, 165, 70-72.
- Vidal-Tomás, D., Ibáñez, A. M., & Farinós, J. E. 2018. Herding in the cryptocurrency market: CSSD and CSAD approaches. *Finance Research Letters*, *Forthcoming*.