

# Which Came First, Price or Activity? A Vicious Circle of a Blockchain-Based Social Media in the Bear Market (Extended Abstract)\*

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Steemit<sup>1</sup> is one of the most widely used blockchain-based social media.<sup>2</sup> On Steemit, users can get rewards in the form of cryptocurrencies called STEEM and SBD (Steem Blockchain Dollars) if their posts are upvoted (“liked”). As the name suggests, SBD intends to follow 1 US Dollar, but the STEEM price can be quite volatile. Users can also get rewards by (up)voting others’ posts, which is called a curation reward. A reward is proportional to a voter’s STEEM stakes, which is called STEEM Power. Throughout this process, Steemit hopes that “good” contents can be created and discovered in a decentralized way.

One may expect that there is a correlation between the STEEM price and the user activity on Steemit. For instance, an increase in the STEEM price may cause an increase in the Steemit activity as users would be attracted by its lucrative rewards. Likewise, as the activity on Steemit increases, there may be more interest in the linked cryptocurrency STEEM.

To the best of our knowledge, our paper is the first to investigate the causal relationship of the activity on the blockchain-based social media and the linked cryptocurrency through time-series analysis. We analyze the entire Steemit data and the STEEM price from May 7th, 2017 to March 19th, 2020. We measure the Steemit activity as the DAU (Daily Active Users) which is calculated as the number of unique users who write posts or comments on Steemit each day. This paper explores the causality between the STEEM price and the Steemit DAU using the VAR (vector autoregressive) model and Granger causality test (Granger 1969).

Specifically we analyze three regimes: a full regime, a bull-market regime, and a bear-market regime. The full regime contains the whole data sample, and the bull or bear-market regime contains the period when the market is bullish or bearish, respectively. In order to use the Granger causality test, the time series should be stationary, which can be tested by the Augmented Dickey-Fuller test and the Phillips-

Perron test. In many cases, including our data, the original time series is not stationary. In such cases, transformations such as differencing and taking logarithm should be applied. We use both the first-differenced and the logarithmic first-differenced (or simply, log-differenced) data for our analysis. Note that the log-differenced data is widely used, since the regression result can provide the percentage change interpretation.

First, using the log-differenced data, we show that in all regimes, the STEEM price Granger causes the Steemit DAU, but not the other way around. Furthermore, we also analyze the first-differenced data. As before, in all regimes, the STEEM price Granger causes the Steemit DAU, but the Steemit DAU does not Granger cause the STEEM price in both full and bull-market regimes. In contrast, in the bear-market regime, the Steemit DAU Granger causes STEEM price. That is, in the bear regime, the STEEM price and the Steemit DAU Granger cause each other, which can be seen as a vicious circle.

As opposed to more traditional social media such as Facebook and Twitter, which are run by publicly traded companies, the Steemit users may be more sensitive to the change in the STEEM price, as the reward is paid by STEEM. Our result may suggest that the Steemit users (who may also be investors of STEEM) react to the change of the Steem price more pronouncedly in the bear market than in the bull market.

## Ethics Statement

All the data we used for our analysis in this paper is publicly available. Steemit, the social media on the Steem blockchain (<https://steem.com>), that we used for the activity analysis, logged the activity data on the Steem blockchain. By the nature of a public blockchain, all data is publicly accessible. The Steem price data is also publicly available, for instance, from CoinMarketCap (<https://coinmarketcap.com>), which we used for the data collection.

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<sup>1</sup><https://steemit.com>

<sup>2</sup>See <https://www.stateofthedapps.com>.

uation (IITP) grant funded by the Korea government (MSIT) (No. RS-2024-00397663, Real-time XR Interface Technology Development for Environmental Adaptation).

## References

Granger, C. W. 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37(3): 424–438.

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## Paper Checklist

1. For most authors...
  - (a) Would answering this research question advance science without violating social contracts, such as violating privacy norms, perpetuating unfair profiling, exacerbating the socio-economic divide, or implying disrespect to societies or cultures? **Yes**
  - (b) Do your main claims in the abstract and introduction accurately reflect the paper's contributions and scope? **Yes**
  - (c) Do you clarify how the proposed methodological approach is appropriate for the claims made? **Yes**
  - (d) Do you clarify what are possible artifacts in the data used, given population-specific distributions? **NA**, our analysis is unrelated to the population-specific distributions. And we also use all data given the sample period.
  - (e) Did you describe the limitations of your work? **Yes**
  - (f) Did you discuss any potential negative societal impacts of your work? **Yes**
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2. Additionally, if your study involves hypotheses testing...
  - (a) Did you clearly state the assumptions underlying all theoretical results? **Yes**
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  - (e) Did you address potential biases or limitations in your theoretical framework? **Yes**
3. Additionally, if you are including theoretical proofs...

**NA**, we do not prove theoretical results.
4. Additionally, if you ran machine learning experiments...

**NA**, we did not run machine learning experiments.
5. Additionally, if you are using existing assets (e.g., code, data, models) or curating/releasing new assets, **without compromising anonymity**...
  - (a) If your work uses existing assets, did you cite the creators? **Yes, we mentioned the name of libraries and the homepage of the tool or any data source.**
  - (b) Did you mention the license of the assets? **Yes, we are only using publicly available data: public blockchain and publicly available price data.**
  - (c) Did you include any new assets in the supplemental material or as a URL? **NA**, we did not create new dataset, the code for the analysis can be submitted upon request.
  - (d) Did you discuss whether and how consent was obtained from people whose data you're using/curating? **NA**, we only use publicly available and anonymized data, in particular, daily active users (DAU).
  - (e) Did you discuss whether the data you are using/curating contains personally identifiable information or offensive content? **NA**, DAU does not contain personally identifiable information, especially because DAU is big enough.
  - (f) If you are curating or releasing new datasets, did you discuss how you intend to make your datasets FAIR (see FORCE11 (2020))? **NA**
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6. Additionally, if you used crowdsourcing or conducted research with human subjects, **without compromising anonymity**...

**NA**, we did not use crowdsourcing or conduct research with human subjects.