

Media matters

Understanding the impact of media coverage on the Bitcoin market



- Professor Ernest Biktimirov at Brock University and Financial Analyst Liana Biktimirova, Canada, used topic modelling analysis to investigate Bitcoin coverage by the Wall Street Journal, identifying six distinct Bitcoin-related topics.
- Sentiment analysis (positive vs negative coverage) and a 'hype' score (intensity of coverage) were calculated for each topic and correlated with Bitcoin price, trading volume, and volatility.
- The study provides valuable insights into the interplay between media discourse and Bitcoin market dynamics, underscoring the power of topic modelling analysis in financial research.

Over the past decade, Bitcoin has experienced a meteoric rise from a niche digital currency, experimented with by cryptography enthusiasts and technologists, to a globally recognised financial asset class adopted by the world's largest institutions, companies, and even nation states^{1,2}. Alongside this rapid adoption, the asset has experienced tremendous growth in both usage and, of course, price. Bitcoin was the best-performing financial asset in 8 out of 11 years since 2013 and returned, on average, an astonishing 671% per year³.

These outsized returns do not come without substantial risk. While the longer-term track record of Bitcoin is clearly positive, the asset class is also extremely volatile. Indeed, in the years where Bitcoin was not the best-performing asset, it was the worst-performing asset – posting drawdowns of -58% in 2014 and -73% in 2018³. Due to this combination of high risk and high reward, any models or tools that provide predictive or explanatory power of the Bitcoin market could be extremely valuable. This is where new research by Ernest Biktimirov, a Professor of Finance at the Goodman School of Business of Brock University, Canada, and Liana Biktimirova, a Financial Analyst in Toronto, comes in⁴.

Media magic

Biktimirov and Biktimirova's research focuses on an innovative tool in finance research called 'topic modelling analysis'. Topic modelling analysis allows the dissection of published media into clearly defined topical themes. Then, it quantifies attention and sentiment (positive or negative) associated with each theme over time.

Biktimirov and his co-authors have published two previous studies using this methodology to analyse the relationship between housing media sentiment and house price changes in the US, as well as the relationship between media reporting and US stock market returns during the COVID-19 pandemic^{5,6}. For the current study, the researchers identified six distinct Bitcoin-related topics by analysing over 3,000 articles published by the Wall Street Journal from 2013 to 2021: *Investing*, *Bitcoin Market*, *Regulation*, *Private Equity*, *Cybersecurity*, and *Macroeconomy*.

A sentiment score for each article was produced by data mining the text using predefined positive and negative word lists and calculating the difference between the sum of each list for each article. While other studies using topic modelling analysis typically focus only on sentiment, Biktimirov and Biktimirova pioneered an extra layer of analysis named the 'hype' score. The hype score, which reflects the intensity of coverage of each topic for a given month, has also been used by Biktimirov and his co-authors in

their 2021 study on US stock market returns during the COVID-19 pandemic⁶.

The results of their study are fascinating. *Investing* was by far the most discussed topic, appearing in 72% of articles from the sampled period. In contrast, *Macroeconomy* only appeared in a third of the articles studied. Interestingly, all Bitcoin-related topics had overall negative sentiment scores, perhaps reflecting the prevailing view of the traditional finance world towards Bitcoin and the cryptocurrency markets to date. This is reinforced by the finding that *Cybersecurity* had the most negative sentiment score – with security, fraud, and hacks being a common concern for most people regarding cryptocurrencies. Key events and major announcements are also reflected in the sentiment scores, as shown by a steep drop in the *Cybersecurity* sentiment score following the hack of over 100 high-profile Twitter accounts to promote a Bitcoin scam in 2020.

The buzz about Bitcoin

While sentiment scores tended to vary between topics, the hype scores shared more similar trends. The most notable trend is seen in 2017, when hype scores for all topics increased dramatically as Bitcoin skyrocketed past its previous all-time-high price. This trend was repeated in 2021 when Bitcoin again hit a new all-time high as the global economy began recovering from the effects of the COVID-19 pandemic. This pattern underscores a strong relationship between media coverage and investor behaviour.

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Correlating the sentiment and hype scores between each topic reveals further insights. *Investing*, *Private Equity*, and *Macroeconomy* show significant positive correlations with each other, while *Regulation* and *Cybersecurity* commonly exhibit a negative correlation. Hype scores show positive correlations for all topics, with the highest correlation between *Investing* and *Macroeconomy*.

The final step in the analysis involved taking the data produced from the sentiment analysis and hype scores for each topic and relating them using a regression model against three core metrics of the Bitcoin market: returns, trading volumes, and volatility. Interestingly, only sentiment scores for *Investing*, *Macroeconomy*, and *General* (a measure of all six topics combined) were positively related

Modified from Biktimirov & Biktimirova (2023), doi.org/10.1016/j.econlet.2023.111311

Word cloud for *Cybersecurity*. The font size represents the relative frequency of each word.

Modified from Biktimirov & Biktimirova (2023), doi.org/10.1016/j.econlet.2023.111311

Word cloud for *Investing*. The font size represents the relative frequency of each word.

Modified from Biktimirov & Biktimirova (2023), doi.org/10.1016/j.econlet.2023.111311

Word cloud for *Regulation*. The font size represents the relative frequency of each word.

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to Bitcoin returns. Sentiment scores for *Bitcoin Market, Regulation, Private Equity*, and *Cybersecurity* showed no significant relation to Bitcoin returns. Another finding was that the hype scores for *Investing, Private Equity, Macroeconomy*, and *Cybersecurity* all had negative relationships with Bitcoin returns during Bitcoin bear markets – when the price is in a negative trend – but not in Bitcoin bull markets – when the price is rising – highlighting different relationships in different markets.

Turning media mayhem into clear conclusions

Biktimirov and Biktimirova’s recent paper documents the first application of topic modelling analysis to the Bitcoin market in the research literature. It provides many new insights into the relationship between the financial media and the Bitcoin market. One key takeaway from the study is that the six topics identified differ in their relation to Bitcoin returns, trading volume, and volatility – not only in strength but also in direction (negative vs positive) and shape (linear vs non-linear). By calculating and analysing the ‘hype’ score, the research team also demonstrates that the intensity of media coverage offers extra explanatory power for Bitcoin market metrics.

While the exact relationship between each Bitcoin-related topic and the Bitcoin market effects is complex and dynamic, changing over time as narratives form and fade, one thing is abundantly clear – topic modelling analysis is a powerful tool for analysing financial markets of all types, especially in our increasingly interconnected and media-driven world.

Personal response

What was the inspiration behind conducting this research?

We were inspired to conduct this research for two reasons. First, the role of Bitcoin has grown significantly in the modern world, and therefore, it is becoming increasingly important to understand the factors that affect its value. Second, an innovative tool in finance research – topic modelling analysis – can uncover hidden themes, trends, and sentiments that may impact the Bitcoin financial market. In this research, we were attracted by the opportunity to apply topic modelling analysis to discover specific Bitcoin-related topics that are discussed in printed business media and to examine the relation of their sentiment and hype to Bitcoin’s return, trading volume, and volatility.

What were the biggest challenges and barriers to conducting and completing this research?

The main challenges that we encountered in this research were related to several subjective choices related to topic modelling analysis. Specifically, as researchers, we had to decide on the list

of stop words, such as ‘the’, ‘an’, ‘then’, and ‘etc’, dictionaries for measuring sentiment, and the number of topics. To ensure that our choices did not affect the observed results, we performed extensive robustness checks that included different stop words, dictionaries, and numbers of topics. For example, to confirm our choice for the number of topics, we examined the results across 1 to 15 topics.

What are the main implications of this research for Bitcoin investors?

Our research identifies the specific topics that warrant investors’ attention in different market conditions. Moreover, the intensity of discussions (measured by hype scores), not only sentiment, can offer additional insights about the Bitcoin market.

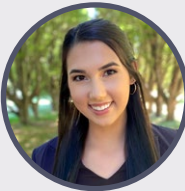
Does topic modelling analysis hold predictive power for anticipating changes in Bitcoin price, trading volumes and volatility?

Topic modelling not only holds predictive power for Bitcoin price, trading volumes, and volatility changes, but also, most importantly, identifies the specific topics that drive this relationship.

Details



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Bio

Ernest Biktimirov, PhD, CFA, is a Finance Professor at Brock University, Canada. With a PhD in Finance from the University of Kentucky, he specialises in empirical asset pricing, behavioural finance, and financial education.

Liana Biktimirova, with a BBA in finance from Brock, works as a Financial Analyst in Toronto, Canada.

Further reading

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