Cryptocurrency research: future directions

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INTRODUCTION

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Cryptocurrency research: future directions

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ABSTRACT

Since Bitcoin was first proposed in late 2008 and went live in 2009, hundreds of research papers have been published trying to understand the behaviour of cryptocurrencies and their impact on financial markets. Their size and importance to the financial sector has increased substantially also has the number of challenges they face and the negative externalities they have caused. This article reviews the related cryptocurrency literature and introduces articles included in this special issue on this theme which were presented at the 2020 Cryptocurrency Research Conference. We conclude by offering possible future research directions.

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Cryptocurrencies; bitcoin; fintech; alternative finance

1. Introduction

Cryptocurrencies have emerged as a disruptive and transformative force in the world of finance, challenging traditional financial systems and capturing the attention of investors, academics, and policymakers alike. Since the introduction of Bitcoin in 2009, the cryptocurrency market has experienced unprecedented growth, fostering a wave of innovation and research across various disciplines. Bitcoin's revolutionary design, based on blockchain technology, laid the foundation for a new era of digital currencies. The early years witnessed scepticism with only a handful of papers published on this topic by finance scholars (e.g. Dwyer 2015; Urquhart 2016), but as adoption grew, cryptocurrencies gained momentum as an alternative investment asset offering diversification and hedging properties to investors (Corbet et al., 2018). The rapid advancement of blockchain technology has given rise to a multitude of cryptocurrencies, each with unique features and use cases. From smart contracts on the Ethereum platform to privacy-centric coins like Monero and Zcash, technological innovations have fuelled the diversification of the cryptocurrency ecosystem (Chod and Lyandres 2023; Katsiampa, Yarovaya, and Zięba 2023; Sapkota and Grobys 2021). Researchers have extensively explored blockchain's underlying principles, cryptographic algorithms, and consensus mechanisms to categorize crypto assets based on their technological characteristics and utility (e.g. Benedetti and Nikbakht 2021; Corbet et al. 2020a).

The cryptocurrency market has been characterized by extreme price volatility, attracting substantial attention from investors and researchers (Duan et al. 2021; Gkillas et al. 2023; Shen, Urquhart, and Wang 2020). Studies have delved into market efficiency, performance, liquidity, and the presence of market anomalies (Brauneis et al. 2022; Manahov and Urquhart 2021; Momtaz 2021; Shi, Zhai, and Wu 2023 Wei 2018). The integration of cryptocurrencies into traditional financial markets has been the subject of intense investigation. Researchers have examined the interactions between cryptocurrencies and other asset classes, such as stocks and commodities, to understand the extent of co-movement and contagion effects (Corbet et al., 2018; Elsayed, Gozgor, and Yarovaya 2022). Additionally, research has focused on the risk characteristics of cryptocurrencies, including measures of volatility, tail risk, and correlations with macroeconomic variables (e.g. Borri 2019; Naeem et al. 2023). The decentralized nature of cryptocurrencies has posed significant challenges for regulators and policymakers. The absence of a central authority raises concerns about consumer protection, financial stability,

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and potential illicit activities (Foley, Karlsen, and Putninš 2019). Research in this domain has explored various regulatory approaches and their impact on market behaviour and adoption (Jalan et al. 2023).

A lack of cryptocurrency regulation, coupled with their rapid growth and adoption, has led to numerous scandals and controversies, ranging from security breaches and hacks to fraudulent schemes and market manipulations (Akyildirim et al., 2020). These incidents have piqued the interest of finance researchers, who seek to understand the underlying factors contributing to such events and their implications for financial markets. Understanding the behaviour of market participants is crucial to comprehending cryptocurrency price movements. Behavioural finance has been employed to study investor sentiment, herding behaviour, and the role of emotions in decision-making (Yarovaya, Matkovskyy, and Jalan 2021). Additionally, studies have examined the impact of media on cryptocurrency market sentiment and its ability to predict price trends (e.g. Corbet et al. 2020b; Lucey et al. 2022).

The energy-intensive nature of cryptocurrency mining has raised concerns about its environmental impact (Corbet, Lucey, and Yarovaya 2021). Researchers have investigated the energy consumption of various cryptocurrencies, compared their carbon footprints to traditional financial systems, and explored potential solutions to enhance sustainability (e.g. De Vries 2023). As the cryptocurrency landscape continues to evolve, finance scholars will undoubtedly play a critical role in shaping the understanding and potential applications of this transformative technology. This paper provides a snapshot of the current state of cryptocurrency research based on the papers presented at the Cryptocurrency Research Conference 2020 and submitted to this Special Issue, highlighting key themes, challenges, and opportunities for future investigation.

2. The cryptocurrency research conference

To promote and advance research on cryptocurrencies, Dr. Larisa Yarovaya initiated the first Cryptocurrency Research Conference (CRC) in 2018. The conference aims to bring together an international group of academics conducting research in cryptofinance and related disciplines, as well as practitioners and policymakers, to foster debates on current issues surrounding cryptocurrencies and digital finance. The first conference was held at Anglia Ruskin University, Cambridge, UK, and the subsequent one took place at the University of Southampton in 2019. Amidst the COVID-19 pandemic, the ICMA Centre, Henley Business School, hosted the event virtually in 2020, and this special issue was attached to it. The conference continued to be held virtually in 2021. Following that, in 2022, the conference took place at Durham University, and in 2023, it was held at the International University of Monaco.

For the 2020 version, more than 80 papers were submitted to this conference by scholars all over the world and after careful consideration, 40 papers were invited for presentation in the conference. After a double-blind review process, seven papers were accepted for this Special Issue. The conference keynote speakers were Professor Douglas Cumming from Florida Atlantic University and Professor Sean Foley from Macquarie University, two leading academics in the cryptocurrency space.

3. Articles in this special issue

In this section, we summarize the findings and implications of the seven accepted articles in this special issue.

Cryptocurrencies have had a big impact on other financial markets and two papers in this special study on these flows and spillovers between markets. Elsayed and Sousa (2023) study the dynamic spillovers between international monetary policies in Europe, Japan, the UK and the US and three large cryptocurrencies through a time-varying parameter vector autoregressive model. The authors find strong evidence of spillovers between cryptocurrency returns and monetary policy, especially during times when shadow policy rates became negative. The gross directional spillovers suggest that the shadow policy rates spill over more than they receive, while those to and from cryptocurrencies are, unsurprisingly, volatile. Interestingly, the authors show strong interconnectedness between monetary policy in either the US or the Eurozone and the UK, and also between Bitcoin and Litecoin. Finally, the authors show that the Fed's 'unconventional' policy, compared to 'standard' policy, spillovers are only slightly larger but their composition qualitatively changed over time.

The second paper that studies spillovers in this special issue is Hou et al. (2023) who study the spillovers between Bitcoin and the crude oil market, with a special focus on the impact of the US–China trade war. Since Bitcoin has similar characteristics to commodities, there is a rationale that investors who trade commodities might also be interested in commodities causing spillovers. The authors also point out that the literature has not yet found clear evidence of the dynamics of informational linkages between Bitcoin and crude oil markets. Interestingly, this paper considers both a static and time-varying information transmission of volatility, skewness and kurtosis between two popular Bitcoin markets, Bitstamp and ItBit, and the two major crude oil markets, WTI and Brent crude oil. By implementing a two-state regime model to estimate higher-order moments and Legendre polynomials, the authors find that crude oil is an information transmitter while Bitcoin is an information receiver in terms of the static and time-varying between-market transmission of three different risk measures. The information content of Bitcoin is enhanced once the US–China trade war begins and Bitcoin becomes a diversifier for oil risk which becomes more pronounced in the post-trade war period.

The third paper of the special issue studies the impact of various types of jumps occurring in one cryptocurrency's price process on the discontinuity component of the realized volatility of other cryptocurrencies. Gkillas et al. (2023) proposes a novel jump model approach to capture the asymmetric effects of various jump variations in the underlying price process, which is motivated by two stylized facts observed in cryptocurrency markets, namely very high volatility, and the existence of jumps. Another benefit of this model is that it is able to assess the impact of co-jumps too. The paper shows that downside, upside and small jumps negatively affect the jump component of other cryptocurrencies' realized volatility, while larger jumps have the opposite effect. Interestingly, the authors also show that co-jumping behaviour can trigger future jumps while upside and downside jumps in the S&P500 negatively impact cryptocurrency markets.

Yao et al. (2023) is the fourth paper of this special issue and they study the issue of investor attention on idiosyncratic risk in cryptocurrency markets. To measure investor attention, Google Trends is utilized and they show that increased attention leads to significantly lower idiosyncratic risk by increasing liquidity. Interestingly, the authors show that the effect of investor sentiment is larger for smaller cryptocurrencies in terms of market capitalization and for younger cryptocurrencies. This suggests that the attention of smaller and younger coins is very important for pricing their behaviours. Finally, the authors note that this effect is stronger in more stable external market environments and a rising market state.

The fifth paper included in this special issue is by Karaa et al. (2023), which is one of the first papers in the literature to study whether feedback trading is present in cryptocurrency markets and how noise-related factors, such as sentiment, volume and liquidity, affect its presence. The paper uses data from the popular exchange Bitstamp and finds strong evidence of positive feedback trading, which grows stronger as the frequency of data becomes higher. However, the presence of feedback trading is mainly during periods of high and rising sentiment, volume and liquidity. Interestingly, feedback trading is identified mostly during times when the European and North American stock markets are open and noise trading in cryptocurrency markets exhibits similar effects to feedback trading in other asset classes.

Related to the previous paper in this special, Kalyvas et al. (2023) studyied the mediating effect of behavioural factors on the relationship between Bitcoin returns and industry indices. This paper studies four industry indices which may have a relationship with Bitcoin, namely technology, energy, clean energy and banking indices. By using the sentiment index from Thomson Reuters Marketpsych, the authors find that the sensitives of technology and clean energy indices to sentiment positively and significantly strengthen the relationship between sentiment and Bitcoin returns. Therefore, the authors show that investors' sentiment captures the association between Bitcoin and sectors related to cryptocurrencies, which is contrary to prior studies that find a direct relationship between industry indices and Bitcoin returns.

Contrary to the other papers published in this special issue that study Bitcoin and other cryptocurrencies, Hoang and Baur (2023) study stablecoins, a special group of cryptocurrencies that are pegged to another asset, usually the US dollar. Stablecoin market capitalization continues to rise; however, there is a lack of understanding of their behaviour and working dynamics. This paper uses high-frequency data and shows significant evidence of excess price variations. The authors argue that Bitcoin is the likely course of the excess volatility due to its correlation with Bitcoin. They also show that through a quasi-natural experiment stablecoins increase the trading volume on Bitcoin.

4. Future research directions

In this section, we explain a few key areas that future research within cryptocurrencies should study in order to progress our understanding and appreciation of cryptocurrencies.

Firstly, and related to the final paper in this special issue, stablecoins. Stablecoins are growing in size, usage and influence on cryptocurrency markets and traditional financial markets in general. Tether, the world's largest stablecoin, has a market capitalization of over $83 billion while the leading five stablecoins are all valued at over $3 billion each.[1] Stablecoins are used for transaction cryptocurrencies and are a real challenge to fiat currencies; however, our understanding of stablecoins is very limited. Grobys and Huynh (2021) show that Tether causes Bitcoin to jump while Grobys et al. (2021) and Duan and Urquhart (2023) show the instability of stablecoins. A seminal paper by Lyons and Viswanath-Natraj (2023) demonstrates that improved arbitrage design stabilizes the price of Tether while Catalini, de Gortari, and Shah (2022) provide some simple economics for stablecoins. However, with the collapse of Terra in May 2022 and the regulatory attention stablecoins are attracting, academia needs to pursue studies on how best to design stablecoins, who trades them, how they can best keep their peg, as well as the impact that stablecoins have on other financial markets as well as cryptocurrencies.

Secondly, we encourage investigations into criminality within cryptocurrency markets. The seminal paper by Foley, Karlsen, and Putninš (2019) documented that around 46% (or $76 billion) of illegal activity involved Bitcoin per year, while subsequent studies, while Gandal et al (2018) showed the suspicious trading around the Mt. Gox collapse. Dhawan and Putninš (2022) showed that cryptocurrency manipulators pump extreme distortions of 65% while Amiram, Jorgensen, and Rabetti (2022) show that unregulated exchanges are central to laundering funds between terrorists and operatives on the ground. However, given the scale of misconduct reported in the press and nearly every regulator in the world studying closely how these markets work and perform[2] it is imperative that future research studies the criminality in cryptocurrency markets and how regulation may help to get this under control. This research area may lead to cross-discipline collaboration between lawyers, computer scientists, criminologists and well as finance/economic experts.

Thirdly, the current literature mainly concerns how cryptocurrency prices behave in relation to others and whether behaviours found in traditional markets are also present in cryptocurrency markets. But why should certain behaviours in traditional markets be present in cryptocurrency markets? Future research should use the unique characteristics of cryptocurrency to study the distinctive behaviours of cryptocurrencies. One huge benefit of most cryptocurrencies is the use of public blockchains, where researchers can track every transaction between entities and provide real in-depth analyses of the on-chain behaviour of cryptocurrencies. Only a handful of studies have used such data to provide insight into the behaviour on the chain (Foley, Karlsen, and Putninš 2019; Griffin and Shams 2020; Jahanshahloo, Irresberger, and Urquhart 2023; Makarov and Shoar 2023). Given the ability to study every block, transaction and user on the blockchain, as well as their behaviours, it would be a very fruitful future research area.

Finally, cryptocurrency research needs to interact more with climate and green finance. Both areas of research have grown substantially in recent years but the interaction between both disciplines is severely lacking. Many cryptocurrencies, including Bitcoin, use the proof-of-work consensus mechanism which consumes a tremendous amount of energy (Cambridge Bitcoin Electricity Consumption Index). Although some cryptocurrencies use the virtually zero environmental impact consensus mechanism, proof-of-stake, some of the largest coins have a serious impact on the environment. Therefore, we encourage future research to merge these two areas and document the impact cryptocurrencies are having on the environment and how we can mitigate such issues in the future.

Notes

1. As of 7th July 2023.
2. https://decrypt.co/116511/ftc-probes-possible-misconduct-cryptocurrency-advertising.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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