Scientific
Research
Publishing

The Drivers of Economic Bubbles in Cryptocurrencies That Affect Its Long-Term Sustainability

Michael Brode

The Oakwood School, Greenville, USA
Email: mbrode@theoakwoodschool.org

Abstract

Cryptocurrencies have emerged as a viable alternative to traditional financial systems. However, the rapid rise of cryptocurrencies has led to concerns and debates about the sustainable characteristics of risky investments like cryptocurrencies. This research explores the drivers of economic bubbles in the cryptocurrency market, potentially affecting their long-term sustainability and implications. In the quantitative analysis, this research employs time series analysis to analyze data and identify patterns of historical cryptocurrency prices and trading volume to explore the relationship between bubble indicators and sustainability factors. The qualitative analysis reveals that most investors rely on social media, newspapers, and other trusted businesses to gather information about the cryptocurrencies they intend to invest in.

Keywords

Cryptocurrency, Sustainability, Economic Bubbles, ESG, Investor Sentiment, Pump and Dump Schemes, Bitcoin, Blockchain, Economic Policy

1. Introduction: Exploring the Decentralized Paradigm of Cryptocurrencies

The rapid evolution of financial technology has introduced a revolutionary concept that challenges traditional notions of currency, transactions, and institutional control. At the forefront of this technological upheaval is the emergence of cryptocurrencies, digital assets built on decentralized blockchain technology. While the discussion surrounding cryptocurrencies often centers on their volatile market behavior and potential for financial gain, the heart of their significance lies in their unique ability to transcend established financial paradigms.

This research paper delves deep into the core principles of cryptocurrencies, particularly their decentralized nature, autonomy, and the philosophical underpinnings that advocate for a departure from centralized financial systems. By examining the decentralized framework that underlies cryptocurrencies, this study seeks to elucidate the rationale behind the movement's persistence in favoring financial autonomy and privacy over conventional regulatory oversight.

2. Context and Purpose Structure of the Paper

In the following sections, we will embark on a journey through the multifaceted landscape of cryptocurrencies. This paper reviews the foundational principles that gave birth to cryptocurrencies and the technological infrastructure that sustains their decentralized nature. From there, we will explore the inherent advantages of decentralization, including financial inclusivity, autonomy, and resistance to censorship. Subsequently, our exploration will extend to the potential consequences of regulatory interference in the realm of cryptocurrencies. We will delve into concerns related to innovation stifling, centralization of power, and the intricate challenge of balancing privacy rights with regulatory oversight.

Implications and Significance

As the financial world grapples with the rise of cryptocurrencies and the dilemma of regulating a technology designed to operate beyond traditional boundaries, this research paper aims to provide a comprehensive understanding of the philosophical, technical, and societal dimensions at play. By shedding light on the essence of decentralized cryptocurrencies and the implications of potential regulatory measures, we seek to empower readers with the knowledge necessary to engage thoughtfully in the ongoing dialogue surrounding the future of finance.

In the pages that follow, the paper navigates the intricate intersections of technology, philosophy, economics, and governance to unveil the rationale behind the steadfast belief in the decentralized paradigm of cryptocurrencies. Through a balanced exploration of benefits and challenges, we endeavor to contribute to the shaping of a discourse that not only acknowledges the transformative potential of cryptocurrencies but also respects the values of autonomy, privacy, and financial empowerment that underlie their existence.

The global cryptocurrency market has grown significantly over the past several years. Moreover, international investors have been lured by cryptocurrencies, whereby the majority have invested a significant amount of their reserves into the cryptocurrency market. However, the frequent crashes in the cryptocurrency market have ignited concerns and debates about the sustainable characteristics of risky investments like cryptocurrencies. Their soaring prices, without apparent justification, have also triggered suspicion about whether these sharp prices result from economic bubbles.

Haykir and Yagli (2022) argue that cryptocurrency economic bubbles origi-

nate from several factors. First is the divergence between an asset's market value and intrinsic value. Secondly, the market inefficiency in the digital market causes volatile cryptocurrency price movements. Thirdly, economic bubbles are closely linked to technological factors. Thus, economic bubbles in cryptocurrencies may be due to their innovative financial products. Fourthly, the limited supply of cryptocurrencies such as Bitcoin may push up their demand in the market, hence inducing bubble formation in the cryptocurrency prices. Finally, many investors are not knowledgeable about cryptocurrencies (Haykir & Yagli, 2022).

This research paper explores various critical drivers of economic bubbles in cryptocurrency, potentially affecting long-term sustainability, founded on the above factors. Thus, this paper is as follows: the subsequent section delves into the literature review, which explores various findings on economic bubbles in cryptocurrencies. The third section offers the methodology part of the study, which explores the quantitative, qualitative, sentimental, network, and econometric analysis. The final part of the study provides the discussion and conclusion part of the study.

3. Literature Review

For the last decade, the rise of Cryptocurrency has been one of the most impressive economic revolutions globally. Thus, their high-tech assets and exciting price behavior have fascinated worldwide investors, researchers, media coverage, and regulators. However, most cryptocurrencies have had a reputation for having volatile prices, dramatic price increases, and downfalls in the last few years. Most researchers, therefore, have questioned if cryptocurrencies experience economic bubbles, and if they do, should they be controlled? This segment explores various critical drivers of financial bubbles in the cryptocurrency market, potentially affecting its long-term sustainability, as discussed by several economic researchers.

Enoksen et al. (2020) define a bubble as an aberration from the ultimate value. Thus, an economic bubble happens when the price of an asset/item is significantly higher than its intrinsic value. However, where Cryptocurrency is involved, researchers define a bubble as volatile price behavior. In their research study, Enoksen et al. (2020) employ the PSY outline to identify bubbles for the following cryptos: BTC, Ether, Ripple, LTC, Monero, Dash coin, Nem coin, and Dogecoin. Next, they explore whether three variable quantities capturing ambiguity in overall monetary markets can predict financial bubbles in the above cryptocurrencies. The three variables are the EPU guide, the VIX index, and the Ted spread index. Their results prove that price unpredictability and transaction bulk consistently correlate positively with bubble performance. Thus, a high EPU index implies a greater possibility of cryptocurrency bubbles, while a lower VIX index reveals a lesser chance of bubbles.

Wang and Vergne (2017) investigate the aspects linked with disparities in cryptocurrency market values. Thus, they explore whether the "buzz" on cryp-

tocurrencies in social media and the internet explains their price disparities. Using an exclusive measure of innovation potential, their studies reveal that the buzz on crypto is undesirably associated with revenue after regulating factors such as liquidity and supply growth. Their research shows that a cryptocurrency's association with deceitful movement is not depressingly linked to payments. Thus, this finding proves that media has a strong influence on cryptocurrencies. Finally, their findings prove a positive relationship between an increase in supply and weekly returns.

Phillips and Gorse (2018) employ a wavelet coherence (a statistical method that examines how the frequencies of two-time series signals are correlated over time, revealing patterns and associations between their different frequency components) to study the relationship between crypto price and its related features online activities. Their work examines four cryptocurrencies: Bitcoin, Ethereum, Litecoin, and Monero. The online activities factors are: social media influences derived from Reddit, Google search volume, and Wikipedia. Their findings reveal that the connection between cryptocurrency prices and online activities could be more stable, sparse, and contain the most negatives in the short run. Thus, in the short-term period, online activities increase to reduced prices. A noteworthy negative correlation between online influences and price occurred in mid-2016 when a popular app of the time, the DAO, sponsored by Ethereum, was hacked. Thus, due to uncertainty generated by the hack, the crypto prices significantly reduced, while online activities such as social media interest in the app dramatically increased.

However, the medium-term relationships are less irregular than those detected in the short period (Phillips & Gorse, 2018). Thus, the correction between online activities and cryptocurrency prices is favorable, with the Ethereum DAO hack being an exception. Phillips and Gorse's (2018) study reveals a consistent long-term positive association between price and online activity. Thus, the long-term positive correlation between online activity and cryptocurrency prices could be due to technological advancement. When a venture has technical progress, it attracts a given community, increasing online activity and demand, as well as the price of the Cryptocurrency (Phillips & Gorse, 2018).

De la Horra et al.'s (2019) study analyzes whether the increasing Bitcoin demand is due to its value as a medium of transaction, a speculative commodity, or a sanctuary asset. They, therefore, study it from a fiscal model standpoint and shape a mandate model that discovers long- and short-run associations among the variables. Their findings reveal that BTC is a speculative asset in a shorter period. In the long term, however, their findings reveal that conjecture does not impact Bitcoin's demand. Instead, the long-term demand for Bitcoin is driven by the positive prospects regarding BTC's future value as a transaction asset (de la Horra et al., 2019).

Erdogan et al. (2022) study the association between cryptocurrencies and ecological deterioration using typical and asymmetric methodologies. They begin

their study by employing the standard causality test proposed by Toda and Yamamoto in 1995. The test outcomes reveal that BTC and Ether, exclusive of XRP, have a causal relationship with ecological dilapidation (the degradation and decline of natural ecosystems and their components due to various environmental stressors and human activities). To check the sturdiness of the approximations, they employ the Fourier-augmented Toda-Yamamoto test. The results reveal a causal relationship between BTC and XRP to ecological dilapidation but do not show any relationship between Ethereum and economic deterioration. Although the average causality test results argue the presence of a causal association between cryptocurrency demand and ecological dilapidation, they cannot distinguish the causal impacts of constructive and undesirable shocks of BTC demand on ecological dilapidation. To address this, they employ the irregular causality tactic. The results show causal impacts from the constructive shock of BTC demand, adverse shocks of XRP and Ether demands, to positive tremors on ecological dilapidation.

The more media attention crypto has been getting, the more speculative bubbles appear, and the more media attention it gets, the more people find out about the negative side effects. The main reason for the drivers of economic bubbles in cryptocurrencies that can impact their long-term sustainability is speculative behavior. The main hypothesis for drivers of economic bubbles in cryptocurrencies that can impact their long-term sustainability is speculative behavior. Cryptocurrencies often experience rapid price surges driven by hype, speculation, and a fear of missing out (FOMO) among investors. When people invest in cryptocurrencies solely with the expectation of quick, substantial gains, it can create a speculative bubble. This bubble leads to inflated prices that are not necessarily supported by the underlying technology or fundamentals of the cryptocurrency. As more investors jump into the market, prices can skyrocket to unsustainable levels. Eventually, the bubble bursts, causing a sharp and often dramatic price correction, which can erode trust in the cryptocurrency and undermine its long-term sustainability. To ensure the long-term sustainability of cryptocurrencies, it's essential for the market to mature, for investors to base their decisions on fundamental analysis, and for regulatory frameworks to be established to deter excessive speculation and market manipulation. The main reason for drivers of economic bubbles in cryptocurrencies that can impact their long-term sustainability is speculative behavior. Cryptocurrencies often experience rapid price surges driven by hype, speculation, and a fear of missing out (FOMO) among investors. When people invest in cryptocurrencies solely with the expectation of quick, substantial gains, it can create a speculative bubble. This bubble leads to inflated prices that are not necessarily supported by the underlying technology or fundamentals of the cryptocurrency. As more investors jump into the market, prices can skyrocket to unsustainable levels. Eventually, the bubble bursts, causing a sharp and often dramatic price correction, which can erode trust in the cryptocurrency and undermine its long-term sustainabili-

ty.

To ensure the long-term sustainability of cryptocurrencies, it is essential for the market to mature, for investors to base their decisions on fundamental analysis, and for regulatory frameworks to be established to deter excessive speculation and market manipulation. The second hypothesis: environmental concerns related to cryptocurrency mining are another large driver because environmental concerns have garnered significant attention in recent years, influencing regulatory actions, investor sentiment, and the broader discourse around the sustainability of cryptocurrencies. The environmental impact of cryptocurrency mining has the potential to significantly shape the future of the crypto market and its sustainability. The more media attention crypto has been getting, the more speculative bubbles appear, and the more media attention it gets, the more people find out about the negative side effects, such as environmental issues. At the same time, it acts as a learning curve since the more media attention regarding environmental issues, the more efforts are put in place to make crypto more environmentally friendly, such as Ethereum being backed by Proof of Stake.

4. Qualitative Analysis

4.1. Data Collection Methodology

The data collection for this study involved analyzing interviews and surveys from secondary data sources using sites like Google Scholar and Web of Science to gather data from previous readings. Keywords essential to this study were cryptocurrencies, private investments, risks, government regulation, bitcoin, volatility, speculation, and investment strategies. We also utilized government and business websites to understand Americans' general sentiments regarding cryptocurrency volatility and digital banking, as well as government intervention to regulate the market.

4.2. Sampling Methodology

This research employed the snowball sampling method. Researchers in this study only considered knowledgeable participants and investors in the cryptocurrency market. The respondents were required to have more than five years of active investments in cryptocurrencies and knowledge about investments. Once they established the respondents' prerequisite to participate in the survey, a post was published on LinkedIn where it presented the topic of the study as well as the requirements. LinkedIn was the preferred social media application because it is a professional networking platform, and most of its users are within the business field. Thus, the platform is an effective way to reach educated interviewees. The sample size was 20 participants.

4.3. Research Design Methodology

After identifying the participants through the online community, the researchers drafted a questionnaire with essential research topic questions. The interviewers

asked the following research questions: 1) Do you gather information on the Cryptocurrency you invest in? 2) Do you think government involvement is essential for the Cryptocurrency market to flourish? 3) What is your investment tactic when investing in Cryptocurrency? 4) Do you think there is a future for the cryptocurrency market?

4.4. Results

4.4.1. Do You Gather Information on the Cryptocurrency You Invest In?

All the participants involved in the study had one aspect in common: before they invested in cryptocurrencies, they researched and gathered information on the CC they were interested in. What differed among the participants, however, were the sources they utilized in gathering the information and how they did it (McMorrow & Esfahani, 2021). Thus, some respondents argued that they sourced information through trusted business websites, financial reports, and newsletters. Others stated that before they made their initial investments, they examined the price performance of the Cryptocurrency in the market by utilizing graphs and social media. Participant 2; "*You know, before making that initial purchase, I try to gauge the risk of the cryptocurrency by checking its demand and supply in social media.*"

4.4.2. Do You Think Government Involvement Is Essential for the Cryptocurrency Market to Flourish?

Most participants differed significantly when asked whether government involvement/regulation is good or bad for the cryptocurrency market. Thus, although several individuals viewed it as essential and effective, most respondents argued that government intervention was unnecessary and would not contribute to the success of Cryptocurrency in the financial market (Magnusson & Stenberg, 2022). Thus, the perception of government involvement in the cryptocurrency market was largely negative. Although investors agreed that government regulation was needed, they perceived taxes as a demotivating factor in the cryptocurrency market. Participant 4: "*It is crazy how you can say that 'damn crypto is no good,' but also if you make money off of it you pay 30% taxes. But I guess it needs to be regulated in some way.*"

4.4.3. What Is Your Investment Tactic When Investing in Cryptocurrency?

Most respondents differed on the different ways to set up an investment strategy. However, what they had in common was the fact that they all traded with or purchased Cryptocurrency directly. Most of the participants also invested a fraction of between 5% and 20% of their entire wealth in Cryptocurrency (Magnusson & Stenberg, 2022). These participants were also investing for fun. Thus, this proved that they were wary of taking enormous risks in the cryptocurrency market. However, a particular individual invested 80% of his entire income/wealth in cryptocurrencies. When asked why he had invested a large proportion, he

answered that he was knowledgeable and had a clear investment strategy.

4.4.4. Do You Think There Is a Future for the Cryptocurrency Market?

Most interviewees argued that the future of Cryptocurrency is a vague one. Moreover, they mentioned that cryptocurrencies will continue to be volatile and reach new all-time highs and lows (Magnusson & Stenberg, 2022). The participants not only stated the volatility of the cryptocurrencies but also the lack of support from the government. However, some respondents argued that governments would gradually accept Cryptocurrency, and in a few years, the coins might become more stable (Magnusson & Stenberg, 2022). Most participants agreed that the cryptocurrency market will continue to grow, and the novel cryptocurrencies will rise little, but the effects on non-investors will be minimal.

5. Sentiment Analysis

This segment analyzes social media, news articles, and online forums to capture the public sentiments and perceptions of cryptocurrency. This section, therefore, explores various findings from news articles, social media platforms such as LinkedIn, and blogs/websites to explore individuals' sentiments on cryptocurrency.

5.1. Findings from Various Social Media Articles, News Articles, and Online Platforms

In his CNBC article, Devon (2022) investigates the number of Americans comfortable and willing to invest in cryptocurrency. Thus, his findings reveal that as of 2022, only 21% of Americans were happy investing in cryptocurrency. That percentage was down from 35% in 2021. Moreover, the majority of individuals unwilling to invest in cryptocurrency were millennials. Compared to 50% in 2021, only 31% of American investors aged between 26 and 41 felt comfortable investing in cryptocurrency in 2022. According to Devon (2022), the decline in the number of individuals interested in crypto was unsurprising. Thus, from November 2021 to late 2022, the crypto market lost nearly $2 trillion, making most investors have substantial financial losses. A principal reporter at Bankrate argued that the cryptocurrency market attracts investors who are only willing to invest in it when it is doing well (Devon, 2022). Thus, in case of any losses, these investors change their perceptions and sentiments on making any purchase on the cryptocurrency market.

In his news article, Franck (2022) explores the number of individuals who have invested in cryptocurrency in the United States. His findings reveal that according to the NBC report, one in five Americans have invested in, traded, or used cryptocurrency. Among the demographic studied, men aged 18 to 49 argued that they have dabbled in crypto. However, most survey participants viewed cryptocurrency as a negative digital asset. Although cryptocurrency is popular in the United States, it has negative reviews among citizens.

Bischoff (2022) investigated individuals' sentiments on cryptocurrencies and which of them are viewed favorably based on an analysis of 48 K Reddit posts. He argues that although research studies argue that individuals are more likely to write a negative review than a positive one, the cryptocurrency internet talk had a whooping positive conversation from 2017 to 2020. Thus, more than 85 percent of subreddit reviews were scored as having a positive sentiment.

These positive review conversations involved not only investors but also non-investors. They did not only leave a positive review on Bitcoin but also on other non-popular cryptocurrencies such as Tron. That positive conversation led to an increase in cryptocurrency prices between 2017 and 2019, making Bitcoin have a record-high price of $65,000.

Liesman (2022) argues that in a 2022 survey, Americans with opposing views on cryptocurrencies jumped to 43% in November, up from 25% in April of the same year. This was after a series of cryptocurrency collapses, scandals, and bankruptcies. Moreover, a study from CNBC's All-America Economic survey revealed that most Americans favored strong regulation in the cryptocurrency market. With only 8% of Americans having a positive review of cryptocurrency, the digital asset price decreased significantly in late 2022. Thus, Liesman's (2022) essay reveals that the cryptocurrency market manipulation problem in 2022 made investors support the regulation of cryptocurrencies to protect investors from devastating financial losses.

5.2. Data

Descriptive statistics:

This study examines four cryptocurrencies: BTC, LTC, ETHER, and XRP. The reason for investigating the four currencies is that they have the uppermost prices as of mid-2022 and have operated in the crypto market for numerous years. Thus, the data in this research was taken from Early 2017 to mid-2022 and entailed the day-to-day ultimate price taken from the Coin Market Cap Website.

Daily Log returns were calculated with the formula;

$$R_{it} = \ln\left(P_{it}/P_{i,t-1}\right)$$

where R_{it} represents the daily log-in returns of cryptocurrency at day t; P_{it} signifies the ultimate revenue at day t; $P_{i,t-1}$ symbolizes the concluding price of cryptocurrency at day $t-1$. Cryptocurrency market capitalization as of mid-2022;

Currency	Market Cap
BTC	$377.53 Billion
ETHER	$129.53 Billion
LTC	$3.79 Billion
XRP	$16.02 Billion

The descriptive data of daily final returns of the crypto coins were reported as follows: Ether had the uppermost average daily revenue at 0.32%, and Bitcoin had the uppermost medium average daily returns at 0.23%. The report also re-

vealed that Bitcoin and Ethereum had a negative skewness with the uppermost market demand, while XRP and Litecoin had a constructive unevenness.

As discussed above, Bitcoin and Ethereum exhibit an irregular influence in their unpredictability, and in the existence of undesirable/bad reviews, the instability tends to surge. However, in the other two cryptocurrencies, the existence of bad news from the media lessens their volatility. This spectacle can be credited to the statistic that Bitcoin and Ethereum have a high market cap, where their demand in several countries worldwide is relatively high (Gupta & Chaudhary, 2022). Thus, negative or positive news factors tend to augment bubbles in the most popular cryptocurrencies.

5.3. Theoretical Framework

Cryptocurrencies have been a hot topic since the creation of Bitcoin in 2009. The notion of Bitcoin allowed a network of people to trade and issue digital tokens while being protected through cryptography. Thus, Bitcoin revolutionized digital currencies in the cryptocurrency market. Throughout the past few years, cryptocurrencies have fascinated investors but are a topic of complete confusion for others. This is because of the dramatic price increases, downfalls, and volatility witnessed in the cryptocurrency market for several years. For instance, in 2013, Bitcoin was trading at around $13 in price value. However, it experienced its first surge by reaching an all-time high of $250 in 2014 before correcting downward by over 50%.

Between 2015 and 2016, Bitcoin maintained an acceptable market phase where it traded at a low of $200. However, in the last quarter of 2017, Bitcoin surged in value by selling at $20,000. Social media attention and mainstream adoption popularized the cryptocurrency then, leading to a significant correction, whereby it traded at $3500 in 2018. In 2021, Bitcoin's price skyrocketed again, reaching a new time high of $ 65,000. In the following years, however, Bitcoin experienced a significant correction where its price declined by more than half. This finding provides evidence that cryptocurrencies, not limited to Bitcoin, experience economic bubbles. This brings us to the question: what are the drivers of financial bubbles in the cryptocurrency market, potentially affecting their long-term sustainability?

Cryptocurrencies have three characteristics that are significant to the drivers of economic bubbles in the cryptocurrency market. They are unregulated, decentralized, and anonymous. Environmental concerns are one of the critical drivers of financial bubbles in the cryptocurrency market, potentially affecting its sustainability. It is essential to delve into the making of cryptocurrency coins, particularly Bitcoin, to understand how environmental factors cause cryptocurrency bubbles. Thus, the blockchain in Bitcoin relies on users to authorize transactions and update the DLT with novel chunks of information because of the unregulated nature of the cryptocurrency. This blockchain must be complex and expensive to verify to discourage fraudsters and any actors attempting to

manipulate the data. Hence, Proof of Work permitting is needed for users to authorize cryptocurrency transactions by solving intricate mathematical problems. This mechanism demands significant computational power and energy consumption to validate transactions and secure the network. It is uncertain how much energy cryptocurrencies use, as they are hard to crack by design. The blockchain, Bitcoin, consumes much energy when mining. Thus, in the past few years, business leaders and governments have announced their plans to suspend Bitcoin to limit fuel energy consumption, leading to uncertainty in the market. For instance, the price of Bitcoin experienced a dramatic correction in 2021 and 2022 after Elon Musk suspended its use on vehicle purchases due to environmental concerns related to cryptocurrency mining.

Energy costs and the low supply of Bitcoin also cause economic bubbles in the cryptocurrency. The critical finding in any market is that the demand and supply of a commodity determine its price; the same theory works in the cryptocurrency market. The same theory applies to the cryptocurrency market. Thus, the low supply of Bitcoin in the market, brought by the high energy costs, increases the price of the cryptocurrency, leading to economic bubbles. Market factors such as EPU, monetary policies, and macroeconomic aspects are significant drivers of financial bubbles in the cryptocurrency market. Economic Policy Uncertainty (EPU) refers to the uncertainty surrounding future economic policies and their potential impacts on various sectors of the economy. Thus, tension in the cryptocurrency market can lead to speculative behaviors and exaggerated price movements, which can in turn, contribute to economic bubbles.

Monetary policies can indirectly contribute to financial bubbles in the cryptocurrency market by impacting investor behavior, market sentiment, and the broader economy. For instance, central banks often implement expansionary monetary policies, such as lowering interest rates during economic downturns to stimulate borrowing, spending, and investment. When interest rates are low, investors might seek alternative assets, including cryptocurrencies, in search of higher returns, which can eventually lead to economic bubbles in the cryptocurrency market. Macroeconomic aspects play a significant role in causing financial bubbles in the cryptocurrency market. These factors encompass broader economic conditions that can lead to irrational exuberance, speculative behavior, and, ultimately, the formation of economic bubbles. For instance, positive financial news and media coverage can create a sense of urgency or the fear of missing out among investors. This can lead to the rush of cryptocurrency investment, causing economic bubbles in the market.

Online activities play a significant role in driving economic bubbles in the cryptocurrency market. Thus, cryptocurrencies are often discussed on social media platforms and online communities. Positive sentiments and recommendations from influential figures can cause a herding mentality among investors, pushing the majority to invest in crypto and eventually driving up their demand and prices in the market. Thus, most investors in the cryptocurrency market

trade hypothetically and do not consider the cogent economic essentials. Online platforms and apps make it easy for individuals to trade in cryptocurrency with low entry barriers quickly. This accessibility can lead to many inexperienced traders entering the market. As these traders quickly chase profits, they can contribute to price volatility and bubbles. To summarize, key drivers of economic bubbles in the cryptocurrency market, potentially affecting their long-term sustainability, entail technological factors, environmental concerns, online activities, and economic factors, among others.

6. Comparison between Historical Asset Bubbles and Cryptocurrency Bubbles

Similarities in the characteristics of the historical asset bubbles and cryptocurrency bubbles

1) Speculative nature. Both historic and cryptocurrency bubbles are driven by speculative behavior (White et al., 2020). Thus, investors are motivated by the expectation of significant price appreciation and often exhibit herd mentality, following the trend of missing out on making profits.

2) Investor sentiment. Investor sentiment plays a crucial role in both historic asset and cryptocurrency bubbles. Strong influence from social media/media outlets and widespread optimism fuel investors' sentiment lead to price increases (White et al., 2020).

3) Irrational exuberance. Both historic asset and cryptocurrency bubbles are characterized by periods of irrational exuberance, where investors overlook or dismiss the risk associated with the asset (White et al., 2020).

4) Volatility and price correction. Whether in historic assets or cryptocurrency, bubbles are prone to high levels of volatility. Prices can experience rapid fluctuation, and when the bubble eventually bursts, there can be a sharp price correction (White et al., 2020).

5) Market manipulation. Both historic assets and cryptocurrencies are often accompanied by market manipulation, where there have been fraud, pump-and-dump schemes, and other manipulative practices (White et al., 2020).

Differences in the characteristics of the historical asset bubbles and cryptocurrency bubbles

1) Tangible commodities. Historic asset bubbles mainly entail tangible assets such as real estate, stocks, or commodities, while cryptocurrency bubbles are centered around digital assets (White et al., 2020).

2) Global Reach. Unlike historic assets, Cryptocurrencies are global and operate daily, allowing investors worldwide to participate.

3) Regulatory environment. Historic asset markets were subject to various regulatory frameworks and oversight, which mitigated certain risks and stabilized the market. On the other hand, cryptocurrencies are still evolving in regulation, with varying degrees of oversight and legal framework (White et al., 2020).

4) Accessibility. Compared to historic assets, cryptocurrencies are more accessible to individual investors due to low barriers to entry.

Lessons learned from previous episodes of market exuberance and subsequent crashes.

There are several lessons investors can learn from previous market exuberance and subsequent crashes, such as the dot.com and U.S. Housing bubble. Some of them include the following.

1) Avoid herd Mentality. Market exuberance always involves herd mentality, where investors follow the crowd without conducting thorough research and analysis. Thus, investors must research the market they are venturing into rather than mindlessly following the crowd.

2) Be cautious of speculative bubbles. Investors should be cautious of speculative bubbles. Speculative bubbles occur when asset prices detach from intrinsic value, driven primarily by investors' speculation and irrational exuberance.

3) Risk management and asset allocation. Investors must understand their risk tolerance and create a well-balanced asset allocation strategy.

4) Avoid overleveraging. During market exuberance, investors may be tempted to take excessive debts to increase their profits. This can result in a devastating financial loss in a market crash.

Data Analysis: Qualitative Analysis

This segment utilizes time series analysis to analyze data and identify patterns of historical cryptocurrency prices and trading volume to explore the relationship between bubble indicators and sustainability factors. The cryptocurrencies in question are the three major ones: Bitcoin, Ethereum, and Tether.

In 2013, Bitcoin experienced its first surge, from around $13 in price value to reaching an all-time high of approximately $250 in April before correcting downward by over 50%. The 2014-a gradual decline in the Bitcoin price characterized the 2015-year phase. Following the 2013 bubble burst, Bitcoin entered an acceptable market phase where the price declined, reaching a low of $200. It maintained a record low of $200 at the beginning of 2016 but continued to surge throughout the year. In 2017, Bitcoin gained substantial momentum and almost reached an all-time high of $200,000 end of the year. This was driven by increasing media attention and mainstream adoption. Following the dramatic price rise in 2017, Bitcoin prices declined throughout 2018 and reached a record low of below 3500 by the end of the year.

After a significant decline in 2018, Bitcoin prices gradually recovered in 2019. By mid-2020, the price was hovering around $10,000. A renewed surge in the Bitcoin price marked the latter months of 2020. Thus, by 2021, Bitcoin's price skyrocketed, reaching a new-time high of $65,000.

In the following year, however, Bitcoin experienced a significant correction where its price declined significantly. This period was influenced by several factors, such as regulatory concerns, environmental debates surrounding the min-

ing of Bitcoin, and uncertainties. As of July 2023, the Bitcoin price has slowly but steadily increased to about $31,000 (Figure 1).

The increase in the number of wallets shown is shown in Figure 2. As more people got involved with crypto due to increased media attention, more people got digital wallets to buy and trade Bitcoin, causing the price of crypto to rise.

Ethereum has experienced significant price fluctuation for over eight years and has emerged as one of the leading cryptocurrencies in market capitalization worldwide. Thus, Ethereum started its journey in 2015 by trading at a few dollars and gradually increased to around $10 in 2016.

From August 2016 to July 2017, Ethereum experienced a significant price rise, surging from 10$ to $400 by mid-2017.

The cryptocurrency continued gaining momentum in the following months, exceeding $400 and peaked at 1400 in January 2018. However, the market subsequently experienced a correction, leading to a decline in Ethereum price. Thus, by July 2018, the cryptocurrency had dramatically reduced to $200 and continued to decrease the following year, reaching a record low of $100 in July 2019. From July 2019 to August 2020, Ethereum showed some signs of recovery, surging to approximately $400 by July 2020. Late 2020 to early 2021 marked a significant bull run for the cryptocurrency market, where Ethereum price dramatically surged from $400 in July 2020 to an all-time high of $4000 in May 2021. From 2021 to 2023, the cryptocurrency experienced a significant correction phase, currently trading at $1995.39 as of July 2023 (Figure 3).

Tether is one of the most stable coins in the cryptocurrency ecosystem. Since its launch in 2014, it has fluctuated less than three times yearly and has gained stability since late 2018. Thus, Tether's price has consistently remained stable and has been trading at approximately $1 for the last few years. Although the Tether is a stablecoin, the cryptocurrency market is highly volatile and can fluctuate significantly within short periods (Figure 4).
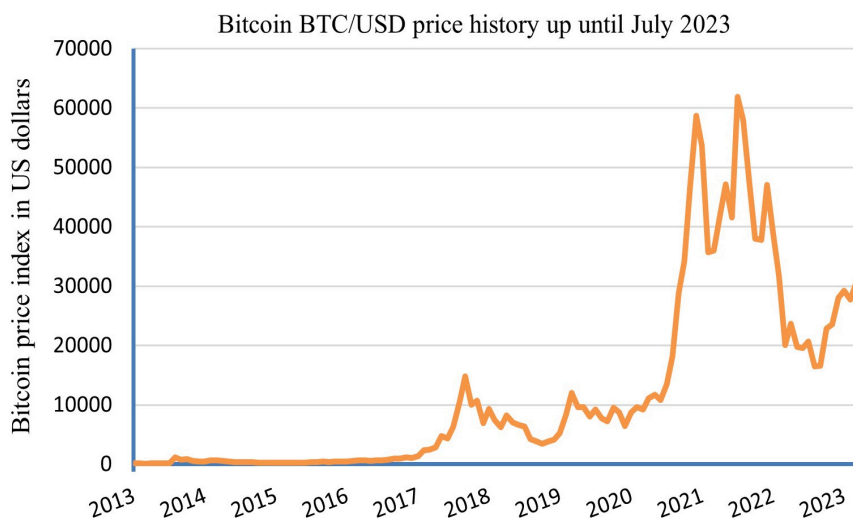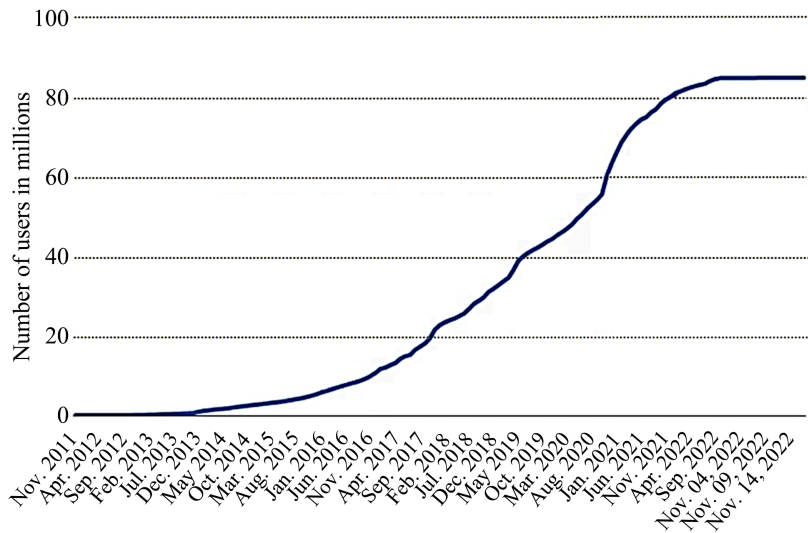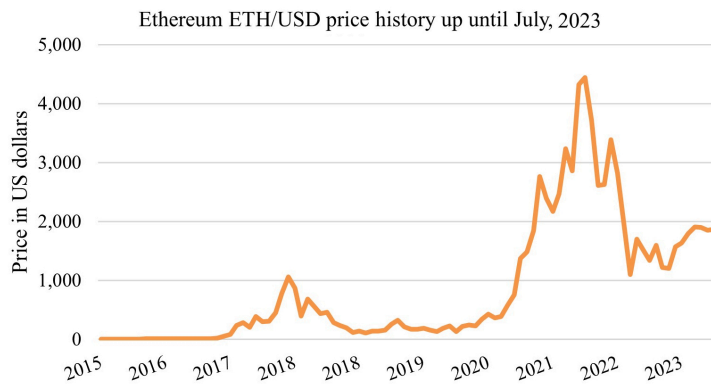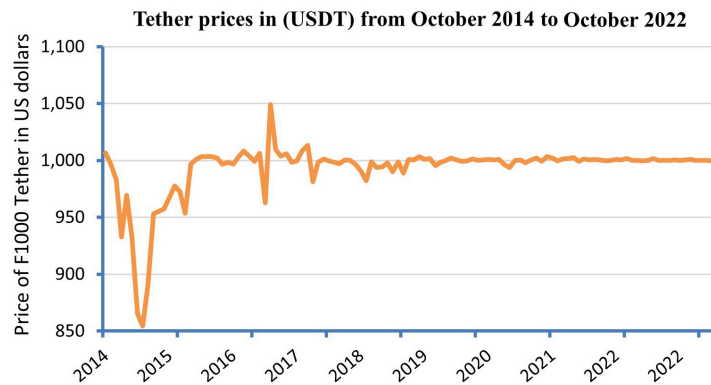

Figure 1. Bitcoin BTC/USD price history up until July 2023-Bitcoin© Statista 2023.

Figure 2. Number of crypto wallet users.

Figure 3. Ethereum ETH/USD price history up until July 2023-© Statista 2023.

Figure 4. Tether prices in (USDT) from October 2014 to October 2022-© Statista 2023.

Figure 5 shows that over time crypto topics have gained more popularity and have become more widely known, thus showing the relation with speculative bubbles. The more media attention crypto got, the more people became willing to get involved with Crypto.
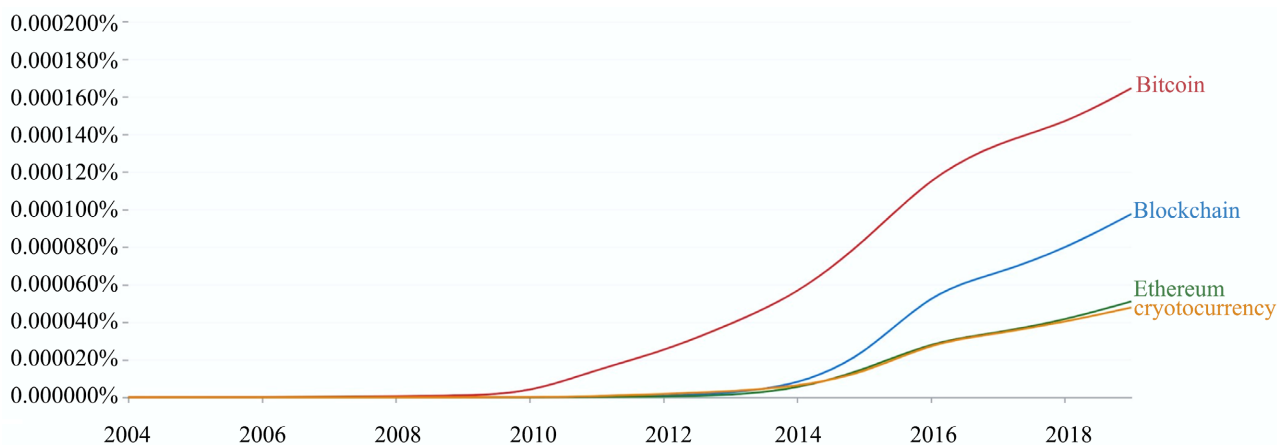
Figure 5. Cryptocurrency's response to media attention.

7. Discussion and Conclusion

This research is a comprehensive study of the drivers of economic bubbles in cryptocurrencies that affect their long-term sustainability and implications. Thus, as discussed, factors contributing to financial bubbles in the cryptocurrency market entail environmental concerns, economic factors, technological factors, online activities, and the cryptocurrency's intrinsic value, among others.

The data analysis segment provides a robust approach to the key drivers of economic bubbles in cryptocurrencies. In the quantitative analysis, this research employs time series analysis to identify patterns of historical cryptocurrency prices and trading volume. In the qualitative analysis, the research findings reveal that most investors rely on social media, newspapers, and other trusted businesses to gather information about the cryptocurrencies they intend to invest in. Moreover, most of them are likely to follow the heuristic approach when making their investment decisions. This finding provides evidence that most cryptocurrency investors follow the herding mentality when investing in digital assets.

Government intervention in cryptocurrency is not a popular concept. From the research findings, most investors argue that government regulation does not determine the success of cryptocurrencies in the market. Moreover, government restrictions will likely discourage investors from investing in cryptocurrency, leading to economic bubbles.

The GARCH models in the econometric analysis provide evidence that macroeconomic aspects, such as media, influence the volatility of cryptocurrencies in the market. Thus, in the presence of positive news, most cryptocurrencies experience a sharp increase in their price value. However, negative publicity increases their instability. Although the cryptocurrency market is snowballing, it has faced criticism due to its significant energy consumption, carbon footprints, and illegal activities. To address these ESG challenges and improve the industry sustainability and social impact, cryptocurrency leaders can implement the following.

- Adopt Energy-efficient mechanisms: One of the primary environmental

concerns with Cryptocurrencies, especially Bitcoin, is their energy-intensive mining process. To improve ESG, developers can explore and implement alternative consensus mechanisms that consume less energy than the traditional PoW.

- Transparent ESG report: Cryptocurrencies can provide a regular transparent report to their stakeholders, disclosing information about their energy consumption, carbon emissions, social initiatives, and government practices, among others, to address the potential adverse effects.
- Regulatory compliance: Collaboration with regulatory authorities can lead to establishing ESG guidelines and standards for the cryptocurrency industry. Compliance with such regulations can enhance trust and credibility within the market.

Cryptocurrencies have three characteristics: unregulated, decentralized, and anonymous. Therefore, due to their features, cryptocurrencies are not equipped to deal with their economic issues, such as price volatility and fraudulent activities. Governments should refrain from intervening to address these challenges because they would undermine the decentralized nature of cryptocurrencies. Drawing from historical asset bubbles, the initial difficulties in adopting novel technologies are expected. Hence, the economic challenge witnessed in various crypto coins is part of a learning curve that digital assets must navigate to reach maturity. As the technology matures and cryptocurrency becomes a more widely accepted concept of transaction, individuals will become aware of the common pitfalls surrounding cryptos, like attaining quick wealth from NFTs. With time, the increased awareness or knowledge of digital assets will lead to a more cautious approach to the technology, reducing exaggerated expectations and stabilizing the prices of crypto coins in the market.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Bischoff, P. (2022). *How Do People Feel about Cryptocurrencies*? Comparitech. https://www.comparitech.com/crypto/sentiment/

de la Horra, L. P., de la Fuente, G., & Perote, J. (2019). The Drivers of Bitcoin Demand: A Short and Long-Run Analysis. *International Review of Financial Analysis, 62,* 21-34. https://ideas.repec.org/a/eee/finana/v62y2019icp21-34.html https://doi.org/10.1016/j.irfa.2019.01.006

DeVon, C. (2022). *Only about 30% of Millennials Are Comfortable Investing in Crypto, down from about 50% in 2021: "The Shine Has Come off These Coins"*. CNBC. https://www.cnbc.com/2022/09/29/millennial-investors-are-getting-less-comfortable-with-cryptocurrency.html

Enoksen, F. A., Landsnes, C. J., Lučivjanská, K., & Molnár, P. (2020). Understanding Risk of Bubbles in Cryptocurrencies. *Journal of Economic Behavior & Organization, 176,*

129-144. https://doi.org/10.1016/j.jebo.2020.05.005
https://www.sciencedirect.com/science/article/pii/S0167268120301505#sec0001

Erdogan, S., Ahmed, M. Y., & Sarkodie, S. A. (2022). Analyzing Asymmetric Effects of Cryptocurrency Demand on Environmental Sustainability. *Environmental Science and Pollution Research, 29,* 31723-31733.
https://link.springer.com/article/10.1007/s11356-021-17998-y
https://doi.org/10.1007/s11356-021-17998-y

Franck, T. (2022). *One in Five Adults Has Invested in, Traded or Used Cryptocurrency, NBC News Poll Shows.* CNBC.
https://www.cnbc.com/2022/03/31/cryptocurrency-news-21percent-of-adults-have-traded-or-used-crypto-nbc-poll-shows.html

Gupta, H., & Chaudhary, R. (2022). An Empirical Study of Volatility in Cryptocurrency Market. *Journal of Risk and Financial Management, 15,* Article No. 513.
https://www.mdpi.com/1911-8074/15/11/513#B26-jrfm-15-00513
https://doi.org/10.3390/jrfm15110513

Haykir, O., & Yagli, I. (2022). Speculative Bubbles and Herding in Cryptocurrencies. *Financial Innovation, 8,* Article No. 78.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9396602/
https://doi.org/10.1186/s40854-022-00383-0

Liesman, S. (2022). *Just 8% of Americans Have a Positive View of Cryptocurrencies Now, CNBC Survey Finds.* CNBC.
https://www.cnbc.com/2022/12/07/just-8percent-of-americans-have-a-positive-view-of-cryptocurrencies-now-cnbc-survey-finds.html

Magnusson, C., & Stenberg, T. (2022). *Cryptocurrency Investments: The Good, the Bad, and the Ugly? An Empirical Study on the Factors Affecting Private Financial Investment Decisions in Cryptocurrency.*
https://hj.diva-portal.org/smash/record.jsf?pid=diva2%3A1665717&dswid=-2359

McMorrow, J., & Esfahani, M. S. (2021). An Exploration into People's Perception and Intention on Using Cryptocurrencies. *HOLISTICA—Journal of Business and Public Administration, 12,* 109-144.
https://sciendo.com/article/10.2478/hjbpa-2021-0018?tab=art%C3%ADculos-recientes
https://doi.org/10.2478/hjbpa-2021-0018

Phillips, R. C., & Gorse, D. (2018). Cryptocurrency Price Drivers: Wavelet Coherence Analysis Revisited. *PLOS ONE, 13,* e0195200.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0195200
https://doi.org/10.1371/journal.pone.0195200

Wang, S., & Vergne, J. P. (2017). Buzz Factor or Innovation Potential: What Explains Cryptocurrencies' Returns? *PLOS ONE, 12,* e0169556.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5234770/
https://doi.org/10.1371/journal.pone.0169556

White, R., Marinakis, Y., Islam, N., & Walsh, S. (2020). Is Bitcoin a Currency, a Technology-Based Product, or Something Else? *Technological Forecasting and Social Change, 151,* Article ID: 119877.
https://www.sciencedirect.com/science/article/abs/pii/S0040162519301337
https://doi.org/10.1016/j.techfore.2019.119877