

Advantages & Disadvantages of Cryptography & Valuation Analysis

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This Research Paper discusses cryptography and the blockchain in depth and offers a broader perspective. The benefits and drawbacks of using such delicate technology, as well as their positive effects on the users, take up a significant section of the work. In addition, I devote a quarter of the paper to my own research and analysis of the stock market capitalization of cryptocurrencies over the previous decade, which sheds light on the extent of their volatility. Popular digital currencies like Bitcoin and Ethereum are discussed, along with the security, legitimacy, and reliability of the underlying technology, which may sway readers to make a purchase. The key finding from the Bitcoin analysis is Bitcoin's price history over the past 10 years. It shows that Bitcoin had a slow start and gained attention in 2013. Its price has been highly volatile, experiencing spikes and crashes due to factors like speculation, regulation changes, and technological advancements. Based on the analysis of Ethereum's price history, the main finding is that Ethereum has witnessed significant price fluctuations since its inception. The cryptocurrency reached its all-time high of \$4,815 in November 2021, highlighting its potential for impressive returns. This finding implies that investing in Ethereum can offer lucrative opportunities for investors. Moreover, The abstract provides an introduction to the concepts of Bitcoin and Ethereum, with a focus on the aspects of security, validity, trustworthiness, as well as the credibility and safety of users in relation to data miners within the realm of technology. This article aims to conduct a thorough examination of the historical background and assessment of Bitcoin and Ethereum, the security measures used in blockchain technology, the influence of regulations, practical implementations in various industries, and the protection of user information. Anticipate a comprehensive examination that provides readers with profound insights on these crucial topics.

Introduction

The introduction of cryptocurrencies, a revolutionary kind of digital currency founded on blockchain technology, has transformed the financial landscape since Bitcoin's inception in 2008. Among the several cryptocurrencies that have gained fame, Bitcoin and Ethereum stand out as trailblazers, altering how we view and interact with existing financial institutions. The purpose for this research is to thoroughly examine the benefits and drawbacks of cryptocurrencies in general, with a particular emphasis on an in-depth examination of Bitcoin and Ethereum's fluctuating value. This research intends to fill a major knowledge vacuum by addressing key concerns and essential elements about the ramifications of these digital currencies for the financial sector, technical innovation, larger socio-economic settings, and a user's security in the midst of private transaction. This research paper offers an in-depth overview on such technology to re-assure people of its capabilities, both positive and negative.

History of Blockchain and Cryptography

Decentralized cryptocurrencies are digital currencies that are neither backed or issued by a central authority. In 1983, American cryptographer David Chaum created an electronic cur-

rency called E-cash that deals with internet transactions, marking the beginning of the era of cryptocurrencies.¹ In addition, the term "cyber currency" was coined to describe this type of cryptographic money. The first use of the phrase "cryptocurrency" was in 1989.² However, in the early 1990s, cryptographic protocols and software were developed that made it possible to create a digital currency that was really independent of any central authority. This article will provide a thorough evaluation and response to the many questions that have been raised about blockchain and cryptocurrency platforms, such as their impact on the stock market.

Interestingly, the emergence of Bitcoin in 2008, the most popular and frequently used digital currency platform in the world, considerably boosted the appeal of this digital form of cash around the world. Satoshi Nakamoto, an alias used by an unknown programmer or group of programmers, is credited with creating the cryptocurrency we've been discussing. In addition, since Bitcoin's release in 2009 on its decentralized platform, such money has been nothing but of interest in the modern society, with 94% of Crypto Buyers falling within the range of 18 and 40 years.³ People's interest in digital stock and cryptocurrency platforms has grown steadily over the years, and the creation of digital art or NFTs (non-fungible tokens) is a relatively new phenomenon.

In addition, cryptocurrencies are not controlled by any cen-

tral authority. According to “Cryptocurrency Explained With Pros and Cons for Investment”⁴ cryptocurrencies are not issued by any central authority, making them immune to government interference. This decentralized nature of cryptocurrencies is one of their key characteristics. Additionally, “Cryptocurrencies, Digital Dollars, and the Future of Money” explains that cryptocurrencies operate on decentralized networks using blockchain technology, which eliminates the need for a central authority such as a bank to validate transactions⁵.

The United States Mint is responsible for issuing legal tender—bills and coins of varying denominations—that are backed by the government and subject to strict regulations. However, due to a number of issues and pieces of information that have yet to be taken into account, crypto has no centralized issuer or governing authority. Therefore, the FDIC does not insure bitcoin accounts. However, in September 2021, El Salvador was the first country to make such currency legal in people’s everyday lives, making it usable anywhere from fast food eateries to regular retail products. By lowering transaction costs, increasing transaction speeds, and facilitating the inclusion of poor and rural households in the financial system, digital currencies like Ethereum and Bitcoin and other innovations in payment systems have the potential to make the initiated process quite effective.

Furthermore, Bitcoin is important and useful, and it is becoming increasingly popular as a result of the growing concern in the safety and security of digital and privatized transactions. And, contrary to common opinion, the concept is not limited to a single century. In terms of theory, people’s serious curiosity and intrigue when discussing cutting-edge technological developments. Fast, computerized, secure, and internationally accessible transactions prevent data theft from unsafe sources like hackers and allow records to be kept permanently. Additionally, the method helps lower the likelihood of fraud.

The Value of Cryptocurrencies - Market Fluctuation

First and foremost, Bitcoin, the most well-known and widely used cryptocurrency since its inception, remains at the forefront of the cryptocurrency industry in terms of market capitalization, user base, and general interest in the topic. Decentralized financial (Defi) systems are being developed with the help of other virtual currencies like Ethereum. Price fluctuations are defined and illustrated by the fact that on May 19, 2023, one Bitcoin was worth \$28,970 USD, an increase of 0.96 percent over the previous day.

There are only about 1.3 million Bitcoin in circulation on cryptocurrency exchanges at the moment. Bitcoin exchanges have a relatively tiny supply of Bitcoin compared to more substantial sources like the dollar note. In 2021, along with the US dollar, bitcoin was recognized as legal money in El Salvador.⁶ (Coin Market)⁷ now lists 16,531 different crypto-

currencies. There is a high danger of getting scammed during transactions because it is difficult to tell whether or not a cryptocurrency is legitimate.

According to a report by the US Federal Trade Commission (FTC) in 2021, over 46,000 people reported losses of more than \$1 billion to cryptocurrency scams.⁸ This indicates the prevalence of fraudulent activities in the crypto space. Additionally, the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC) frequently warn investors about the risks associated with digital assets and cryptocurrency investment scams.⁹ These regulatory bodies highlight the deceptive practices used by fraudsters, such as false promises of high returns and guarantees with little risk. Therefore, it is crucial for individuals to exercise caution and conduct thorough research before engaging in any cryptocurrency transactions.

The author acknowledges that cryptocurrency prices seem to operate independently of centralized markets, but does not provide specific evidence or explanations for this assertion.¹⁰ The article primarily focuses on Bitcoin’s market valuation and price fluctuations, rather than exploring the broader risks associated with cryptocurrency investments or offering insights into risk management strategies.¹¹

On May 19, 2023, the value of a single Bitcoin had a significant upsurge, reaching \$28,970 USD, which denoted a noteworthy increment of 0.96 percent compared to the preceding day⁷. The aforementioned temporal variation during a 24-hour period highlights the swift and ever-changing characteristics of the cryptocurrency market, wherein alterations in prices may transpire within brief intervals.

Additionally, the constrained availability of Bitcoin on digital currency platforms serves as a noteworthy element that contributes to the fluctuation of its price. At now, the circulating quantity of Bitcoins is at roughly 1.3 million, which is very limited in comparison to conventional currencies like the US dollar⁷. The limited availability of Bitcoins might intensify fluctuations in prices, since alterations in demand can exert a more significant impact on the quantity of Bitcoins that are accessible.

Nevertheless, the bitcoin industry is not immune to several obstacles, one of which being the prevalence of fraudulent activity. The exploitation of the cryptocurrency trend by fraudsters, resulting in significant financial losses for consumers, was emphasized in reports released by the U.S. Federal Trade Commission (FTC) in 2021 (Reports Show Scammers Cashing in on Crypto Craze⁸). These occurrences serve as a poignant reminder of the necessity for investors to show prudence and thoroughness when navigating the domain of cryptocurrencies.

Furthermore, there is one reason why digital currency is the future of online banking: convenience. Digital currency offers freedom of movement and economic expansion outside na-

tional borders. More generally speaking, it is cheap, simple, and quick to use in transactional contexts. Trade and other chances to improve national economies can be facilitated by digital currency.

According to a study on the move to a cashless future and the growing prominence of digital assets, digital payments are becoming increasingly popular due to their convenience, speed, inclusion, and efficiency¹². This shift towards a cashless society is driven by the advantages of digital payments. Additionally, the introduction of central bank digital currencies (CBDCs) is being considered by many countries to further promote this transition. CBDCs, if designed prudently, can potentially offer more resilience, safety, greater availability, and lower costs than private digital currencies¹³. These factors contribute to the convenience and economic expansion facilitated by digital currency.

0.1 Investment Risks

Investors who use cryptocurrencies can diversify their portfolios beyond just stocks and bonds. As of 2023, the prices of cryptocurrencies appear to be independent from other centralized markets that the government supervises,¹⁴ even though there is little historical evidence on how the markets have performed in terms of shares or bonds.

Bitcoin's opening market price of \$23,003.26 USD per BTC reflected the inherent investing risks. There are currently 19,277,125 Bitcoin in circulation, giving the cryptocurrency a market valuation of \$443.1 billion USD as of the year 2023. In the last 24 hours, the value of Bitcoin has increased by \$6.2 billion USD, or 23.33 percent. Daily price swings like demonstrated by the supplied comparison are highly harmful to investments and should be avoided at all costs when making long-term business decisions.

Furthermore, it is important to note that the volatility and price swings of cryptocurrencies, such as Bitcoin, have been well-documented¹⁵. As for the broader risks associated with cryptocurrency investments, it is crucial to consider factors such as market volatility and the lack of regulation in the cryptocurrency market¹⁵. To mitigate these risks, investors can employ risk management strategies, such as diversifying their investment portfolio and conducting thorough research before making investment decisions¹⁵. It is advisable to consult credible sources and references for a more comprehensive analysis of investment risks and risk management strategies.

Advantages of Cryptography

0.2 Definition of Blockchain Technology

Bitcoin and other cryptocurrencies owe a great deal of their popularity and utility to blockchain technology⁴. Blockchain

technology can be thought of as an electronic ledger or a network of interconnected blocks. To elaborate, blockchain technology is an electronic ledger or network of interconnected blocks. A block is a group of transactions that has been unanimously verified by all nodes in the network¹⁶. It is important to note that blockchain is characterized by key features such as decentralization, immutability, and consensus mechanisms¹⁶. Each computer or node in the network must agree to keep a copy of the ledger's contents, ensuring transparency and security¹⁶. Blockchain technology can be implemented in various industries, including online voting, crowdsourcing, and traditional supply chains¹⁶. It is worth mentioning that banks like JPMorgan Chase & Co. are exploring blockchain technology to reduce transaction fees and speed up payment processing¹⁶. Bitcoin, the first cryptocurrency created, remains the most popular, valuable and widely used cryptocurrency today. In addition to Bitcoin, many other alternative cryptocurrencies have been established with different metrics and feature sets. Some are influenced by Bitcoin, while others are completely original.

Establishment of Bitcoin

In 2009, the anonymous creator of Bitcoin named "Satoshi Nakamoto"¹⁷. As of March 2021, there were approximately 18.6 million bitcoins in circulation, valued at \$927 billion in total. The popularity of Bitcoin spurred the development of similar digital currencies known as "altcoins".

Bitcoin is a decentralized digital currency that operates on a blockchain system¹⁸. Its decentralized nature means that it is not controlled by any central authority, such as a government or a bank. This makes it immune to government interference, censorship, and inflation¹⁹. Bitcoin is often seen as a potential store of value due to its limited supply and the fact that it cannot be easily manipulated by governments or financial institutions. As a medium of exchange, it offers fast and secure transactions, reducing the need for intermediaries and lowering transaction costs¹⁹. Compared to traditional fiat currencies, Bitcoin also provides greater financial privacy and can be accessed by anyone with an internet connection, making it accessible to the unbanked population¹⁹. Overall, Bitcoin has revolutionized the concept of money by introducing a digital, decentralized, and secure alternative to traditional currencies. That is why users are interested in the modern world.

Bitcoin is without a doubt the most well-known and valuable cryptocurrency⁶. In 2008, Satoshi Nakamoto presented cryptocurrency to the world with a white paper. Each cryptocurrency asserts its own unique function and set of requirements. Petrol for the cutting-edge underlying contract platform is Ether. Financial institutions use Ripple's XRP to conduct business across multiple regions. XRP is a value exchange token that got its moniker from the xRapid category.

The number of digital currencies available now is in the hundreds. As of March 2023, there are around 22,904 crypto coins in circulation. The number of redundant systems employed for the needed tasks need not be 100%. There were about 19 million bitcoins worth over \$576 billion in circulation as of May 2022. There will never be more than 21 million bitcoins in circulation⁴. As Bitcoin gained popularity, other "altcoins" (alternative cryptocurrencies) were created. Some are whole new currencies, while others are only Bitcoin forks or clones competing for user attention. Some examples include EOS, Solana, Litecoin, Ethereum, and Cardanol. Furthermore, it is estimated that by November 2021, Bitcoin will have amassed around \$2.1 trillion, or about 41% of all cryptocurrencies⁴. Ripple's XRP data displayed on their website appears to be accurate. Because of this, online transactions can proceed more quickly and easily, regardless of the user's specific situation.

Bitcoin's maximum supply of 21 million coins is a fundamental characteristic of the cryptocurrency²⁰. This limited supply is designed to prevent inflation and maintain scarcity, which can contribute to market stability. The scarcity of Bitcoin has the potential to increase its demand and price over time²⁰. As of January 2023, there are approximately 19.3 million bitcoins in existence, with about 1.7 million left to be mined before reaching the limit²⁰. After the maximum supply is reached, no more bitcoins will be generated, and miners will earn income primarily from transaction fees²⁰. It is also estimated that up to 20% of the already issued bitcoins may be permanently lost²⁰. While the implications of these characteristics can vary, the limited supply of Bitcoin is considered an important feature that distinguishes it from traditional fiat currencies and other cryptocurrencies²⁰.

Protection from Inflation and Market Fluctuation

Almost all cryptocurrencies have a fixed supply when they first launch. An ASCII computer file detailing the number of each Bitcoin in circulation⁴. This means that if its use becomes more widespread, its value will rise, contributing to market stability and, perhaps, preventing inflation. Bitcoin's originator, like the creators of many other digital assets, intended for there to be a maximum supply. This indicates that Satoshi has put a firm cap on the total amount of Bitcoins in circulation²¹. He set the maximum number of Bitcoins that could ever be created at exactly 21 million. Bitcoin, like many other one-of-a-kind products, was only meant to be available to the wealthy who can purchase such technology due to the numerous dangers and rewards associated with using it.

The finite availability of Bitcoin, capped at a total of 21 million coins, carries several ramifications for the market of this particular cryptocurrency. First and foremost, the reduction in the supply of Bitcoin has the potential to enhance its scarcity,

hence potentially stimulating an increase in both its demand and price²⁰. The presence of a fixed supply also serves as a safeguard against inflation, as the issuance of new coins ceases once the maximum limit is attained²⁰. The aforementioned characteristic sets Bitcoin apart from conventional fiat currencies, as the latter are susceptible to inflationary forces. Furthermore, the constrained availability of Bitcoin may potentially enhance market stability via mitigating the likelihood of abrupt expansions in the monetary base²⁰. Nevertheless, it is crucial to acknowledge that the ramifications of these attributes remain a matter of contention, necessitating more investigation to comprehensively grasp their influence on market dynamics and stability.

The Unique Decentralized System

Cryptocurrencies are a decentralized alternative to traditional financial systems. This system leverages trust to regulate transactions between two parties rather than relying on a central authority such as a bank or financial institution⁴.

Decentralization in cryptocurrencies offers several advantages and disadvantages in comparison to traditional monetary systems. One significant advantage is the elimination of trusted third parties, such as banks or brokers, which reduces the risk of fraud and manipulation²². With blockchain technology, transactions are validated and recorded by a network of users, ensuring transparency and immutability. This decentralized approach also enhances privacy by reducing the reliance on centralized databases that can be vulnerable to hacking or data breaches.

However, decentralization comes with its own challenges. The complexity of managing a decentralized system can hinder scalability and efficiency²². Additionally, the lack of a central authority can make it difficult to resolve disputes or reverse transactions in case of errors. The decentralized nature of cryptocurrencies also poses regulatory challenges, as it can be difficult to enforce compliance with financial regulations and combat illicit activities²³.

Despite these challenges, decentralization has enabled the rise of innovative financial applications, such as decentralized finance (DeFi) and non-fungible tokens (NFTs). These applications provide opportunities for financial inclusion, allowing individuals to access financial services without relying on intermediaries. However, it is important to strike a balance between decentralization and regulation to ensure the stability and security of the financial system²³.

Additionally, a cryptocurrency-based system eliminates the possibility of a single point of failure, such as a major bank, when the American institutions collapsed in 2008 causing a worldwide crisis. Organizations that provide financial services to consumers, businesses, and governments are known as financial institutions. When it comes to the provision of fi-

financial services for cryptography Cryptocurrencies eliminate the need for a trusted third party, such as a bank or credit card provider⁴. Public keys, private keys, and other incentive schemes secure decentralized transfers like proof of work or stake.

At the same time, given its decentralized nature, it is also much more difficult to intercept data miners and illegal transactions taking place for harmful purposes. However, Law enforcement agencies have indeed been successful in intercepting and tracing illegal transactions involving cryptocurrencies. One notable example is Operation Ironside/Trojan Shield, a three-year operation conducted by the FBI and Australian Federal Police. This operation resulted in the arrest of thousands of suspects involved in criminal activities. The authorities intercepted secret messages exchanged between criminal gang members worldwide using an encrypted chat platform. Additionally, it is important to note that Bitcoin transactions can be tracked by anyone as the blockchain, a public ledger, records all transactions. These incidents demonstrate that governments can track individuals and monitor data in Bitcoin transactions, although it is challenging²⁴.

The User's Privacy and Security

The blockchain ledger relies on difficult-to-solve mathematical puzzles. This means that cryptocurrency transactions are more secure than regular online payments. For the sake of anonymity and security, cryptocurrencies don't use real names or any other information that may be used to track a user's identity (Cryptocurrency Explained With Pros and Cons for Investment, 2023). Data miners cannot access individual terminals' private transactions thanks to SHA-256, a fairly difficult algorithm. This transaction review tool encrypts the access key before digesting it. Data miners, who steal private information from users, can be deterred by storing cryptographic hash functions and encrypting sensitive information like receipts and transactions using a combination of hexadecimal and binary digits.

One of the most popular potential applications of cryptocurrencies is now being tested in the remittance industry. It is explained how Bitcoin and other cryptocurrencies might be used as intermediaries in international monetary transactions²⁵. This results in the conversion of fiat money into Bitcoin (or another cryptocurrency), the transfer of said Bitcoin across national borders, and its subsequent conversion back into the original fiat money. This strategy reduces the time and cost normally associated with sending money abroad. "Flat money" refers to a form of legal cash that is recognized internationally and has the full faith and credit of its issuer. According to Nakamoto's original Bitcoin whitepaper, SHA-256 is employed to create a digital fingerprint of each block, linking them together to form the blockchain²⁶. This ensures that

any tampering with the data would be immediately detectable, as it would change the hash value of the block, rendering it invalid. By using a cryptographic hash function like SHA-256, the Bitcoin network achieves a high level of immutability and resistance to fraud.

SHA-256 Algorithm Explained

The technique, which is a special sort of function known as a cryptographic hash function, takes a string of input data of a given length and returns a string of output data that is entirely alphanumeric. "The Secure Hashing Algorithm 256 (SHA-256) is a hash function used in the Bitcoin environment; it takes a message as input and returns a value known as the hash or message digest. This means that the output will never be longer than 256 bits, no matter how large the input data string is. The hashing process is useless as a kind of encryption because it is one-way and cannot be undone (decrypted). When SHA-256 is applied to numerous outputs, we can compare how drastically different the work is when just one character is changed in the message²⁵. Table 5.1 demonstrates that the output length is unaffected by an increase in the input length. Furthermore, SHA-256 is deterministic in the sense that it always produces the same hash value for the same input.

The SHA-256 algorithm is of paramount importance in safeguarding the confidentiality and authenticity of transactions inside the blockchain system²⁷. SHA-256 facilitates the generation of digital signatures for individual transactions, therefore ensuring the verification of data validity and integrity. The algorithm in question is employed inside the Bitcoin ecosystem for the purpose of generating distinct transaction IDs and ensuring the security of the mining procedure.

As stated in Nakamoto's seminal Bitcoin whitepaper from 2008, the use of SHA-256 is utilized to generate a cryptographic hash function for each block, therefore establishing interconnections among them to constitute the blockchain²⁶. This measure guarantees that any unauthorized manipulation of the data would be promptly identifiable, as it would alter the hash value of the block, so invalidating it. The Bitcoin network attains a significant degree of immutability and resistance to fraudulent activities through the utilization of a cryptographic hash function such as SHA-256²⁷.

Furthermore, the SHA-256 algorithm possesses the characteristic of being a unidirectional function, hence rendering the task of deducing the original data from its corresponding hash value virtually unattainable²⁷. This characteristic guarantees the security and protection of transactions and user identities, preventing unauthorised access.

In essence, the significance of the SHA-256 algorithm stems from its capacity to offer robust hashing, digital signatures, and immutability to transactions inside blockchain sys-

tems. Consequently, it serves as a crucial element within the security framework of cryptocurrencies such as Bitcoin²⁷.

Every user can feel safe and confident while using SHA-256. In this section, we'll look at why SHA-256 is so well-suited for usage as the blockchain's principal hashing function. There are two main features of the SHA-256 algorithm. The first is collision resistance (no repeated values), which describes and emphasizes the fact that no two input values can produce the same hash result. This ensures that the hash values of all blocks in the blockchain are unique. User input that cannot be re-created using a hash value alone is also considered preimage resistant. This ensures that during the bitcoin proof of work, miners are unable to estimate the nonce's value by reversing the good hash back into the input, and instead must resort to a brute-force strategy to accomplish the task²⁵.

Disadvantages of Cryptography

Illegal Transactions Between Users

Due to the anonymity and security of bitcoin transactions, it is difficult for governments to track down individuals by their wallet address or monitor their data. Bitcoin has traditionally been used in many criminal activities, including the purchase of drugs on the dark web⁴. Additionally, some people have utilized it to convert their unlawfully acquired money through a trustworthy middleman to mask the source.

Volatile and Unforeseeable Nature

When stock markets are volatile, the value of digital currencies like bitcoin and Ethereum rise sharply because their prices are constantly changing on various open and public exchanges authorized by the government. The price of bitcoin has seen wild swings, going from a peak of \$17,738 in December 2017 to a low of \$7,575 in the months since then. Some analysts have predicted that the cryptocurrency market is a bubble that would burst in the near future⁴. Furthermore, the worth of such delicate technology is unpredictable, as the worth and value of Cryptography and Cryptocurrencies, such as Bitcoin and Ethereum, are mostly determined by interest and popularity.

One major risk associated with volatile assets is the potential for significant financial losses. Cryptocurrencies like Bitcoin and Ethereum have experienced extreme price fluctuations, with values soaring to record highs and plummeting to dramatic lows²⁸. Investors who fail to accurately predict these price movements can suffer substantial losses, especially if they buy assets at their peak value and sell during a downturn.

Moreover, the high volatility of cryptocurrencies can also lead to market manipulation and fraud. The lack of regula-

tion in the cryptocurrency market makes it susceptible to price manipulation schemes, including pump and dump schemes, where the price of a specific cryptocurrency is artificially inflated before the orchestrators sell off their holdings, causing a rapid price decline²⁸.

The rapid and unpredictable price swings in cryptocurrencies can also create challenges for market stability. Large price fluctuations can erode investor confidence and discourage mainstream adoption of cryptocurrencies as a reliable medium of exchange or store of value. Moreover, the market impact of sudden price drops or crashes can extend beyond the cryptocurrency sector and spill over into broader financial markets, especially if investors panic and sell off their assets²⁸.

To mitigate these risks, investors should exercise caution and adopt strategies such as diversification and risk management techniques. Diversifying investments across different asset classes can help minimize the impact of volatility in any single investment.

Specified Cash-Back Tokens Provided with Transactions

The notion of Utility Tokens must be grasped before moving forward. Tokens are used to accomplish a certain goal by providing their owners with access to a decentralized app's or ecosystem's resources. Web3 could incorporate a decentralized exchange (DEX), metaverse platform, or blockchain-based platform. Some examples of utility tokens are Ethereum (ETH) and XRP (XRP). Cryptocurrencies like XRP and ETH are known as utility tokens because they serve a specific purpose on their underlying blockchains. The primary function of Transactional Tokens is as a medium of exchange. Bitcoin is the most well-known example of this. In addition, Uniswap and other Governance tokens are used to cast votes or exercise other powers on a blockchain. Tokens refer to the underlying infrastructure for blockchain-based apps like Solana. More specifically, security tokens are digital representations of rights to ownership in a certain asset, such as a tokenized share of stock (value recorded as digital information on the blockchain). One type of securitized token is the tokenized sapphire offered by MS Token, a fine art security token and NFT studio. Discovering one of them for sale will give you a piece of the Millennium Sapphire⁴. Another mind-blowing aspect of conducting business online. Cash-back tokens are a great illustration of purchasing that gives something back in a special way since they allow the buyer to earn money or a gift in exchange for their purchase. Crypto cashback is equal to one percent of the transaction amount and is given to qualifying users who have enabled the "spend from crypto balance" function.

While they offer benefits such as incentivizing users to participate in a particular platform or rewarding them for specific

actions, they can also have some disadvantages.

The existence of cash-back tokens might potentially lead to the development of a fragmented ecosystem. Diverse platforms may own distinct tokens, hence engendering confusion and challenges in the process of inter-platform exchange or use. The presence of fragmentation within the cryptocurrency ecosystem may impede the widespread acceptance and practicality of these digital assets.

Additionally, it is important to note that the value of cash-back tokens may exhibit volatility. Similar to other digital currencies, the value of cryptocurrencies can experience substantial fluctuations, hence introducing a level of anxiety for users who possess limited familiarity with the underlying market dynamics. The inherent volatility of these tokens poses a significant challenge for users in accurately estimating the true worth of their incentives, leading to potential uncertainty over the purchasing power of those tokens.

Furthermore, it is worth noting that cash-back tokens may possess restricted functionality beyond a certain platform or ecosystem. Although these digital tokens can facilitate transactions for certain commodities or services within the platform, their broader adoption in the general market may face significant limitations. The absence of acceptance might impose limitations on users, hindering their ability to utilise their rewards in a broader spectrum of transactions, therefore constituting a perceived disadvantage.

Analysis of Bitcoin Data — Past 10 years

Bitcoin was launched in 2009, but during the first four years after its inception, it was hardly used and barely known. In fact, Bitcoin did not get serious attention from financiers and the media until 2013. The price of bitcoin momentarily surpassed \$200 in April of 2013, but has since dropped back to roughly \$70. Bitcoin's value plummeted from about \$680 in December 2013 to below \$50 in January 2014, marking a severe decline in the following year, 2014. One of the main Bitcoin exchange platforms at the time of the uprising and fast decrease was the Mt. Gox exchange, and its failure was widely blamed for the crash. After another drop in 2014, Bitcoin's price stayed very stable for the next several years, moving between roughly \$200 and \$600 over the course of 2015. In 2017, Bitcoin's value again skyrocketed, this time reaching a high of about \$20,000 in December, at the end of May (Bitcoin's Price History, 2023).

Following this event, Bitcoin's price has been extremely volatile, with frequent large swings. The assertion is supported by the fact that Bitcoin's price fell from above \$20,000 to below \$6,000 by the end of 2019, only to recover to around \$10,000 in June of this year. In 2020, Bitcoin's price and worth reached a peak of roughly \$29,000 in April due to a new wave of investor interest (Bitcoin's Price History, 2023). A

significant 416% increase in value. Not much later in November of 2020, Bitcoin spiked with a new all-time high of approximately \$69,000. Towards December of 2021, Bitcoin's value declined and reached an approximate value of \$49,000.

In light of the erratic decline and growth of such technology, it's not surprising that Bitcoin has been one of the most volatile assets in the financial sector over the past decade. It has gone through times of rapid expansion as well as deep declines and stale patches. Investors should carefully examine their risk tolerance before putting money into Bitcoin or any other cryptocurrency due to the high volatility of their prices (Bitcoin's Price History, 2023).

Personal Analysis of Ethereum Data

Purpose of Ethereum and Definition

The first Ethereum tokens were released in 2015. As the technology has become more widely used, its market valuation has risen dramatically over the past decade. There have been large swings in the price of Ethereum over time, with quick increases followed by precipitous decreases³⁰.

In its early years, Ethereum's price fluctuated between \$2 and \$15, with a low of \$2 and a high of \$15 being the norm for much of 2016 and early 2017. However, the price of Ethereum started to surge towards the end of 2017, eventually reaching a record high of about \$1,100 in January of 2018. To a great extent, this was due to the hype and speculation around initial coin offers (ICOs), many of which were conducted on the Ethereum blockchain³⁰.

The price of Ethereum plummeted to around \$138 USD at the end of 2018³⁰, following a peak in user interest and the currency being used mostly for NFT reasons in early 2018. Many other cryptocurrencies also saw significant losses. Thus this drop is part of a larger market-wide trend.

The price of Ethereum has been more volatile ever since the incident occurred, although it has remained on an upward trend overall. The price of Ethereum started to rise sharply again in the first few months of 2021, and by November of that year, it had risen to more than \$4,445³⁰. Partially responsible for this trend is the rising demand for Ethereum-based decentralized financial (Defi) solutions.

The price fluctuations of cryptocurrencies such as Bitcoin and Ethereum are driven by a multitude of variables, including market trends, legislative shifts, and advancements in technology. Market trends have a substantial impact as they serve as indicators of the demand and supply dynamics within the realm of cryptocurrencies. The perceived validity and acceptability of cryptocurrencies can be influenced by regulatory developments, including government legislation and policies, which in turn can have an impact on their pricing. Technological advancements, such as advancements in blockchain tech-

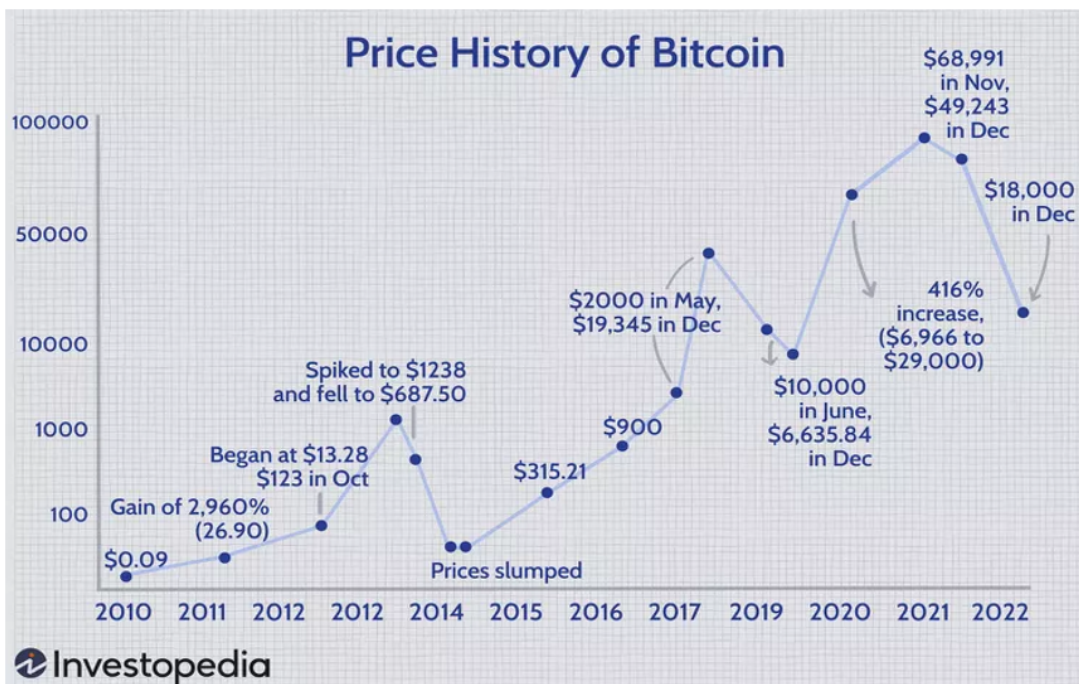


Fig. 1 Price History of Bitcoin²⁹

nology or the introduction of novel features and updates, have the potential to impact cryptocurrency values by augmenting the use and efficacy of these digital assets³¹.

The purpose of Ethereum and its most Popular Application

Non-fungible token is the full form of NFT. In economics, "non-fungibility" refers to the fact that your furniture, music files, and computer are all unique to you. It could be something physical, or it could be something digitally modified. Certain parts can only be used in one specific product due to their unique properties. However, fungible items can be exchanged since their value distinguishes them rather than their unique characteristics. For instance, 1 ETH and \$1 USD are both fungible because each can be traded for another of the same value. Nonfungible tokens (NFTs) are digital representations of physical assets. Artworks, antiques, and even real estate can all be tokenized as a special token of gratitude. More than a million people in 2022 will use the open sea app, making it the most popular Ethereum exchange. No one can alter the ownership record or create a new NFT on the Ethereum blockchain because of this security feature³².

However, Non-fungible tokens (NFTs) are not limited to artworks, antiques, and real estate. They can be used to represent a wide range of digital and physical assets. For example, in the world of sports, NFTs have been used to tok-

enize collectible items like trading cards, game moments, and even virtual sports memorabilia³³. Additionally, NFTs have found applications in the music industry, allowing artists to tokenize their music, albums, and concert tickets³³. Virtual fashion items, virtual real estate, virtual pets, and even virtual land have also been tokenized using NFTs³³. These examples demonstrate the diverse range of assets that can be represented and monetized through NFTs, providing new opportunities for artists, businesses, and creators.

Advantages of Ethereum Currency on Non-fungible Tokens and Transactions

Proof of ownership can be easily demonstrated due to the public nature of transaction records and token metadata. Once a transaction has been validated, it is extremely difficult to "steal" possession of the token³³. Since NFTs can be traded directly between users, intermediary platforms that charge hefty fees for the service are unnecessary. All Ethereum products have the same "backend" infrastructure.

To rephrase, all Ethereum products are interoperable with one another and support the transfer of NFTs. Buying an NFT on one product and selling it on another is a simple process. You, as the product's creator or benefactor, can list your NFTs on a number of different products at once, and all of them will always reflect the most recent ownership data (Non-fungible Tokens (NFT) — ethereum.org, 2013). Ethereum's worth and

value make this conceivable; they are unlikely to decrease and should remain stable for the foreseeable future. It is ensured that users' tokens can be traded at any time through authorized, private terminals that are safe from data miners³³.

Half of all Millennial millionaires have at least 25% of their wealth in crypto, with most of those being NFT holders according to a CNBC poll from 2021³⁴. Among U.S. adults, 31% of those between the ages of 18 and 29 have engaged in cryptocurrency investment, trading, or use as of November, compared to 21% of those between the ages of 30 and 49, 8% of those between the ages of 50 and 64, and 3% of those 65 and over³⁴.

Comparison Between Digitized and the Standard Internet

The NFT internet Development

No two NFTs share the same digital fingerprint. Each NFT must have an owner whose identity can be confirmed by public records. NFTs are compatible with everything that runs on Ethereum. An event ticket issued as an NFT can be exchanged for another NFT on any Ethereum marketplace". A piece of art could be traded for a ticket. Makers of content can sell their wares to customers anywhere in the world. Authors can retain full rights to their creations and collect royalties and other financial benefits instantly. Non-fungible tokens (NFTs) on the Ethereum network allow for the creative use of previously unimagined objects³⁵. One example is using a digital work of art as collateral for a decentralized loan.

Internet Development in The Modern World

Duplicate versions of popular file formats take as long to download as the original since they are identical to it in every way except size. One is expected to trust the institution's description of the function and purpose of the servers housing digital ownership records. An additional perk is that companies selling digital products need to maintain their own infrastructure. To facilitate the sale of digital event tickets, an app would need to operate its own ticket exchange. Creators also rely heavily on the platforms' distribution and technical support systems. These typically have stipulations placed on when and where they can be used. The vast bulk of revenue generated by platforms like music streaming services is kept by the platform itself³².

Methodology

Design Methodology Research

This study employs a thorough mixed-methods strategy to investigate the domain of cryptocurrencies and their far-reaching implications in depth. The research design consists of three interdependent phases: a comprehensive literature review, a quantitative analysis of Bitcoin and Ethereum's valuation trends, and a qualitative analysis of market sentiments.

Review of the Literature

The literature evaluation includes a comprehensive examination of key concepts within the realm of cryptocurrencies, blockchain technology, and their impact on financial markets and socioeconomic structures. Notably, the works of Nakamoto on the underlying principles of blockchain and on the origins of cryptographic currency provide essential theoretical foundations^{26,36}. Furthermore, authors Swan and Antonopoulos provide illuminating perspectives on the broader implications of decentralised digital currencies³⁷.

Methods for Collecting Information

Data on Cryptocurrency

The quantitative analysis phase relies on meticulously sourced and curated Bitcoin and Ethereum historical price data. This dataset includes daily closing prices, trading volumes, and market capitalization figures for each cryptocurrency since their inception to the present day. The data was obtained from reputable cryptocurrency exchanges, such as CoinMarketCap and Binance. This methodology guarantees an accurate and comprehensive representation of price dynamics over the past decade.

Analytical Methods

Trend Determination

Utilising time series analysis techniques, key trends, turning points, and protracted periods of growth or decline in the Bitcoin and Ethereum valuations were identified. This methodology is influenced by the works of Lo, MacKinlay, and Brooks, which demonstrate the effectiveness of time series analysis in revealing hidden patterns in financial data^{38,39}

Volatility Evaluation

Multiple techniques were utilised to assess volatility, each casting light on a unique facet of market dynamics. Fama and Schwert introduced the standard deviation of daily returns to quantify the dispersion of price changes^{40,41}. Additionally,

Wilder's Average True Range (ATR) technique captured price ranges to provide insight into intraday volatility. Bollinger Bands, derived from Bollinger's research, were utilised to visualise volatility patterns^{42,43}.

Sentiment Analysis

Using NLP (Natural Language Processing) techniques, a curated corpus of Bitcoin and Ethereum-related news articles and social media posts was subjected to qualitative sentiment analysis. Informed by the work of Zhang, Pang, and Lee, this method enabled the retrieval of market sentiment indicators to supplement quantitative findings.

Conclusion

In conclusion, this research paper undertook an exhaustive voyage to comprehend the world of cryptocurrencies, concentrating on Bitcoin and Ethereum as prominent examples while addressing both the advantages and disadvantages for interested users, specifically one's security and the assurance of their safety. The analysis encompassed a decade and revealed extraordinary insights regarding their valuation trends and the broader implications for investors and stakeholders. The historical data analysis of Bitcoin revealed a turbulent voyage marked by exponential growth, spectacular collapses, and intense market volatility. While reaching \$1,242 in 2013 and \$19,782 in 2017 was indicative of potential gains, downward trends and events such as the Mt. Gox exchange failure highlighted the inherent risks of investing in cryptocurrencies. The findings highlight the need for meticulous risk evaluation and a nuanced comprehension of market dynamics. Ethereum, on the other hand, has experienced significant price fluctuations since its inception, with its all-time high of \$4,815 in November 2021 indicating the possibility of significant returns. The analysis demonstrated the impact of market sentiment, Bitcoin's dominance, and platform development on Ethereum's price trajectory, reinforcing the need to consider a variety of variables when making intelligent investment decisions. This research sheds light on the transformative potential of cryptocurrencies in financial systems and provides insights into the intricate relationship between technological innovation, market sentiment, and investor behaviour. As this field continues to evolve, a comprehensive comprehension of the benefits, drawbacks, and fundamental trends will enable individuals and institutions to navigate the ever-changing landscape of cryptocurrencies with greater confidence and more informed decisions.

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