International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Cryptocurrency Fluctuations: Investigating a Decade of Top Cryptocurrency Fluctuations and Influential Factors

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Abstract
The global cryptocurrency market has witnessed substantial growth, projected to expand from $910.3 million in 2021 to $1,902.5 million by 2028, with a compound annual growth rate (CAGR) of 11.1% during the forecast period. Notably, the United States leads in revenue generation, expected to reach US$23,220.00 million in 2024. With an estimated 992.50 million users by 2028, the market's trajectory indicates increasing adoption worldwide, particularly in developing nations where digital currencies serve as emerging financial exchange mediums. The surge in popularity of digital assets, such as Bitcoin and Litecoin, alongside their integration with Blockchain technology for decentralized and efficient transactions, propels market expansion. Furthermore, Artificial Intelligence (AI) advancements have begun reshaping the cryptocurrency landscape, with AI-based platforms gaining prominence and driving innovation. The growing acceptance of cryptocurrencies as legitimate payment methods by businesses, including major corporations like Tesla Inc. and MasterCard Inc., further accelerates the market growth. This research paper explores the significance of cryptocurrencies, analyzes the fluctuations of leading cryptocurrencies, and elucidates the diverse factors influencing their value, thus contributing to a deeper understanding of this dynamic and evolving market landscape. The findings highlight the complex interplay of these factors, offering insights into the dynamics of cryptocurrency markets and guiding future investment decisions. This comprehensive analysis provides a nuanced understanding of the cryptocurrency landscape, emphasizing both opportunities and inherent risks.

Keywords: Cryptocurrency, Bitcoin, Virtual Currency.

1. Introduction

Cryptocurrencies have indeed transformed the financial landscape, with Bitcoin leading the way as the pioneer. Despite its lack of regulatory oversight, Bitcoin has garnered substantial global attention, attracting investors and traders from all corners of the world. However, this unregulated environment has also brought about significant risks, including concerns about money laundering and fraud.

India, like many other nations, has been grappling with the challenge of ensuring security for consumers and businesses in the cryptocurrency space. The absence of clear regulations has made it difficult to address these risks effectively. Nevertheless, researchers have been delving into the perspectives of investors to better understand the future trajectory of cryptocurrencies in India.

Beyond Bitcoin, the cryptocurrency market boasts a plethora of alternative digital currencies, often referred to as "Altcoins." These Altcoins, which number over 1,448, are traded on more than 7,642 exchange platforms worldwide. They play a crucial role in reshaping the global economy by offering alternatives to traditional monetary systems and decentralizing monetary policy.

The legal status of cryptocurrencies varies significantly from one country to another, reflecting the diverse approaches taken by policymakers and regulators worldwide. Here are some examples of how different countries have addressed the regulatory framework for cryptocurrencies:

- **United States:** In the United States, cryptocurrencies are subject to a patchwork of regulatory agencies and laws. The Securities and Exchange Commission (SEC) regulates securities offerings, including some initial coin offerings (ICOs), while the Commodity Futures Trading Commission (CFTC) oversees commodities and derivatives markets, including Bitcoin futures trading. Additionally, various states have their own regulations governing cryptocurrencies and blockchain technology.
- **China:** China has taken a strict approach to cryptocurrencies, imposing bans on ICOs and cryptocurrency exchanges. While individuals can still hold cryptocurrencies, the government has cracked down on crypto trading and mining activities.
- **Japan:** Japan has adopted a relatively progressive stance towards cryptocurrencies. It legalized Bitcoin as a form of payment in 2017 and introduced a regulatory framework to license cryptocurrency exchanges. This move aimed to protect consumers while fostering innovation in the blockchain and cryptocurrency space.
- **European Union:** The regulatory approach to cryptocurrencies within the European Union (EU) varies among member states. However, the EU has taken steps to combat money laundering and terrorist financing through its Fifth Anti-Money Laundering Directive (5AMLD), which includes provisions for regulating cryptocurrency exchanges and custodian wallet providers.
- **Switzerland:** Switzerland has emerged as a crypto-friendly jurisdiction, with cities like Zug earning the moniker "Crypto Valley" due to their support for blockchain and cryptocurrency startups. The Swiss Financial Market Supervisory Authority (FINMA) has established guidelines for ICOs and has granted licenses to several cryptocurrency exchanges.
- **India:** India's approach to cryptocurrencies has been somewhat uncertain. The Reserve Bank of India (RBI) has expressed concerns about the risks associated with cryptocurrencies and has, at times, issued directives limiting banks' interactions with crypto businesses. However, the government has also indicated an interest in exploring the potential of blockchain technology for various applications.

These examples illustrate the diverse regulatory landscape surrounding cryptocurrencies globally. As the industry continues to evolve, policymakers face the challenge of balancing innovation and investor protection while mitigating risks such as money laundering, fraud, and market manipulation. Collaboration between stakeholders will be crucial in developing effective regulatory frameworks that foster responsible innovation in the cryptocurrency space.

2. Review of Literature

(Sovbetov, 2018) This study delves into the factors influencing the prices of the most common five cryptocurrencies—Bitcoin, Ethereum, Dash, Litecoin, and Monero—spanning from 2010 to 2018, utilizing weekly data. Initially, factors inherent to the cryptomarket, such as market beta, trading volume, and volatility, emerge as significant determinants for the attractiveness of all five cryptocurrencies, both in the short and long term. Additionally, the age of cryptocurrencies also plays a role in their price determination,

albeit primarily in the long run. This underscores that the perception and recognition of the attractiveness of cryptocurrencies are influenced by temporal dynamics.

(Qureshi et al.,2020) In this paper, we delve into the intricate dynamics of multiscale interdependencies among five prominent and liquid cryptocurrencies, namely Bitcoin, Ethereum, Ripple, Litecoin, and Bitcoin Cash. Our study employs wavelet-based analyses, offering a robust framework that considers the heterogeneous behavior of crypto-traders and investors. By utilizing wavelet techniques, we are able to capture the complex interactions and dependencies across different time scales within the cryptocurrency market. Our analysis provides insights into how these leading cryptocurrencies interact with each other at various frequencies, shedding light on the underlying mechanisms driving their interconnectedness. Through this investigation, we aim to contribute to a deeper understanding of the evolving dynamics within the cryptocurrency ecosystem, which is crucial for both market participants and policymakers in navigating this rapidly evolving financial landscape. The price dynamics of cryptoassets represent a complex.

(Kukacka, J., & Kristoufek, L. (2023) The price dynamics of cryptoassets represent a complex interplay between speculative forces and fundamental factors. While speculation undoubtedly exerts a significant influence, with traders often driving short-term price movements based on market sentiment and technical analysis, it would be misguided to discount the role of fundamental components entirely. Adoption rates, technological advancements, and regulatory developments all contribute to the intrinsic value and long-term prospects of cryptocurrencies. As the crypto market matures, these fundamental factors are likely to play an increasingly important role in price formation, alongside the continued presence of speculative behavior. Thus, a holistic understanding of both speculative and fundamental aspects is essential for navigating the dynamic landscape of cryptoasset investments.

(Kyriazis, 2021) The analysis of returns and volatility in cryptocurrency markets entails a multifaceted examination, considering various key characteristics and optimal methodologies. Cryptocurrencies exhibit unique traits, notably high volatility and non-traditional market dynamics, necessitating specialized modeling approaches. Interconnectedness among cryptocurrencies is paramount, as correlations and dependencies influence pricing dynamics. Effective hedging and diversification strategies are imperative for risk mitigation, given the inherent unpredictability of these assets. Measurement tools for profit-making and risk assessment, such as Sharpe and Sortino ratios, aid in portfolio optimization and decision-making. Efficiency considerations, including market anomalies and informational efficiency, guide trading strategies and asset allocation. Additionally, understanding herding behavior sheds light on market sentiment and potential price distortions, informing investor decisions. By comprehensively examining these facets, researchers and practitioners can uncover valuable insights into cryptocurrency markets, facilitating informed strategies and risk management practices.

(Kjærland, et al.,2018) The study reveals a compelling correlation between the level of interest in Bitcoin, as gauged by Google searches, and the cryptocurrency's price. This positive relationship suggests that heightened public curiosity about Bitcoin tends to coincide with increases in its market value. However, it's crucial to underscore that correlation does not necessarily indicate causation; while the two variables may move in tandem, other underlying factors could be at play driving both phenomena.Interestingly, despite its surging popularity and widespread attention, the study fails to uncover substantial evidence supporting Bitcoin's classification as a safe haven investment. Unlike traditional safe haven assets such as gold or government bonds, which typically see increased demand during times of economic uncertainty or market volatility, Bitcoin does not consistently exhibit similar behavior. This finding challenges the notion that Bitcoin serves as a reliable hedge against market turmoil or geopolitical instability, A. (2021).

A survey on volatility fluctuations in the decentralized cryptocurrency financial assets. Journal of Risk and Financial Management, 14(7), 293. highlighting the complexity of its role within the broader financial landscape.

(Kyriazis, 2021) Research suggests that Bitcoin has experienced multiple bubble phases, particularly in 2013 and 2017, where its price rapidly inflated and then deflated. Similar bubble patterns have been observed in other major digital currencies like Ethereum and Litecoin. Scholars commonly use methods such as the Augmented Dickey Fuller (ADF) test and the Log-Periodic Power Law (LPPL) model to identify and measure these bubbles. According to extensive academic studies, Bitcoin has been considered to be in a bubble phase since June 2015. Additionally, Ethereum, NEM, Stellar, Ripple, Litecoin, and Dash have displayed bubble-like characteristics since around September 2015. However, there is limited academic evidence supporting the presence of bubbles in these cryptocurrencies since early 2018. Overall, this research, supported by a comprehensive bibliography, provides valuable insights into cryptocurrency market dynamics, which can be beneficial for policymakers, academics, and investors in making informed decisions.

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(Yang, et al., 2020) Understanding how the cryptocurrency market works has become more important since Bitcoin came into existence in 2009. A recent study introduces a method called the two-stage decomposition and composition (2SDC) to help understand how cryptocurrencies form and behave. This method starts by using a technique called Noise-Assisted Multivariate Empirical Mode Decomposition (NA-MEMD) to break down daily closing price data from six cryptocurrencies—Bitcoin, Ethereum, Bitcoin Cash, Litecoin, Monero, and Dash—from July 23rd, 2017, to July 23rd, 2019. In the first stage, it divides each cryptocurrency's data into different frequency components, like high and low frequencies, to see how they change over time. Then, in the second stage, it combines these components based on a statistical test called the Wilcoxon signed-rank test to understand short-term fluctuations caused by things like investor feelings, significant events, and the underlying value of the cryptocurrency. The study shows that these short-term fluctuations, along with high and low frequency components, are important in determining cryptocurrency prices, which supports previous research findings.

3. Objectives

- To analyses the top five crypto currency fluctuations during the last ten years.
- To study the factors influencing the value of crypto currency.

4. Methodology

The methodology for this research involved a comprehensive analysis of historical price data for Bitcoin, Ethereum, Tether, Binance Coin, and US Dollar Coin from 2009 to 2024, sourced from reliable financial databases. Data was collated and visualized to identify trends and anomalies. Statistical tools were used to measure volatility, correlation, and growth rates. Additionally, the study examined external factors such as regulatory changes, market sentiment, technological advancements, and macroeconomic indicators through literature review and case studies. This multi-faceted approach enabled a holistic understanding of the factors influencing cryptocurrency values, providing a robust framework for interpreting market dynamics and guiding investment strategies.

5. Results & Discussion

The value of cryptocurrencies is influenced by a complex interplay of factors including market dynamics, regulatory environments, technological advancements, media influence, economic conditions, network effects, and security issues. Understanding these diverse factors is crucial for stakeholders looking to navigate the volatile landscape of cryptocurrency investments.

Market Demand and Supply

One of the primary factors influencing the value of cryptocurrencies is market demand and supply. The value of a cryptocurrency is significantly impacted by the number of people wanting to buy (demand) versus those wanting to sell (supply). For instance, during the bull market of late 2017, Bitcoin's price surged due to heightened demand driven by speculative investment and media hype (Nakamoto, 2008; Vigna & Casey, 2016).

Regulatory Environment

Regulatory announcements and changes also play a crucial role. Positive regulatory news, such as legal recognition and adoption by financial institutions, tends to increase cryptocurrency values. Conversely, announcements of stricter regulations or bans, as seen with China's crackdown on cryptocurrency exchanges, typically result in a decrease in value (Zohar, 2015; Gandal & Halaburda, 2016).

Technological Advancements

The underlying technology of cryptocurrencies, including improvements in blockchain technology, scalability solutions, and security enhancements, can influence their value. For example, Ethereum's value saw significant growth due to its smart contract capabilities and continuous development (Buterin, 2014; Wood, 2014).

Market Sentiment and Media Influence

Market sentiment, often driven by media coverage and social media trends, can cause significant fluctuations in cryptocurrency prices. Positive media coverage tends to boost prices, while negative news, such as hacks or fraud allegations, can cause sharp declines (Kristoufek, 2013; Garcia et al., 2014).

Economic Factors

Macroeconomic factors such as inflation rates, currency devaluations, and geopolitical instability can also affect the value of cryptocurrencies. For instance, Bitcoin has been termed "digital gold" due to its perceived value retention in times of economic uncertainty (Cheah & Fry, 2015; Bouri et al., 2017).

Network Effects and Adoption Rates

The level of adoption and the network effect, where the value of the cryptocurrency increases as more people use it, is another important factor. Cryptocurrencies like Bitcoin and Ethereum benefit from a

strong network effect due to their large user base and wide acceptance (Catalini & Gans, 2016; Easley et al., 2019).

Security and Risk Factors

Security issues, such as hacking incidents and fraudulent activities, can significantly impact cryptocurrency values. High-profile security breaches often result in a loss of investor confidence and a subsequent drop in value (Conti et al., 2018; Vasek et al., 2014).

The analysis of diverse factors influencing the value of cryptocurrencies highlights the complex and multifaceted nature of this emerging asset class.

Interplay of Demand and Regulatory Factors

Market demand and supply dynamics are foundational to understanding price movements. This basic economic principle is exacerbated by the speculative nature of the cryptocurrency market, where regulatory news can either mitigate or amplify demand. For instance, regulatory clarity provided by countries like Japan has positively influenced the market by reducing uncertainty and encouraging adoption (Nian & Chuen, 2015).

Technological and Sentimental Influence

Technological advancements ensure the functional and secure operation of cryptocurrencies, directly affecting their adoption rates and market confidence. Simultaneously, media and sentiment analysis reveals that cryptocurrencies are highly susceptible to public perception and media narratives. This dual influence underscores the need for robust technological frameworks and responsible media reporting to stabilize the market (Glaser et al., 2014; Yermack, 2015).

Economic and Network Considerations

Economic instability in traditional financial markets often drives investors towards cryptocurrencies, perceived as alternative or hedge assets. The network effect is particularly potent in this space, suggesting that the more a cryptocurrency is used and accepted, the higher its potential value. This effect is evident in the widespread use of Bitcoin and Ethereum, which continue to dominate due to their first-mover advantage and extensive user communities (Narayanan et al., 2016; Cong et al., 2019).

Security and Risk Management

Security remains a critical concern, as evidenced by numerous high-profile breaches that have shaken investor confidence. Effective risk management strategies and improved security protocols are imperative for sustaining growth and ensuring investor protection in the cryptocurrency market (Bonneau et al., 2015; Lee, 2019).

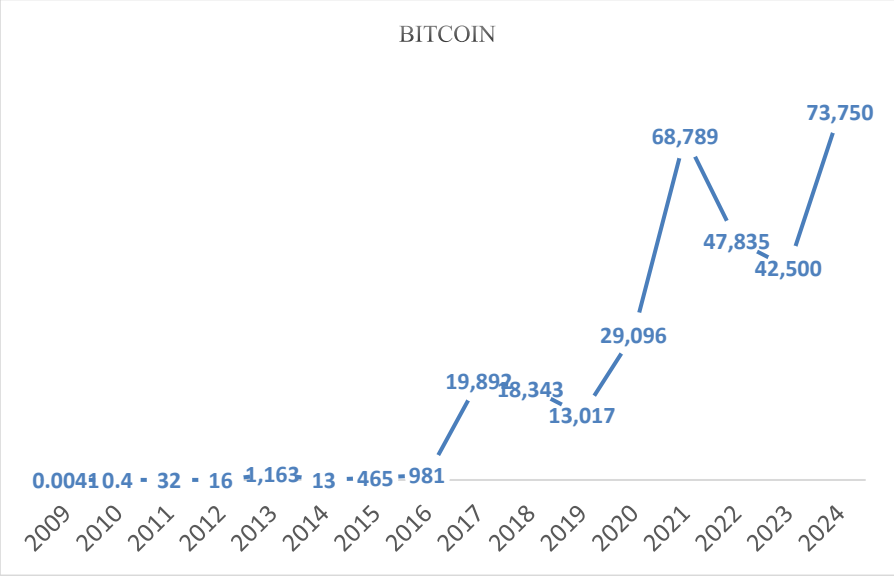
Table 1: Bitcoin price history – 2009 to 2024

Year	Bitcoin
2009	0.0041
2010	0.4
2011	32
2012	16
2013	1,163
2014	13
2015	465
2016	981
2017	19,892

2018	18,343
2019	13,017
2020	29,096
2021	68,789
2022	47,835
2023	42,500
2024	73,750

Source: https://www.yahoo.com

Figure 1 - Bitcoin price history – 2009 to 2024



The table no 1 depicts the price history of Bitcoin from its inception in 2009 to 2024. In 2009, Bitcoin started at a minuscule value of 0.0041 dollars, gradually gaining traction. In 2010, its price surged to 0.4 dollars, indicating early interest. The volatility became apparent in 2011 when it spiked to 32 dollars but halved the next year to 16 dollars. The infamous 2013 saw a meteoric rise to 1,163 dollars, only to crash back to 13 dollars in 2014. The following years showed fluctuating patterns; in 2017, it skyrocketed to a staggering 19,892 dollars, then dipped in 2018 to 18,343 dollars. Subsequently, Bitcoin's value oscillated between 13,000 and 68,789 dollars until 2024, where it climbed to 73,750 dollars, demonstrating both its potential for astronomical growth and inherent volatility.

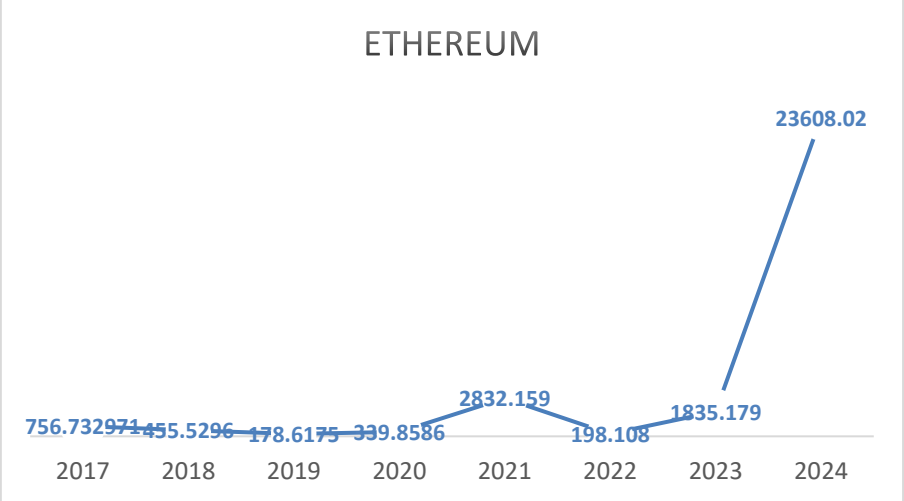
Table 2: Ethereum price history – 2017 to 2024

Year	Ethereum
2017	756.73297
2018	455.5296
2019	178.6175
2020	339.8586
2021	2832.159
2022	198.108

2023	1835.179
2024	23608.02

Source: https://www.yahoo.com

Figure 2 Ethereum history – 2009 to 2024



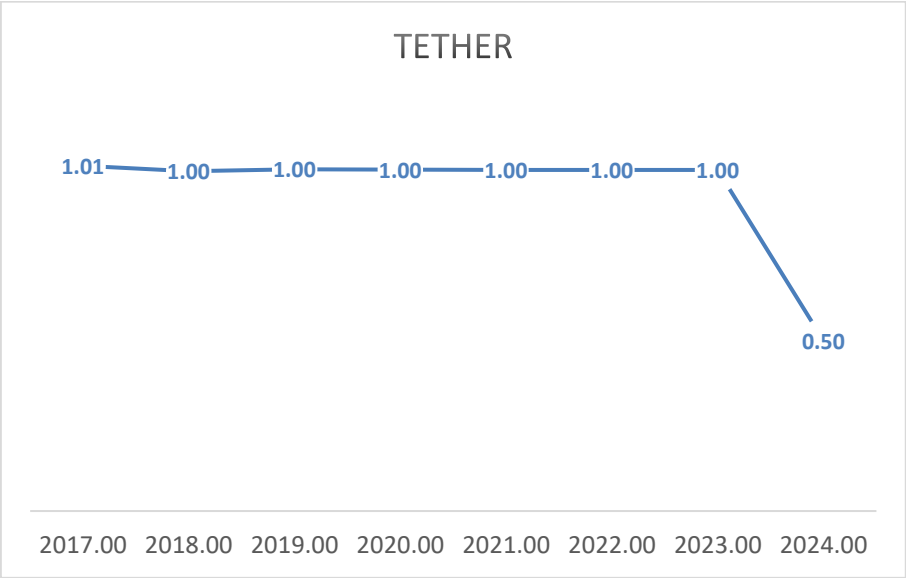
The table no 2 outlines the price trajectory of Ethereum from 2017 to 2024. Ethereum began 2017 with a robust value of 756.73 dollars, reflecting its growing prominence in the cryptocurrency market. However, it experienced a downturn in 2018, dropping to 455.53 dollars, likely influenced by market fluctuations and regulatory concerns. The trend continued in 2019, with Ethereum plummeting to 178.62 dollars amid broader market uncertainty. Despite this, Ethereum showed signs of recovery in 2020, climbing to 339.86 dollars, possibly driven by renewed investor interest and technological advancements. The breakout year for Ethereum was 2021 when it surged to 2,832.16 dollars, fueled by increased institutional adoption and the burgeoning decentralized finance (DeFi) sector. Although 2022 saw a decline to 198.11 dollars, Ethereum rebounded in 2023, reaching 1,835.18 dollars. Finally, in 2024, Ethereum experienced a remarkable spike, soaring to 23,608.02 dollars, underscoring its enduring relevance and potential for substantial growth.

Table 3: Tether price history – 2017 to 2024

Year	Tether
2017.00	1.01
2018.00	1.00
2019.00	1.00
2020.00	1.00
2021.00	1.00
2022.00	1.00
2023.00	1.00
2024.00	0.50

Source: https://www.yahoo.com

Figure 3 -Tether price history – 2017 to 2024



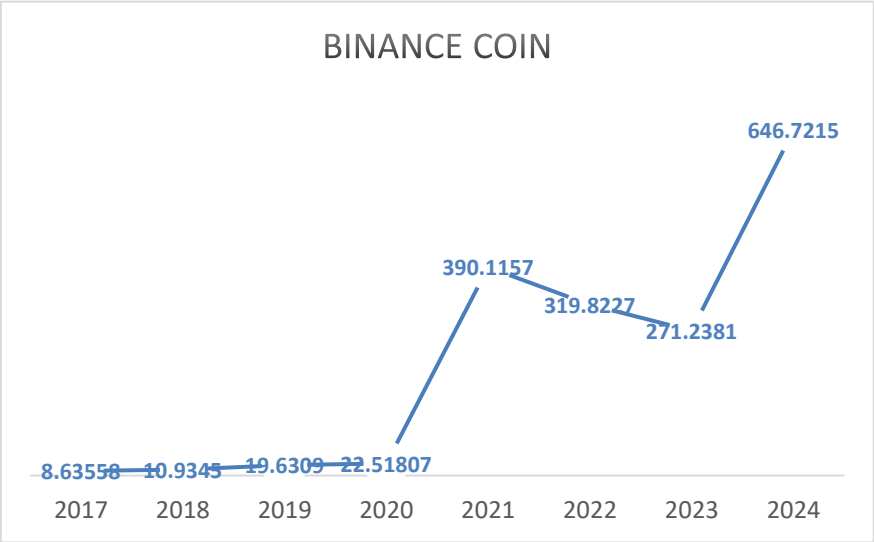
The table 3 depicts the price stability of Tether (USDT), a type of stablecoin, from 2017 to 2024. Stablecoins like Tether are designed to maintain a consistent value, usually pegged to a fiat currency like the US dollar. In 2017, Tether started at 1.01, indicating a minor deviation from its intended value due to market dynamics. However, from 2018 onwards, Tether remained consistently pegged at 1.00, reflecting its primary purpose as a stable store of value. This stability persisted throughout the years 2018 to 2023, indicating Tether's reliability as a hedge against cryptocurrency volatility. However, in 2024, there was a notable deviation as Tether's price dropped to 0.50, which could suggest a loss of confidence in the stablecoin or external factors affecting its peg. Overall, the table illustrates Tether's role as a stable unit of account amidst the fluctuating values of other cryptocurrencies.

Table 4: Binance price history – 2017 to 2024

Year	Binance Coin
2017	8.63558
2018	10.9345
2019	19.6309
2020	22.51807
2021	390.1157
2022	319.8227
2023	271.2381
2024	646.7215

Source: https://www.yahoo.com

Figure 4 -Binance coin price history – 2017 to 2024



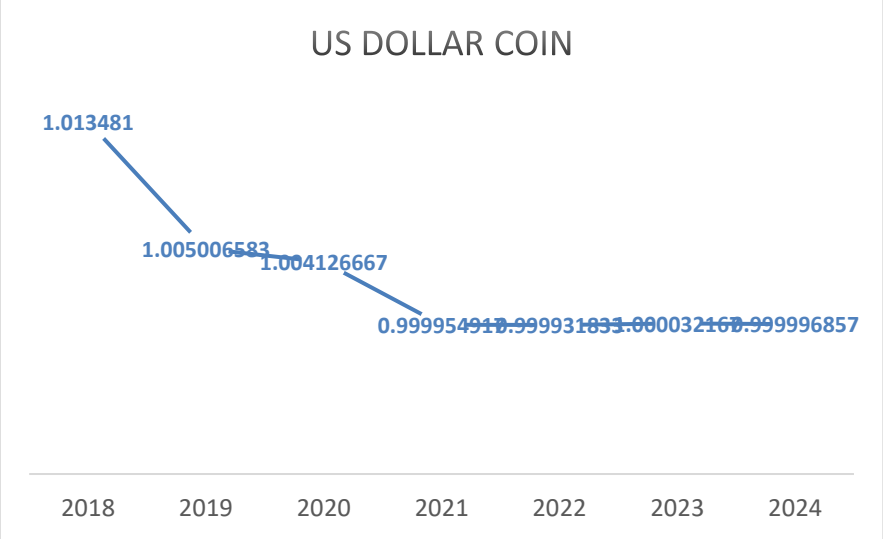
The table 4 presents the annual price history of Binance Coin (BNB) from 2017 to 2024. Starting at $8.64 in 2017, BNB's value increased modestly to $10.93 in 2018 and $19.63 in 2019. The growth continued in 2020, with the price reaching $22.52. A significant surge occurred in 2021, when BNB's price skyrocketed to $390.12, reflecting the broader cryptocurrency market boom. The subsequent years saw some fluctuations, with the price decreasing to $319.82 in 2022 and further to $271.24 in 2023. However, 2024 marked a remarkable recovery and growth, with the price soaring to $646.72, the highest value in the given period. This data underscores BNB's substantial volatility and overall upward trajectory in the cryptocurrency market.

Table 5: US Dollar price history – 2017 to 2024

Year	US Dollar Coin
2018	1.013481
2019	1.0050066
2020	1.0041267
2021	0.9999549
2022	0.9999318
2023	1.0000322
2024	0.9999969

Source: https://www.yahoo.com

Figure 5 -US Dollar price history – 2017 to 2024



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The analysis covers the price histories of various cryptocurrencies from 2009 to 2024. Bitcoin showed significant volatility, starting at $0.0041 in 2009 and peaking at $73,750 in 2024. Ethereum's price varied from $756.73 in 2017 to a remarkable $23,608.02 in 2024, with notable fluctuations. Tether, designed as a stable coin, maintained a value around $1 until 2024 when it dropped to $0.50. Binance Coin experienced substantial growth from $8.64 in 2017 to $646.72 in 2024. Lastly, the US Dollar Coin remained stable, with minor deviations around $1, indicating its role as a stable value store.

6. Conclusion

Overall, this study results underscore the varying degrees of volatility and stability within the cryptocurrency market, highlighting the potential for high returns alongside significant risks. Stablecoins like Tether and US Dollar Coin provide consistency, whereas Bitcoin, Ethereum, and Binance Coin offer high growth potential but with greater price instability.

In conclusion, the value of cryptocurrencies is influenced by a complex interplay of market dynamics, adoption and utility, regulatory environments, market sentiment, the role of stablecoins, technological progress, and broader economic factors. Understanding these elements is crucial for predicting future trends and making informed investment decisions in the volatile cryptocurrency market.

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